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Abstracts and full-text reports uploaded to the conference system undergo a review procedure. Abstracts will be evaluated on the basis of abstracts/proposals. The conference system allows the full text to be sent if the abstract is accepted. Participants must wait for the evaluation results after uploading their article abstracts to the conference system. If their abstracts are accepted, they can upload their full texts to the conference system. The full texts are then sent to at least two reviewers for review. The conference has a double-blind peer-review process. Any paper submitted for the conference is reviewed by at least two international reviewers with expertise in the relevant subject area. Based on the reviewers' comments, papers are accepted, rejected or accepted with revision. If the comments are not addressed well in the improved paper, then the paper is sent back to the authors to make further revisions. The accepted papers are formatted by the conference for publication in the proceedings.

Aims & Scope

Traditionally, it is seen that change and transformation in the field of social sciences takes a little more time compared to fields such as health, technology and engineering. However, this situation seems to have started to change with the Covid-19 epidemic disease. It is expected that changes will occur in human and social behavior during and after the Covid 19 epidemic disease. These changes have started to show themselves in many fields related to social sciences, especially education, psychology, sociology and economy. For this reason, this conference focused on the changes and innovations in the field of social sciences that started with Covid 19. However, the organizing committee also recognizes the value of traditional knowledge in the social sciences. For this reason, the conference is also open to traditional studies in the field of social sciences.

The aim of the conference is to bring together researchers and administrators from different countries, and to discuss theoretical and practical issues in all fields of social sciences. At the same time, it is aimed to enable the conference participants to share the changes and developments in the field of social sciences with their colleagues.

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Stress Detection through Compound Facial Expressions Using Neural Networks

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Abstract: Human face is the most dynamic part of the body that conveys information about the instant emotions. Facial expression analysis starts from early 1900s where later on scientists identify the six basic facial expressions as Anger, Disgust, Fear, Happiness, Sadness, Surprise and Neutral with the pioneering studies of psychologists. In the last decades, the acceleration in artificial intelligence and computer vision research makes it possible to automatically detect facial expressions through images. Furthermore, micro expressions, muscle movements and compound facial expressions; that are the combinations of the basic expressions can be also analyzed with computer vision algorithms. The main motivation in automatic facial expression analysis is to support human-computer. Furthermore, facial expression analysis can be a driver for automatic emotion analysis. In this study, we propose a novel method to detect stress indicators on the frontal face images. The detection procedure is based on compound facial expression analysis. 49 couples of 6 basic facial expressions where one is dominating, and the other is the complementary expression are employed. iCV-MEFED facial expression dataset is used in the experiments where video and image samples are provided for every compound facial expression class. The training and testing of compound facial expressions are done using a deep neural network. The robust representations of faces are achieved using a fusion method that combines deep texture features and the action units on the face. Then, through the appropriate grouping of the compound expressions, the system can detect the signs of stress. The proposed approach obtains encouraging results, and it is open to further improvements.

Keywords: Facial expression analysis, Stress detection, Emotion analysis, Compound expressions, Machine learning.

Introduction

Face and facial expressions involve significant information about the instant emotional states of humans. Starting from early 1900s, even before, the psychologists have observed human and animal facial expressions and attempted to categorize them. There are categorizations that are accepted by the community and the research studies are following. Together with the advancements in artificial intelligence and computer vision fields, implementing a robust facial expression analyzer on real time became possible. Automatic facial expression analysis also supports human computer interaction and is utmost important in this sense. Furthermore, besides the automatic computer vision systems classifying the facial expressions, there are approaches that classifies facial expressions based on the dimensions of valence (positive-negative) and arousal (activation level), representing emotional intensity and affective states. In summary, we can summarize the facial expression analysis directions as follows (Sajjad et al., 2023):

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- **Basic Emotions Classification**
Basic emotional categories such as happiness, sadness, anger, fear, surprise, disgust, and neutral expressions
- **Compound Emotions Classification**
Classifies facial expressions into compound or complex emotional states that combine basic emotions, such as happy-sad, angry-surprised, or fear-disgust
- **Action Unit (AU) Classification**
Typically uses machine learning algorithms to detect and classify AUs from facial landmarks or image patches, facilitating detailed analysis of facial expressions.
- **Valence-Arousal Classification**
Classifies facial expressions based on the dimensions of valence (positive-negative) and arousal (activation level), representing emotional intensity and affective states.
- **Micro-Expression Classification**
Micro-Expression Classification focuses on detecting and classifying subtle and rapid facial expressions known as micro-expressions which occur within fractions of a second and often reveal concealed emotions. Utilizes high-speed imaging, motion analysis techniques, and specialized classifiers to capture and classify micro-expressions accurately.

The above-mentioned categorizations can be utilized to build applications on top such as diagnosis of disorders, security or learning. Currently there are active research studies to bring a robust solution to compound and micro expression analysis.

Literature Summary

Recognizing facial expressions by computers presents a formidable challenge due to various factors, including the diverse physiognomy of individual faces, head poses, and lighting conditions (Nonis, Dagnes, Marcolin, & Vezzetti, 2019). This task becomes even more intricate when dealing with compound emotions or facial expressions, which adds complexity to an already demanding analysis. A significant hurdle in human emotion recognition lies in the scarcity of robust and well-labeled datasets pertaining to human emotions (Martinez, & Valstar, 2016). While most analyses focus on the seven primary human emotions - sadness, disgust, anger, happiness, surprise, fear, and contempt (Ekman, 1992) - recent research efforts have been directed towards advancing the analysis of compound facial expressions and emotions (Yu et al., 2018; Hu et al., 2017; Guo et al., 2017; Du & Martinez, 2022), driven by advancements in tools for compound human emotion analysis (Loob et al., 2017).

Psychological studies have revealed that different regions of the face convey distinct emotional cues through facial expressions (Levi & Hassner, 2015; Zhao et al., 2016; Grobova et al., 2017). Further investigations suggest that certain facial regions carry more emotional information than others (Lusi et al., 2017). For instance, the eyes and eyebrows are primary conveyors of emotions like fear and anger, whereas expressions of happiness and disgust are predominantly exhibited through the mouth region. The expression of surprise may involve both the mouth and the eyes/eyebrows regions (Kulkarni et al., 2018)

Although much research has focused on the six basic human emotions as defined by Ekman and Friesen - fear, anger, disgust, sadness, surprise, and happiness (Ekman & Friesen, 1971) - psychological studies indicate that emotions extend beyond these basic categories, influenced by factors such as mental states, interpersonal relationships, and cultural backgrounds (Keltner et al., 2019; Haamer et al., 2017). Noroozi et al. (Noroozi et al., 2017) extensively discuss compound human emotions, which combine two basic emotions with one acting as dominant and the other complementary. The complexity of compound human emotions poses significant challenges in recognition and classification, as the fusion of two basic emotions amplifies the intricacy of emotional states.

Automatic stress detection from facial images is a burgeoning area of research aiming to develop computational methods for accurately identifying stress levels based on facial expressions. The detection of stress from facial images holds promise for various applications, including healthcare, human-computer interaction, and psychological research.

Several studies have investigated different approaches and techniques for automatic stress detection from facial images. One common approach involves feature extraction from facial images using techniques such as facial landmark detection, facial action unit analysis, and texture analysis. These features capture subtle changes in

facial expressions associated with stress, such as furrowed brows, tense lips, or widened eyes. Machine learning algorithms, including support vector machines (SVM), convolutional neural networks (CNN), and deep learning architectures, are commonly employed for stress classification. These algorithms are trained on labeled datasets of facial images annotated with stress levels to learn patterns and relationships between facial features and stress states.

For example, some studies revealed promising results concerning methods using machine learning and deep learning for facial parameters such as facial expression (Dinges et al., 2005), semi- or/and non-voluntary facial features (Giannakakis et al., 2017), action units (Giannakakis et al., 2020) as well as integrating basic emotion classes (Zhang et al., 2019). However, no studies have been conducted to examine the integration of compound emotions in the detection of stress.

Several challenges exist in automatic stress detection from facial images, including variability in facial expressions across individuals, the subjective nature of stress, and the need for large and diverse datasets for training robust models. Additionally, addressing ethical considerations, such as privacy concerns and potential biases in algorithmic predictions, is essential in the development and deployment of stress detection systems. In this respect, the current study is unique; it is the first endeavor to scrutinize stress detection through compound facial expressions using neural networks.

The paper proposes a valence-arousal classification-based approach in order to detect the signs of stress automatically from the frontal face images. The main contribution of the paper is to explore the mapping between the compound facial expressions and the presence of stress signs accordingly. There are many datasets including compound facial expressions. In our study, we employ iCV-MEFED dataset that is the richest compound expression dataset including the 50 compound expression classes where dominant and complementary combinations of the six basic expressions are used (Guo et al., 2018).

Stress Detection through Compound Facial Expressions

The proposed system consists of two main blocks. The first part is the compound expression analyzer proposed by Jiddah and Yurtkan (2023), and the second part is the proposed stress detection mapping under the supervision of our expert psychologist. Convolutional neural networks (CNNs) and Long-Short Term Memory (LSTM) networks are employed.

iCV-MEFED Dataset

The iCV-MEFED dataset, developed and compiled by Guo et al. (2018), represents a unique collection of human compound emotions. It addresses the limitations of existing publicly available datasets by offering a comprehensive range of 50 fine-grained emotional classes. This dataset is pioneering in its scope, containing 31,250 facial images sourced from 125 subjects, ensuring a balanced representation of genders and diverse ethnic backgrounds, with subjects aged between 18 and 37 years. Notably, all images in the iCV-MEFED dataset are captured under controlled conditions to minimize data noise, including factors like background interference, varying illumination, and head pose discrepancies. Such efforts are crucial to mitigate biases that may affect the analysis and classification outcomes of the images (Clark et al., 2020). Each subject in the dataset is guided by a trained psychologist to enact five samples of each of the 50 emotions, ensuring accurate expression of the complex emotional spectrum. The exhaustive list of 50 emotional classes captured in the dataset is detailed in Table 1. Figure 1 shows example faces from the dataset.

Compound Facial Expression Recognizer

In the hybrid recurrent neural network (RNN) method, the classification model's input data comprises AU (Action Unit) feature data extracted from the dataset. Following AU feature extraction, each image in the dataset is depicted by a 35-feature vector, comprising 18 AU presence features and 17 AU intensity features. All images in the dataset undergo AU feature extraction and are subsequently labeled based on their emotion class, facilitating classification. Therefore, the input data dimension for this approach is a 35×1 feature vector.



Figure 1. Examples from icv-mefed dataset.

CNN-LSTM represents a type of deep learning architecture that amalgamates two distinct deep learning networks, thereby creating a hybrid network that harnesses the computational benefits of both networks (Wang et al., 2020). In this framework, CNN-LSTM utilizes the initial layers of the CNN network to perform feature extraction from the input data, which, in our experimental setup, comprises the AU data feature vector. Subsequently, the extracted features are forwarded to the LSTM network for classification and prediction. LSTM networks offer a notable advantage over generic recurrent neural networks due to their utilization of memory blocks, facilitating expedited learning processes (Amin et al., 2019). CNN-LSTM networks have demonstrated efficacy in executing deep learning tasks efficiently, and our proposed methodology aims to capitalize on the availability of a series of five emotion images in each class for every subject in the iCV-MEFED dataset.

Table 1. Compound facial expression classes of icv-mefed Dataset (Guo, et al., 2018).

	Angry	Contempt	Disgust	Fear	Happy	Sadness	Surprise
Angry	Angry	Contempt angry	Disgust angry	Fear angry	Happy angry	Sadness angry	surprise angry
Contempt	Angry contempt	Contempt	Disgust contempt	Fear contempt	Happy contempt	Sadness contempt	Surprise contempt
Disgust	Angry disgust	Contempt disgust	Disgust	Fear disgust	Happy disgust	Sadness disgust	Surprise disgust
Fear	Angry fear	Contempt fear	Disgust fear	Fear	Happy fear	Sadness fear	Surprise fear
Happy	Angry fear	Contempt happy	Disgust happy	Fear happy	Happy	Sadness happy	Surprise happy
Sadness	Angry sadness	Contempt sadness	Disgust sadness	Fear sadness	Happy sadness	Sadness	Surprise sadness
Surprise	Angry surprise	Contempt surprise	Disgust surprise	Fear surprise	Happy surprise	Sadness surprise	Surprise

The implemented CNN-LSTM model in this study is structured with a total of 12 layers, each layer configured as follows: an input layer, three max-pooling layers, five convolutional hidden layers, one LSTM layer, one dense layer, one dropout layer, and an output layer. The max-pooling layers serve to condense the feature dimensions through feature summarization, aiding in convolutional layer padding. The LSTM layer is integrated into the architecture post-feature summarization by the last pooling layer, resulting in a feature map comprising the most pertinent features for classification. All input data are vectorized into a 35×1 (35, 1) input dimension for our model. The convolutional layers engage in feature extraction utilizing the ReLU activation function, while the batch size is set at 64. Additionally, the model employs the Adam optimizer with a learning rate of 0.001 and a categorical loss function.

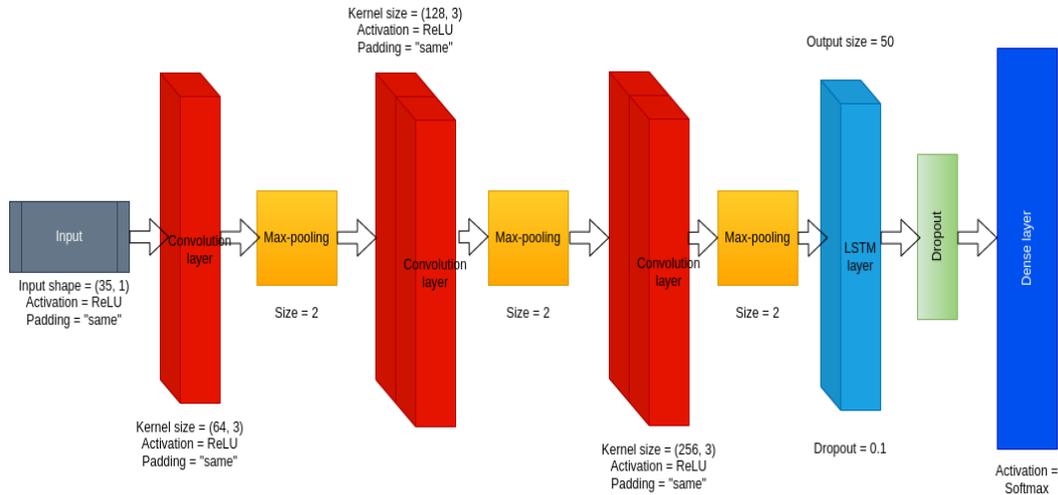


Figure 2. CNN-LSTM hybrid neural network model used.

Stress Detection through Facial Expressions

The signs of stress can be analyzed through facial information. In our study, we concentrate on the standardized basic facial expressions and their compound versions in order to explore the stress indicators. Together with our expert psychologist’s supervision, we have found that the marked compound facial expression classes in Table 2 are carrying information about the stress. Thus, the neural networks are re-trained according to the Table 2, where marked stress related compound expressions are treated as positive class, and the unmarked classes are treated as negative class. In total, 20 classes are selected as stress indicators.

Table 1. Stress indicator compound facial expression classes excluding contempt compound expressions of icv-mefed dataset where boxed classes are positive classes.

	Angry	Contempt	Disgust	Fear	Happy	Sadness	Surprise
Angry	Angry	Contempt angry	Disgust angry	Fear angry	Happy angry	Sadness angry	surprise angry
Contempt	Angry contempt	Contempt	Disgust contempt	Fear contempt	Happy contempt	Sadness contempt	Surprise contempt
Disgust	Angry disgust	Contempt disgust	Disgust	Fear disgust	Happy disgust	Sadness disgust	Surprise disgust
Fear	Angry fear	Contempt fear	Disgust fear	Fear	Happy fear	Sadness fear	Surprise fear
Happy	Angry fear	Contempt happy	Disgust happy	Fear happy	Happy	Sadness happy	Surprise happy
Sadness	Angry sadness	Contempt sadness	Disgust sadness	Fear sadness	Happy sadness	Sadness	Surprise sadness
Surprise	Angry surprise	Contempt surprise	Disgust surprise	Fear surprise	Happy surprise	Sadness surprise	Surprise

Since the review of the literature revealed no studies exploring the relationship between compound emotions and stress, the compound emotions of emotional stress are grouped according to the basic emotions that the expression of stress has been linked to. Stress has been linked with negative affect and reflected in the emotions of sadness, fear, anger, and disgust (Das & Yamada, 2013; Lerner et al., & Taylor, 2007; Lazarus, 2006; Zautra,

2006). Thus, among the seven basic emotions, emotional stress is grouped according to disgust, sadness, anger, and fear and their compounds as shown in Table 1. In the face of stressful events, positive feelings (i.e., happiness) and negative emotions (i.e., sadness) have been found to have an inverse relationship (Zautra et al., 2010). In this regard, compound emotions involving positive and negative emotions have not been considered for examination.

Table 2. Stress indicator compound facial expression classes including contempt compound expressions of icv-mefed dataset where boxed classes are positive classes.

	Angry	Contempt	Disgust	Fear	Happy	Sadness	Surprise
Angry	Angry	Contempt angry	Disgust angry	Fear angry	Happy angry	Sadness angry	surprise angry
Contempt	Angry contempt	Contempt	Disgust contempt	Fear contempt	Happy contempt	Sadness contempt	Surprise contempt
Disgust	Angry disgust	Contempt disgust	Disgust	Fear disgust	Happy disgust	Sadness disgust	Surprise disgust
Fear	Angry fear	Contempt fear	Disgust fear	Fear	Happy fear	Sadness fear	Surprise fear
Happy	Angry fear	Contempt happy	Disgust happy	Fear happy	Happy	Sadness happy	Surprise happy
Sadness	Angry sadness	Contempt sadness	Disgust sadness	Fear sadness	Happy sadness	Sadness	Surprise sadness
Surprise	Angry surprise	Contempt surprise	Disgust surprise	Fear surprise	Happy surprise	Sadness surprise	Surprise

Analysis of Contempt Expression

Despite contempt being a form of negative emotion, it has been the least studied emotion among the basic seven emotions. This, examination of its relationship with stress, has also been found as an underexamined area in literature. This could be originated from the fact that contempt is regarded as a more human-targeted social emotion helping in the regulation of hierarchies (Fischer et al., 2022). The research on contempt and relationships has revealed associations between contempt and a lack of control over the other person (Fischer & Roseman, 2007), breakup-related distress (Heshmati et al., 2017), low competence and self-esteem (Schriber et al., 2017) as well as contempt and lower levels of self-reported stress (Crowley, 2013). The associations between contempt and relationships point out a potential relationship between coping and stressful situations. Therefore, an alternate table including the previously classified compound emotions along with; contempt and compound emotions of contempt with disgust, fear, sadness and anger has been created, as shown in Table 2. The average accuracy found in detecting stress was 72.92%, compared to 71.28% in Table 1, which excluded contempt and its compounds with the stress emotions. The slight increase could mean that contempt has a role in the process and regulation of stress.

Results and Discussion

The experiments are completed on iCV-MEFED dataset with 80:20 ratio of testing and validation. 5-fold cross validation method is applied to validate the results. A class that is mapped as a stress indicator is treated as positive class, and others are treated as negative class. The performance metrics of accuracy, precision, sensitivity, specificity and F1-score are used to evaluate the system. The usual classification metrics used are true negative (TN); which is the number of correctly identified negative classes in predictions, true positive (TP); which is the number of correctly identified positive classes in predictions, false negative (FN) this is the number of incorrectly identified negatives in predictions, false positive (FP); this is the number of incorrectly identified positives in the predictions. Formulas related to the performance metrics are listed from equation 1 through equation 5.

$$\text{Accuracy} = (TP+TN)/(TP+TN+FP+FN) \quad (1)$$

$$\text{Precision} = TP/(TP+FP) \quad (2)$$

$$\text{Sensitivity} = TP / (TP+FN) \quad (3)$$

$$\text{Specificity} = TN / (TN+FP) \quad (4)$$

$$\text{F1 score} = 2 * ((\text{Precision} * \text{Recall}) / (\text{Precision} + \text{Recall})) \quad (5)$$

Table 3. Performance evaluations of the proposed system based on the positive classes listed in table 1.

Fold	Accuracy	Precision	Sensitivity	Specificity	F1 score
Fold 1	71.33	61.07	30.70	90.68	40.86
Fold 2	70.92	60.77	31.52	90.10	41.51
Fold 3	72.99	75.86	89.86	34.10	82.27
Fold 4	70.68	58.89	30.77	89.74	40.42
Fold 5	70.48	72.67	90.16	29.65	80.48
Average	71.28	66.0	55.0	67.0	57.0

It can be observed from the Table 3 that the system can recognize the signs of stress automatically with the average accuracy of 72.92 % that is an acceptable rate. Furthermore, the system is more sensitive to signs of stress. Considering the challenges in the problem, the overall performance of the system is acceptable and is open to further improvements. On the other hand, the selection of contempt expression is still a challenge that we found, and then experiments are also accomplished with the compound contempt expressions excluded. In terms of average accuracy, the two approaches are approximately performing in the similar levels. However, from the view of sensitivity, the contempt expression and its compounds bring significant improvements.

The compound facial expression analysis is still a challenging problem of computer vision when considering more compound classes like 50 in total, that are used in our study. The average accuracies are even below 50% in most of the proposed models. Although the robust recognition of compound expressions brings different challenges to resolve, they can form a good basis for psychological analysis through faces, from the aspects of depression, stress and anxiety. The results shown that dominant and complementary expression classes can be a good basis for analyzing the signs of stress.

Table 4. Performance evaluations of the proposed system based on the positive classes listed in table 2.

Fold	Accuracy	Precision	Sensitivity	Specificity	F1 score
Fold 1	73.37	73.63	73.60	73.14	73.61
Fold 2	72.88	73.74	71.64	74.13	72.68
Fold 3	73.01	71.01	74.96	71.17	72.96
Fold 4	73.12	71.62	74.71	71.59	73.13
Fold 5	72.20	70.91	74.25	70.20	72.54
Average	72.92	72.0	74.0	72.0	73.0

Conclusion

The paper proposes a stress detection system based on compound facial expressions. The challenging problem of detecting the signs of stress through frontal faces is attacked. The proposed system is taking iCV-MEFED dataset as a basis that includes the highest number of compound expression classes in the research studies where there are 50 classes composed of the dominant and complementary combinations of the six basic expressions. An extensive mapping of compound expression classes to stress indication is performed. The computer vision part of the system is employing a hybrid CNN and LSTM neural networks. The system is evaluated on the dataset by applying 5-fold cross validation. The performances of the system reached to 72.92 % accuracy and shown that the proposed methodology achieves encouraging results giving directions to further improvements.

Analysis of Contempt Expression

The system's overall accuracy is beyond 70% and this level of performance is acceptable. Furthermore, the system is open to performance improvements. A possible future work is to employ texture feature extraction techniques like Local Binary Patterns (LBPs) to enhance the facial representations to improve the system's performance. Another similar direction may be the improvements in the deep learning model used. One of the possible future works to adapt is to investigate the compound expression basis for the signs of depression and anxiety. Similar input level and neural network level enhancements are also to be considered for these future directions. Overall, the proposed system forms a basis and opens new directions for further facial analysis based on dominant and complementary facial expressions.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Black Market Exchange Rate, Currency Substitution and Demand for Money

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Abstract: Strict control on foreign exchange and successive devaluation of domestic currency adopted by Algerian government for nearly four decades resulted in black market for foreign currencies, high inflation rates and consequently, lost of confidence in Algerian dinar as a unit of account and store of value. The aforementioned results have given rise to the phenomenon of currency substitution. The aim of this paper is to provide evidence of the existence of currency substitution in Algeria. Using time series data covering the period 1990-2021 and an autoregressive distributive lag (ARDL) model combined with CUSUM and CUSUMQ, the demand for money in Algeria is estimated. Our results point out to the existence of currency substitution when the black market exchange rate is incorporated in the money demand equation. Our findings contribute to the existing literature on currency substitution issue. As far as policy makers are concerned, the existence of CS could hinder the effectiveness of stabilization policies and thus, means of reducing currency substitution should be devoted.

Keywords: Black market exchange rate, Currency substitution, Demand for money

Introduction

Currency substitution refers to a situation in which domestic currency is totally or partially substituted for foreign one in performing its traditional functions. Individuals may hold foreign currency as a unit of account, medium of exchange and a store of value, a situation referred to as total substitution (Clements & Schwarts, 1992). However, some authors limit the concept of (CS) to the use of foreign currency by domestic residents as a store of value (Calvo & Végh, 1992).

The replacement process, whether partial or complete, expresses a state of loss of confidence in domestic currency at least as a store of value, especially in cases of high-inflation, where individuals' purchasing power is eroded which makes foreign currency more desirable than domestic money. Currency substitution, has been a worldwide phenomenon and has gained much attention in the literature on both developed and developing countries. Factors that influence currency substitution depend largely on capital mobility/or capital restrictions, which are quite different between the two mentioned categories of countries. Generally, a perfect capital mobility, the dominant feature for most developed countries allows residents to hold a portfolio of currencies to minimize the cost of international transactions or to earn a profit if the foreign currency appreciates or the domestic currency depreciates. Currency substitution in most developing countries, arises as a direct consequence of government strict control on foreign exchange, creating therefore, a favorable environment for the development of black market for foreign exchange, the only available outlet for obtaining foreign currency.

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Currency substitution phenomenon in some developing countries is fueled by soaring inflation, low nominal interest rates on domestic financial assets, and periodic devaluation of the domestic currency, a climate where foreign currency becomes more desirable as a store of value (Aarle & Buina, 1995).

As regards the effects side of currency substitution, many studies agree on its negative effects on the economy. Boamah, et al. (2012) noted that an increased currency substitution may have some negative spill-off effects such as weakening the autonomy of monetary policy; increasing vulnerability to economic shocks arising from the host country; the potential for deterioration of the balance of payments account or exchange rate volatility; Furthermore, currency substitution has the potential to negatively impact overall economic growth, especially for small open economies (Bahmani Oskooee & Techaratanachai, 2001).

The starting point in handling the Algerian currency substitution case is to analyse it within the framework of the shortages of foreign exchange created by the various forms of controls, mainly exchange rates and trade restrictions, imposed on the foreign sector of the economy. One of the significant consequences of these controls is the development of a black market for foreign exchange. An increasing need for foreign exchange has been created by implementing the structural adjustment program imposed by the international monetary fund. Foreign trade liberalization and managed float of the Algerian dinar, were therefore, fundamental factors to expand the activity of the black market for foreign currencies in Algeria. Several currency devaluations were judged as necessary for price liberalization and dinar value correction which was overvalued. The aforementioned procedures have caused high, unprecedented inflation rates, leading to purchasing power erosion and later on to loss of confidence in Algerian dinar. Statistics about black market exchange rate in Algeria bring out an active black market for currencies. According to the latest numbers, the black market premium for the euro currency amounts today to more than 70%. To hedge against inflation and more depreciation of the dinar, many Algerians tend to alter their wealth portfolios by substituting foreign money for domestic money. This adjustment takes place mostly in the black market. Thus, the phenomenon of currency substitution, as a store of value in particular, is likely to be more pervasive in Algeria. The purpose of this research is to test for the existence of currency substitution in Algeria through estimating its impact on the demand for money. Although currency substitution is an important issue, it remains an unexplored field in Algeria. Therefore, further works on its impact on the Algerian economy; its implications for macroeconomic modeling, exchange rates, and interest rate policies are of extreme importance. After this introduction, the remainder of the paper is organized as follows: section 2 reviews the literature on currency substitution. Section 3 describes the data, methodology and presents the empirical results and section 4 concludes with some policy recommendations.

Literature Review

Considerable amount of attention has been given to the currency substitution issue in both developed and developing countries. This section reviews the pertinent literature that deals with currency substitution in developing countries. Studies that deal with currency substitution fall into two categories. One category aims at investigating the presence and extent of currency substitution while the other is more interested in assessing its impact on a country's economy. Although there are varying approaches to modeling currency substitution, most studies have used a simple money demand function.

The idea of including the exchange rate in the demand for money function as another important determinant, though not tested empirically, was first introduced by Robert Mundell (1963). Subsequently, many studies attempted to examine such link empirically, (Arrango & Nadiri, 1981; Domowitz and Elbadawi, 1987; Arize, 1989. Bahmani-Oskooee & Pourheydrian, 1990; McNown & Wallace, 1992; Hassan, 1992; Arize & Shwiff, 1993; Chowdhury, 1997; Pozo & Wheeler, 2000).

Mundell's idea was picked up by Arango and Nadiri (1981) who pointed out that traditional studies shortcomings on the demand for money lie in their reliance on local variables only such as permanent income, domestic interest rate and price expectations, things that may lead to misspecification of the demand for money. The authors concluded that a well specified money demand equation should take into account foreign money developments, such as exchange rate expectations and foreign interest rate. A majority of the studies in the literature have used the model of Arango and Nadiri (1981) or some variant, as the basis for estimating currency substitution.

According to Bahmani-Oskooee (1996), the general consensus in the literature on the demand for money, is that in developed countries, nominal exchange rate represents a suitable cost of holding money whereas in developing countries, due to lack of well-developed financial markets, the cost of holding money is often

proxied by the expected rate of inflation. Therefore, the choices available for asset holders in developing countries are limited to mostly money and goods. Also, investors in these Countries, are constrained to invest in bank deposits and bank bonds, the interest on which are not market determined, they are however, fixed by the countries' monetary authorities for extended time period (Wong,1977; Hassan, 1992). Using a bound testing approach to cointegration, Bahmani-Oskooee and Tanku (2006) estimated the demand for money in 25 LDCs, their results were inconclusive about which rate should enter the money demand equation; the official rate exchange; the black exchange rate or the premium (the gap between official and black). Currency substitution evidence however, was found within four Caribbean countries namely; Guyana, Jamaica and Trinidad and Tobago in Boamah et al. (2012). The authors adopted a variant of traditional money function used by Bahamni-Oskooee and Techaratanachai (2001), Bahamni-Oskooee and Tanku (2006) and Baharumshah et al. (2009). Quarterly data for the period 1996-2006 were used with an ARDL bound testing approach. Haridutt Ramcharran (1990), estimated a money demand equation using data for the period 1973-1987. They pointed out to the existence of currency substitution in Barbados. The phenomenon of currency substitution in LDCs according to the author, is attributed to the black market for foreign currencies, and trade controls imposed by governments:

Data, Methodology and Results

According to the literature on the demand for money, a money demand equation should contain a scale variable to the level of transactions in the economy and a variable representing the opportunity cost of holding money. Furthermore, to account for economic openness, another variable reflecting the relative returns of foreign money vis-à-vis domestic money should be included in the demand for money equation. Since Algeria is a developing country which lacks well developed financial market, the inflation rate is used as a proxy for the opportunity cost of holding money. Following Bahmani-Oskooee (1996) and Bahmani-Oskooee and Rehman (2005) we adopt the following specification:

$$\ln M_t = a + \ln Y_t + c \ln P_t + d \ln EX_t + \varepsilon_t \quad (1)$$

Where;

M_t is the desired holdings of real money balances (M_1 or M_2); M_1 consists of currency in circulation and demand deposits in scheduled banks. M_2 consists of M_1 plus quasi money. Y_t is the real GDP; P_t is the consumer price index; EX_t is the exchange rate defined as the number of Algerian dinars per U.S dollar; ε_t is the stochastic disturbance term.

According to macroeconomic theory, the money demand is assumed to be an increasing function of real income (i.e., real GDP), thus, an estimate of b is expected to be positive. Theoretically, estimate of the inflation rate c is expected to be negative. However, what should be emphasized in this regard is that high inflation rates erode the value of domestic currency and would tend to decrease the demand for domestic currency and thus a negative sign of c . Nevertheless, higher inflation rates may also mean higher demand for domestic currency in order to meet required transaction needs yielding a positive sign of c . The impact of inflation on the demand for money is therefore, dependent on the net effect of the two influences. As regards the estimate of d , it could be positive or negative depending on the prevailing effects; the wealth effect or the substitution effect. According to Arango and Nadiri (1981), a depreciation of domestic currency or an increase of foreign currency leads to an increase in value of foreign assets held by domestic residents. If this increase is perceived as an increase in wealth (a wealth effect), then, the demand for money increases yielding a positive estimate of d . Domestic currency depreciation on the other hand, could also result in a decrease of money demand (substitution effect). The so mentioned effect was pointed out in Bahmani-Oskooee and Pourheydarian (1990). They argued that when a currency depreciates, individuals could expect further depreciation and may hold less of domestic currency. In this case, the estimate of d is expected to be negative.

Table 1. Model identification

Model	Identification
Model 1	$\ln M_1, \ln GDP, \ln CPI, \ln OEX$
Model 2	$\ln M_1, \ln GDP, \ln CPI, \ln BOX$
Model 3	$\ln M_1, \ln GDP, \ln CPI, \ln PR$
Model 4	$\ln M_2, \ln GDP, \ln CPI, \ln OEX$
Model 5	$\ln M_2, \ln GDP, \ln CPI, \ln BOX$
Model 6	$\ln M_2, \ln GDP, \ln CPI, \ln PR$

The Two monetary aggregates M_1 and M_2 in equation (1) above are subject to empirical tests, each in three alternatives namely; official exchange rate, black market exchange rate and exchange rate premium. Table 1 below provides an identification of the various alternatives that will be subject to estimation:

The Data

Quarterly data over the period 1990Q1 – 2021Q4 are collected from the international Financial Statistics (IFS) by the IMF. Data on black market exchange rate are collected from other source¹.

The ARDL Estimation Technique

The six models identified in table1 above, will be estimated using a cointegration ARDL bounds testing approach developed by Pesaran (1997) and Pesaran and Shin (1999) and Pesaran et al. (2001). This method has several advantages over conventional methods such as cointegration of Engle and Granger (1997), Johansen (1988) and Johansen and Juselius (1990). First, the ARDL procedure does not require that the series should be integrated of the same order² (it can be used for stationary variables and / or integrated of order 1 and / or fractional integration). We note in this context that this procedure cannot be applied to variables with order of integration superior or equal two. Secondly, this procedure has good small sample properties as compared to alternative approaches. In this context, we note that Narayan (2005) has provided critical values for sample sizes ranging from 30 to 80 observations. Third, this procedure allows variables to have different numbers of delay, and provide unbiased long- run estimates with a valid t-statistic even in the case of endogeneity of regressors (Harris & Sollis, 2003). Fourth, unlike conventional methods of cointegration that use a system of equations for estimating long-term relationships, this procedure uses a single equation in the reduced form.

The aim of this study is two folds as it first estimates the long-run income, inflation, and exchange rates (official, black, premium) elasticities of M_1 and M_2 monetary aggregates and examines their stability and second to test for the existence of currency substitution. However, this will not be sufficient. Laidler (1993) as well as many other authors, point out the importance of the short-run adjustment process. According to them, the short-run modeling of money demand could be a potential source of instability. Thus, incorporating the short –run dynamics into equation (1) leads to an error correction model of the ARDL form following Pesaran et al. (2001):

$$\Delta \ln M_t = a_0 + \sum_{i=1} a_{1i} \Delta \ln M_{t-i} + \sum_{i=0} a_{2i} \Delta \ln Y_{t-i} + \sum_{i=0} a_{3i} \Delta \ln P_{t-i} + \sum_{i=0} a_{4i} \Delta \ln EX_{t-i} + \delta_1 \ln M_{t-1} + \delta_2 \ln Y_{t-1} + \delta_3 \ln P_{t-1} + \delta_4 \ln EX_{t-1} + \varepsilon_t \quad (2)$$

The operator Δ represents the first difference and ε_t is a white noise representing the error term. The cointegration bounds testing approach is based on the F statistic or Wald statistic. According to Pesaran et al. (2001), the asymptotic distribution of F is non-standard under the null hypothesis of the absence of long-term relationships between variables, and this regardless of their order of integration if it is (I (0) or I (1)). Based on equation (2), the null hypothesis is $H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$, while the alternative hypothesis (existence of cointegration relations) is $H_1: \delta_1 \neq 0, \delta_2 \neq 0, \delta_3 \neq 0, \delta_4 \neq 0$. To perform the test, Pesaran et al. (2001) provide two sets of critical values, upper and lower. The first (upper) when all variables are integrated of order one (I (1)) and second (lower) when all variables are stationary (I (0)). These two sets of critical values provide a band covering all possible classifications of variables, whether purely I (0), purely I (1) or mutually cointegrated. If the F statistic exceeds the upper band, then the null hypothesis is rejected, then there are cointegration relationships between variables. In case the F-statistic lies between the two bands, while the cointegration test is conclusive (in this case it is necessary to know the order of integration of each variable). And in the case when the F statistic is less than the lower band, the null hypothesis cannot be rejected, therefore there is no cointegration relationship.

Results and Discussion

The cointegration ARDL bounds testing approach requires that the series should have an integration order less than two. Therefore, it is essential to ensure that the order of integration of the variables in the work in hand is less than two. The results of the Augmented Dickey-Fuller (ADF) and Philips Perron (PP) tests of stationarity are presented in Table 2:

Table2. Stationarity test results

Series	Augmented Dickey-Fuller (ADF)		Philips Perron (PP)		Decision I(d)
	Level	1 st difference	Level	1 st difference	
LnM1	- 1.6008 [0.4793]	- 6.5204* [0.0000]	- 1.7142 [0.4218]	-11.6796* [0.0000]	I(1)
LnM2	- 3.2359** [0.0201]	- 5.7111 [0.0000]	-2.8617*** [0.0527]	- 9.4208 [0.0000]	I(0)
LnGDP	- 1.7373 [0.4100]	- 1.8515*** [0.0613]	- 0.5180 [0.8829]	- 5.3230* [0.0000]	I(1)
LnCPI	- 5.5392* [0.0000]	-2.0408 [0.0400]	-5.0355* [0.0000]	- 7.2474 [0.0000]	I(0)
LnOEX	-4.8169* [0.0001]	-8.1831 [0.0000]	-5.3409* [0.0000]	-8.2845 [0.0000]	I(0)
LnBEX	-2.2125 [0.2029]	- 8.9756* [0.0000]	-2.2944 [0.1753]	-8.9865* [0.0000]	I(1)
LnPR	-1.3825 [0.8618]	-10.7403* [0.0000]	- 1.6690 [0.7595]	-10.7824* [0.0000]	I(1)

***, **, * are the MacKinnon critical values for the rejection of the null hypothesis of a unit root at the 1%,5% and 10% levels respectively. Values between brackets are probabilities.

According to the results in table2, variables are a mixture of I(0) and I(1). These results represent a suitable rationale for using ARDL approach. the next step in ARDL approach is to test for the existence of a long-run causal relationship between the variables using the bounds test approach developed by Peasaran et al. (2001). Since the test is sensitive to the lag length, this latter is determined according to Akaike Information Criterion (AIC). The results of cointegration test are reported in Table 3:

Table3. ARDL Bounds test for cointegration

Null Hypothesis: No Level Relationship						
	F-Statistic	Significance	I(0)	I(1)	Decision	
Model 1	11.22956	10%	2.37	3.2		
Model 2	15.05788	5%	2.79	3.67		
Model 3	14.90562	2.5%	3.15	4.08		
Model 4	14.64838	1%	3.65	4.66	Cointegration	
Model 5	4.935526					
Model 6	23.68478					

Results of bound tests in table 3 show that the calculated F-statistics are statistically significant (i.e. higher than the upper bound) at 1% level of significance indicating a long run-relationship between variables in the various models. Having the existence of a cointegration relationship between the variables in our models, the next step is to check the long-run coefficients. Table 4 below reports these estimates.

Table 4. Estimated long-run coefficients

Models	Optimum lags	C	Variables				
			LnGDP	LnCPI	LnOEX	LnBEX	LnPR
Model 1	(2,4,4,0)	- 50.84990*	7.885916*	- 0.870238	0.006868	-	-
Model 2	(2,0,4,0)	- 44.66506*	6.085952*	0.949934**	-	- 0.005220*	-
Model 3	(1,0,3,0)	- 44.27246*	6.129775*	0.672352***	-	-	- 0.004793
Model 4	(8,2,1,3)	- 83.74591	9.083529	3.390313	- 0.018757	-	-
Model 5	(1,8,0,3)	- 69.07732*	8.366140***	1.037108	-	0.015482	-
Model 6	(1,4,1,3)	58.31740	- 6.709433	2.344735	-	-	- 0.055674

***, **, * indicate significance at the 1%,5% and 10% levels respectively.

As can be seen, all variables carry their expected signs and significance at 1% level of significance when the black-market exchange rate(BEX) is included in the demand for money equation M1(model 2). Such high significance diminishes with the inclusion of the official exchange rate and disappears totally when the money demand equation M2 is used. As far as currency substitution is concerned, the correct, negative sign and the significance of the black-market exchange rate confirm the substitution effect for the Algerian case. In fact, many algerians, use the algerian black market for foreign currencies to substitute national

currency for foreign one, getting therefore, benefit from the continuous devaluation of the Algerian dinar. The aforementioned results are extremely important as they point out first, more stability in monetary aggregate M1 by including black-market exchange rate and second, evidence for currency substitution stemming from black market for foreign currencies in Algeria. As mentioned previously, the short-run modeling of money demand could be a potential source of instability. Thus, short-run coefficients estimates should be considered. To this end, the long-run coefficient estimates are used to form error-correction term ECM by substituting the lagged level variables in (2) by lagged error-correction term ECM and estimate the model again by imposing the optimum number of lags determined before. A negative and significant coefficient obtained for ECM is a more efficient way of establishing cointegration. As can be seen from Table 5, indeed ECM carries its expected negative and significant coefficient in M1 models, supporting cointegration among all variables. Finally, we perform the CUSUM and CUSUMSQ tests to the residuals. As it is clear the CUSUM and CUSUMSQ tests in figure1 support stability of M1.

Table 5. Estimated short-run coefficients

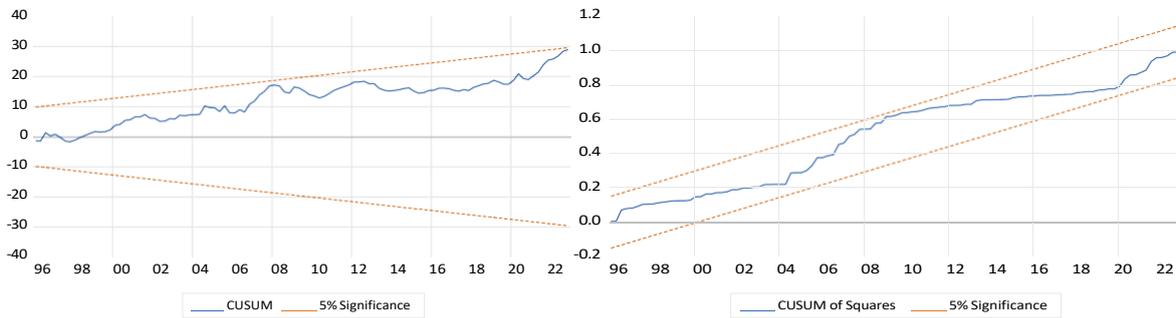
	Models					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
C	- 0.963386	- 1.755169	- 1.841403	0.731735	1.089937	0.503035
LnM1(-1)	- 0.018946	- 0.039296	- 0.041593	-	-	-
ΔLnM1(-1)	- 0.166646	- 0.142275	- 0.134325	-	-	-
LnGDP(-1)	0.149404	0.239155	0.254953	- 0.079368	- 0.132005	-
ΔLnGDP	1.444677	1.132744	1.142319	0.934770	0.423876	- 0.057874
ΔLnGDP(-1)	0.666928	0.456004	0.455912	-	-	-
ΔLnGDP(-2)	- 0.633545	- 0.935181	- 0.931598	-	-	-
ΔLnGDP(-3)	- 1.231050	- 0.853009	- 0.815584	-	-	-
LnCPI	-	0.037329	0.027965	-	-	-
LnCPI(-1)	0.016487	-	-	- 0.029623	- 0.016364	0.020225
ΔLnCPI	- 0.207039	-	-	0.048534	0.001619	0.188079
ΔLnCPI(-1)	0.211803	-	-	0.172591	0.280490	0.225661
ΔLnCPI(-2)	- 0.371639	-	-	- 0.029623	- 0.372283	- 0.199129
ΔLnCPI(-3)	- 0.167970	-	-	-	-	-
ΔLnCPI(-4)	0.288477	-	-	-	-	-
ΔOEX	- 6.87E-05	-	-	0.000220	-	-
OEX(-1)	0.000130	-	-	0.000164	-	-
ΔOEX(-1)	- 0.000537	-	-	- 0.001974	-	-
ΔOEX(-2)	- 0.000796	-	-	- 7.08E-05	-	-
ΔOEX(-3)	- 0.004944	-	-	- 0.002058	-	-
ΔLnOEX	-	-	-	-	-	-
ΔLnOEX(-1)	-	-	-	-	-	-
ΔLnOEX(-2)	-	-	-	-	-	-
ΔLnOEX(-3)	-	-	-	-	-	-
BEX	-	- 0.070205	-	-	- 0.000244	-
PR	-	-	- 0.000199	-	-	-
LnM2(-1)	-	-	-	0.008738	0.015779	- 0.008626
ΔLnM2(-1)	-	-	-	-	0.069482	-
ΔLnM2(-2)	-	-	-	-	0.158129	-
ΔLnM2(-3)	-	-	-	-	- 0.069585	-
ΔLnM2(-4)	-	-	-	-	- 0.158587	-
ΔLnM2(-5)	-	-	-	-	0.107245	-
ΔLnM2(-6)	-	-	-	-	- 0.068496	-
ΔLnM2(-7)	-	-	-	-	- 0.195745	-
PR(-1)	-	-	-	-	-	- 0.000480
Δ PR	-	-	-	-	-	0.000354
Δ PR (-1)	-	-	-	-	-	0.000747
ECM(-1)	- 0.035229*	- 0.041572*	- 0.0034768*	0.023452	0.011415	0.002045

Conclusion and Policy Recommendations

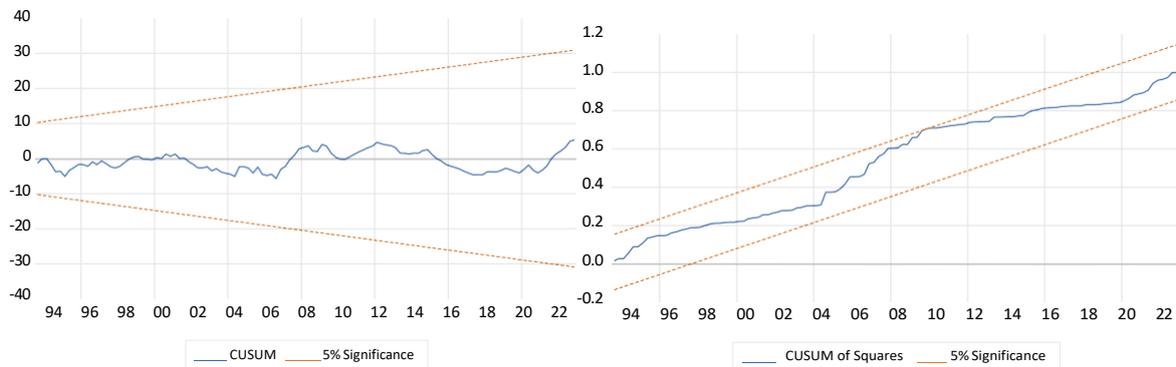
Currency substitution - the partial or total use of foreign money in fulfilling money traditional functions- is a worldwide phenomenon. Due to its effects on the formulation of effective macroeconomic policies, has been

given much attention in the literature for both developed and less developed countries. Unlike developed countries Currency substitution in most developing countries, arises as a direct consequence of government strict control on foreign exchange. Strict control on foreign exchange and successive devaluation of domestic currency adopted by Algerian government for nearly four decades resulted in black market for foreign currencies, high inflation rates and consequently, lost of confidence in Algerian dinar. Naturally, in a country like Algeria, the phenomenon of currency substitution, as a store of value in particular, is likely to be more pervasive as individuals use foreign currencies as a mean to hedge against inflation. In an attempt to test for the existence of currency substitution in Algeria, we estimated the money demand function. Our findings are extremely important and deserve more attention as they point out the existence of currency substitution in Algerian case. As far as policy makers are concerned, and for a successful and effective monetary policy, the monetary authorities would rather concentrate on M1 because not only is it cointegrated with its determinants and it is stable.

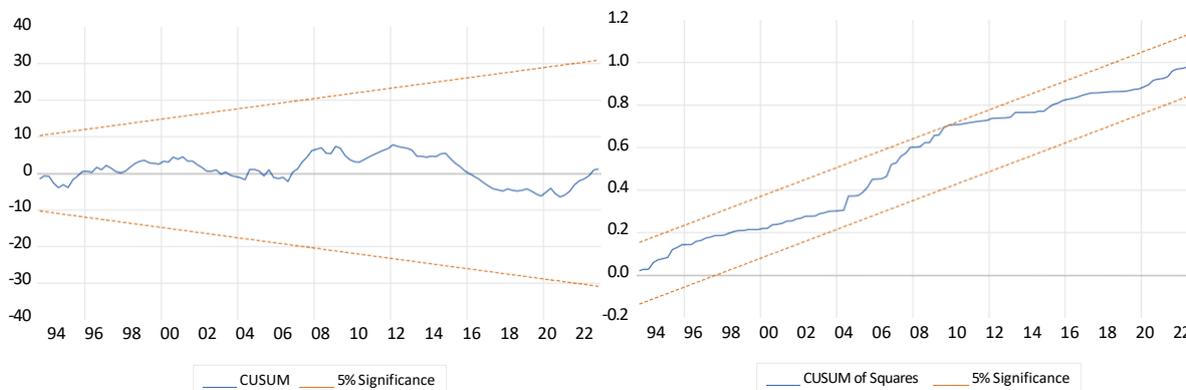
Model 1. LnM1, LnOEX, LnGDP, LnCPI



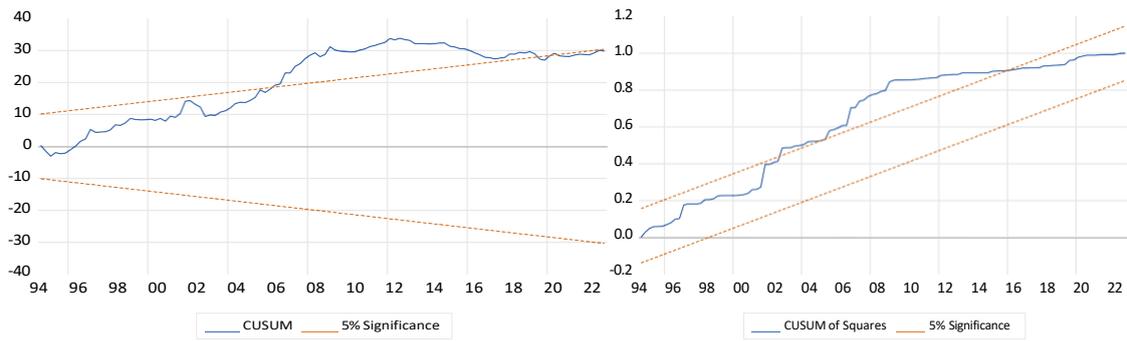
Model 2. LnM1, LnBEX, LnGDP, LnCPI



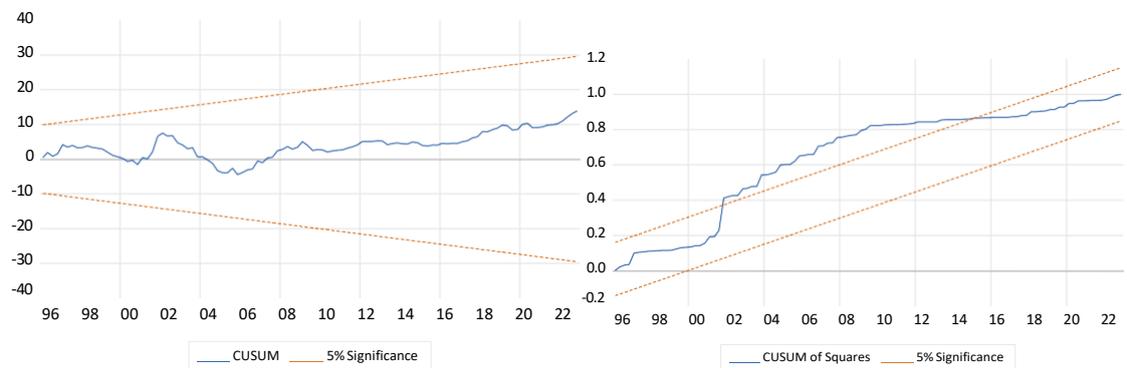
Model 3. LnM1, LnPR, LnGDP, LnCPI



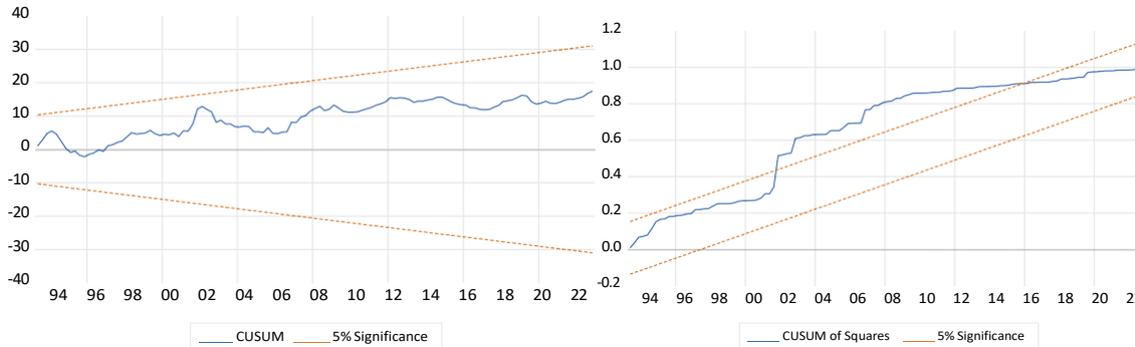
Model 4. LnM2, LnOEX, LnGDP, LnCPI



Model 5. LnM2, LnBEX, LnGDP, LnCPI



Model 6. LnM2, LnPR, LnGDP, LnCPI



Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

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* ¹Data on black market exchange rate for the period 1990Q1- 2003Q4 are collected from http://www.puaf.umd.edu/faculty/reinhart/OFFICIAL_PARALLEL_DATABASE1.xls. Those for the period 2004Q1- 2021Q4 however, are collected from dealers in black market for currencies in Algeria.

* ² This advantage is very important when testing variables with different order of integration.

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Augmented Reality for Supporting Student's Engagement in Mathematics Education: A Systematic Literature Review

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Abstract: Augmented reality (AR) has gained considerable attention in academic research as a primary instructional tool to enhance learning across various educational levels, including mathematics education. AR enables the overlaying of three-dimensional images onto real-world environments within an academic setting. While AR has demonstrated its potential to improve learning outcomes in academic contexts, there is a need for a comprehensive review to identify, assess, and summarize empirical findings related to student engagement, particularly in mathematics education. Consequently, a systematic review was conducted to examine the uses of AR in student engagement in mathematics education. A thorough electronic search was performed on the Scopus database to retrieve pertinent journal articles. After applying inclusion and exclusion criteria, 18 studies were selected for analysis. The results reveal that AR can facilitate student engagement in three key aspects: interactive, collaborative, and immersive experiences. Although AR offers several advantages for promoting student engagement in mathematics education, its practical implementation in educational settings requires careful consideration of AR application and content design and close collaboration between educators and technology. Furthermore, the successful integration of AR technology relies on the well-planned implementation of learning programs that effectively incorporate AR elements for mathematics education.

Keywords: Augmented reality, Mathematics education, Student engagement, Systematic literature review

Introduction

Augmented reality (AR) has gained significant popularity as an interactive technology in diverse educational contexts over the past decade. One of the primary reasons for the widespread adoption of AR is its compatibility with multiple platforms, including desktops, tablets, smartphones, and notebooks. According to a recent study by Marshall (2023), AR can be defined as the dynamic overlay of context-sensitive virtual information onto real-world contexts. Due to its effectiveness as an educational tool, AR has been extensively studied across various disciplines, such as physics, biology, chemistry, and mathematics. AR generally establishes connections between virtual objects and real environments, facilitating the visualization and comprehension of complex concepts.

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Integrating virtual and real-world objects in AR is commonly referred to as "mixed reality," initially introduced in the 1990s as an innovative approach to training and education. Since then, AR has garnered considerable attention and has been the subject of numerous published studies investigating its advantages, limitations, and challenges in educational settings. The interactive and innovative applications facilitated by AR technology have demonstrated significant potential in various subjects, particularly mathematics education.

While previous review studies have primarily focused on enhancing student engagement, a subset of studies has specifically examined the relationship between AR and student engagement. Recognizing this research gap, this paper aims to address the need for further investigation by conducting a systematic review of the AR literature about student engagement over the past decade. The study aims to answer the following research questions (RQs):

RQ1: How has the distribution of AR implementation for student engagement in mathematics education evolved over the years?

RQ2: How does the distribution of AR implementation for student engagement in mathematics education vary across different countries?

RQ3: What research methods have been utilized to investigate student engagement using AR?

RQ4: How does AR technology contribute to facilitating student engagement?

Through this study, we aim to contribute to the existing body of literature by providing comprehensive insights into the use of AR for promoting student engagement, specifically within the domain of mathematics education.

Literature Review

Augmented reality (AR) has gained traction in educational institutions as an immersive technology. Its visual and interactive nature appeals to the current generation of students, Generation Z, providing a comprehensive teaching and learning experience. In education, engagement is crucial and influenced by attention, interest, and motivation. Wiseman et al. (2016) described that engagement refers to students' active involvement and effort in educational activities, encompassing cognitive, behavioral, and emotional aspects. Motivation and engagement are fundamental for attaining educational objectives and goals (Ozhan & Kocadere, 2020). Technology can be utilized as a tool to foster student engagement with learning activities (Puspita et al., 2022; Supriyadi & Kuncoro, 2023). Consequently, engagement in a digital environment becomes significant for researchers, educators, instructional designers, and developers (Wiseman et al., 2016). These researchers also emphasize the importance of fostering engagement to facilitate learning activities and create support mechanisms surrounding them.

According to Chen et al. (2017), AR has the potential to deepen student involvement, increase enjoyment, and foster positive attitudes. It effectively enhances student motivation and engagement (Bacca Acosta et al., 2014). The features embedded in AR technology can effectively engage students in the learning process and improve their visualization skills (Saidin et al., 2015). Positive feedback from participants also indicates their willingness to participate in their studies through AR tools actively. Furthermore, Karagozlu (2018) highlights that engagement with learning materials leads to improved academic achievement.

Method

Research Design

This study examines the role of augmented reality (AR) in enhancing student engagement in mathematics education. The study encompasses four primary objectives: (1) analyzing the distribution of student engagement using AR in mathematics education based on publication year, (2) investigating the distribution of student engagement using AR in mathematics education across different countries, (3) identifying the indicators of student engagement evaluated in AR applications for mathematics education, and (4) determining the evaluation methods utilized for assessing AR applications in mathematics education.

The selection of the systematic literature review (SLR) methodology for this study was motivated by its ability to provide a transparent assessment of the strengths and weaknesses of previous investigations (Xiao & Watson, 2019). SLR studies offer a comprehensive overview by consolidating existing knowledge, revealing the current understanding, and identifying research gaps within a specific field (Okoli & Schabram, 2010). The literature

review conducted in this study follows the guidelines outlined in the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) protocol to ensure the quality and rigor of reporting academic literature (Okoli & Schabram, 2010).

Identification

The search strategy utilized Scopus databases, as outlined in Table 1. It combined keywords, synonyms, and Boolean operators relevant to the research question to encompass all databases.

Table 1. Search query

SCOPUS	("student's engagement") AND ("augmented reality" OR "AR") AND ("mathematics education")
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Screening

Based on Figure 1, the screening process resulted in the selection of 18 articles. The screening phase involved evaluating titles and abstracts to identify relevant papers and filtering the entire text based on predetermined criteria. The initial title and abstract screening were conducted by the researchers, with the second author providing validation.

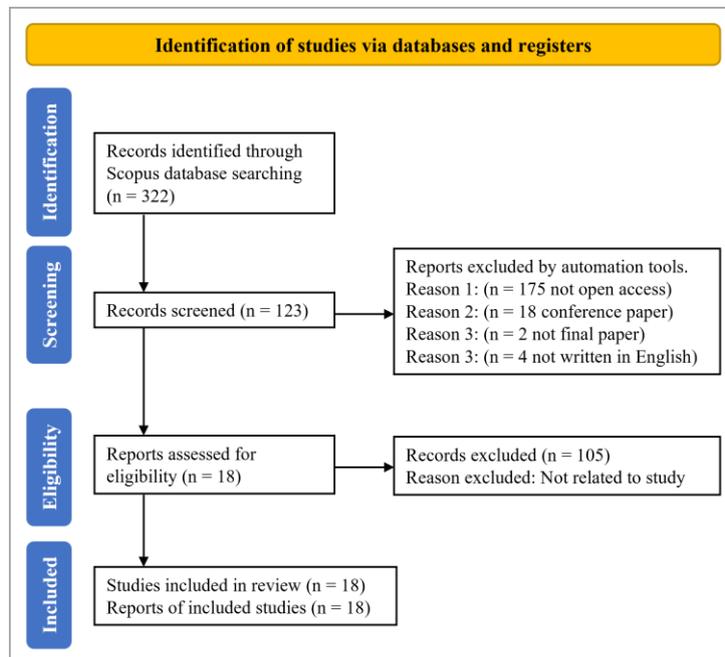


Figure 1. Prisma flow diagram

Table 2. Weight of evidence judging criteria

Level 1-4	Methodology quality	Methodology relevance	Topic relevance
1. Excellent	Excellent research approach and method quality	Excellent use of the research design to answer RQs	Clearly defined research answers Referred to ethics concerning children
2. Good	Good relationship multiple review elements	Sound use of research design	Functional, relates to research questions
3. Satisfactory	It appears logical and relatable	Broadly matched to elements of research questions	Broadly relevant to research questions
4. Inadequate	Research design or analysis not clearly stated	Not suited to research questions	Did not answer research questions

The authors conducted a validation process by randomly selecting ten articles from 18. The inter-rater reliability was found to be very high. Specifically, two papers were thoroughly discussed among the reviewers, while one paper was rejected as two out of three reviewers deemed it unsuitable based on the research inclusion criteria.

To ensure the quality and accuracy of the assessment, the criteria for evaluating the article's quality were based on guidelines established by (Gough, 2007), as shown in Table 2.

Eligibility

The review examines the impact of augmented reality (AR) on student engagement and its characteristics. The systematic process undertaken to generate data is visually represented in Figure 1. Specific inclusion criteria were developed to ensure the selection of pertinent studies, as outlined in Table 3. Two electronic databases were utilized as data sources, as indicated in Table 1. A search string was devised to identify relevant keywords within the literature of the past five years, as presented in Table 3. The evaluation of article quality was based on guidelines established by (Gough, 2007), summarized in Table 2. The outcomes of the screening process are depicted in Figure 1.

Inclusion/Exclusion Criteria

The study exclusively incorporates open-access references and aims to explore student engagement facilitated by augmented reality (AR) technology. To achieve this objective, the research reviews literature published between 2013 and 2022 to identify the critical characteristics of student engagement in AR technology. The decision to limit the literature review to this specific timeframe is based on the belief that it would effectively capture the impact of AR on learning over the past decade. The inclusion and exclusion criteria for selecting relevant studies are outlined in Table 3.

Table 3. Inclusion/exclusion criteria

Criterion type	Inclusion	Exclusion
Publication	2014-2022	Before 2014
Quality Assurance	Studies published in peer-reviewed journals	Not published in peer-reviewed journals
Language	English	Non-English text
Topic	Student's engagement using AR	
<u>Geographical location</u>	<u>Worldwide studies</u>	

Inclusion/Exclusion Criteria

Despite working independently to code the data from the 18 articles, the two authors conducted regular meetings to discuss their findings. Ten articles were randomly chosen to assess the inter-rater reliability, and both authors individually coded them. The coding results were then entered into SPSS to calculate Cohen's Kappa value. The obtained value of 0.545 ($p < 0.01$) indicates a "moderate" level of agreement, as defined by Viera & Garrett (2005). In cases where there were discrepancies in the coding results, the two authors collaborated to review and align the data to ensure complete consistency.

Data Analysis

Information from each study was meticulously documented in an Excel spreadsheet, encompassing details such as author, country, year, participant characteristics, research questions, methods, and findings. Two distinct types of data analysis were employed to organize and synthesize the relevant data findings. Initially, a descriptive analysis was conducted, which involved recording information such as references, study focus, keywords, and context. Subsequently, a thematic analysis was undertaken to categorize and code the data sources into meaningful codes and categories.

Results and Discussion

Results

This criterion applied during the literature review resulted in a reduction from an initial pool of 322 journal articles to a final selection of 18 papers that underwent full-text analysis. The final review encompasses these 18

papers. Please refer to Figure 1 to access the PRISMA flowchart illustrating the process. This study aims to investigate using augmented reality (AR) to enhance student engagement. Student engagement refers to the extent of students' active involvement, interest, and enthusiasm in their learning and classroom activities. Higher levels of student engagement are associated with improved learning outcomes, while lower levels of engagement can impede effective learning. This literature review delves into the significance of this topic, which will be further discussed.

RQ1: How has the distribution of AR implementation for student engagement in mathematics education evolved over the years?

The first research question analyzes the distribution of research studies concerning augmented reality (AR) to support student engagement across various years. The findings in Figure 2 highlight an uneven distribution of research conducted throughout different years. Notably, there is a notable increase in the number of studies conducted in 2020 and 2021 compared to the other years examined.

This uneven distribution suggests that the interest and attention towards AR in the context of student engagement have intensified in recent years, particularly in 2020 and 2021. More studies conducted during this period may indicate a growing recognition of AR as a valuable tool for enhancing student engagement. However, it is essential to note that further research is still required to fully understand AR technology's potential impact and benefits on student engagement across a broader range of years.

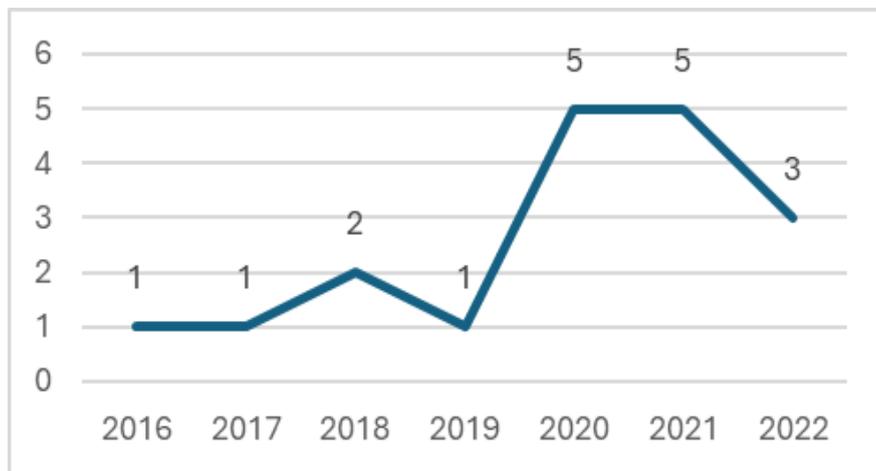


Figure 2. The number of studies published by year

RQ2: How does the distribution of AR implementation for student engagement in mathematics education vary across different countries?

The exploration of augmented reality (AR) to enhance student engagement has garnered attention and involvement from multiple countries. A diverse range of countries participated and contributed to the investigation of this study. Notable countries involved in the research encompassed the United States (US), Malaysia, Finland, Italy, Kuwait, Turkey, Greece, Spain, Indonesia, England, Portugal, Chile, Belgium, and Morocco, as depicted in Figure 3.

The involvement of these countries signifies the global interest in understanding the potential of AR technology in promoting student engagement. The diverse geographical representation suggests a widespread recognition of the importance of incorporating AR into educational practices. By examining the contributions of various countries, this study offers a broader perspective on the utilization of AR to support student engagement. It highlights the international nature of research in this field.

RQ3: What research methods have been utilized to investigate student engagement using AR?

The fourth research question delves into the methodology employed in AR applications to support student engagement. The selection of an appropriate research methodology is paramount for researchers to ensure the

validity and reliability of their findings. Upon analysis, it was discovered that the predominant research approach utilized in AR studies for enhancing student engagement was quantitative, accounting for 67% of the studies. These quantitative methods involve collecting and analyzing numerical data to draw objective conclusions. Additionally, qualitative methods were employed in 28% of the studies, enabling researchers to gather in-depth insights and understand students' subjective experiences and perspectives. Lastly, a smaller proportion of studies (5%) incorporated mixed methods, combining quantitative and qualitative approaches to comprehensively understand student engagement supported by AR technology (see Figure 4).



Figure 3. The number of studies published by the country

The consideration of different research methodologies allows researchers to approach the study of AR in student engagement from diverse angles, ultimately contributing to a more comprehensive understanding of the topic. By employing a mix of quantitative and qualitative methods, researchers can explore both the measurable outcomes and subjective experiences, providing a well-rounded perspective on the effectiveness and impact of AR in fostering student engagement.

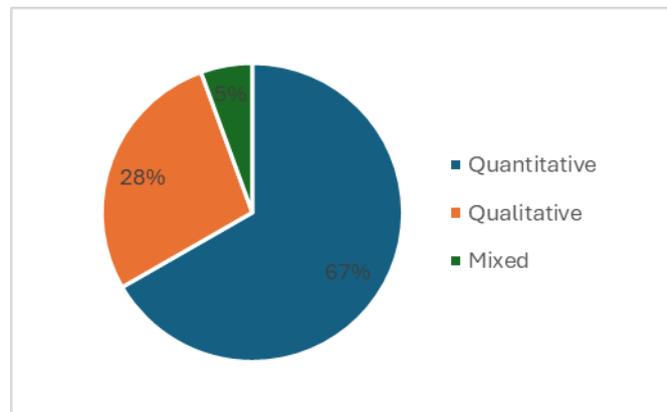


Figure 4. Research methods applied

RQ4: How does AR technology contribute to facilitating student engagement?

The study explores various aspects of student engagement that can be supported through augmented reality (AR) technology. Three main aspects identified in the selected studies are interactive, collaborative, and immersive engagement. These aspects are consistently observed across most studies, as presented in Table 4. By examining the aspects of student engagement in the selected studies, this research provides valuable insights into the different dimensions of AR-supported engagement. The consistent presence of interactive, collaborative, and immersive elements underscores the effectiveness of AR technology in fostering active and immersive learning experiences for students.

Table 4. Aspects of student engagement

Authors and Year	Aspects of Student Engagement
(Chung et al., 2021)	Interactive, Collaborative, Immersive
(Cesari et al., 2021)	Interactive, Immersive
(Sofianidis, 2022)	Interactive, Collaborative, Immersive
(Halili et al., 2021)	Interactive, Collaborative, Immersive
(Rosa-Dávila et al., 2021)	Interactive, Collaborative, Immersive
(Purwaningtyas et al., 2022)	Interactive, Collaborative, Immersive
(Allcoat et al., 2021)	Interactive, Immersive
(Walker et al., 2017)	Interactive, Collaborative, Immersive
(Jesionkowska et al., 2020)	Interactive, Collaborative, Immersive
(Pombo & Marques, 2020)	Interactive, Collaborative, Immersive
(Nadeem et al., 2020)	Interactive, Collaborative, Immersive
(Sirakaya & Cakmak, 2018)	Interactive, Collaborative, Immersive
(Saundarajan et al., 2020)	Interactive, Collaborative, Immersive
(Capone & Lepore, 2022)	Interactive, Collaborative, Immersive
(Nguyen et al., 2018)	Interactive, Collaborative, Immersive
(Badilla-Quintana et al., 2020)	Interactive, Collaborative, Immersive
(Saltan & Arslan, 2016)	Interactive, Collaborative, Immersive
(Elmqaddem, 2019)	Interactive, Collaborative, Immersive

Discussion

Our study shows that research related to AR for supporting student engagement has increased every year (see Fig. 2). Research on AR has increased every year because this technology has the potential to be used in various fields, including education. This is also supported by improvements in the availability of AR hardware, such as smartphones and tablets, which make these technologies more accessible to students in the classroom.

AR technology is rapidly developing its use in the education sector for several reasons. From a visualization perspective, AR can provide rich and interactive visualizations of abstract concepts, such as human body systems, molecular mechanisms, and geographic networks (Adedokun-Shittu et al., 2020; Ewais & Troyer, 2019; Sural, 2017). AR can be used to create learning projects that allow students to learn through exploration and experimentation (Cai et al., 2021; Jesionkowska et al., 2020). AR can connect concepts taught in schools with real environments, enabling students to learn in real locations (Adedokun-Shittu et al., 2020). AR can increase student motivation and participation by providing exciting and interactive learning experiences (Papanastasiou et al., 2019). AR also helps students to learn independently freely because AR provides more opportunities for students to learn interactively and visually (Anderson et al., 2021). Other research has also shown that using AR in education can improve student learning outcomes in various fields.

Meanwhile, regarding the geographical distribution of selected articles, augmented reality (AR) in education is spread worldwide. The analysis in this study shows that AR has contributed to student engagement in various countries such as the USA, Italy, Greece, Malaysia, Spain, Indonesia, England, Belgium, Portugal, Kuwait, Finland, Turkey, Chile, and Morocco. Although AR is used in education in various countries, the amount of use and use is still different. Further research is required to determine how it is implemented effectively in education.

Answering the third research question, the quantitative method is the most common method related to AR for supporting student engagement in the studies examined. Qualitative and mixed research types follow this number. In quantitative research on the use of AR in education, the existing research evaluated the differences in learning outcomes between the AR and non-AR groups using statistical analysis. In a qualitative study of AR in education, the selected study evaluated students' perceptions of AR technology, conducted observations of students using AR, and conducted interviews about their AR experiences. While the mixed is a combination of both. All of these methods have been used to evaluate the use of AR in education, but the choice of method depends on the research objectives, research focus, and type of data desired (Leighton & Crompton, 2017; Papanastasiou et al., 2019).

In terms of pedagogical contribution, AR is proven to attract students' interest, increase enjoyment, and increase their involvement in teaching and learning (Pahmi et al., 2023). AR is also proven to support Aspects of Student Engagement, such as interactive, collaborative, and immersive. AR can support student interactivity in learning

(Molnár et al., 2018). AR provides rich and interactive visualization of abstract concepts (Roopa et al., 2021). This visualization can make concepts easier to understand and interesting for students. With AR technology, teachers can create projects that allow students to learn through exploration and experimentation (Arvola et al., 2021). This can increase student engagement with content and make learning more enjoyable. In addition, AR can also be used to connect concepts taught in schools with real environments, enabling students to learn in real locations (Adedokun-Shittu et al., 2020). This can make learning more relevant and exciting to students. AR allows direct interaction with virtual objects and the actual environment, increases students' active participation in the learning process, and provides more opportunities to learn interactively and visually, thereby making students feel more involved in the learning process (Kamarainen et al., 2018).

Regarding collaboration, AR can create learning situations that allow students to collaborate to explore and try out concepts (Radu & Schneider, 2019). For example, AR can be used to create games that allow students to work together to complete tasks or challenges (Nadolny, 2017). Good communication can also be built through AR technology in the classroom (Leighton & Crompton, 2017). Students can share information and ideas with their friends through AR applications used in learning (Weng et al., 2020). This will also create a fun and exciting learning experience, making students more interested in working with their friends.

AR can support immersive learning experiences in the learning process in several ways (Kiryakova, 2020). Visualization through AR can make concepts easier to understand and enhance an immersive learning experience for students (Kazanidis et al., 2021). AR can also present virtual objects that interact with real environments. This can enhance immersive learning experiences for students (Papanastasiou et al., 2019). Although AR has several benefits in student engagement, effective implementation in learning requires good design and manufacture of AR applications and content and good collaboration between teachers and technology. It must be supported by good planning of the implemented learning programs and can integrate AR technology well (Chang et al., 2019).

Conclusion

AR has been increasing and receiving attention from educational institutions. This is due to the technology's visual and interactive nature. Several studies have provided evidence that AR technology has motivated and engaged learners with visual and interactive features, which made the learning process more active and effective. Since engagement is crucial for learning, examining how AR technology facilitates student engagement is essential. AR technology incorporates instructional design methods, interactive and collaborative features, and immersive visualization experiences to stimulate students' learning. The study showed that diverse and multiple features in each category were integrated, from touch interface to panning zooming and rotation navigation, voice and gesture recognition, model rendering, contextual visualization, augmentation and annotation, optical character recognition, and text recognition, which are frequently used. Students preferred more interactive features and creative options to be included so that there is the possibility of creating new things by the students. This study is expected to reveal the importance of engagement in AR-integrated learning environments and explain how technology enhances students' engagement with learning activities. Also, this study is anticipated to benefit those integrating AR into educational institutions.

Scientific Ethics Declaration

The authors declare that the scientific, ethical, and legal responsibility of this article published in EPESS journal belongs to the authors.

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Individual Interpretation and Usefulness of Agility in Work and Everyday Life

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Abstract: The global and local changes of the 21st century have brought new types of organisational characteristics to the fore. More and more businesses are looking at how to build more resilient, crisis-resilient organisations and what the real key is. There is a growing consensus that only flexible organisations that are open to change can be truly successful today (and in the future). Flexible organisations, agile companies, promise the greatest growth potential, and there is only one real explanation for this. These companies have the ability to change quickly and flexibly, whereas the vast majority of their competitors have not (or will not) be able to do the same. An organisation that can claim to have the hallmarks of a flexible, business agile organisational culture will have a significant competitive advantage. Agility goes beyond mere flexibility and encompasses a mindset and framework that enables a business to change quickly, make informed decisions and maintain a competitive advantage in a dynamic environment. Agility is also characterised by innovation and the ability to embrace change. We can imagine these at an organisational level, but how well do they translate at an individual level? This research, the results of which this paper seeks to present in more detail, has sought to identify and locate this. In addition to presenting the results, it also takes care to review the literature, which will enable us to draw conclusions about the real meaning and importance of agility, both at the individual and entrepreneurial level.

Keywords: Agility, Competition, Change, Business

Introduction

The real competitive advantage of agile operators comes from flexibility and speed. In our fast-changing world, adaptation has become an essential condition to stay competitive. And to stay competitive, factors such as innovation, research and development, education and training, quality, etc. are the best tools to mitigate the effects of the crisis (Girod et al., 2023). Kotter predicted as early as 1996 that the pace of change would not slow down in the twenty-first century and that competition would increase dramatically in most industries. He was sure that businesses would face more serious threats - and opportunities - than ever before (Kotter, 1996). Adapting to the environment, adapting as quickly as possible, had already captured the attention of experts decades earlier: research on agility had been conducted since the 1930s and 1940s. The early descriptions focused on cybernetics, information theory, systems theory, operations research, TQM, the 6 sigma, reengineering and lean manufacturing. It is clear from this interpretation that agility was understood mostly in terms of corporate operations and less in relation to individuals. Today, we know that it is not only organisations that can be agile, but also individuals, among whom we can name employees, managers, and even in our everyday lives we can identify the characteristics of agility (Muduli & Pandya, 2018). However, agility

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- Selection and peer-review under responsibility of the Organizing Committee of the Conference

can also be associated with individuals in many cases. In describing the characteristics of agility, one can also refer to great generals and military leaders, saying that to achieve agility, one needs a leader who inspires and encourages, but does not control much.

War strategies have very often required a combination of flexibility, variability or speed, to enable more effective military action and better mobilisation of units. The art of warfare was precisely what developed the agile thinking and attitudes of individuals, whereas today it is accelerated change and our turbulent world that explain its appreciation. Agility is closely linked to individuals, because an agile organisation is also made up of individuals and people. A business can become agile if it can identify agile actors, agile leadership and an agile organisational culture. It is through the behaviour, attitudes and behaviour of people that an organisation becomes what it is. Agile organisations are indeed different from traditional organisations. An agile organisation constantly analyses its environment, makes quick decisions, constantly looks for and corrects operational errors, and places a high value on constant learning and acquisition of new knowledge. It is people, individuals, who can make a meaningful contribution to all this, so each individual plays a central role in the process of becoming agile. In fact, organisational behaviour is nothing more than the cumulative behaviour of all those involved.

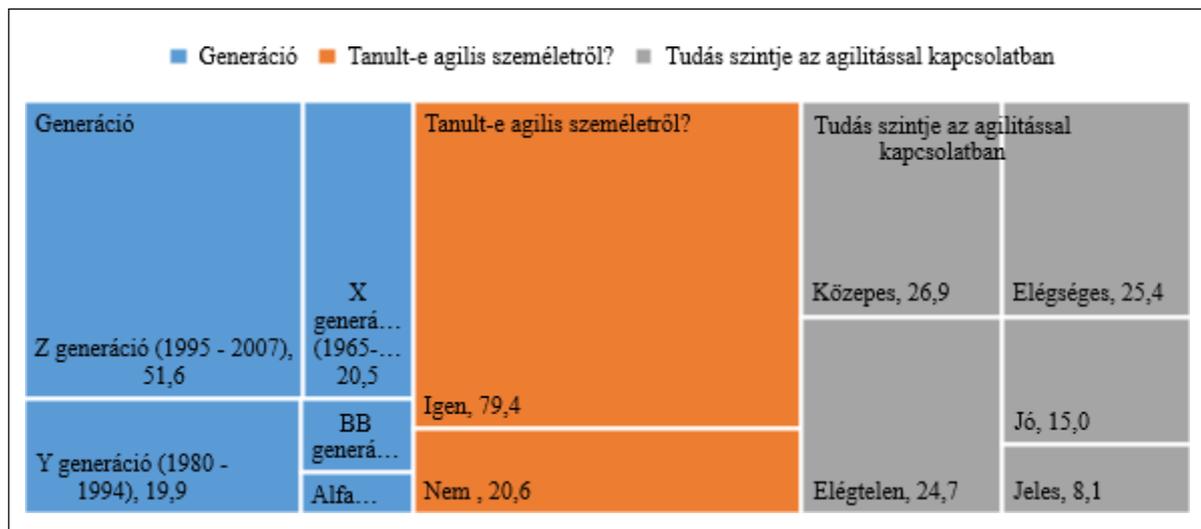
Literature Review

The 21st century has put our everyday lives on a completely new footing. How quickly and to what extent we can adapt to changes in our immediate or wider environment has become an important question. The reason is that while our world used to be characterised by a less fast and simpler (business) environment, the same can now be said in very few areas (Uhl-Bien & Arena, 2017). What does it mean to be agile? To be flexible, changeable and fast at the same time. Agility is a talent (hence an important skill) that both makes you able to create new things (Dalcher, 2021) and more reactive to change. It requires being extremely open-minded, not being averse to new things and being receptive to change. Where individuals have high levels of uncertainty, are afraid of new things or have difficulty accepting change, agile functioning is more difficult to develop. An organisation will be agile if the individuals within it can become agile themselves. But its benefits are clear. Agility can bring benefits to the business such as lower costs, improved organisational performance, profitability and higher shareholder value. Flexible business models seek to implement the ability to change quickly and at moderate cost. The requirement for flexibility needs to be balanced with the costs of change (Denning, 2020). Business agility is a strategic issue, as ultimately it is management that can most influence how flexible the organisational structure becomes, what information is used to make decisions, or how quickly decisions are implemented that management has made to respond to change (Arifin & Purwanti, 2023). However, this does not mean that business agility is only the responsibility of management, as this type of behaviour requires a whole enterprise, as flexibility and agility must be ensured at all levels to achieve the desired results. And this cannot be achieved without committed and change-ready employees, collaborative partners or reliable suppliers. Alongside flexibility, speed is another important factor. Responsiveness is understood at both organisational and individual level. At the individual level, it can be expressed, for example, in the time it takes staff to complete a task, the time it takes to implement a change, or the time it takes to take a decision and put it into practice (Haeckel, 1999). Agility is also required in people, processes, strategy and technology, because they are inseparable and only together can they provide a continuous and dynamic response to the challenges of change. Agility means that the organisational structure is highly flexible, so that change does not cause difficulties for the organisation even if structural features need to be disrupted or reorganised. For change management, the agile business model provides attributes that can clearly benefit the success of change (Arbussa et al., 2017). Organisational flexibility, agility or variability can only be an advantage for change management, but only if resistance to change is minimised (Suprapti & Suparmi, 2022). The agile business model has also achieved great success in this respect, as it would not be able to sustain the dynamism of change if it were to face constant resistance from stakeholders. Agility is not an organisational capability that can be inherited or created out of thin air. The ability to be agile in business needs to be developed incrementally in the organisation, and the key to this is when the agile organisational culture is successfully built (Gren & Lenberg, 2020). Agility allows the organisation to implement change with the least possible resistance, while speed ensures that the benefits of change are captured earlier than everyone else (Zhou & Wu, 2010). And variability is the embodiment of the fact that individuals themselves do not shy away from change, even if they have a fundamental role to play, need to participate in the process and may have to make sacrifices and efforts in the change process. Agility is a strong presupposition of change, as it is indeed when the winds of change blow that we need to intervene quickly and flexibly (Prikladnicki et al., 2018). We can experience the same in our everyday lives. At the same time, those who are quickest to see and seize opportunities, adapt to change and do

so effectively are the ones who can develop the most (Dove, 2001). Success in business and in our personal lives depends to a large extent on our ability to identify the opportunities that surround us, or to know the environment that surrounds us. An agile mind is quick, resourceful and adaptable. Agile organisations are therefore responsive, resourceful and able to adapt to their environment (Mathiassen & Pries-Heje, 2006).

Composition of the Sample

In the present study, we measured the individual usefulness of agility by means of a complex, multi-topic questionnaire that, in addition to the challenges of the present, also attempts to measure basic competences (agility, conscious use of the Internet). The research was conducted in autumn 2023 and we draw our conclusions on the basis of a total of 5067 evaluable questionnaires. The questionnaires were completed by Generation X, Y and Z respondents, so we consider this as one of the most important grouping criteria. We also consider it important to examine the previous participation in agile education and the level of knowledge about agile, which is also considered as a relevant criterion. The survey was conducted online. The results presented in this paper are based on the questions of the first block of the questionnaire. In this study we want to show how respondents evaluate the impact of agility on themselves in their work in the organisation. Respondents were asked to rate the statements presented in the study using a four-point Likert scale, where a value of 1 represented total disagreement and a value of 4 represented total agreement, providing the option to decline to respond, which was taken into account in the rating with a value of 0. More than half of our respondents are Generation Z, 20-20% are Generation X and Y, and a total of 5.2% are Generation BB and 2.9% are Generation Alpha. Some form of agility was taught to 80% of the respondents in the sample, but only a quarter of respondents overall rated their knowledge as good to excellent. The composition of the sample is shown in the figure below.



Source: Own research, 2023, N = 5067

Figure 1. Composition of the sample by respondents' generation, participation in agility education and knowledge of agility

Results

In this study, we wanted to examine four claims in detail along the three grouping criteria above. It can be seen that the highest proportion of respondents perceive the individual usefulness of agility in helping to change the general mindset of employees. This was followed by a relatively high rating for the factor that agility helps to improve collaboration between peers. A much lower proportion rated agility as helping to increase employee engagement and reduce the frequency of conflicts. For all four statements, none of them scored above 3.0. While the first two statements tend to be at the positive end of the scale, the last statements, on employee engagement and reducing the incidence of conflict, are not so positively rated.

We then used analysis of variance to assess the extent to which each grouping criterion influences the perception of the statements. To this end, we used a one-way ANOVA, the tables of which are shown below, together with

the descriptive tables. First, we examined respondents' generational affiliation. It can be seen that the significance values indicate that the age of the respondents has a clear influence on all four statements t, as is clearly shown by the significance level below 5%.

Table 1. Overall perception of questions on agility

	Average	Source
helps to make cooperation between partner areas more effective	2,771	1,212
changes the general mindset of workers	2,729	1,192
increases employee engagement	2,532	1,210
reduces the frequency of conflicts	2,457	1,186

Source: Own research, 2023, N = 5067

Table 2. Correlation of respondents' perceptions of agility questions with their age

		Sum of Squares	df	Mean square	F	Sig.
helps to make cooperation between partner areas more effective	Between Groups	142,769	4	35,692	24,736	0,000
	Within Groups	7304,211	5062	1,443		
	Total	7446,980	5066			
changes the general mindset of workers	Between Groups	86,006	4	21,501	15,312	0,000
	Within Groups	7108,037	5062	1,404		
	Total	7194,043	5066			
increases employee engagement	Between Groups	49,831	4	12,458	8,564	0,000
	Within Groups	7363,772	5062	1,455		
	Total	7413,603	5066			
reduces the frequency of conflicts	Between Groups	21,033	4	5,258	3,744	0,005
	Within Groups	7110,208	5062	1,405		
	Total	7131,241	5066			

Source: Own research, 2023, N = 5067

Table 3. Perception of agility questions by generation

		Average	Source
helps to make cooperation between partner areas more effective	Generation BB (1940 - 1964)	2,393	1,371
	Generation X (1965-1979)	2,857	1,225
	Generation Y (1980 - 1994)	2,826	1,186
	Generation Z (1995 - 2007)	2,798	1,170
	Alfa generation (2008-)	1,980	1,358
	Total	2,771	1,212
changes the general mindset of workers	Generation BB (1940 - 1964)	2,385	1,362
	Generation X (1965-1979)	2,869	1,158
	Generation Y (1980 - 1994)	2,756	1,203
	Generation Z (1995 - 2007)	2,725	1,154
	Alfa generation (2008-)	2,250	1,428
	Total	2,729	1,192
increases employee engagement	Generation BB (1940 - 1964)	2,363	1,331
	Generation X (1965-1979)	2,577	1,223
	Generation Y (1980 - 1994)	2,504	1,228
	Generation Z (1995 - 2007)	2,569	1,170
	Alfa generation (2008-)	2,041	1,329
	Total	2,532	1,210
reduces the frequency of conflicts	Generation BB (1940 - 1964)	2,313	1,296
	Generation X (1965-1979)	2,509	1,157
	Generation Y (1980 - 1994)	2,419	1,216
	Generation Z (1995 - 2007)	2,480	1,162
	Alfa generation (2008-)	2,196	1,364
	Total	2,457	1,186

Source: Own research, 2023, N = 5067

We also examined the generational ranking along the results. The statements show that the highest average score, i.e. the most positive opinion for each factor, was obtained from members of generation X. They were followed in order by Generation Y respondents and Generation Z respondents. As members of the BB generation and the alpha generation were very under-represented in the sample, their opinions are not discussed in detail. It can be seen, therefore, that it is the respondents who have been involved in the world of work for a long time and have a stable career who have the most positive opinions about the individual usefulness of agility. One might expect that Generation Z, who are the most free and flexible, would be the most positive about these factors, but the sample does not confirm this assumption. Next, we examined the impact of participation in agile education on our statements based on the results of the analysis of variance. Here, we were surprised to find that the significance values showed that there was only one case of an influential effect on the statements. Only the respondents' participation in agile education had an influence on the frequency of conflict occurrence, since only in this case the significance value was below 5%.

Table 4. Correlation of respondents' perceptions of agility questions with their participation in agile education

		Sum of Squares	df	Mean square	F	Sig.
helps to make cooperation between partner areas more effective	Between Groups	0,321	1	0,321	0,219	0,640
	Within Groups	7446,659	5065	1,470		
	Total	7446,980	5066			
changes the general mindset of workers	Between Groups	2,895	1	2,895	2,039	0,153
	Within Groups	7191,148	5065	1,420		
	Total	7194,043	5066			
increases employee engagement	Between Groups	1,532	1	1,532	1,047	0,306
	Within Groups	7412,070	5065	1,463		
	Total	7413,603	5066			
reduces the frequency of conflicts	Between Groups	6,127	1	6,127	4,355	0,037
	Within Groups	7125,115	5065	1,407		
	Total	7131,241	5066			

Source: Own research, 2023, N = 5067

If we break down the respondents by participation in agile education, we see that the order is not clear, i.e. the respondents are very heterogeneous. Respondents who participated in agile education rated the statement on collaboration most positively only. Surprisingly, for all other statements, respondents who did not participate in agile education gave higher average ratings to the factors. This result is interesting because one would expect that those who have attended training on agile methodology would have a better understanding of its essence and would report more positively about it. This suggests that although respondents had attended agile training, they were more aware of the organisational effectiveness of agile, or even its role in project management, rather than the positive effects they experienced for themselves.

Table 5. Perceptions of agility-related questions in groups trained on the basis of participation in agile education

		Average	Source
helps to make cooperation between partner areas more effective	No	2,755	1,219
	Yes	2,775	1,211
	Total	2,771	1,212
changes the general mindset of workers	No	2,776	1,172
	Yes	2,717	1,197
	Total	2,729	1,192
increases employee engagement	No	2,566	1,173
	Yes	2,523	1,219
	Total	2,532	1,210
reduces the frequency of conflicts	No	2,525	1,163
	Yes	2,439	1,192
	Total	2,457	1,186

Source: Own research, 2023, N = 5067

Last but not least, we also looked at the extent to which the level of knowledge about agility influenced the questions. Here again, we found that each factor was significantly influenced by the perception of one's own knowledge of agile approaches.

Table 6. Correlation between respondents' perceptions of agility questions and their knowledge of agile

		Sum of Squares	df	Mean square	F	Sig.
helps to make cooperation between partner areas more effective	Between Groups	81,437	4	20,359	13,992	0,000
	Within Groups	7365,544	5062	1,455		
	Total	7446,980	5066			
changes the general mindset of workers	Between Groups	133,182	4	33,295	23,870	0,000
	Within Groups	7060,861	5062	1,395		
	Total	7194,043	5066			
increases employee engagement	Between Groups	96,350	4	24,087	16,663	0,000
	Within Groups	7317,253	5062	1,446		
	Total	7413,603	5066			
reduces the frequency of conflicts	Between Groups	106,158	4	26,539	19,123	0,000
	Within Groups	7025,084	5062	1,388		
	Total	7131,241	5066			

Source: Own research, 2023, N = 5067

In the present case, we would expect that those with good or excellent knowledge would be the most likely to report on these factors. However, we find that it is not respondents who rated their knowledge as excellent or excellent who gave the highest ratings to each factor, but respondents who rated their knowledge more modestly, in the fourth category, good. This is true for all factors without exception. It is clear that those whose knowledge was unsatisfactory rated their individual utility the lowest, which is entirely in line with the general perception.

Table 7. Perceptions of agility-related questions in groups based on knowledge of agile knowledge

		Average	Source
helps to make cooperation between partner areas more effective	Insufficient	2,576	1,314
	Sufficient	2,777	1,128
	Medium	2,823	1,157
	Good	2,968	1,168
	Excellent	2,806	1,326
	Total	2,771	1,212
changes the general mindset of workers	Insufficient	2,456	1,295
	Sufficient	2,756	1,099
	Medium	2,847	1,104
	Good	2,882	1,155
	Excellent	2,806	1,350
	Total	2,729	1,192
increases employee engagement	Insufficient	2,334	1,313
	Sufficient	2,486	1,123
	Medium	2,655	1,144
	Good	2,711	1,168
	Excellent	2,539	1,335
	Total	2,532	1,210
reduces the frequency of conflicts	Insufficient	2,231	1,267
	Sufficient	2,431	1,108
	Medium	2,573	1,122
	Good	2,624	1,161
	Excellent	2,527	1,317
	Total	2,457	1,186

Source: Own research, 2023, N = 5067

Conclusions

The results show that knowledge about the individual utility of agility is still in its infancy. The vast majority of respondents have attended training on agility, but have not yet seen or experienced its individual benefits. This

can be clearly seen from the maximum of the mean scores. None of the statements measuring individual usefulness reached a value of 3.0, supporting the above. It can also be observed that the generation most at the forefront is Generation X, who have been exposed to a variety of approaches and methodologies through their work experience. It is worth prioritising this generation, as they are the ones who can disseminate and explain the essence and usefulness of agility at individual and organisational level. It was also observed that a relatively small proportion of respondents considered their knowledge of agility to be excellent. It is therefore interesting to note that the most positive image was that of respondents who rated their own knowledge as good. Although more than half of the sample was made up of Generation Z, it is important to see that they are not the ones who would be at the forefront. This is important because 21st century education needs to find the competencies that the labour market demands. This is perfectly illustrated by the Generation X view. It is therefore essential that members of Generation X act as mentors to Generation Z young people, who are able to pass on, disseminate and teach agile thinking to members of the younger generation who will be pillars of the future labour market.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

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Educational Technology in Early Childhood Education: A Systematic Literature Review

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Abstract: The development of science and technology in the 21st century is currently digital-based. In line with technological progress and innovation, it also impacts the world of education, such as changes in pedagogy and approaches to facilitating and delivering learning content. The advantages and ease of use of technology in education also have great potential to modernize the methodology of traditional teaching and learning systems. Early Childhood Education is vital in becoming the foundation for children's growth and development towards a successful and highly competitive future so that they continue to develop. Educational technology is an inseparable component in supporting the learning process of early childhood. This research uses Systematic Literature Review (SLR) analysis. This research aims to thoroughly explore how technology is used in Early Childhood Education and what aspects of development occur in children who use EdTech in Early Childhood Education. The data source in this research is the Scopus database of 174 documents published in 2018-2022, screened by applying inclusion and exclusion criteria in three different rounds, 13 articles were analyzed in complete text form. This research shows that technology is used in early childhood education to improve cognitive aspects, language, arts, students' interest in learning, and preschool preparation for children. Types of technology that can be applied include PowerPoint, video, digital storytelling, drawing, digital stories, and so on. This research also explains that the use of technology must be adjusted to the age, education level and targets of students. Improper use of technology can cause problems such as children losing their ability to mingle with society and tend to be comfortable with online life. Aspects of development in children that make good use of technology are cognitive aspects, language, art, and increasing knowledge in children, as well as motivation to learn.

Keywords: Educational technology, Early childhood education, Systematic literature review

Introduction

The Industrial Revolution era describes the rapid development of science and technology in the 21st century. Everything is based on digital, artificial intelligence, and connectedness in this era, so the world is increasingly united in globalization (Schwab, 2016). Technological advances and innovations also have an impact on the

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world of education, such as changes in pedagogy and approaches to facilitating and delivering learning content (Sharma, 2019). The advantages and ease of using technology in the world of education also have great potential to modernize the methodology of traditional teaching and learning systems (Gizaw, 2020).

Early Childhood Education has a very important role in forming the basis for children's development towards a successful and highly competitive future so that it continues to develop; educational technology becomes an inseparable component in supporting the early childhood learning process. The advantages and ease of using technology in the world of education also have great potential to modernize the methodology of traditional teaching and learning systems (Parikh, 2012).

In this context, scientific literature plays a key role in constructing a comprehensive understanding of the influence and effectiveness of the use of educational technology in the early stages of child development. The use of technological tools will be beneficial if they are used according to age development (Qazi, 2018). Technological developments in education require students, teachers, and educators to reconsider their traditional teaching methods and invest in new technologies and tools. To support this, smart learning with educational technology (EdTech) is promoted as one of the supporting trends (Douglas, 2019).

However, current EdTech developments are still evenly distributed across several types of learning, especially in Early Childhood Education, where the use of EdTech still needs to be increased (Bozkurt, 2020). Learning methods are still focused on traditional knowledge. 21st-century learning is technology-oriented, utilizing various types of technology as learning tools to facilitate information retrieval (Long & White, 2010). This is a major challenge faced by Early Childhood education. The explanation above shows that learning innovation is needed in Early Childhood Education by utilizing EdTech, such as media, methods, strategies, and learning techniques. This research wants to explore the use and development of EdTech in Early Childhood Education through systematic procedures supported by systematic literature analysis (SLR). SLR analysis is a research methodology for collecting, identifying, and critically analyzing available research studies (e.g., articles, conference proceedings, books, and dissertations) through a systematic procedure. The aim is to review key points of current knowledge about a topic or research question to suggest areas that require further research (Pati & Lorusso, 2018).

Therefore, this SLR research focuses on several things, as formulated in the following research questions: (RQ1) How is technology used in Early Childhood education? (RQ2): What aspects of development occur in children who utilize EdTech in Early Childhood Education?

Method

This research uses a systematic literature review (SLR) research analysis with several stages. Several stages in SLR research adopt the systematic literature review process carried out by Qazi et al. [9] and Ribeiro et al. [10] with minor modifications and adjustments. The stages in this SLR research are as follows:

1. Determine the research questions and objectives
2. Determine the data source and data search keywords.
3. Determine inclusion criteria and exclusion criteria
4. Perform a data search.
5. Select the data results that have been found
6. Data extraction
7. Data Analysis
8. Make interpretations and conclusions

Criteria for Inclusion and Exclusion

In this process, research may only be included if it meets the following criteria:

1. Studies published in 2018–2022;
2. Research is scientific journals and articles;
3. Studies that meet the following criteria: written in English, and
4. Research is available in full-text form. Articles that did not meet all inclusion criteria were excluded from this list.

- Data Search carried out in November 2023 on the Publish or Perish Database according to the keywords that had been determined. Keywords (Educational Technology 116 and Early Childhood Education) contained 58 documents.

Data Selection

The initial data search results are then filtered again by applying inclusion and exclusion criteria in the process data search. The selection process is carried out in three rounds, with the following stages explained:

- The selected documents are documents from various countries (without exception), published between 2018 and 2022, which can be seen in table 1.
- The author selects the title and abstract (if necessary) without paying attention to the quality of each document. The selected document type discusses EdTech in Early Childhood Education
- The author reviews the manuscript in more detail in terms of title, abstract, keywords and content documents to decide whether it is worthy of further review or not. The result at this stage is a document that discusses the application and development of EdTech in early childhood education attached in Table 1 below.

Table.1. EdTech in early childhood education

Data sources	Keyword	Result	R.1	R.2	R.3
Scopus	<i>Educational Technology in Early Childhood Education</i>	116 58	<i>In- Ex</i> 92 24 48 10	<i>In- Ex</i> 21 71 8 40	<i>In- Ex</i> 10 11 3 5

Table 1 above explains that it should be noted that after the selection process, documents that pass the selection will only be published in 2018–2023. Following the data in Table 1, there can be keywords that contain a lot of data that is worth studying in more detail because the results of the search and selection for these two keywords are 13 documents published in 2018–2023. Thus, the systematic review process flows as follows:

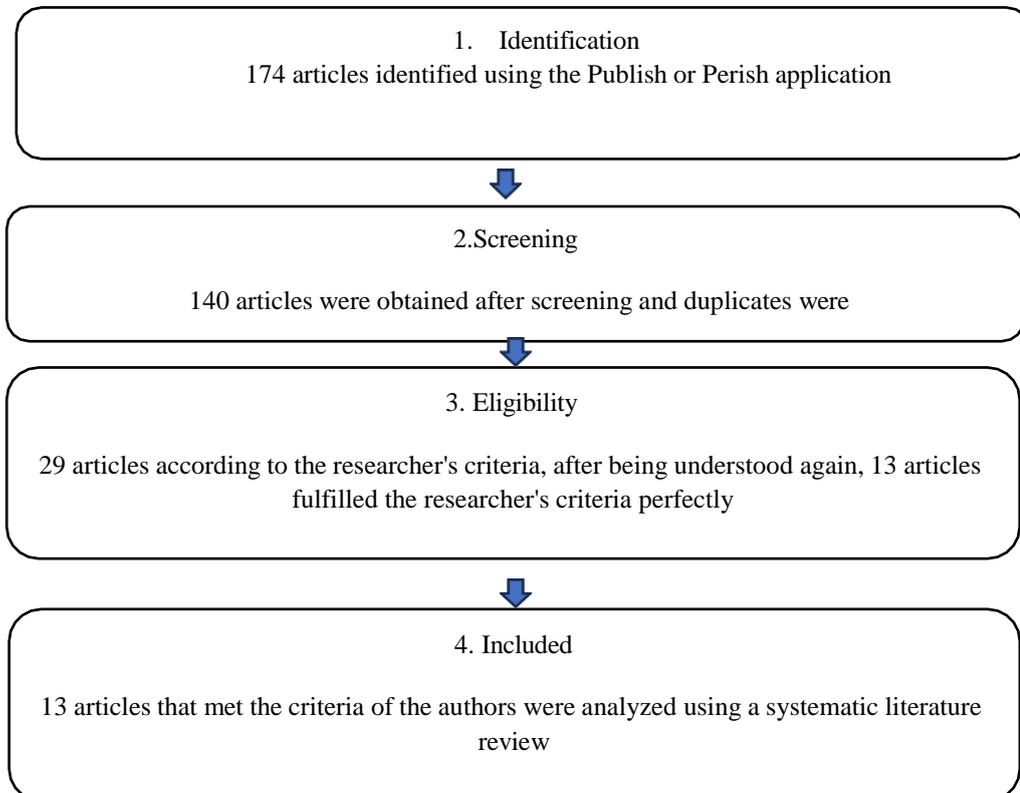


Figure 1. Ed-tech prism diagrams

Data Extraction

At this stage, all articles are reviewed and analyzed based on the indicators in Table 2. These indicators were chosen because of their relevance in providing information to answer the research questions explained in the introduction.

Table 2. Type of data to be extracted

No. Items	Discription
1.Year	Year of publication?
2.Location	Location and domain of acticle?
3.Educational technology tools	Educational Technology in Early Childhood Education
4. Educational technology tools	EdTech is use in the teaching of Early Childhood Education?

Results and Discussion

Based on the approach described previously, the 13 articles that have been selected and identified will be analyzed in detail in the data analysis stage. This process begins by providing a summary of each piece and outlining its entire content. The information recorded in Table 2 from each piece will be extracted and then presented in Table 3.

Table 3. Extraction data results (n=13)

Study	Year	Loc.	Domain	EdTech Tools	EdTech use
[11]	2018	Australia	A pedagogy of multiliteracies: Young children and multimodal learning with tablets	ablet technology, Computers, iPads, and BetterWorks applications,	Developing skills to improve literacy, such as letter and sound recognition (phonics), basic vocabulary, stimulation,for conversation and language use, multimodal learning
[12]	2019	Spanyol	Impact of using interactive devices in Spanish early childhood education public schools	Touch screen technology such as tablets, computers and interactive whiteboards (IW)	Increasing motivation to learn because content displays colors and moving images, there is language development in children.
[13]	2019	Finlandia	Teachers' beliefs about technology integration in early childhood education: A meta-ethnographical synthesis of qualitative research	Computers, Multimedia presentations, Digital games.	Improve children's social emotions, knowledge related to learning and skills, especially in the areas of literacy and mathematics. Children get the opportunity to practice word order, concepts, letter sounds, classification, counting, etc.
[14]	2019	Australia	It is a tool, but not a 'must': early childhood preservice teachers' perceptions of ICT and its affordances	Interactive whiteboards and desktop computers, laptops and screen-based technology (watching videos).	Developing social emotional aspects, language and children's experiences of technology outside of school and their experiences in the classroom.
[15]	2020	United Kingdom	A material for education process and the Teacher: the use of digital storytelling in	Computers (digital stories)	Arouse children's interest in learning, improve children's cognitive abilities.

			preschool science education			
[16]	2020	Mexico	Designing The Catbus: Interactive Support for Early Childhood Emotional Well-being in Education	Computers (digital stories)	(digital stories)	Improve social and emotional skills in many ways through interactive storytelling about the perceptions, expressions and emotional responses of early childhood.
[17]	2020	Jerman	Can children benefit from early internet exposure? Short-and long-term links between internet use, digital skill, and academic performance	Computers (Internet)		Development of early digital skills and good screen time management in early childhood.
[18]	2020	Spanyol	Types of Use of Technologies by Spanish Early Childhood Teachers	Information and Communication Technology (JClick, NeoBook, Paint)		Improve aspects of language development and knowledge of early childhood from the digital stories displayed.
[19]	2020	Amerika Serikat	An Interactive Pedagogy in Mobile Context for Augmenting Early Childhood Numeric Literacy and Quantifying Skills	Mobile learning		Improve literacy and numerical quantification skills. Additionally, it allows children to learn while they explore their learning environment, which may provide additional social and physical benefits.
[20]	2020	Amerika Serikat	A cross-cultural study on technology use in preschool classrooms: early childhood teacher's preferences, time-use, impact and association with children's play	Smartphones, iPads and Computers.		Increases children's motivation to learn, helping children to prepare for school, although some Greek teachers state that outdoor play is better for children and the use of technology should be limited.
[21]	2020	Switzerland	Harnessing the Potential of Storytelling and Mobile Technology in Intangible Cultural Heritage: A Case Study in Early Childhood Education in	Computer storytelling, (Digital Drawing, Mobile technology).	(Digital Drawing, Mobile)	Increasing new knowledge and motivation of preschool children about traditions, local cultural assets.

			Sustainability		
[22]	2020	United Kingdom	Early childhood practitioner beliefs about digital media: integrating technology into a child-centred classroom environment	Digital media (internet, Power point)	Increase motivation to interact with fellow students in learning and playing.
[23]	2022	South Korea	An IoT-Based Approach for Learning Geometric Shapes in Early Childhood	Computer (Video)	Increase children's interest in learning, improve aspects of language, social and artistic development from the educational videos displayed.

Table 3 above explains various EdTech applied in early childhood education in various countries. The types of EdTech that are widely used in Indonesia in early childhood education include the use of iPads and computers in learning. The aim is to increase children's learning motivation. Other types of learning used include Power Point, video, digital storytelling, drawing, digital stories and so on. This type of EdTech is applied in early childhood education combined with traditional environmental learning . Apart from that, the use of EdTech is also beneficial for improving aspects of social emotional development children, arts, language, literacy and numerical skills and increasing these development aspects is useful in the preschool preparation process for early childhood.

This section is a discussion of the data results that have been presented and described briefly in the previous quarter. This discussion is then used as the basis for answers to the research questions mentioned above. These answers are summarized in Table 5. The use of educational technology (EdTech) has been implemented in early childhood education. It should be emphasized that the use of EdTech in early childhood education is not only reserved for students, teachers, and educational institutions. However, this research can also be used by parents in the general public to provide an understanding of how to provide technology to early childhood. Several types of EdTech in early childhood education analyzed are combined with various types of traditional learning. They can train teachers and utilize technology to develop different competencies, knowledge, skill development, and attitudes, showing that the use of EdTech in early childhood education has proven to be beneficial for improving the quality of education if used appropriately.

Table 5. Answers to research questions

Question	Answer
(RQ1) <i>How is technology used in Early Childhood education?</i>	The use of technology in early childhood education is in improving cognitive aspects, language, art, students' interest in learning, and preschool preparation for children. The types of technology that can be applied include PowerPoint, video, digital storytelling, drawing, digital stories, and so on. The use of technology must be adjusted to the age, level of education, and targets of students. Inappropriate use of technology can cause problems such as children losing their ability to blend in with society and tend to be comfortable with online life.
(RQ2) <i>What aspects of development occur in children who utilize EdTech in Early Childhood Education?</i>	Aspects of development in children that make good use of technology are cognitive aspects, language, art, and increased knowledge in children, as well as <u>motivation to learn in children.</u>

These 13 articles come from the Scopus database and were published between 2018 and 2022. Research on the use and development of EdTech in early childhood education has been carried out by previous researchers, both generally and specifically discussing certain early childhood education materials. This research also found that

several aspects developed with the use of EdTech in early childhood education are quite diverse and do not only focus on developing knowledge and understanding of material, such as digital literacy development, interaction skills and Overall, technology can increase motivation in young children in learning.

Conclusion

SLR research is related to the use of EdTech in early childhood education and has been studied by many researchers in various countries, both generally and specifically in certain aspects. However, research related to technology education still needs to be deepened so that it can provide benefits for educators, parents and the general public. Early childhood education is combined with various learning approaches with various objectives of developing competence, knowledge, skills and character, as well as educational administration. Learning Approaches and competency aspects developed using Edtech in early childhood education have been adapted to the educational needs of the 21st century. This clearly shows the existence of technological innovation in early childhood education. This SLR has implications for researchers and practitioners. The results of this research can provide new knowledge and insight into the use of EdTech in early childhood education so that it can be used as a reference for teachers, students and educational institutions to improve the quality of early childhood education. Apart from that, it can also provide insight into the current state of technology.

Recommendations

I recommend this article for the development of early childhood education and learning

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

* This article was presented as an oral presentation at the International Conference on Social Science Studies (www.iconsos.net) held in Alanya/Turkey on May 02-05, 2024

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English Activity Programs in Libraries: Exploring the Potential of Children's English Libraries as a Countermeasure for Educational Gaps

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Abstract: The Korean government has implemented various measures to address the disparity in English language proficiency stemming from income inequality. One such initiative is children's English libraries. These libraries in Korea not only provide English-language books but also offer camps and English-language programs either for free or at low cost. In Japan, educational disparity has emerged as a significant issue in recent years, particularly regarding English education at the elementary school level, which has only recently been introduced as a school subject and appears to be exacerbating the gap. To investigate the feasibility of establishing children's English libraries similar to those in Korea, this study conducted regular English-language activities at libraries akin to those in Korea in 2022 and 2023, and surveys were conducted among the children and their guardians.

Keywords: Library, Children's english libraries, Countermeasure for educational gaps, English activity

Introduction

The South Korean government has implemented various measures to eliminate the disparity in English proficiency arising from income inequality. One such initiative is children's English libraries, which not only provide English books but also offer camps and English programs for free or at a low cost. In Japan, educational disparity has emerged as a significant issue in recent years, particularly regarding English education at the elementary school level, which has only recently been introduced as a school subject and appears to be exacerbating the gap. Thus, this study explores the possibility of establishing English libraries akin to those in South Korea by conducting regular English activities in libraries. Specifically, this research focuses on developing, and practicing programs based on CLIL (Content and Language Integrated Learning), which involves learning content from other subjects through English.

Children's English Libraries in South Korea

Several studies in South Korea have been conducted on children's English libraries since 2009. For instance, Chang (2011) surveyed the operation of English reading programs at public children's libraries nationwide,

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finding that 60% of them ran such programs, primarily targeting children under seven years old and younger elementary students, with storytelling activities being the most common. The survey also noted that while various types of programs, such as age-specific ones and experiential programs like fairy tale plays, were being run, most libraries lacked proper standards in terms of objectives, instructors, content, and levels of English reading programs. Chang further conducted a questionnaire survey among children and guardians participating in the library programs, revealing that many guardians recognized the importance of English reading programs, though satisfaction levels were not very high, and many felt the need for more diverse and numerous programs.

Lee (2015) surveyed children's English libraries in Busan and Seoul and found that they were typically located in economically affluent areas of new towns and new urban districts. The libraries were suggested to be staffed with professional personnel capable of English instruction, such as librarians, native English-speaking teachers, and Korean teachers with an English education background, and also to include resources like DVDs, audio materials, and board games. Ham and Kim (2010) proposed using libraries as one strategy to improve the English education environment in rural areas, suggesting that renovating existing public libraries into English-only spaces could help reduce costs and focus resources on running programs, thus providing high-quality education aligned with public education and offering rural residents educational opportunities comparable to those in cities, potentially at a lower cost than English villages.

Busan English Library

This section introduces the Busan English Library, which is reputed to be one of the largest English libraries in South Korea. The Busan English Library was opened on July 1, 2009, within the same premises as the Busan Global Village, and on May 30, 2013, the Busan English e-Library was inaugurated. Membership is free and open only to residents of Busan, allowing them to borrow books and participate in programs at no cost.

English Resource Room

The shelves are organized by Lexile measure, a reading standard index developed by Metamatrix, color-coded for different levels:

- Green Corner Children (Green: 32 seats) for elementary-level books from Lexile 100 to 400.
- Blue Corner Juniors (Blue: 30 seats) for middle and high school level books from Lexile 500 to 800.
- Orange Corner Adults (Orange: 30 seats) for books over Lexile 900 used by college students, English majors, and teachers.

World for Kids

This children's area includes three rooms:

- Read to Me: A room for preschool children to read with their parents, featuring about 2,000 picture books at the BR (Beginning Reading) Lexile level.
- Magic Club: A room for fun reading sessions in English.
- Story Club: A room for ongoing programs.

English Resource Room

Books in the English Resource Room are also organized by Lexile measure according to reading difficulty:

- Green Corner Children (Green: 32 seats) contains books for elementary levels from Lexile 100 to 400.
- Blue Corner Juniors (Blue: 30 seats) includes books for middle and high school levels from Lexile 500 to 800.
- Orange Corner Adults (Orange: 30 seats) houses advanced books over Lexile 900 suitable for college students and English educators.

English Reading Diagnostics

A unique feature of the Busan English Library is the incorporation of the Scholastic Reading Inventory (SRI) and Scholastic Reading Counts (SRC) for English reading diagnostics:

- SRI: A computer program that recommends books based on the user's Lexile measure.
- SRC: A post-reading quiz program with about 10 questions that helps gauge comprehension of the book read.

Tests are available daily, and those interested can apply via the library's website.

English Programs

All English programs are free and available on a first-come, first-served basis; some programs may reach capacity soon after registration opens.

Permanent English Educational Programs

Programs for families (targeting preschool children & 1st and 2nd graders):

- Read & Create with Family I: For parents and children (6-7 years old) - Reading English picture books and engaging in creative activities.
- Read & Sing with Family I: For parents and children (6-7 years old) - Reading English fairy tales at a 100L level and singing along.
- Read & Create with Family II: Reading English fairy tales between 100L-200L levels and conducting creative activities.
- Read & Sing with Family II: For parents and 1st and 2nd graders - Reading and singing activities based on English fairy tales from 100L-200L.
- Reading with Family I: For parents and children (6-7 years old) - Reading English stories and engaging in related activities.
- Reading with Family II: For parents and 1st and 2nd graders - Reading English stories and engaging in related activities.
- Kids Animation: For parents and children (6-7 years old, 1st and 2nd graders) - Screening educational animations.

Programs for 3rd and 4th Graders

- Reading Starter I: Reading books at a 200L level and expressing personal thoughts.
- Reading Starter II: Reading books from 200L to 300L and sharing personal insights.
- Step-up Reading I: Collaboratively reading books from 300L to 400L and discussing them.
- Step-up Reading II: Reading books from 400L to 500L and engaging in various post-reading activities.
- Media Magic: Using various media (films, animations, video clips, music) to learn English expressions and related activities.
- Topic Activity (Advanced): Reading books on various topics and engaging in related activities post-reading.

Programs for 5th and 6th Graders

- Step-up Reading II (Advanced): A program aiming to encourage independent reading through engagement with books from 400L to 500L and diverse reading activities.
- ENIE (Weekdays): Learning English through editorials in English newspapers.
- Intensive Reading: Targeted at children who can start reading in English independently, involving reading chapter books and engaging in various reading activities.
- Topic Discussion: Conducting group discussions on various topics.
- ENIE (Weekends): Reading English newspapers with a native English-speaking teacher and receiving personalized feedback on writing short essays.

Special Reading Promotion Program: Reading Star

Reading Star is a self-directed English reading enhancement program where participants take the SRI test, read books suited to their level, take the SRC quiz to measure improvement, and write reading reports in English to be reviewed by native speakers.

- Period: Annually from April to October (7 months)
- Eligibility: Approximately 120 students from elementary to high school in Busan city.

Use of Volunteers

The Busan English Library actively incorporates volunteers through the following programs:

- Reading Buddy: A weekly activity where elementary students (mentees) and middle/high school students (mentors) read English fairy tales together to develop proper reading habits and build confidence and interest in English.
- Fun Reading with Volunteers: A daily program from Monday to Friday where volunteer members (adults) read English books to children and 1st and 2nd graders.

The Aim of Study

The purpose of this study is to implement English programs for children in Japanese libraries and to explore the possibility of establishing facilities in Japan similar to the children's English libraries found in South Korea.

Method

In the fiscal year 2022, the program was conducted three times, and in the fiscal year 2023, it was held five times, totaling eight sessions in libraries. The participants were preschool and elementary school children, taught English by university students volunteering. Additionally, to evaluate the program, open-ended surveys were administered to the participating children and their guardians.

Results and Discussion

2022 Library Activities

Initially, the plan was to implement this program as part of the library's activities with the cooperation of the libraries. We sought to collaborate with libraries in the suburbs of Tokyo, such as those in Kokubunji City and Nerima Ward, to implement our English program. However, we were refused permission to conduct the program in these libraries for reasons including "Only storytelling is allowed in libraries" and "Libraries are not educational facilities and therefore cannot host programs with a strong educational component." Consequently, we decided to rent a seminar room at a library, "Musashino Place" in Musashino City for a fee to carry out the program.

However, as there were no residents of Musashino City among us, we were not permitted to advertise in the Musashino City newsletter or distribute flyers in community centers and public halls, which made it difficult to recruit children. The program was originally scheduled to be held four times, but it was canceled when only one child registered for the third session. Therefore, the last session was moved to the Kinuta Library in Setagaya Ward, where one of the members is a resident and facilitated the events.

Session 1: Let's Play in English! Art Class "Drawing with Vegetable Stamps"

Date and Time: October 30, 2022, 14:00 - 15:00

Location: Musashino Place, Room C

Participants: 1 preschool child, 10 elementary school students

Volunteers: 6 university students

First, we conducted a CLIL art project, where participants created artwork using vegetable stamps. We then started with a storytelling session on the picture book "*It Looked Like Split Milk*", followed by learning how to say different vegetables, colors, and shapes in English. The children then freely created their artwork.

The following is the schedule for the day.

14:00~14:05 Self-introductions.

14:05~14:15 Storytime with the picture book.

14:15~14:30 Explanation of vegetable stamping.

14:30~14:50 Create freely. Add titles to the artwork.

14:50~15:00 Share titles and show each other's artwork.

Children's Reactions

Initially, the children appeared nervous, but they relaxed after making origami with the students before the program started. Each group, assisted by a student, conversed in both English and Japanese while working on their projects. The older children quickly became enthusiastic and, after completing one piece, moved on to create a second one, drawing their favorite animals, the sky, trees, and more. The younger children and the preschool child, who did not understand the concept of using sliced vegetables as stamps, ended up using the vegetables like paintbrushes but were imaginative in their drawings, nonetheless.

Children's Feedback

Here are some comments from the children:

- I was glad to learn the English names for vegetables.
- I want to teach them to my friends, too.
- It was fun using various vegetables.
- I did well. I want to like vegetables even more now.
- At first, I was just doing it somehow, but gradually I understood what I was making and created my artwork.
- I was surprised that everyone was speaking English and I learned about various vegetables and fruits, so I want to learn more here. It was fun.
- There were various vegetables. I learned the names of vegetables like edamame and spinach in English. Vegetable stamping was also fun.

Guardians' Feedback

Here are some comments from the guardians:

- We were provided with a lot of interesting materials related to vegetables, allowing us to experience something we don't usually do.
- Thank you for letting us participate in such an enjoyable event. I believe that starting from art class will also increase their interest in English.
- It was an interesting activity with many different vegetables provided as tools, allowing the children to experience something they normally don't get to do.
- Thank you for letting us participate in such an interesting event. Starting with art helped to increase their interest in English.

Session 2: Let's Play in English! English × Physical Education "Using Our Brains and Bodies" - Why not experience soccer in English, pretending to be your favorite player?

Date: November 27, 2022, 14:00 - 15:00

Location: Musashino Place, Room C

Participants: 6 elementary school students

Participating Students: 7 university students

In the second session, we conducted a CLIL session focused on physical education. Specifically, we used soccer as the theme and conducted activities such as learning numbers, colors, and sports names, followed by creating self-introductions and practice menus.

The following is the schedule for the day.

14:00~14:08 Greetings. Introductions of teachers and students.

14:08~14:38 Confirmation of alphabet, numbers 1-10, colors & sports names.

14:38~14:58 Let's create a practice menu!

14:58~15:00 Greetings

Children's Reactions

The children seemed to enjoy the activities involving soccer balls, but as it was the first experience for the university students who participated as volunteers, there were moments when the proceedings did not go smoothly.

Children's Feedback

Here are some comments from the children:

- It was good to be able to touch the soccer ball and watch videos.
- The teacher's English was difficult to understand, but the shots in the soccer videos looked cool.
- It was fun and easy to understand.

Guardian's Feedback

Here are some comments from the guardians:

- This was their first time attending an English class and they seemed to have fun. It was very timely to have this theme during the Soccer World Cup excitement. The teacher's gentle English was easy to listen to. Thank you.
- It was great to see them interested in watching soccer videos for self-introductions and quizzes, as they like soccer.
- It was good to be able to interact with English in a fun atmosphere. They seemed to have a good time doing quizzes on the videos and everyone enjoyed themselves. They were happy to be able to introduce themselves too. It was a fulfilling and fun experience. Thank you.
- It was good to see them willing to learn unexpected vocabulary and actions. I think it was great to have participated in such an English learning environment. Thank you.

Session 3: Let's Play in English! Paper Plane Competition: Make and Play with Paper Airplanes with University Students

Date: February 18, 2023, 13:30 - 14:30

Location: Setagaya District Kinuta Library Meeting Room

Participants: 1 preschool child, 7 elementary school students

Participating Students: 7 university students

The third session involved an activity of making paper airplanes in English. We began with a storytelling session reading "*Little Cloud*", followed by a slideshow presentation on making paper airplanes. Then, while watching the slideshow, we made paper airplanes in English. Finally, we flew the completed paper airplanes and measured flight distance and altitude.

The following is the schedule for the day.

13:30~13:45 Greetings, Storytime (Reading "*Little Cloud*"), Slideshow of Paper Airplane Making

13:45~14:00 Make paper airplanes in English while watching the slideshow.

14:00~14:10 Fly the completed paper airplanes, and measure flight distance and altitude.

14:10~14:15 Participants present their flight distance and altitude.

14:15~14:25 Divide into groups and make large paper airplanes.

14:25~14:30 Fly the completed paper airplanes, award medals to participants, and dismiss.

Children's Reactions

Many participants were proficient in English and responded well to communication in English. Half of the participants were 1st graders who enjoyed folding and flying paper planes while listening to English, each showing their unique enjoyment. The other group (2nd to 5th graders) was very calm, attentively following the English slides while making their paper airplanes. Notably, the older group (2nd to 5th graders) cooperated by calling out to each other, unfortunately not in English, while folding and flying larger paper planes in the latter part. When announcing the flight distances and altitudes, following the students' presentations, every participant was able to announce loudly in English. Overall, it seemed that they were enjoying themselves in various ways appropriate to their ages.

Children's Feedback

Here are some comments from the children:

- I had fun. Thank you.

Guardians' Feedback

Here are some comments from the guardians:

- I could see my child thoroughly enjoying making paper airplanes and testing how far they could fly, which also brought discoveries for us. It was reassuring that the university students, both young men and women, kindly interacted with the children, allowing them to participate comfortably.

Discussion of Fiscal Year 2022

As mentioned above, we had struggled to find a library where we could implement the program, and we were unable to secure cooperation from Musashino City in recruiting children. Various difficulties arose before implementation. Based on the experience of the fiscal year 2022, it can be said that conducting English activity programs like those in English libraries in Korea at public libraries is quite challenging.

However, feedback from the children (e.g., 'I was surprised that everyone was speaking English and I learned about various vegetables and fruits, so I want to learn more here. It was fun.') and guardians (e.g., 'It was good to be able to interact with English in a fun atmosphere.' 'I think it was great to have participated in such an English learning environment. ') indicates satisfaction with and enjoyment of such English activities.

2023 Library Activities

In 2023, practices were conducted at four libraries: Shirayuri University Library, Fukaya City Library, Biei Town Library, and Kodaira City Central Library.

Session1: Le's Make a Panel Theater and Read a Story in English

Date: June 24, 2023, 13:00 - 15:00

Location: Third floor of Shirayuri University Library

Participants: 10 elementary school students

Volunteers: 5 university students

We conducted an activity where we made a panel theater based on the picture book "Guri and Gura".

The following is the schedule for the day.

13:00-13:05 Greetings.

13:05-13:15 What's in the box?

13:15-13:25 Introduction to the picture book "Guri and Gura".

13:25-13:40 Practice singing.

13:40-13:50 Brainstorming egg dishes.

13:50-14:10 Creating a panel theater.

14:35-14:45 Break time / Editing time.

14:45-14:55 Presentation viewing.

14:55-15:00 Conducting surveys

Children's Reactions

Initially, the children were nervous, but as they started playing the "What's in the box?" game, they gradually began to speak more and consulted with each other, guessing "Ah! Maybe it's that!". In the activity where they thought about dishes using eggs, we had already anticipated what kind of egg dishes the children might think of, so on the day, it was easy to decide on the ingredients and utensils to use. As a result of discussions with the children, they decided to make omurice (rice omelet) and doughnuts, which were then created as panels. The omurice covered in ketchup and placed on a plate was depicted as very appetizing. After completing the panels, the groups practiced parts of the picture book's narration and recorded it. They rehearsed once before the final recording, which was then filmed. In the end, everyone watched the presentations together.

Children's Feedback

Here are some comments from the children:

- It was fun.
- I had fun making tools from "Guri and Gura" and singing with everyone.
- I learned a lot of English. It was fun.
- The "Guri and Gura" panel theater was fun.

Guardians' Feedback

Here are some comments from the guardians:

- At first, some children were shy, but I was amazed to see how quickly they started to enjoy themselves and became friendly with each other, and how they became more comfortable with English. It was wonderful to see the teachers always being fun and kind, turning the children into smiling and proactive participants in such a short time. Thank you. They also seemed to enjoy painting and drawing.
- My child seemed to have a lot of fun and it was a good experience. Initially hesitant about not understanding English, they became engrossed and enjoyed themselves while painting and memorizing lines.
- I was worried that things might not go smoothly because children can be unpredictable and I feared they might cause trouble, but there was time for them to do things they enjoy like drawing and singing, and thanks to good support, everything turned out well. I was relieved to see them participating happily. Thank you.

- I was happy to see my child taking initiative. It was their first time with English, but they seemed to enjoy it.

Session 2: Why not experience soccer in English, pretending to be your favorite player?

Date: July 29, 2023, 14:00 - 15:30

Location: Fukaya City Library 3F Exhibition Room

Participants: 11 pre-school children, 5 elementary students

Volunteers: 8 university students

The second session focused on CLIL with the theme of soccer.

The following is the schedule for the day.

14:00-14:10 Greetings.

14:10-14:35 Quiz/Game.

14:35-15:10 Let's introduce ourselves.

15:10-15:20 Storytime.

15:20-15:30 Conducting surveys.

Children's Reactions

During the session, the children gradually got to know each other as they introduced themselves while passing a soccer ball around with the university students. They particularly enjoyed the experience of touching the soccer ball. However, due to the presence of many preschool children, there was some confusion and a need for adaptable instruction to cater to the children's levels.

Children's Feedback

Here are some comments from the children:

- I understood the English.
- The guessing game was fun.
- It was fun.

Guardians' Feedback

Here are some comments from the guardians:

- Learning English while playing is, I think, the best way for children to enjoy and learn. The students were very enthusiastic and active in their assistance. So cute!! I hope this becomes a regular event.
- It was great to see my son actively having fun. I would like to bring his younger brother next time.
- At first, he seemed overwhelmed by the atmosphere, but he enjoyed participating through greetings and games, which was impressive. The teachers did a great job of encouraging everyone. I would like to participate again if there is another opportunity.
- I don't speak English myself, so I also enjoyed this kind of class.
- I was pleased to see my child seriously participating in various activities on their own. It was a different learning environment, but it was good that he talked and worked well with other children he was meeting for the first time.
- It was good that the event was almost entirely in English.
- We rarely have all-English events, so this was a very good opportunity!

Session 3: Let's Play in English! Origami in English

Date: September 8, 2023, 16:00 - 17:00

Location: Biei Town Library

Participants: 6 preschool children, 4 elementary school students

Volunteers: 3 university students

We conducted an activity to learn how to fold origami such as frogs and shurikens in English.

The following is the schedule for the day.

16:00-16:10 Greetings.

16:10-17:00 Origami activity.

Children's Reactions

Three booths were set up where children took turns visiting each booth to learn how to fold origami in English. Although the number of student volunteers was reduced to three due to some being diagnosed with COVID-19,

many parents actively participated because there were many preschool children, which helped avoid major confusion. The participating children appeared to be having a great time.

Children's Feedback

Here are some of the children's comments:

- It was fun.
- I wanted to make more different things.

Guardians' Feedback

Here are some comments from the guardians:

- This was our first time at such an English event in this area, and I would like it to continue.
- My child seemed to have a lot of fun; please keep these sessions going in the future.

Session 4: Let's Learn About Body Movements and Create a Practice Menu in English

Date: October 29, 2023, 14:00 - 15:30

Location: Fukaya City Library 3F Exhibition Room

Participants: 10 preschool children, 6 elementary school students

Volunteers: 7 university students

We conducted an English activity to create a soccer practice menu.

The following is the schedule for the day.

14:00-14:10 Greetings.

14:10-14:35 Grouping / Game.

14:35-15:10 Let's create a practice menu.

15:10-15:20 Storytelling.

15:20-15:30 Conducting surveys.

Children's Reactions

More than half of the children participated in the program conducted in July. Since there were many preschool children in the July program, some confusion was observed; however, this time, by separating the preschool children and elementary students for instruction, the program was able to proceed more smoothly than in July.

Children's Feedback

Here are some comments from the children:

- It was fun.
- I enjoyed touching my body to the music and playing soccer.
- Next time, I will try to speak English loudly!
- It was fun. I want to come again.

Guardians' Feedback

Here are some comments from the guardians:

- Today's class was divided into groups for preschool children and elementary students, which was better than last time as it was more purpose-specific. It was good for the brain to learn English while being physically active. The last book about the war was read in a soft voice, and my child didn't understand it, so it would have been nice to have some explanation from the teacher afterward.
- We had fun participating.
- Today was full of enjoyable content. Thank you.
- Thank you for your valuable time. I appreciate the environment where English is spoken.
- My child was nervous during the self-introduction and couldn't speak, but by the time we started moving with the soccer, smiles had increased.
- The ball games and video quizzes were easy to understand and enjoyable even for a four-year-old. It was great that the kids were frequently encouraged and seemed to relax. Thank you.
- My child seemed to be having a lot of fun watching videos in English. I know there were many confusing moments, but I was happy that you dealt with the young children with a smile.
- We watched videos in English, and I was surprised that he could say a few body parts. He was scared at first because it was dark.
- The 1.5 hours felt very short because it was easy for young children to understand and was very interesting.

Session 5: Storytime and Story Creation with an English Picture Book: "The Very Hungry Caterpillar"

Date: December 10, 2023, 13:30 - 15:00

Location: Kodaira City Central Library 3rd Floor Audio-Visual Room

Participants: 5 elementary school students

Volunteers: 7 university students

We focused mainly on storytelling activities at the request of the library.

The following is the schedule for the day.

13:30-13:40 Introducing ourselves while singing songs.

13:40-13:50 Storytime with picture books.

13:50-14:10 Story creation.

14:10-14:30 Rehearsal for presentation.

14:30-15:00 Presentation.

Children's Reactions

- Although the participants were quite reserved and had difficulty opening up initially, during the story creation session, they were able to have individual conversations with the university students and seemed to enjoy the creative process.

Guardians' Feedback

Here is a comment from a guardian:

- My child enjoyed the method of thinking about what happens next in the picture book, expressing it through drawings, and learning English from their artwork. We haven't created opportunities for engaging with English outside of lessons yet, but my child seemed to enjoy this lesson format that combines drawing, which is a familiar activity, with new language learning. If there are more classes like this, I would like to send my child again.

Discussion of Fiscal Year 2022

In 2023, activities were conducted in four libraries, and there was a request to include English storytelling sessions in three of these. In Japan, libraries are traditionally viewed as places primarily for providing books, making it challenging to conduct English activities similar to those in South Korea. On the other hand, some guardians, especially in remote areas like Biei Town in Hokkaido, northern Japan, have expressed a desire for the continuation of such activities. There seems to be a demand for libraries to transcend their conventional roles and offer a broader variety of activities.

Conclusion

This study explored the feasibility of establishing English libraries similar to those in South Korea by regularly conducting English-related activities. The findings reveal significant challenges in implementing such programs in Japan as they are in South Korea. In 2022, difficulties included finding libraries willing to host the program and a lack of cooperation from Musashino City in recruiting participants. In 2023, increased collaboration from libraries, particularly in tasks like child recruitment, made it possible to execute the program in four libraries. Nevertheless, some libraries imposed conditions such as mandatory English storytelling sessions for program approval. After two years of practical research, it has become apparent that while replicating the South Korean model of English libraries in Japan is challenging, it is feasible to run similar English programs centered around storytelling activities.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Online Counseling in the Student Context: A Bibliometric Analysis

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Abstract: This study aims to provide a bibliometric review of the relevant previous research landscape related to online counseling in the student context from 2000-2023. Data were taken from the Scopus database of 215 and refined into 114 publications. Based on the results from bibliometric analysis using VOSviewer software, it was found that 2020 would be the year with the most published articles, namely, 20 articles. The United States is the country that publishes the most articles related to online counseling in the student context, with 26 publications and 18 collaboration links with other countries, followed by Australia, namely 12 publications with 8 collaboration links with other countries, and Indonesia, namely 10 publications with 11 collaboration links with other countries. The trend of citations related to online counseling in the student context occurred in 2020, with as many as 253 citations. Of the 114 articles that have published research related to this field, 40 have been published in Q1 journals. The focus of research on online counseling in the student context by clustering using VOSviewer software is 1) COVID-19 and mental health; 2) higher education and self-stigma; 3) technology and anxiety.

Keywords: Online counseling, Bibliometric analysis, Guidance and counseling

Introduction

Online counseling interventions are now considered to have the potential to address various needs in mental health services (Wong et al., 2018; Navarro et al., 2019; Seidel et al., 2020; Yurayat & Tuklang, 2023). Online counseling has been the subject of extensive research and a rapidly growing field of intervention (Dowling & Rickwood, 2013). Methods of providing support through online counseling continue to improve as technology develops (Nelson et al., 2023). Online counseling is a therapeutic intervention in cyberspace between trained professional counselors and their clients facilitated by technology as a communication modality (Richards & Viganó, 2012). Communication modalities include forums, email exchanges, chat (instant messaging), webcams (e.g., cameras that transmit video over the internet), and audio (voice-only exchanges) (Chester & Glass, 2006;

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Dowling & Rickwood, 2013). Then, the exchange of information can be asynchronous or synchronous. Communication exchanges are asynchronous, meaning there is a time lag between contacts, and communication exchanges are synchronous, meaning communication occurs in real-time or without significant time lag between users (Perle et al., 2011). Asynchronous communication modalities include email and forums, while synchronous ones include audio, chat, and webcam (Dowling & Rickwood, 2013).

Based on the systematic review conducted in this article, the COVID-19 pandemic is a topic that is widely discussed in research related to online counseling in the educational context. Research by Pokhrel & Chhetri (2021) explains that the COVID-19 pandemic has caused the largest disruption to education systems in human history, affecting nearly 1.6 billion students in more than 200 countries. The closure of schools, educational institutions, and other learning spaces has affected more than 94% of the world's student population. The COVID-19 pandemic has brought major life changes (Okan et al., 2020). Social distancing measures and educational movement restrictions have significantly disrupted traditional practices (Pokhrel & Chhetri, 2021). German researchers noted that social distancing and isolation requirements resulting from COVID-19 contributed to the loneliness and depression experienced by many students at school (Holm-Hadulla et al., 2021). The causal factors are poor academic achievement, school dropout rates, and violence against minors (Azevedo et al., 2021). During the lockdown period, university students experienced somatic complaints and aggressive behavior (Parola et al., 2020), high levels of anxiety and depression (Villani et al., 2021; Bruno et al., 2021), and changes in sleep rhythms and symptoms of insomnia (Marelli et al., 2021). Vocational school students who study online also often experience mental health problems, low academic achievement, inaccurate information, and a lack of problem-solving skills (PSS) (Yuniarti & Yusuf, 2021). Therefore, the impact of the COVID-19 pandemic on students' mental health is a major concern for higher education institutions as well as the mental health sector worldwide.

Overall, the scientific community believes that college students' mental health has been severely impacted during the public health emergency, and there is a need to support, assist, and prevent the long-term impact of the pandemic on their mental health (Celia et al., 2022). Research has found a gap in that only about one in five students receive adequate mental health services at university even though the university has adequate facilities to offer help (Auerbach et al., 2016). Then other research also found that only 15.7% of students with mental health disorders received counseling (Rongbudsri et al., 2019). This condition becomes even more complicated because research has explained that the impact of the global COVID-19 pandemic does not provide many choices regarding how to implement mental health services for students (Yurayat & Tuklang, 2023). Because even after the pandemic passes, it will likely have a long-term impact on individual mental health (Ornell et al., 2020).

Research coinciding with the emergence of the COVID-19 pandemic in 2019 noted that the Internet and digital devices are now opening doors for individuals seeking mental health services in Indonesia (Sukmawati et al., 2019). Although the number of people who choose to use the Internet for mental health support is still limited, this number continues to increase along with the rapid growth of Internet users in Indonesia (Sukmawati et al., 2019). The term 'cybercounseling' has been used to describe counseling services based on technological innovation to help combat 'cyberbullying' (Pimdee & Leekitchwatana, 2022). Studies have also been conducted to highlight mental health prevention and intervention efforts using the Internet and mobile devices (Ebert et al., 2018), as well as reporting on the use of the Internet in providing online mental health counseling to treat college students' anxiety, depression, and improve psychological well-being (Davies et al., 2014). Although initially online counseling has received criticism from professionals and lay people due to concerns regarding the impact of the loss of cues on the therapy process, ethical issues and legal implications for all aspects of the construction and delivery of online counseling features, various practical problems of online counseling, as well as concerns about reliance on technology (Barak et al., 2012), but with increasing research evidence regarding the benefits of online counseling, online counseling is now an acceptable form of psychological support (Baker & Ray, 2011; Jorm et al., 2013).

Research highlights the significant benefits of online counseling services for students in various contexts. Thanks to the Internet, individuals seeking mental health services have a new way to communicate with health professionals worldwide (Li et al., 2013). In Ghana, male and female students generally receive online counseling and report that the most significant advantages of online counseling are time savings and convenience (Awabil & Clifford, 2018). This research is in line with research that reports that utilizing online counseling is a convenient way to access information quickly, saves time, increases self-confidence in clients who lack the confidence of face-to-face counseling, and provides a more effective way to interact with clients (Bastemur & Bastemur, 2015; Lamela et al., 2020). Apart from that, online counseling also helps students eliminate the challenges of the counseling process, such as limited transportation and places to live that are

difficult to reach, such as in rural or remote places (Navarro et al., 2019). Likewise, the effectiveness of online counseling for students with disabilities who experience travel barriers or wish to remain anonymous (Jones & Stokes, 2009). Online counseling has been reported to help remove the social stigma associated with seeking mental health support services so that more people can seek professional help (Li et al., 2013; Lamela et al., 2020; Hadler et al., 2021; Ran et al., 2021). The effectiveness of online counseling is at least equivalent to face-to-face counseling (Barak et al., 2012; Richards & Viganó, 2013; Dowling & Rickwood, 2013; Drago et al., 2016), and can be successfully applied to various mental health problems such as depression, anxiety, stress, or post-traumatic stress disorder (Andrews et al., 2018; Andrews et al., 2018; Berryhill et al., 2019; Axelsson et al., 2020; Novella et al., 2022). The results showed that in students in Italy, positive affect, subjective well-being, and future time perspective increased significantly after the intervention of online counseling; in contrast, the participants reported significantly lower levels of negative affect, global mental distress, state and trait anxiety, as well as perceived stress over time (Celia, et al., 2022).

In line with the continued development of research on online counseling in the student context, this research seeks to outline and map the cumulative scientific knowledge and nuances of the field's evolution by rigorously understanding large amounts of unstructured data using bibliometric analysis. Bibliometric analysis is a popular and rigorous method for exploring and analyzing large amounts of scientific data, allowing researchers to uncover nuances of evolution within a particular field while highlighting emerging areas within that field (Donthu, Kumar, Mukherjee, et al., 2021). Bibliometric analysis is used for various reasons, such as to uncover emerging trends in article and journal performance, collaboration patterns, and research constituents and to explore the intellectual structure of a particular domain in the extant literature (Donthu, Kumar, Pandey, et al., 2021; Donthu, Kumar, & Pandey, 2021; Verma & Gustafsson, 2020). The data that takes center stage in bibliometric analysis tends to be massive (e.g., hundreds, even thousands) and objective (e.g., number of citations and publications, occurrences of keywords, and topics), although their interpretation often relies on objective evaluations (e.g., performance analysis) and subjective (e.g., thematic analysis) determined through informed techniques and procedures (Donthu, et al., 2021). Therefore, a well-conducted bibliometric study can build a strong foundation for advancing a field in new and meaningful ways (Donthu, Kumar, Mukherjee, et al., 2021). For example, it enables and empowers researchers to (1) gain a comprehensive picture, (2) identify knowledge gaps, (3) obtain new ideas for investigation, and (4) position their contributions in the field (Donthu, et al., 2021).

Research Purposes

This study aims to provide a bibliometric review of the relevant previous research landscape related to online counseling in the student context from 2000-2023 with the following questions proposed:

Q1: What are the citation trends related to online counseling in the student context?

Q2: How is the distribution of journal rankings based on quartile values related to online counseling in the student context?

Q3: What is the geographical distribution of publications and collaboration patterns between countries in research related to online counseling in the student context?

Q4: What is the focus of research on online counseling in the student context?

Method

Data Collection Strategy

Scopus presents scientific articles from journals that have passed a strict selection process and have a high reputation. Scopus provides complete metadata for each article, including information about the author, affiliation, abstract, keywords, and citations, which makes it easier for researchers to evaluate the relevance of an article and get an overview of a study. Therefore, researchers used Scopus to carry out bibliometric analysis regarding online counseling in a student context. The data collection procedure was carried out using the PRISMA statement, which consists of identification, screening, eligibility, and inclusion processes (Moher et al., 2009). The PRISMA statement provides a methodologically acceptable and rigorous model that contributes to quality assurance of the revision and replication process (Albeha et al., 2020). In the identification process, the author enters TITLE-ABS-KEY ("Online Counseling" OR "Internet Counseling" OR "Virtual Counseling" OR "e-Counseling" OR "Digital Counseling" OR "Web-Based Counseling" OR "Remote Counseling" OR "Cyber Counseling" OR "Telecounseling" AND Student*) in the Scopus database search, thus obtaining

publication data of 215 articles without duplication. After the identification process, screening and assessment for eligibility were carried out, which aimed to exclude articles that were not linear with the included criteria, namely articles that did not discuss online counseling variables in the student context. A total of 114 articles were declared worthy for use in bibliometric analysis. Data was taken via the Scopus database on September 28, 2023.

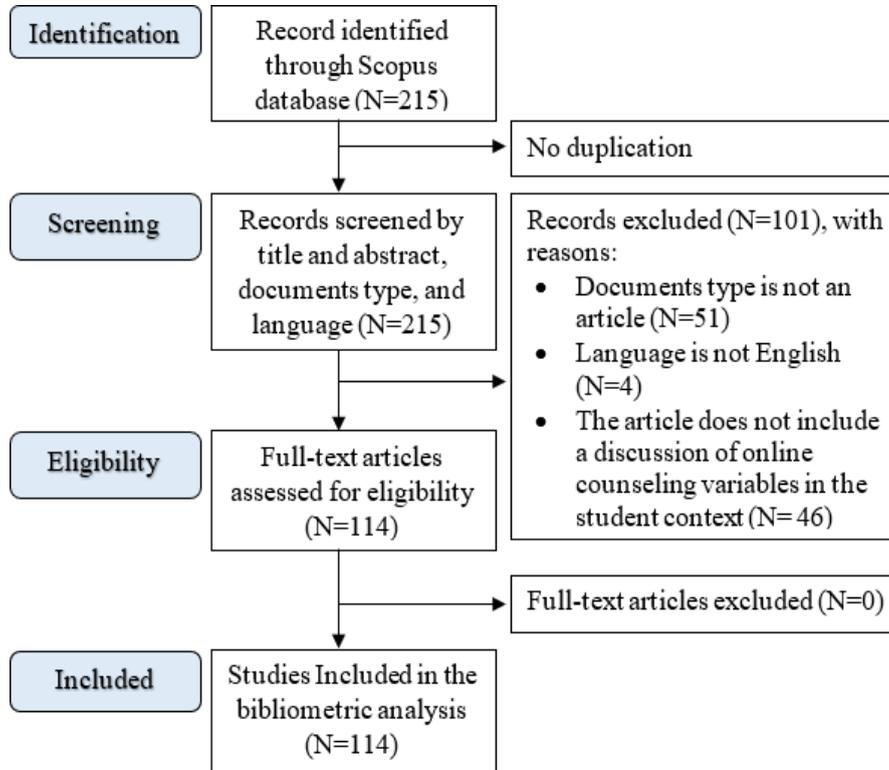


Figure 1. PRISMA flow diagram of the study screening process (Moher et al., 2009)

Data Analysis Method

Total publications and average citations per year regarding online counseling in the student context from 2000 to 2023 were calculated using Microsoft Excel software. The calculation results for the g-index and h-index from each publication were obtained using the Harzing Publish or Perish software. Apart from that, researchers also use Microsoft Excel software to create journal ranking distributions based on quartile values and geographic distribution of publications. Furthermore, to obtain information regarding the distribution of collaboration relations between countries and the research focus of the publication, researchers used VOSviewer software.

Results and Discussion

A description of bibliometric analysis in research on online counseling in student context will be presented in a discussion of trends of citation, journal ranking distribution, geographic distribution and collaboration pattern between countries, and research focus.

The Trends of Citation Related to Online Counseling in The Student Context

This section presents citation trends in research regarding online counseling in the student context from 2000 to 2023 with citation analysis groupings, namely total of publications (TP), number of cited publications (NCP), total of citations (TC), citation per publications (C/P), citation per cited publications (C/CP), h-index (h), g-index (g).

Table 1. Citation analysis of publications

Year	TP	NCP	TC	C/P	C/CP	h	g
2023	13	7	7	0.54	1.00	1	1
2022	18	12	55	3.11	4.58	4	7
2021	9	9	89	9.89	9.88	5	9
2020	20	19	253	9.00	13.31	8	12
2019	3	3	93	31.00	31.00	3	3
2018	10	10	121	12.10	12.10	6	10
2017	6	6	95	15.83	15.83	5	6
2016	6	6	56	9.33	9.33	4	6
2015	6	6	171	28.50	28.50	5	6
2014	3	3	43	14.33	14.33	2	3
2013	5	5	59	11.80	11.80	4	5
2012	2	2	49	24.50	24.50	2	2
2011	1	1	4	4.00	4.00	1	1
2010	2	2	27	13.50	13.50	2	2
2009	3	3	117	39.00	39.00	3	3
2008	3	2	80	26.67	40.00	2	3
2007	3	2	70	23.33	35.00	2	3
2006	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0
2000	1	0	0	0	0	0	0

Table 1 shows that the highest total of publications (TP) between 2000 and 2023 was in 2020, with a total of 20 article publications, followed by 2022 with a total of 18 article publications. 2020 was also the year with the highest number of cited publications (NCP), where there were 19 articles cited out of a total of 20 published articles, followed by 2022, with 12 articles cited out of a total of 18 published articles. Furthermore, the highest total of citations (TC) was in 2020, with 253 citations in 19 published articles, followed by 2015 with 171 citations in 6 published articles. In terms of productivity and the impact of publications on research regarding online counseling in a student context, 2020 occupied the highest position, marked by an h-index of 8 and a g-index of 12. In 2020, it was recorded as having a citation per cited publication (C/CP) of 13.31, which is the result of dividing the total of citations (TC) of 253 citations by the number of cited publications (NCP) of 19. The citation trend related to online counseling in the student context from 2000 to 2023 can be seen from the total value of citations (TC) in Table 1. Table 1 shows that 2020 is the year with the most cited publications, 253 times out of 20 published articles with an h-index value of 8 and a g-index value of 12. So, 2020 is a year that will have a significant influence on research related to online counseling in the student context. Here are the ten most cited articles published in 2020:

Table 2 shows that the article by Saravanan et al. (2020) is the most cited article, with 82 citations. The study "Knowledge, Anxiety, Fear, and Psychological Distress About COVID-19 Among University Students in the United Arab Emirates" found that students with a history of mental illness, anxiety, and fear significantly predicted psychological distress during the COVID-19 pandemic. The study recommended that educational institutions provide academic and professional counseling to reduce students' psychological distress and improve their academic performance. Additionally, the study suggested that conducting frequent web-based question-and-answer sessions might help students manage their doubts about COVID-19 and alleviate their anxiety and fear related to the pandemic. These findings highlight the potential benefits of online counseling and support for students during the COVID-19 pandemic. In summary, the study's results indicate a clear relationship between the psychological distress experienced by university students and the potential benefits of online counseling and support services in addressing their anxiety and fear related to COVID-19. Furthermore, the article with the second most citations is the article written by Savarese et al. (2020), which has 34 citations. The study sheds light on the psychological challenges faced by university students during the pandemic and the importance of providing effective online counseling services to support their mental well-being during such challenging times. The article's results demonstrate the effectiveness of online counseling in addressing the psychological needs of university students during the COVID-19 lockdown. The online counseling services provided by the center included telephone listening activities, online psychological interviews, psychoeducational groups for anxiety management, and workshops on study methods conducted in small

groups. The counseling interventions were aimed at increasing resilience and identifying psychological problems in order to implement timely management.

Table 2. Ten most cited articles in 2020

No.	Author (Year)	Title	Sources	Citation
1.	Saravanan et al. (2020)	Knowledge, anxiety, fear, and psychological distress about covid-19 among university students in the united arab emirates	Frontiers in Psychiatry	82
2.	Savarese et al. (2020)	Online university counselling services and psychological problems among italian students in lockdown due to covid-19	Healthcare	34
3.	Shorey et al. (2020)	Communication skills training using virtual reality: a descriptive qualitative study	Nurse Education Today	25
4.	Seidel et al. (2020)	Communicating mental health support to college students during covid-19: an exploration of website messaging	Journal of Community Health	25
5.	Pordelan et al. (2020)	Promoting student career decision-making self-efficacy: an online intervention	Education and Information Technologies	17
6.	Savarese et al. (2020)	Online university counselling services and psychological problems among italian students in lockdown due to covid-19	Healthcare	10
7.	Bird et al. (2020)	College students' attitudes, stigma, and intentions toward seeking online and face-to-face counseling	Journal of Clinical Psychology	8
8.	Suranata et al. (2020)	The comparative effect of internet-based cognitive behavioral counseling versus face to face cognitive behavioral counseling in terms of student's resilience	Cogent Psychology	8
9.	Zeren et al. (2020)	The effectiveness of online counseling for university students in Turkey: A non-randomized controlled trial	European Journal of Educational Research	8
10.	Foon et al. (2020)	E-counselling: The intention, motivation and deterrent among school counsellors	Universal Journal of Educational Research	7

The third and fourth articles were cited the most, with 25 citations each. The third article is an article written by Shorey et al. (2020). The article's findings on the use of virtual patient simulations in nursing education have implications for the urgency of implementing virtual counseling programs. The study revealed that while virtual patient simulations have the potential to enhance nursing communication skills, there are limitations, such as lack of authenticity and technological improvements needed. The development and implementation of virtual counseling programs should prioritize addressing these limitations to ensure the effectiveness and authenticity of the training. Additionally, the study highlighted the importance of individual learning objectives and priorities in the effectiveness of virtual patient training, indicating that virtual counseling programs should be tailored to meet the specific needs and expectations of the users. Overall, the findings emphasize the need for urgent attention to technological improvements and individualized approaches in the development of virtual counseling programs to ensure their effectiveness in training communication skills. Then the fourth article was written by Seidel et al. (2020). The study examined the communication of mental health support to college students during the COVID-19 pandemic, particularly focusing on the availability of remote counseling services

on college and university websites. The findings revealed that only half of the surveyed web pages provided information about remote counseling, and just under two-thirds of schools had directions for students experiencing a mental health emergency. The study also found that enrollment size was associated with the availability of psychoeducation about mental health and COVID-19, as well as information about remote counseling on school websites. Medium-sized schools were likely to have these resources available compared to small and large-sized schools, possibly due to the availability of a range of mental health treatment options in urban areas. The study emphasized the critical role of college counseling centers in addressing mental health crises, especially during the pandemic. It highlighted the need for colleges and universities to adapt their mental health support strategies to address the ongoing mental health needs of students.

The Distribution of Journal Rankings based on Quartile Values to Online Counseling in the Student Context

Journal ranking of articles related to online counseling in the student context is carried out by identifying quartile values. Identification of quartile values in journals is done via the Scimagojr website. The following is an image that presents the ranking distribution of the journals examined.

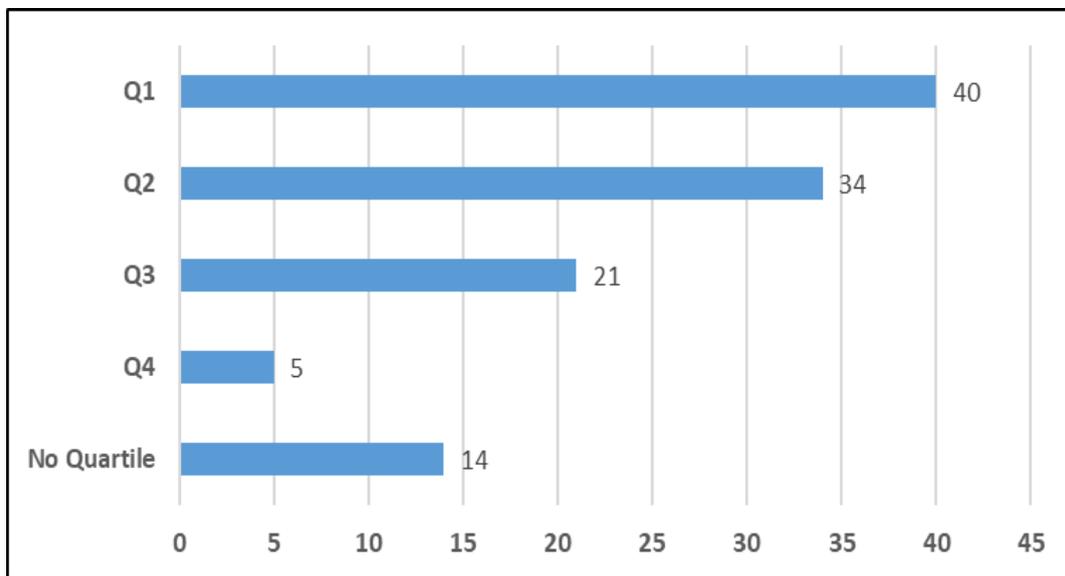


Figure 2. Ranking distribution based on journal quartile values

Figure 2 shows that the ranking by quartiles had the highest distribution in Q1, with a total of 40 articles. Furthermore, the second highest distribution was in Q2 with 34 articles, followed by the distribution in Q3 with 21 articles and Q4 with 5 articles. In research about online counseling in the student context, there were still 14 articles that indicated there were no quartiles. Therefore, authors who research this field need to be more selective in choosing journals to publish their research.

The following is the distribution of journal rankings based on quartile values for the five journals with the most articles from 2000 to 2023. Table 3 shows that *Frontiers in Psychiatry* is the journal that has published the most articles related to online counseling in the student context, namely 5 articles. The journals below can be used as references for researchers to publish articles related to online counseling in the student context.

Table 3. Five journals with the most articles

Journal name	Number of article	Quartile value
Frontiers in Psychiatry.	5	Q1
International Journal for the Advancement of Counselling.	4	Q2
International Journal of Environmental Research and Public Health.	4	Q2
British Journal of Guidance and Counselling.	4	Q3
Education and Information Technologies.	3	Q1
Counselling and Psychotherapy Research.	3	Q2
Journal of the Australian and New Zealand Student Services Association.	3	Q4

Geographical Distribution of Publications and Collaboration Pattern between Countries in Research related to Online Counseling in the Student context

Geographic distribution is an explanation of the distribution country of origin of the author, who has researched the field of online counseling in the student context. Details of the distribution can be seen in Figure 3.

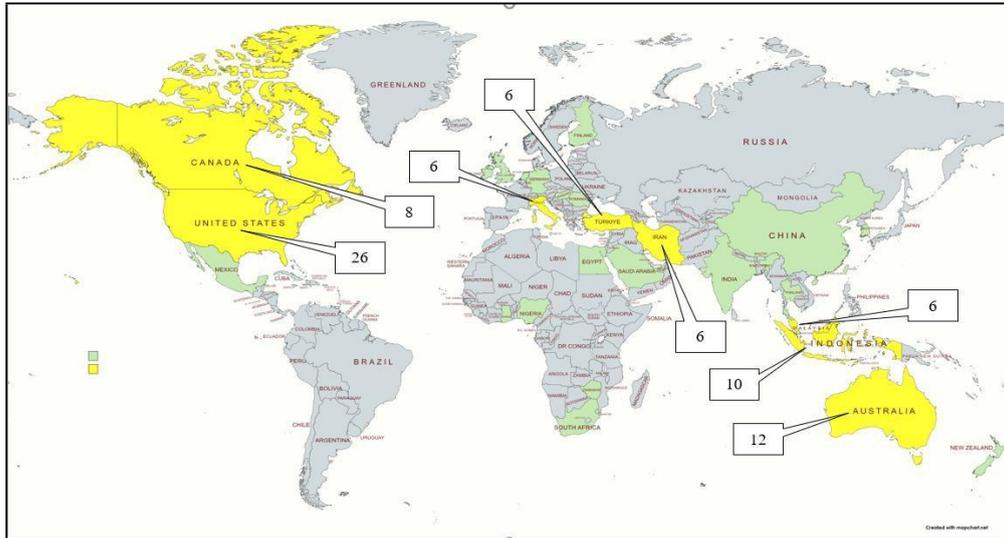


Figure 3. Geographic distribution of publications

There are a total of 35 countries that research the field of online counseling in the student context. The United States is the country that publishes the most articles regarding online counseling in the student context, namely 26 articles. The country with the next most publications is Australia with 12 articles, Indonesia with 10 articles, and Canada with 8 articles. Then, it was followed by Iran, Italy, Malaysia, and Türkiye, with 6 articles each.

In presenting the collaboration relations between countries, researchers do not determine a threshold with certainty. In this case, countries that have 1 article document will be displayed, even though that country does not have cooperative relations with other countries. The distribution of collaboration relations in a total of 35 countries in the article regarding online counseling in the student context is shown in Figure 4.

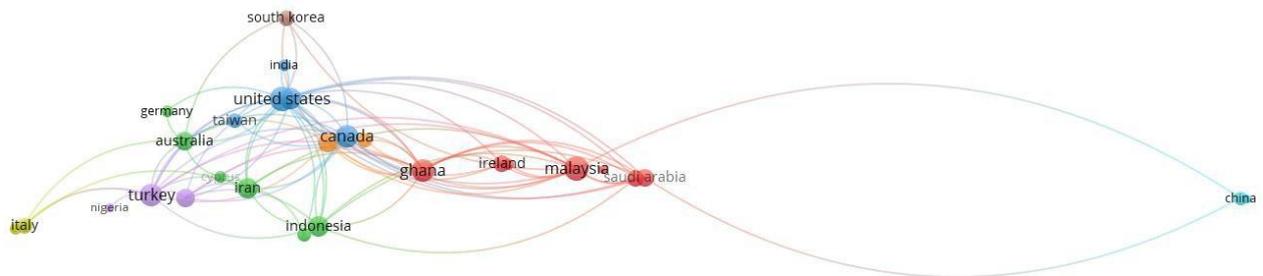


Figure 4. Distribution of collaboration relations between countries

Figure 4 shows that the largest circle diameter is in the United States. The United States has the highest collaborative relationship with other countries, namely 18 countries, regarding online counseling publications in the student context. Apart from that, the relatively large circle diameters are Malaysia, which has 17 collaborative relations with other countries; Canada and Türkiye, with 14 cooperation relations with other countries; and Iran and Indonesia, with 11 cooperation relations with other countries.

The Focus of Research on Online Counseling in the Student Context

The research focus is seen from the author keywords in VOSViewer software by setting the minimum number of occurrences of a keyword to 2 times in published articles so that 53 out of 361 meet the threshold to be

selected. Furthermore, after going through the verified selected keywords process, 37 were used in research and displayed in Figure 5.

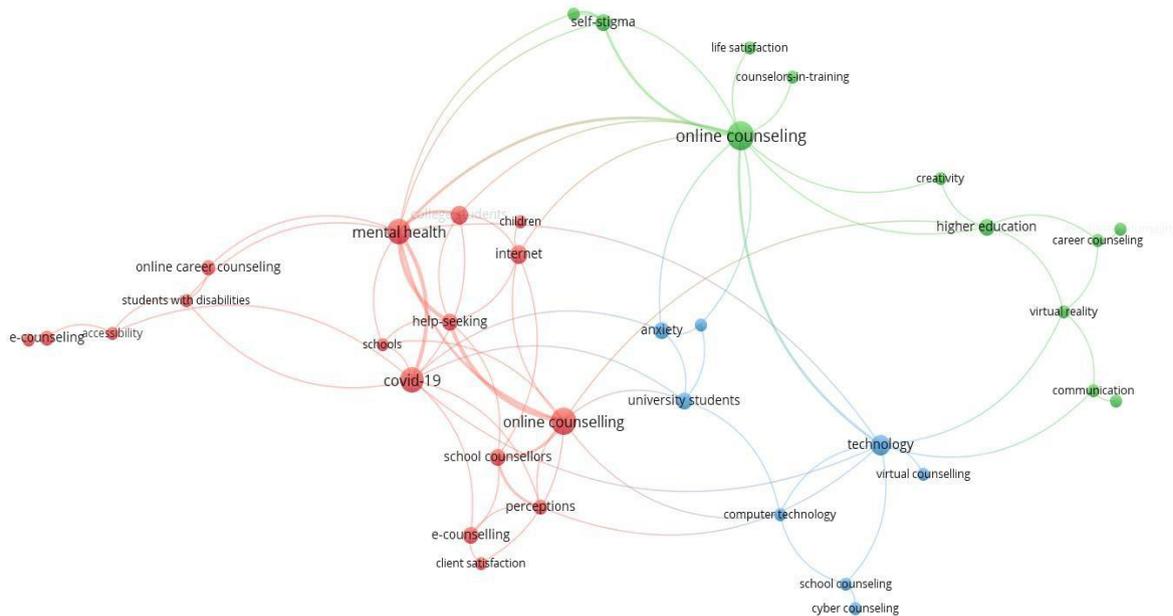


Figure 5. Research focus of publications

Researchers use 3 clusters to explain the focus of research regarding online counseling in the student context, namely the red, green, and blue clusters. First, the red cluster has 17 keywords. Of the 17 keywords, the largest circle diameters are "COVID-19" and "mental health." This indicates that the key "COVID-19" and "mental health" are the main focus of research regarding online counseling in the student context. Second, the green cluster has 12 keywords, where "higher education" and "self-stigma" are the main focus of the research. Next, the third is the blue cluster, which has 8 keywords, where "technology" and "anxiety" are the main focus of research.

Young individuals have emerged as one of the most affected demographics amid the COVID-19 pandemic and associated restrictions on daily life, leading to disruptions in education, social interactions, and connections (Berger et al., 2023). The measures implemented to control the spread of COVID-19 have also affected the mental health of university students and their ability to handle important developmental tasks (Esposito et al., 2023). Therefore, there is a need to provide online counseling services, which have become the preferred method of supporting students during their university studies in the pandemic era, as a supplementary approach to traditional face-to-face counseling (Esposito et al., 2023). The study explores how mental health professionals in schools have supported and addressed the mental health needs of young people during COVID-19 restrictions in Australia (Berger et al., 2023). It highlights the innovative strategies adopted by school mental health staff to assist students during lockdowns and remote learning, including telehealth services, digital resources, and online training and support (Berger et al., 2023). Additionally, the research in Turkey examines counselors' experiences and adaptation processes within university counseling centers during the COVID-19 pandemic (Tuna & Avci, 2023). Thematic analysis indicates that counselors had to adapt to pandemic-induced changes to continue their services, with most counselors showing positive attitudes toward online counseling (Tuna & Avci, 2023). Another study aimed to evaluate the effectiveness of 13 online counseling groups involving 66 underperforming students struggling with their studies, demonstrating the supportive role of online group counseling during the pandemic and in addressing academic challenges (Esposito et al., 2023). The research identified barriers and facilitators in providing counseling and assessment services during lockdowns, including challenges in conducting psychometric assessments during remote learning and ethical concerns surrounding remote counseling delivery (Berger et al., 2023). Counselors faced personal and professional challenges during ongoing counseling sessions (lack of institutional aid, stress, and burnout) and documented their self-care practices (physical health: diet, physical exercise; social support: spending time with families that helped them to feel safe, talk with colleagues and shared their experiences or projects to helped them feel worthwhile; and professional help: counseling sessions after dragged to negativity by clients during the pandemic) (Tuna & Avci, 2023).

Research conducted by Yurayat and Seechaliao (2022) revealed the impact of online counseling (OC) on the mental health of Mahasarakham University Undergraduate Students in Bangkok, Thailand amid the COVID-19 pandemic. OC was found to provide convenient access to psychological support during the pandemic, with counselees exhibiting positive attitudes towards this mode of counseling (Yurayat & Seechaliao, 2022). Notably, no significant differences in attitudes were observed across various demographic and counseling-related factors, as revealed by the study (Yurayat & Seechaliao, 2022). In-depth interviews further highlighted a preference for counseling over both face-to-face counseling (FFC) and OC among participants; the study emphasized the value of OC as a resource for addressing mental health challenges among university students during the pandemic (Yurayat & Seechaliao, 2022). Similarly, research conducted by Celia, Tessitore, et al. (2022) evaluated the effectiveness of online individual counseling provided to Italian undergraduate students during the COVID-19 pandemic. Their study demonstrated significant improvements in mental health indicators post-intervention, including increased positive affect, subjective well-being, and future time perspective, alongside decreased negative affect, global mental distress, anxiety, and perceived stress (Celia, Tessitore, et al., 2022). These findings underscored the positive impact of online counseling interventions in enhancing the well-being of university students during public health crises, providing valuable insights for intervention development in similar contexts (Celia et al., 2022). Furthermore, Khalijian et al. (2023) conducted a mixed study examining the customization and utilization of digital storytelling in online career counseling services for students with physical-motor disabilities in Iran. They found that while students with disabilities face significant challenges in accessing career guidance services, online career counseling, with or without digital storytelling, notably reduces these challenges (Khalijian et al., 2023). Moreover, online counseling significantly enhances academic buoyancy, employability, and mental health among students with disabilities, with digital storytelling showing particular promise in improving employability and mental health outcomes (Khalijian et al., 2023). This research underscores the critical relationship between online counseling and mental health, highlighting its potential to address barriers in accessing career guidance services and promote positive mental health outcomes in this population (Khalijian et al., 2023).

Studies on online counseling have been widely carried out among university students at higher education levels (Tuna & Avci, 2023; Yurayat & Seechaliao, 2022; Celia et al., 2022; Bird et al., 2020; Chen et al., 2022; Wang et al., 2020), where issues like self-stigmatization have emerged as significant topics of investigation. An online survey with 538 participants from a university in the Southeastern United States revealed higher levels of self-stigma and discomfort associated with online counseling compared to face-to-face counseling (Bird et al., 2020). Additionally, participants reported higher value and intentions toward face-to-face counseling (Bird et al., 2020). The study concluded that face-to-face counseling was viewed more favorably than online counseling, and the value of online counseling emerged as a crucial predictor for seeking this form of help (Bird et al., 2020). Stigma significantly influences the willingness of individuals to engage in counseling (Chen et al., 2022). Surveying 823 Chinese college students found that feeling ashamed about seeking help (self-stigma) and doubts about online counseling ethics negatively impacted their willingness to receive online counseling (Chen et al., 2022). However, trust in online interactions positively influenced willingness to receive online counseling (Chen et al., 2022). Importantly, ethical concerns played a mediating role, linking self-stigma and trust to willingness to use online counseling, so the study suggests reducing self-stigma, improving online counseling ethics, and building trust to encourage more students to seek online counseling support (Chen et al., 2022). Interestingly, self-stigma has been observed not only in the context of online counseling but also in face-to-face counseling settings (Wang et al., 2020). A study investigating college students' intentions to seek counseling services found that higher levels of self-stigma and stigma from close others made face-to-face counseling less appealing compared to online counseling (Wang et al., 2020). Despite the general preference for face-to-face counseling, certain personal and social factors may lead individuals to favor online counseling as a more favorable option, highlighting the complex interplay between self-stigma, social influences, and counseling preferences (Wang et al., 2020). These findings underscore the importance of addressing self-stigma in both online and face-to-face counseling contexts to promote more positive attitudes and greater acceptance of counseling services among college students.

Regarding online counseling, technology plays a significant role in shaping the delivery, effectiveness, and challenges of virtual counseling services. Technology plays a multifaceted role in online counseling, offering benefits such as accessibility and efficiency while presenting challenges such as privacy concerns and technological limitations that need to be developed to effectively deliver virtual counseling services (Wells, 2023; Jaber & Al-Hroub, 2023). It serves as a tool to extend counseling services to remote areas, facilitate communication between counselors and clients, and provide support resources for students during online learning (Jaber & Al-Hroub, 2023; Mtemeri et al., 2022; Alias et al., 2022). Several studies have explored the efficacy of online counseling interventions in alleviating anxiety among university students, particularly during the COVID-19 pandemic. The study conducted by the University of Foggia assessed the effects of online

counseling on the mental health of Italian undergraduate students, revealing significant improvements in various mental health aspects post-intervention, including decreased levels of anxiety (Celia, Tessitore, et al., 2022). Similarly, research comparing online synchronous video counseling to in-person counseling using solution-focused brief therapy (SFBT) found significant reductions in anxiety levels for both methods, indicating the effectiveness of online counseling in treating anxiety among undergraduate students in Catholic university in the northeast United States (Novella et al., 2022). Furthermore, a study comparing online and face-to-face psychodynamic counseling interventions demonstrated that both approaches effectively reduced psychological distress, including anxiety symptoms, among students of the University of Milano-Bicocca (Ierardi et al., 2022). Although face-to-face counseling was associated with increased life satisfaction, online counseling was nearly as effective in reducing anxiety, highlighting its potential as an alternative during crises like the COVID-19 pandemic (Ierardi et al., 2022). Additionally, research on online counseling among undergraduate students at the University of Foggia, in southern Italy, using the Brain Wave Modulation Technique (BWM-T) showed promising results in enhancing emotional well-being among university students, with notable improvements in positive affect and decreases in negative affect observed over time, although the decrease in state anxiety was not statistically significant (Celia, et al., 2022). These findings collectively underscore the importance of online counseling interventions in addressing anxiety and promoting mental well-being among university students, particularly in times of crisis.

Conclusion

Online counseling interventions have demonstrated benefits for clients in accessing mental health services. Based on the comprehensive bibliometric review presented in the abstract, this study contributes significantly to understanding the landscape of online counseling in the student context from 2000 to 2023. The meticulous analysis of 114 publications from the Scopus database using VOSviewer software provides valuable insights into the trends and patterns within this field. The identification of 2020 as the peak year for published articles, the prominence of the United States in contributing 26 publications with noteworthy international collaborations, and the emergence of key themes such as COVID-19 and mental health, higher education and self-stigma, and technology and anxiety, all offer a comprehensive understanding of the research landscape. The recognition of 40 articles being published in Q1 journals and the substantial citation trend in 2020 with 253 citations underscore the scholarly impact of research in online counseling in the student context. This study maps the existing body of knowledge and sets the stage for future research directions and policy considerations in online counseling for students.

Recommendations

This study contributes to the existing knowledge base and underscores the importance of addressing mental health concerns and technological interventions in the context of online counseling for students. Researchers and practitioners can leverage these insights to explore further and improve the effectiveness of online counseling strategies, especially in the face of challenges posed by the COVID-19 pandemic and the evolving higher education landscape.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Virtual Classroom Tools in Music Education

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Abstract: Education is also continued with distance education, which is an alternative model with the support of technology. The formation of student and teacher environment in distance education depends on the virtual classroom. Virtual classroom is an educational environment where individuals in different places come together simultaneously through internet infrastructure and computer. Virtual classroom is applied in many disciplines of the education system. The high motivation of the students during the lesson in the virtual classroom and the permanence of learning depend on the virtual classroom tools used during the lesson. However, it is not known under which titles virtual classroom tools are applied in music education, which is a part of the education system. Based on this problem, it was aimed to reveal the dimensions in which virtual classroom tools are applied in music education. Based on the data obtained, it was determined that there are tools specific to music education as well as tools used in general education. In the literature review, it was determined that the tools used in music education are grouped under five headings: recording technology, note writing, sound organisers, in-class activities and artificial intelligence. According to the results of the research, the importance of music teachers' use of educational technologies and the positive effect of virtual classroom tools on students in music lessons have emerged. The necessity of providing in-service training for teachers on the utilisation of virtual classroom tools in the curriculum of music education was emphasised, as was the role of technology in music education in the contemporary context

Keywords: Music education, Virtual classroom, Educational technology

Introduction

It is possible for societies to reach a level of development that allows them to keep pace with the age through changes to the education system. In the current context, it is evident that this change is made possible by the opportunities provided by technology. The discoveries in technology have profoundly affected the field of education and have led to the formation of new concepts by gaining superiority over previous systems (Kılınc, 2015). Consequently, the revolution in information technology has transformed our perceptions of education. Despite the enduring popularity of face-to-face and teacher-centred teaching in traditional methods, contemporary educational approaches necessitate a student-centred approach that emphasises active learning, collaborative learning, and even content preparation.

Distance education represents a significant alternative model of education in the contemporary era, offering a valuable means of demonstrating the importance of sustainability in education. Distance education is a digital education field in which the teacher and the student are situated in different locations and at different times

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(asynchronous) or in the same time period (synchronous). This is achieved through internet infrastructure and technological communication tools (computer, tablet, phone) in both individual and collective education.

In distance education, the teacher and the student require a classroom environment for the transfer of mutual information. This need is met by the "virtual classroom" environment. Concurrently, virtual classroom environments are also digital environments in which people continue the act of learning. These environments enable the use of different learning tools, including the creation of presentations in the lesson, the measurement of information, and the facilitation of learning through the use of various forms of entertainment. In the virtual classroom environment, the teacher's instant access to information from a multitude of sources during the teaching action facilitates the transfer of information to the student. It is well documented that the virtual classroom environment has a more positive effect on course success compared to traditional education. Furthermore, the use of interactive course materials in online learning platforms has been shown to increase academic performance (Ustundag, 2012; Akcapinar, 2014; Zimmerman, 2012). It has been posited that these environments facilitate the retention of knowledge and enhance student engagement (Blaine, 2019).

In order to create a virtual classroom environment, it is first necessary to obtain software that will facilitate the creation of the desired environment. Such software can be used to create a virtual classroom environment in real time. The most commonly used software in this regard is *Adobe Connect*, *Big Blue Button*, *Elluminate Live*, *Microsoft Live Meeting*, *Google Meet*, and *Zoom*.

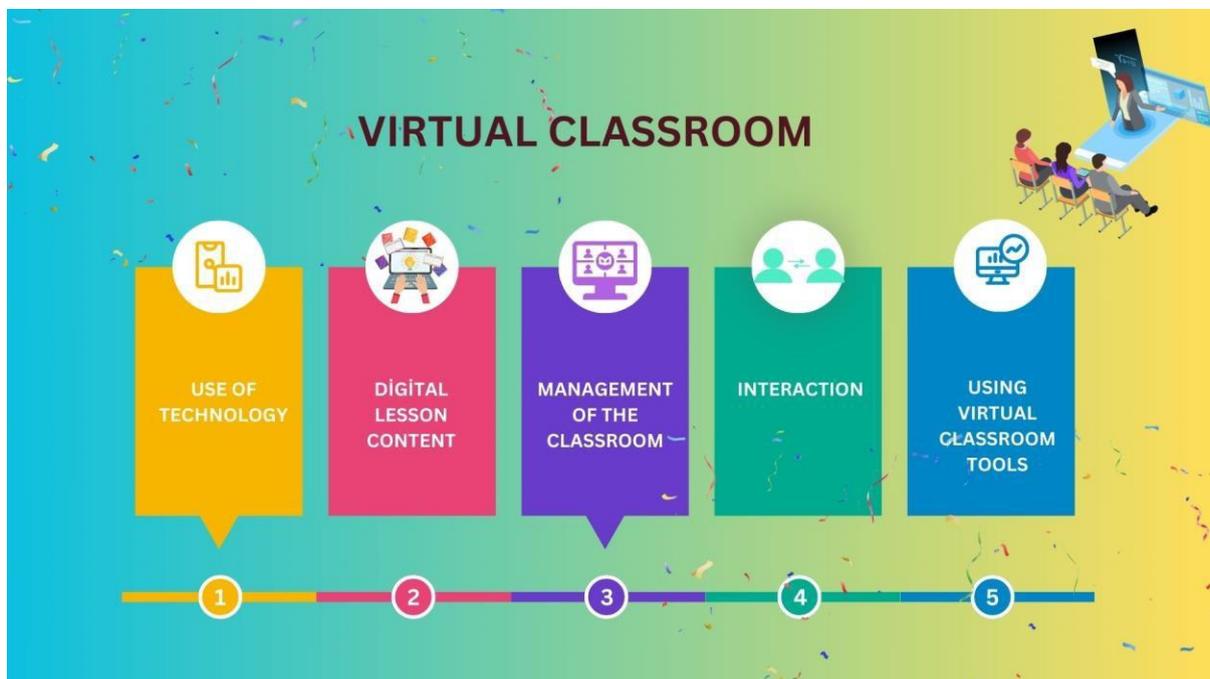


Figure 1. Virtual classroom

The components required for the functioning of the virtual classroom are shown in Figure 1. As illustrated in Figure 1, the components of the virtual classroom include the ability of the teacher and the student to utilise technology for educational purposes, the suitability of the course content for use and sharing in the virtual classroom environment, the classroom management being carried out by the teacher, ensuring interaction by sharing with the student during the lesson, and the active use of virtual classroom tools in the lesson. In light of the 21st century skills required of teachers, it is essential that they are able to utilise virtual classroom tools effectively in the learning-teaching process. They must also be able to select technology-based applications that are suitable for the objectives of the course, follow new developments and continuously improve themselves (Cumhur & Cam, 2021).

In the current era, where Web technologies have reached version 4.0, it is commonly observed that virtual classroom tools are grouped under the designation of Web 2.0. In contrast to Web 1.0 technologies, which are designed to present information, Web 2.0 technologies facilitate both synchronous (real-time) and asynchronous (at different times) online interaction through text, audio, video and graphics (Rockinson-Szapkiw & Walker, 2009; Rosen & Nelson, 2008). The most significant distinction between Web 1.0 and Web 2.0 is that the constraints on access to information are removed in Web 2.0. The advent of this technology has enabled the

development of numerous web-based applications that are now available at no cost. Table 2 presents a comparison between Web 1.0 and Web 2.0.

Table 1. Comparison of Web 1.0 & Web 2.0

WEB 1.0	WEB 2.0
Websites and content produced by certain software developers	Content produced by web users (image, blog, youtube, social media etc.)
Content produced by experts	Content produced by ordinary individuals
Information that is not subject to interaction or manipulation, obtained from websites.	Information that is both interactive and obtained from websites, which is shaped by the contributions of users.
The transfer of information from the minority to the majority.	The majority of information is transmitted from one group to another.
The content is permanent and relatively static.	The regular posting of new content and the updating of existing content are essential elements of this publication.
Expensive software	The provision of paid and free online content creation and delivery tools.

Table 1 illustrates the characteristics of Web 1.0, which involved the acquisition of content from select websites. The content was created by a limited number of experts, lacked interactivity, remained fixed, and the software was exclusively paid. In contrast, Web 2.0 demonstrates that non-expert users can also create content. Information is accessible for sharing within the society, content is updated, and tools can be utilized at no cost.

The reflection of Web 2.0 in music education is not yet fully understood. It is not clear how virtual classroom tools are used, in what contexts, and with what content and methods. In the field of music education, it has been observed that a number of digital platforms have been developed with the intention of offering students interactive and collaborative learning experiences. These platforms often incorporate Web 2.0 tools. While these tools facilitate professional development for teachers, it can be argued that they positively affect students' perspectives on music lessons in formal education.

Considering the development and importance of technology in contemporary education systems, it has become necessary for music teachers and music teacher candidates to apply virtual classroom tools within the curriculum determined in music education. A review of the literature revealed a paucity of studies investigating the full potential and applicability of virtual classroom tools in music education. In light of the aforementioned considerations, there is a clear need for further information about the field. In light of these considerations, the objective of the study was to ascertain the nature of virtual classroom tools and to identify the sub-dimensions of virtual classroom tools that can be employed in music education. In pursuit of these objectives, the following questions were posed:

1. What are the virtual classroom tools?
2. In which sub-dimensions can virtual classroom tools be utilised in music education?

Virtual Classroom Tools

In the context of a virtual classroom, the quality of knowledge transfer between the teacher and the student community is of significant importance. The transfer of information is facilitated by the use of virtual classroom tools. The incorporation of interactive digital boards, chat, video and audio communication, measurement and evaluation, data sharing, and presentation tools facilitates the meaningfulness of the educational process. The utilisation of virtual classroom tools enables the efficient utilisation of time and the provision of instant feedback, thereby facilitating the course operation. Table 3 presents a list of virtual classroom tools that can be employed in educational settings.

Figure 2 illustrates that virtual classroom tools are classified into five distinct categories. The utilisation of image and video tools serves to enhance the quality of teachers' course content, thereby rendering assignments more impressive. Data download tools facilitate the download of data such as images, videos and audio, which are then transferred by teachers to students. Lecture tools are employed in a variety of disciplines with the objective of increasing course interaction. Presentation tools are employed to present topics related to assignments or projects given to students in a virtual classroom environment. Finally, measurement tools are employed to evaluate students' readiness, increase in-class competition and conduct exams.

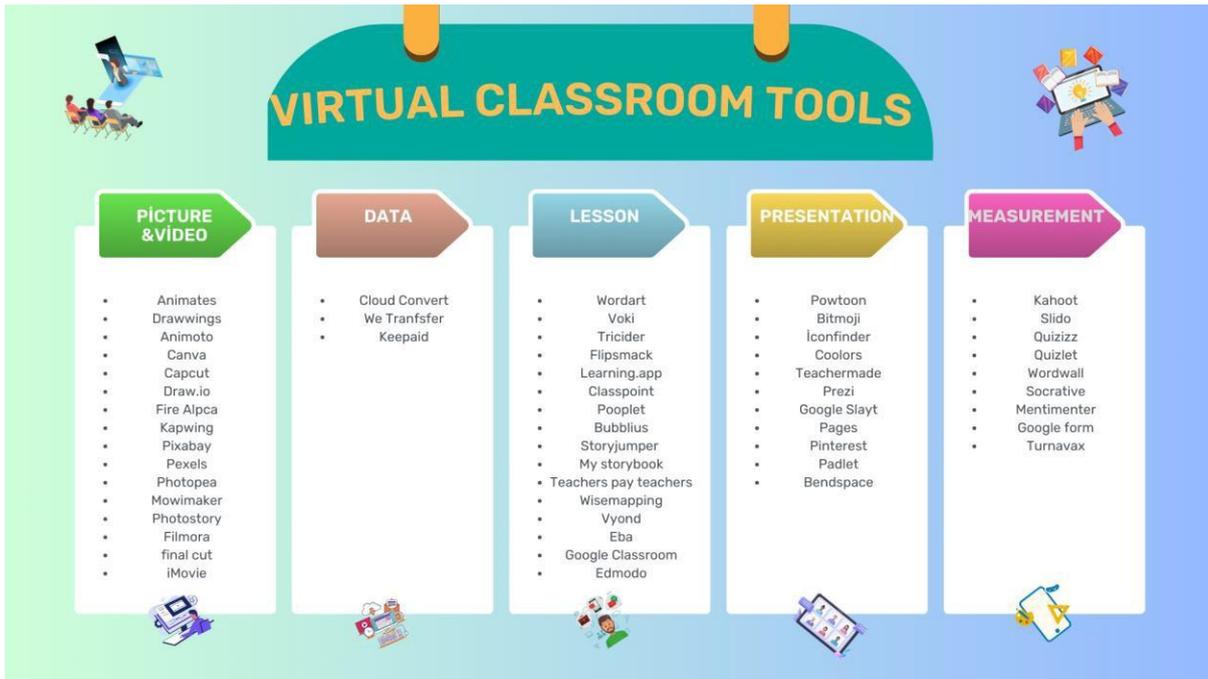


Figure 2. Virtual classroom tools available in education

The following tools are frequently used for the creation of images and videos in the virtual classroom: Animates, Drawing, Animoto, Canva and Capcut. These tools facilitate the production of images and videos with varying structures, thereby enabling students to gain a deeper understanding of the subject matter. Among the data transfer tools, We Transfer is the most commonly used. This tool enables the transfer of digital file types to another party at no cost. Among the lesson tools, "Storyjumper", "Wordart", "Edmodo" and "Google Classroom" are the most commonly used. These tools facilitate in-class activities such as storytelling, virtual poster editing, vocabulary exercises and homework sharing. The presentation tools "Powtoon", "Bitmoji" and "Prezi" are widely used in educational settings. These tools facilitate the creation of engaging lectures, information sharing and homework presentations. The knowledge measurement tools "Kahoot", "Quizizz" and "Quizlet" are frequently employed in virtual classrooms. These tools enable educators to assess students' readiness and conduct exam evaluations.

Virtual Classroom Tools in Music Education

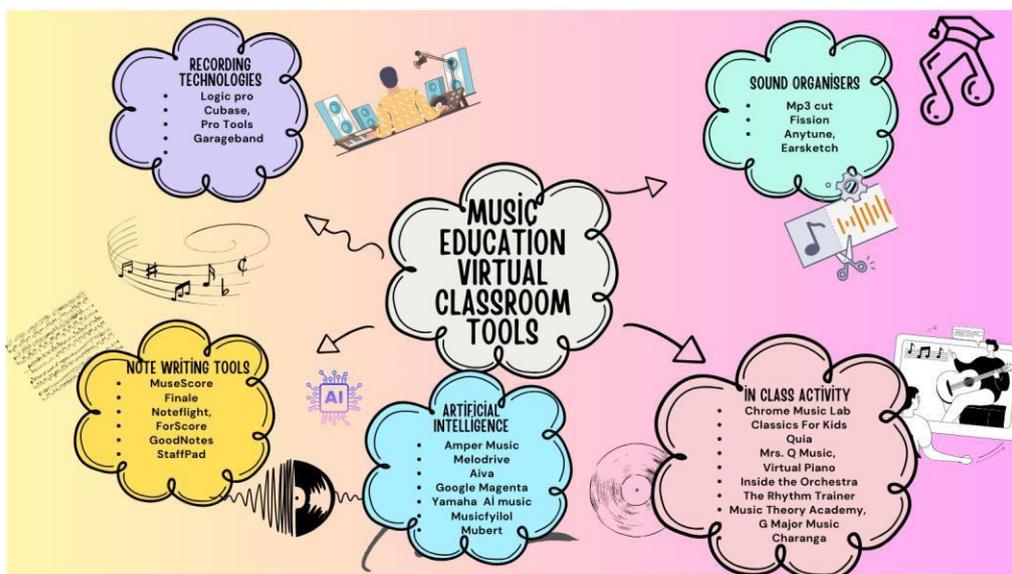


Figure 3. Virtual classroom tools in music education

All digitally available tools are employed in music education as virtual classroom tools. These tools facilitate various gains in music education for students and teachers. For students, they facilitate the advancement of their musical development, instrument training, and the acquisition of fundamental musical elements. For teachers, they facilitate the maintenance of currency in their field by enabling them to remain abreast of musical developments, to design curricula tailored to different age groups with varying tools, and to arrange songs for classroom activities in accordance with their preferences.

Figure 3 categorises virtual classroom tools into five distinct headings: recording technologies, audio editors, note writing, artificial intelligence and in-class activities. Tools within the recording technologies category enable the creation of songs through the recording of voice and instrument. These tools facilitate the organisation of songs by the teacher, allowing them to develop their musical abilities in a structured manner. The teacher can utilise these tools to organise the songs required for ceremonies and activities in formal education. In order to use the tools, it is necessary to have access to a computer, sound card, sound system, MIDI keyboard or piano.

The contribution of the tools designated as sound editors to music education is that educators can utilise specific sections of songs by cutting them in the digital environment. The software facilitates the integration of musical pieces into a larger musical context, whether that be in the context of choral music, instrumental training, or specific activities within the classroom or over the course of a week.

Notation tools facilitate the acquisition of fundamental musical concepts. These tools facilitate the training of voices, instruments, and musical notation. The aforementioned tools permit educators to compose the musical notation of a song to be performed in an educational setting, and to utilise this notation in the classroom. Alternatively, educators may employ a simplified musical infrastructure, which is supported by MIDI technology. The tools included under the heading of "in-lesson activities" facilitate an interactive learning experience by making the lesson both engaging and enjoyable for the student. Furthermore, it contributes to the teaching of speed and loudness terms and basic music elements

The use of virtual classroom tools in music education was categorised under five themes. The other designation under which the virtual classroom tools are collated is that of artificial intelligence. Artificial intelligence technologies can facilitate more effective learning outcomes, comparable to other tools. The primary objective of artificial intelligence is to facilitate the systematic development of cognitive abilities, including the capacity to reason and problem-solve, in a manner analogous to that observed in humans. In order to achieve this goal, machines must be endowed with the capacity to analyse data, learn from experience, experiment with the knowledge acquired and make informed decisions. Furthermore, it is possible that artificial intelligence will reach a higher level of intelligence than humans in terms of processing power and information processing speed due to its current technological potential.

Method

In this study, the traditional literature review method was employed. In traditional literature reviews, the information dispersed throughout the relevant literature is treated as a unified entity, and a connection is established between the issues discussed or a synthesis is reached (Baumeister & Leary, 1997). The use of virtual classroom tools in music education was analysed, and the dimensions of music education were determined.

Results and Discussion

In response to the question "What are virtual classroom tools?", it can be observed that these tools are categorised under five headings: picture and video, data, lesson, presentation and measurement. These tools facilitate the development of course content by reinforcing learning and enabling data sharing. With regard to the category of picture and video, it can be noted that technological tools such as Storyboard, Zoom, Storyjumper, Canva, Popplet are used effectively in education. The utilisation of interactive teaching materials, such as those categorised under the heading of picture and video, has been demonstrated to have a positive effect on students' academic achievement (Yaslica, 2020). Canva, one of the applications under the title of picture and video, has been shown to support students' education by making their learning processes more efficient (Fauziyah et al., 2023).

It has been observed that numerous virtual classroom tools, including Edmodo, Eba, and Classpoint, which facilitate the sharing of homework and student follow-up, are utilized under the course title. Google Classroom has revealed that pre-service teachers have effectively planned the education process (Saimi & Mohamad, 2022). In the context of presentations, it is evident that numerous virtual classroom tools, such as Powtoon, Google Slides, and Prezi, are utilized to facilitate digital subject explanation. "Bitmoji," a prevalent application employed by students for lecturing within the course, addresses the social and emotional needs of students through its character and object designs, thereby enabling them to engage in more cognitive pursuits (Van Pete, 2022).

In the context of measurement, it is evident that tools such as Slido, Google Form, and Quizizz are employed for the purpose of measurement and evaluation. It has been demonstrated that students' motivation towards the Turkish lesson increased with Kahoot, one of the aforementioned measurement tools (Mete & Batibay, 2019). The results of the literature review indicate that virtual classroom tools facilitate active and interactive learning, promoting social interaction over individual and passive learning (Atıcı & Yıldırım, 2010). Furthermore, it has been demonstrated that the integration of virtual classroom tools into learning environments enhances children's metacognitive and creative thinking abilities (Gunduzalp, 2021) and facilitates the development of lifelong learning skills through the provision of engaging learning experiences (Mete & Batibay, 2019). These tools facilitate the assessment of students' digital competencies while simultaneously supporting individual learning and self-expression.

In general, the utilisation of virtual classroom tools has been found to enhance the motivation of students and facilitate the professional development of teachers. In a study conducted by Kayıs (2022), preschool teachers identified the benefits of these tools for educational purposes and asserted that digital tools offer advantages in supporting students' personal development. Consequently, the significance of employing the most appropriate technological tools for specific educational objectives was also emphasised.

In which sub-dimensions are the virtual classroom tools that can be used in music education? A review of the literature reveals that virtual classroom tools in music education are categorised under five headings: recording technologies, audio editors, note writing, in-class activities and artificial intelligence. The category of recording technology encompasses tools such as Logic Pro, Cubase, and Pro Tools. A review of the literature revealed that no studies had been conducted on the use of these tools in the virtual classroom. However, music technology tools were used in harmony education within the scope of traditional education, and these tools contributed to student success (Unal, 2023).

There are four tools under the title of audio editor. With these tools, teachers can digitally edit the relevant parts of songs in classroom song teaching, instrument training and ceremonies. A number of digital tools are available for use in the classroom, including Chrome Music Lab, Quia and The Rhythm Trainer. These tools facilitate the delivery of in-class activities related to musical elements such as speed, loudness and rhythm. A review of the literature revealed that there were no studies on the use of these tools in the virtual classroom. However, teachers have been using tools such as Chrome Music Lab, Muscores, and Music Tech Teacher within the scope of traditional education (Unal & Piji 2022). The results of the research indicated that the tools used by music teachers increase students' participation in the lesson and provide classroom management more easily. In music education, the teaching of basic musical elements (singing, composing, solfege) is of great importance in terms of the requirements of the course. In Lv and Luo's (2021) study, it was determined that the music theory applications used in the course improved students' sight-reading, aural and performance skills. The utilisation of the aforementioned tools serves to enhance students' motivation towards the lesson and foster their self-confidence (Revenko, 2021).

A number of software applications exist which facilitate the creation of musical notation, including Muscores, Finale and Noteflight. These tools facilitate the implementation of in-class activities such as song teaching, instrument training, and note teaching. In the context of the acquisition of basic music elements within the context of the music curriculum, students can engage in solfege and choral studies with the note-writing programme during the lesson. In a study published in 2016, Okay revealed that music teachers should use note-writing programmes in music lessons. Yılmaz's (2019) study concluded that students' note-writing programmes contribute to music education and should be used. Furthermore, the study conducted by Delen and Öz (2019) revealed that music teacher candidates did not utilise note-writing programmes or possess the requisite knowledge.

The tools designated as artificial intelligence are employed to generate a musical composition in a specified style from a given text, with the assistance of artificial intelligence. The integration of artificial intelligence tools

in music education has the potential to enhance students' engagement in the learning process by addressing the shortcomings inherent in traditional education (Yu et al., 2023). A review of the literature revealed that no studies have been conducted on the use of these tools in the virtual classroom. However, in preschool music education, the selection of songs that students like in the lesson was made with artificial intelligence, and it was determined that students' interest in the lesson increased (Yu & Ding, 2020). In this context, artificial intelligence tools will help students to analyse their musical experiences and develop their creativity (Arıcı, 2023). It is anticipated that the advent of artificial intelligence will usher in a novel approach to music education in the near future, as a consequence of the unceasing advancement of technology and the concomitant alterations to the educational landscape (Shang, 2019).

The introduction of new technologies in education has the potential to impact the learning process from various angles. It can be stated that the use of virtual classroom tools in music education supports students to make the information they learn more permanent and encourages their participation in the lesson. The integration of these tools has the potential to enhance standards and facilitate rapid advancement towards success. In the virtual classroom, virtual classroom tools are employed in the teaching of songs, instrumental training, and the fundamentals of music. It has been observed that music teacher candidates lack familiarity with virtual classroom tools. In light of this, integrating the teaching of virtual classroom tools into the music teacher education programme will ensure that music teacher candidates are adequately equipped to navigate the contemporary educational landscape.

Conclusion

At the current juncture of technological advancement, it is evident that virtual classroom tools in music education occupy a pivotal role in both traditional educational settings and the virtual classroom environment. The present study analyses and categorises virtual classroom tools in music education into five distinct headings. In this context, studies on artificial intelligence and in-class activities have emerged as particularly noteworthy, given the advances in technology. Some researchers have proposed that artificial intelligence can only produce different songs by combining existing musical works, and therefore that it lacks the capacity for creativity (Briot & Pachet, 2020). This is because the creation of a product with artificial intelligence in the field of music is not associated with the basic terminology of music. Other studies posit that artificial intelligence can generate authentic musical samples through the application of algorithms (Pachet & Cazaly, 2000). As AI responds to commands entered into the system, it can not only support the musical development of students, but can also be shaped according to the musical preferences of individuals, offering a personalised experience. Although academic studies have been conducted on this subject, further studies are required to provide scientific evidence on the subject.

In the field of music education, the teaching of fundamental musical elements, or the language of music (singing, composing, solfege), is of paramount importance in terms of the requirements of the course. In their study, Lv and Luo (2021) found that the music theory applications used in the course enhanced students' sight-reading, aural skills, rhythmic determination and performance skills. This indicates that students' self-confidence in music lessons has improved (Revenko, 2021). The incorporation of technology in the lesson increases students' motivation and positively affects their interest in the lesson. However, teachers' inability to use technology also decreases motivation towards the lesson (Maraslı & Degirmencioglu, 2023).

Although virtual classroom tools have not been employed in the virtual classroom environment in the studies, the studies conducted in traditional education demonstrate the impact of virtual classroom tools on students and teachers in music education. Virtual classroom tools are not explicitly articulated in the curriculum for music education at the national level or within the YK system. In light of the dearth of experience and knowledge among music teachers affiliated with the Ministry of National Education, and the inadequacies in the undergraduate education of music teacher candidates, it is imperative that these tools be implemented in the field of music education.

Suggestions

- The findings of the research indicated that the use of interactive teaching materials has a positive impact on students' academic achievement, emotional, social and cognitive development. Consequently, it is recommended that these materials be incorporated into the curricula of all disciplines within the education system. It is recommended that measurement practices, which have been demonstrated to enhance students'

learning through enjoyable engagement, be incorporated into lesson planning and that educators be made aware of these effective pedagogical tools. Given the dearth of knowledge and equipment among teachers regarding virtual classroom tools, it is recommended that the Ministry of National Education provide in-service training to support their use of materials specific to their fields and the application of these materials in the classroom.

- The findings of the research indicated that the utilisation of virtual classroom tools in the lesson enabled music teachers to exert greater control over their classrooms. In light of these findings, it is recommended that in-service training be provided by the Ministry of National Education to music teachers in order to facilitate the application of virtual classroom tools in the classroom. In light of the potential impact of virtual classroom tools on the growth of students in music education, it is crucial for music teacher candidates to possess a comprehensive understanding of this subject and to enhance their proficiency in technology-based learning. To this end, it is advised that courses or courses related to virtual classroom tools be incorporated into the educational curriculum of undergraduate students enrolled in the music teaching programme.

- Despite the abundance of in-class activity tools, it was found that there were insufficient academic studies in the literature review. Given that in-class activity tools enhance students' interest in music education and facilitate learning, it is recommended that they be employed more actively in music education and included in the music education programme. Within the scope of the literature review, it is seen that music teacher candidates do not have a good command of the virtual classroom tools under five titles and know only a certain part of them. In today's education system, the use of technology in the course is assumed as a professional equipment. Based on this information, it is recommended that virtual classroom tools should be taught to undergraduate students in the music teaching programme.

Statement of Scientific Ethics

The authors of the study declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to them.

Acknowledgements or Notes

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The Influence of Social Networks on the Social Development of Children

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Abstract: The development of the computer industry and the internet, social networks have experienced diverse applications. They are necessary tools for work, information and communication. However, their application and dependence increasingly includes children. Social networks such as Facebook, Twitter, Myspace, Flickr, Viber, Internet, Google, YouTube and others are the most famous and used means of communication between children. They are an intermediary between the two talking parties. They replace verbal, direct communication by sending messages, images, files as codes of indirect communication. Socialization as a process starts from the family, as the primary environment from which the basic postulates of the process are drawn, but as a secondary environment, the wider circle of family, relatives, friends, school are considered. The main goal of this paper is to point out the negative emergent forms of interpersonal communication, as a consequence of the overall rapid technical-technological development and the process of globalization, with a more detailed elaboration of the impact of social networks on the process of socialization among children. The paper will more specifically elaborate this problem through a theoretical presentation and through a specifically conducted research. The theoretical part will include the basic chapters that will contain data drawn from a wide variety of foreign and domestic literature. In my paper I will give a more detailed description of the research process that I will carry out in order to prove the validity and logical foundation of all my theses presented in this paper. It will cover the methodology of the research, the way in which the collected data will be processed, the results obtained, as well as the interpretation of the findings and the conclusions reached. For the comprehensiveness of the topic, in the paper I will try to give a consistent answer to all questions related to this problem.

Keywords: Social networks, Communications, Social development, Socialization

Introduction

Definition of Basic Terms

Socialization as a Permanent Process

It is very important for the new generations to learn the behavior in accordance with the accepted social norms and values and to be formed as persons who will further develop the society in which they live. But it is necessary to emphasize that the process of socialization does not mean the same as conformism. Socialization is a process of interaction in which the individual (the new member of the social community) acquires knowledge, skills, habits, attitudes, norms, values and other knowledge that he needs for successful integration into the social group or the global community.

Stages of Socialization

Each process goes through certain stages, so the process of socialization goes through four basic stages: childhood, adolescence, maturity and age 65 and over. During each of these stages people begin to learn and develop important and useful skills. These skills continue to evolve, transferring and preparing us for the next

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phase of life. A certain group of people and institutions help guide us through all four stages of the socialization process. These so-called "agents of socialization" include family, school, classmates, colleagues, media, religion, and the workplace. Without experiencing the important stages of socialization and without interaction with the "agents of socialization", the possibility of development and the development of a person is slowed down or completely prevented.

Childhood is the first and most important stage in the socialization process. The first thing people go through is called primary socialization, in which children develop their character, motor skills, reasoning ability, learn language, and most importantly, develop self-awareness. In later childhood, they become familiar with roles, values and norms. Primary socialization is the basis of the entire process of socialization. If these skills are not learned and developed at the beginning of life, it is unlikely that in the later stages a person can acquire them at all, and he will not be able to become an active member of society. During childhood, the family is the most important "agent of socialization". The family provides such an environment that is crucial for cognitive emotional and physical development. Interaction with the family allows the child to learn language, learn and improve basic motor skills, for example, tying shoes, as well as the ability to share and understand emotions.

After the child has perfected the basic life skills, the parents begin to teach him what is right and what is not, teach him obedience, equality, that is, they teach him and give him the foundation so that he can live the life he expects in the future. After all, it is quite clear that without the stage of development in childhood and the accompanying family environment, children would not be ready to survive alone, to communicate with other people, or to continue further, in the next stage. Adolescence is the next stage in the socialization process. It represents a continuation of the development that takes place in the childhood phase, but at the same time it lays the foundations for new things that need to be learned during this phase. During adolescence, the greatest development that an individual should achieve is independence from parents. This dramatic change is called anticipatory socialization, during which the adolescent learns how to prepare for the roles he may encounter later in life, in adulthood. The third stage in the socialization process is adulthood. At this stage, people are most likely fully prepared for what awaits them in life, given the anticipatory experiences they have had in the previous two stages.

Although anticipatory socialization exists to prepare us for what will likely be our future role in society, we need to go one step further and enter the "real world". It is very likely that during adulthood we will face a job that will require us to leave anticipatory socialization and move on to professional socialization. The fourth and final stage of socialization is called age 65 and over. In our society, many people enter the world of retirement can also be called an exit role or leaving an important social role. This stage of socialization is not so significant for the person, because they do not prepare him for the next stage of life. In most cases, retirees take up a hobby just to fill their time.

Primary and Secondary Socialization

Primary socialization is the most important stage in the socialization process that takes place during early childhood, usually within the family. The behavior of their parents, reactions to their approval or disapproval of the child learning the language and other fundamental patterns of behavior in society, are integral parts of primary socialization. It takes place within the family according to tradition from the elders to the younger generations, where the younger generations adopt the norms, tradition and composition of values in their group.

Today, in the rapidly changing world, where the rapid development of technology has turned it into a "global village", there is a so-called reverse socialization. This is a process where the new generation helps the older one to keep up with the rapidly changing world. So many young people teach their parents how to use the different options that mobile phones offer them, such as writing SMS messages, how to connect to the Internet and how to use the benefits that it offers.

Without going into the content of each of the stages in more detail, it can be said that in the first year we overcome the problems of socialization towards the closest people. The problem that arises before the person is gaining trust towards other people. Overcoming difficulties creates one's own personality, where the basic open optimistic attitude is precisely the trust towards others. Primary socialization takes place in the earliest period of a person's life, when the basic patterns of social behavior are adopted, especially in groups in which there are close contacts, and thanks to it he becomes a member of society. It can have a decisive influence on all subsequent human development. Therefore, the most important factors of primary socialization are the family

and the peer group. The family stands out as the most important factor of socialization. Secondary socialization occurs in later years, when the influence of the family diminishes and the influence of other factors such as the peer group and school increases. More specifically, secondary socialization includes the school composition, (from kindergarten to college), mass media, peers.

In the peer group, in interaction with others and through playing children's games, the child learns to obey the already accepted customs in the social group and understands the fact that social life is based on rules. The school, after the family (primary socialization), represents the "final place" of secondary socialization. It acts as a bridge between the family and society as a whole, preparing the child for his role in the adult world. Within the framework of the family, the child is treated and judged based on "particular" norms. In the process of socialization of individuals, there are various stages and different degrees of intensity, that is, different modalities of integration of the individual in the social group and in society as a whole. The mature phase of socialization is called internalization. It is a stage when the person has already built his own attitudes in relation to the social group and society as a whole. Then the person is integrated into society, actively participates in the performance of its activities and has developed a clear attitude towards the problems of the group.

Social Networks – Term

The social network is a theoretical construct used in social sciences to study the relationships between individuals, groups, organizations, and even the entire society (social unit). The term is used to describe social structure as an interaction. The links (sometimes called edges or links) in the structure are called "nodes". Nodes through which each given social unit is connected, represent the convergence of different social contacts of that unit. The "network" between such nodes can be formed by many visible relationships. Such an approach is useful for modeling and explaining many social phenomena. The theoretical approach is necessarily relational. The axiom of the social nexus approach to understanding social relations is that social phenomena should be primarily conceived, explored through the properties and relationships between units, rather than the properties of the units themselves (Rieh,2002).. Thus a common criticism of social network theory is that individual agency is ignored, although this is not the case in practice. Because many different types of relationships, alone or in combination, are involved in network configuration, network analyzers are useful for a wide range of research. Scholars in these and other fields have used the idea of a "social network" superficially for almost a century as a connotation for complex sets of relationships between members of social units at all scales of analysis, from local to global analyses. The foundation of social media is social media, web-based and mobile technologies used for communication that turns into an interactive dialogue. Andreas Kaplan and Michael Heinelein define social media as a group of Internet applications that are built on the ideological and technological foundations of Web 2.0 technologies. Which allow the creation and exchange of user generated content. Social media are media for social interaction and represent a kind of superset of tools that go beyond the spheres of social communication.

Social Networks and the Family

In this section we will consider some of the aspects of family life taking into account the wide networks of social relations. The time of the destruction of traditional family values is distinguished by the functional reduction and social isolation of the family, on the one hand, but also its inclusion in various types of social networks, on the other hand. Although social anthropologists were primarily engaged in the research of social networks, with the development of the theory of the social system, interest in this phenomenon arose in other sciences as well. The so-called applied disciplines give special attention to social networks, as an overall field of communication. Social work as one of those disciplines, and especially in the method of social work in organizing the community, finds a large number of solutions in the process of overcoming more and more complex problems of the modern man and his family. From that it can be expected that the future development of the practical - research part of working with people will take place in that direction.

The challenges of the times we live in reflect the quality of family life and the life of the individual. A time in which there is a lot of talk about destabilization, transformation, redirection, transition, but also destruction, all of this leaves traces in our environment and enters our life through the family. It will be very difficult for an individual to survive in all of this if he does not have a built network of relationships. We can hardly talk about social networks and the family as a system because their management mechanism is complex, and similarly it is difficult to identify the rules and models for their functioning. What should certainly identify the development

process is the social network and the purpose of its existence. It is necessary to find out why someone becomes part of the social network, who maintains the social network (exists), what are the advantages and disadvantages in the functioning of the network and more. The logic of the formation of the network of social relations shows that there is always a reciprocal value between the process of receiving and giving, it is based on deep emotional feelings, or on certain common interests.

Addiction to Social Networks

What is Social Media Addiction?

Although nowadays the computer has a significant place in the development of humanity, this device can still cause a series of inconveniences. World psychiatrists are seriously considering the possibility of Internet addiction, and especially addiction to social networks, computer games, to be on the international list of diseases, because the number of people affected by this addiction is increasing day by day. This is also evidenced by the fact that centers for social network addicts are gradually being opened around the world, and most often the patients are children and teenagers.

There are great difficulties in finding a term that can be used to adequately and precisely describe the nature of this type of interaction (man-machine). The reports freely use the terms "compulsion", "addiction" and "obsession" to define a state of long-term computer use, but none of these terms are considered appropriate. "Compulsion" or "compulsion" as defined in the appendix of the Oxford English Dictionary is an unrelenting, persistent impulse to behave in a certain way contrary to one's conscious intentions or standards. This notion is supported by the definition from the dictionary of psychology, which describes it as an internal irresistible force, a compulsion to perform a certain action without or against the will of the individual to perform it.

Social networks become an addiction when they start to interfere with a person's relationships or when they represent a brake on the goals they are striving for, such as good grades or contribution to a sports activity. Based on that, addiction to social networks is defined as a primary, chronic disease characterized by impaired control over behavior. Addiction can also be defined as a clinical disorder with strong negative consequences in a person's social, work, family, financial and economic functioning. Excessive use of social networks is a phenomenon that interferes with our daily lives. Cases have been reported in which participants using social networks excessively, isolate themselves from all forms of contact, mostly social contacts, and devote themselves entirely to social networks, more than to life events. Just like gambling, social media users can become obsessed with the social media world and neglect family, friends, and school. Therefore in these years of heavy chemicals ravaging the civilized world, cocaine, heroin and all other types of drugs that are created by man, that are not naturally caused, and even those that are, it is neither stupid nor insignificant to there is talk of addiction to social networks. Anyone who has experienced social media addiction knows it's real.

Although addiction to social networks is not yet recognized as a disease, there is evidence that people of all ages, especially children, face real difficulties and dangerous consequences related to the long-term use of social networks. It is not included as a diagnosis in the diagnostic-statistical manual either. for mental disorders, nor in the International Statistical Classification of Diseases and Related Health Problems. However, the effects of excessive use of social networks are similar to the effects of other psychological addictions, such as compulsive gambling or impulse control disorder.

Reasons for Addiction to Social Networks

Dependence on social networks occurs as a consequence of the problems in real life that the individual encounters on a daily basis, as well as the possibility of facing them and solving them. Theorists focus on the already built system of social networks to explain their addictive nature. In the hypothetical world created by social networks, users become confident and get satisfaction that they cannot get in the real world. Researchers investigate what motivates children to use social networks. Many of the children who use social networks are in order to satisfy some psychological need, and continue to use them because of freedom or a relationship that is established with other users (Bajarin, 2011).. There is not enough research on whether social media is addictive or not, but it certainly displaces physical activity, reduced time for study, friends and even family.

Escape from solitude is one of the main reasons why social networks and the Internet are accepted as an environment that can provide emotional support. Some children fail to gain such support among their peers. Addicted children usually do not know how to talk about their feelings. That is why the family is often to blame. In those families, they are too busy with work and are rarely at home, insincere formal relationships rule. Such parents do not have time to listen to their child, nor to give him the necessary attention. The child begins to feel neglected, and from there it follows that in later years that child fails to establish deeper friendly relationships with peers. For him, the use of social networks represents a unique opportunity to establish close contacts and be understood by someone. Another reason for addiction is related to the desire to "run away" from parents, school and the environment. Addicted children are sensitive to social organization, for example, in situations where it is necessary to adhere to strict rules, they experience great stress. They lose their orientation and do not know what they want. Social networks allow them to tap their internal brakes. Children live in daily anticipation that they will come across something they have been dreaming about for a long time. In addition, in social networks it is possible to be someone else without any problem, someone who is not shy and withdrawn, and in that other world it is easy to make virtual friendships.

A study by Park and Shen distinguishes between two theories of addiction and possible causes.

- The Use and Gratification Theory – according to which people use social networks in order to obtain certain gratifications, such as personal identity, personal connections and diversion or diversion.
- Current theory (The Flow Theory) - Which explains the state in which people are so involved in a certain activity that nothing else matters to them.

Also, some of the reasons why children start using social networks are: social acceptance, relaxation, autonomy and escape from everyday problems.

Symptoms of Addiction

Addiction to social networks is more than spending a significant amount of time dedicated to a particular activity. The use of social networks becomes pathological and at the same time causes serious negative life consequences. Some signs that indicate that your child is addicted to pathological use of social networks are skipping homework, skipping schoolwork and poor test scores, and spending time in front of the computer. Psychologists say that some users of social networks show symptoms similar to those caused by drug use or other pleasurable activities. When a child visits violent content and it excites the psych neurological receptors, it causes them to feel that excitement, to feel like they are on a high, and then to become addicted to what brings them to the high. The consequences can be numerous, they are psychological ones that lead children to talk less, socialize less, become more closed, distrustful, etc. and physical consequences of social media addiction caused by lack of activity. Hence, the connection between certain types of adolescent behaviors and socialization and social networks is clear. That relationship has been proven by a series of previous researches (Deloitte Development, 2009; Downes, 2005).

Understanding social networks and the impact of social media on young users is crucial for several reasons (Breuer, 2011; Castells, 2009). The psychological consequences that point to the fact that the child is addicted to social networks are numerous, but essentially they are connected to the following, basic symptoms:

- An increase in the threshold of tolerance, which means that the required time of social networks increases more and more over time, in order to satisfy the needs for which significantly less time was sufficient before.
- Abstinence crisis, which can occur if the child has not had any contact with the computer for several days. It also occurs when trying to reduce, limit or completely stop the computer, that is, its use. It is most often manifested by psychomotor agitation (unconscious movement of the fingers, i.e. emissions from tapping on the keyboard or moving the mouse), anxiety, obsessive thinking, etc.
- Antisocial behavior characterized by neglecting the most important social, social, recreational and other activities and obligations.
- Helplessness and fear that appear most often when the addict is faced with problems or when he feels guilty because of an incident in his own environment. At that very moment, the child seeks salvation in the use of the network.
- Lying to family and friends in order to conceal the actual time spent on social networks.

According to research from the computer addiction service, the symptoms of this type of addiction are specific. In addition to the above, the following symptoms are also mentioned:

- Feeling of euphoria while the child is in front of the computer
- Inability to stop the activity
- Longing for as much time spent in front of the computer as possible
 - Depression and irritability while the child is not in front of the computer
 - School problems, such as poor grades, sleeping in class, sneaky use of social media instead of doing school work and assignments.

Sitting in front of the computer for too long in the child can cause alienation and turn to oneself, lead to an obstacle in communication with the environment and peers. The family is in a big crisis today. Parents hardly communicate with their children at all. That is what they miss the most. Such symptoms are present in closed and alienated children. They are insecure, easily upset and despair at the slightest failure. In addition, they are usually hostile, show hidden or unhidden impatience with the environment and are often dissatisfied with it. Children who are dependent on social networks need more emotional support, that is, those who are not in this so-called. risk group. In fact, in real life they do not even find a friend or comrade who will be able to listen to them or simply spend time with him. The more of these symptoms that can be identified, the greater the need for professional help.

Research Process, Problem and Research

Approach to the Problem

Today, when the problems of old vices, such as tobacco, alcohol and narcotics, have not yet been overcome, space is being opened for new ones. This is about addiction to the Internet, computers, that is, social networks. Precisely because of that ease of establishing contacts, this can contribute to changes in the social development of children. Children spend their free time in front of the computer, completely uncontrollably, neglecting their responsibilities such as studies, friends and interests that they previously had. In extreme cases, the physical appearance is also neglected. It is a condition that the time spent on social networks grows progressively, that the child cannot resist the desire to look at what is happening there and feel nervous when there is no technical device nearby. It is precisely because of the above-mentioned facts that the idea of creating a paper with problems of this type was imposed. It started as a result of the increasing obsession of children with social networks which is more than obvious that it is gradually but surely starting to create a new form of communication between children, which can be confirmed with certainty that it disrupts the natural and old habits of connection friendships, socializing, communication, socializing, etc. Also, for these reasons, addiction of this type has recently entered the media's attention, as a new addiction for children and adults. The reason to delve deeper into disassembling a series of issues that arise in this context is the fact that The Republic of Macedonia is a relatively young and fragile country, which, going through the process of transformation and transition, faces a large number of negative social phenomena, as well as lagging behind in overall development compared to other countries in the Balkans, Europe and the World. From here comes the fact that the use of social networks, as well as the addiction and aggression they cause, is a problem that in our country has been the subject of very little discussion, and almost no research at all.

In this way, all the reasons stated so far in one whole, lead us to the fact that in this way, it will primarily help in raising awareness among people, as well as taking serious measures of education and prevention by the institutions, authorities and the wider masses of the people. I am personally affected by the negative implications of this problem and therefore I would like this research to serve as a useful source of information that will be expanded and supplemented in the future with similar, but also far more in-depth research.

Problem and Point of the Research

From everything that was previously said, the problem of the research arises, which reads: Is there an influence of social networks on the process of socialization among children?

The main goal of the research is the analysis of the effects of taking preventive actions in preventing addiction to social networks. There is also a need to show and primarily prove (especially to those who are uninitiated),

whether the addiction to social networks is a reality that is present in the everyday life of the common man and his loved ones. Any scientific research, regardless of which scientific field it belongs to, is organized to help gain knowledge about the phenomena that are the subject of scientific study. To achieve this, the research should enable either description or prediction or understanding of the research phenomenon. In that sense, description, prediction, and understanding can be seen as separate research goals that must be considered when planning any particular research. That relationship has been proven by a series of previous researches (Deloitte Development, 2009; Downes, 2005).

Description includes descriptive procedures that identify or classify the phenomena under study. Such description procedures are often aimed at making generalizations about the studied phenomena by finding important common features with cognate and related phenomena. Given that phenomena must first be described in order to be predicted and understood, description can also be considered the first step in the process of acquiring scientific knowledge.

The descriptive method is used to collect the data that should be compared, evaluated and interpreted to result in adequate descriptions of the studied phenomenon. The descriptions obtained by the descriptive method can be of a qualitative nature, although they are mostly quantitative and concentrated not only on a few dimensions of the phenomenon that are systematically observed and measured. So for example, when it is asked: What forms of national attachment exist among the Macedonian population?, or What is the average level of intelligence of psychology students?, or What do teachers think about the curricula for the first grade? the answer obtained through the descriptive method represents a quantitative or quantitative description of the corresponding phenomenon.

Prediction requires determining the connection between phenomena, which makes it possible to predict the occurrence of a certain phenomenon on the basis of another. We can talk about a connection between two phenomena when the phenomena occur together (when the presence of one means the presence of the other, and the absence of one and the absence of the other) or when they change together (when changes in one are followed by changes in the other).

Many important questions in psychology call for prediction. Such are, for example, the questions: will participants who achieved better success in primary school achieve better success in secondary school?, are managers who have a higher salary more motivated to work? and are children raised by parents who are alcoholics more likely to become alcoholics themselves? In order to enable a prediction of this kind, the correlation or differentiation method should be applied for data collection and analysis.

General Hypothesis

The personal characteristics of the children, the addictive nature of the social networks themselves, the parents' interest in the time spent on the Internet, as well as the contents, whether they are in accordance with the age of the child, influence such that:

"Excessive use of social networks causes addiction and hinders the proper development of the socialization process among children in elementary school, which is especially pronounced among those who use social networks uncontrollably. It also has significant differences in terms of gender, age and type of settlement."

The more time children spend on social networks, the more the possibility of becoming addicted increases, and thus they begin to neglect their social life, school and family responsibilities and tasks, entailing great physical, psychological and social consequences.

Interpretation of Research Results according to General Hypothesis

The general hypothesis within the scope of this research is that, "Excessive use of social networks causes addiction and hinders the proper development of the socialization process among children in primary school, which is especially pronounced among those who use social networks uncontrollably." In order to confirm/reject the first part of this hypothesis, the Chi square and coefficient of contingency were moved for the frequency of sitting on the Internet and the answers that refer to parents because they are the ones who influence the socialization process of students with their behavior.

Table 1. Cross-tabulation of time spent on the Internet and parents' interest

		Time spent online			Total
		1-2 h	3-4 h	More than 4 h	
Parents' interest	Yes	204	32	58	294
	No	0	2	2	4
Total		204	34	60	298

$\chi^2= 9,864, df=2, p<0,01$
 $C= 5,988, p<0,01$

The data attached to table 1 gives us the connection between the time spent on the Internet and the interest of the parents. The results of the two cross-variables are attached in the table. The s-coefficient of contingency is greater than the critical value 5.988, $p<0.01$ and shows the interrelationship of the two variables, and on the other hand it is complemented by $\chi^2= 9.864, df=2, p<0.01$ which shows that this segment from the first hypothesis was confirmed.

In order to confirm/reject the second part of this hypothesis, the Chi square and coefficient of contingency for the frequency of sitting on the Internet and the answers related to the parents' control of the students' free time have been moved, because they are the ones who, with their behavior, influence the the process of socialization of students.

Table 2. Cross-tabulation of time spent on the Internet and parental control of students' free time

		Time spent online			Total
		1-2 h	3-4 h	More than 4h	
Control of free time	Yes	147	23	49	219
	No	57	11	11	79
Total		204	34	60	298

$\chi^2= 2,896, df=2, p>0,05$
 $C= 3,008, p>0,05$

The data attached to table 2 gives us the connection between the time spent on the Internet and the parental control of the students' free time. The results of the two cross-variables are attached in the table. The s-coefficient of contingency is less than the critical value 3.008, $p>0.05$ and shows no correlation between the two variables, and on the other hand it is complemented by $\chi^2= 2.896, df=2, p>0.05$ which shows that this segment of the first hypothesis was not confirmed.

In order to confirm/reject the third part of this hypothesis, the Chi square and coefficient of contingency for the frequency of sitting on the Internet and the answers related to parental control of the students' time spent on social networks have been moved because they are the ones who with their behavior affect the process of socialization of students.

Table 3. Cross-tabulation of time spent on the Internet and parental control of students' time spent on social networks

		Time spent online			Total
		1-2 h	3-4 h	More than 4 h	
Time control on social networks	Yes	158	25	49	232
	No	46	9	11	66
Total		204	34	60	298

$\chi^2= 0,894, df=2, p>0,05$
 $C= 0,901, p>0,05$

The data attached to table 21 gives us the connection between the time spent on the Internet and parental control of the students' time spent on social networks. The results of the two cross-variables are attached in the table. The s-coefficient of contingency is less than the critical value 0.901, $p>0.05$ and shows no correlation between the two variables, and on the other hand it is complemented by $\chi^2= 0.894, df=2, p>0.05$ which shows that this segment of the first hypothesis was not confirmed.

The data shown in Tables 1, 2 and 3 partially confirmed the general hypothesis which stated that "Excessive use of social networks causes addiction and hinders the proper development of the socialization process among children in primary school, which is especially pronounced among those who use them uncontrollably they use social networks".

Conclusion

From the entire used scientific literature and the obtained results of the conducted research, one general conclusion can be drawn that the process of social development among primary school children is not disturbed as a result of the use of social networks. Most of the sample were students from the fifth grade, while the least from the seventh grade.

According to age, the students who were the most hoarse in the sample were ten years old. The fact is that the most widespread and well-known internet network is Facebook, to which 82.21% of respondents answered that they have their own profile, use it for communication, exchange of experiences, maintaining contacts, etc. The percentage of respondents who know Viber and YouTube is also high. According to table 3, there is a presentation of the answers of the students according to how much of their free time they spend on the Internet, so if the answers are objective and not socially desirable, most of the students, 68.5%, spend 1-2 hours a day, and even 21.1% spend more than 4 hours a day.

According to the contents that the students exchange on social networks, most of them are for communication, then humor, and the least for educational elements and exchange of experiences. It is pleasing to know that a large number of parents show an interest in helping students master the school material, try to control their children's free time and at the same time direct them to alternative activities, such as sports, socializing, courses, etc.

The study of the problem was carried out with empirical research of a descriptive nature, an analysis of the influence of the independent variable was carried out quickly to determine the cause-effect relationships using the clause method. From the instruments, a survey sheet-questionnaire was used, constructed for the needs of the research, in order to obtain answers that study the tasks and hypotheses set. According to the general hypothesis, excessive use of social networks causes addiction and hinders the proper development of the socialization process among children in elementary school, which is especially pronounced among those who use social networks uncontrollably. So, after the conducted research, to answer the first part of the hypothesis, Chi square and contingency coefficient were calculated for the frequency of sitting on the Internet and the answers that refer to parents because they are the ones who influence the socialization process of students with their behavior. In order to determine the relationship between the time spent on the Internet and the parents' interest, the results of the two cross-variables are attached, where the S-coefficient of contingency is greater than the critical value and shows a mutual relationship between the two variables, and on the other hand, it is also complemented by $\chi^2 = 9.864$, $df=2$, $p<0.01$ which shows that this segment of the first hypothesis was confirmed. We also examined the relationship between time spent on the Internet and parental control of students' free time, so the results of the two cross-sectional variables did not show any correlation between the two variables, and it shows that this segment of the first hypothesis was not confirmed. Time spent on the Internet and parental control of students' time spent on social media yielded the results of the two cross-variables where the S-coefficient of contingency was less than the critical value and showed no correlation between the two variables, so this segment of the first hypothesis not confirmed. With that, the general hypothesis that read, "Excessive use of social networks causes addiction and hinders the proper development of the socialization process among children in elementary school, which is especially pronounced among those who use social networks uncontrollably," was partially confirmed.

The tests of the separate hypotheses showed that there is no difference between the gender of the respondents and the addiction to social networks, that is, how much time they spend on the Internet. Also, the time spent on social networks does not differ according to the place of residence, whether the respondents are from a rural or urban environment. The hypotheses that there is no difference between the age of the respondents and the time spent on social networks, as well as the hypothesis that there is no difference between the type of social network and addiction to social networks, were confirmed. It was also confirmed that there is a difference between students of different genders and the elements they see on social networks.

According to the results obtained from the conducted research, it can be concluded that children from primary education are not a threatened category. The time spent on social networks, their content, function and purpose do not affect social development. But despite that, adults still need to pay attention in the context of this issue. We conclude that social networks do not create a form of physiological addiction, so we believe that it is a transient phenomenon that can be influenced, so parents should strive and direct their children towards social development, so that it is correct, healthy, long-term and gives birth to values of a permanent nature.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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Abstract: GeoGebra is a software that is often used in mathematics learning. GeoGebra is an electronic program that contains a set of tools that equip students with mathematical skills. This research aims to look at research trends related to algebra learning that integrates GeoGebra. This research is literature review research, there are 95 publications collected from the Scopus database which are then analyzed using the bibliometric analysis method assisted by the Vos viewer application. Data taken from the Scopus database was refined in 4 stages, namely identification, filtering, eligibility, and inclusion, resulting in 95 publications. The research results show that Spain and Austria are the most influential countries and have high cooperation with other countries in this field. The focus of research related to GeoGebra on algebra material is, 1) geometry and students; 2) GeoGebra and algebra; 3) elementary geometry and computational theory; 4) dynamic geometry and computer algebra. The new themes in this research are symbolic computation, quantifier elimination and real quantifier elimination. This research not only enriches the scientific literature in the fields of GeoGebra and algebra but also provides practical guidance for educators and researchers to improve mathematics teaching and learning methods in the future.

Keywords: GeoGebra, Algebra, Mathematics education

Introduction

Technological developments have had a significant impact on the field of education by making understanding easier and increasing excitement in the learning process (Jan, 2017; Kristanto et al., 2016; Murtikusuma et al., 2019; Sriyanto & Kaniadewi, 2019). Therefore, the use of technology can improve the quality of education through learning media pembelajaran (Joshua et al., 2016; Oktavianingtyas et al., 2018; Rohaeti et al., 2019).

The use of learning media aims to convey something abstract to be realistic to improve student understanding and student learning outcomes (Rohaeti et al., 2019). Improving understanding and learning outcomes using technology depends on students' literacy in information and communication technology (ICT) (Fatahillah et al., 2020). According to Garba (2014), ICT literacy includes five components, namely: accessing, managing, integrating, evaluating, and creating. Therefore, in today's education system, ICT literacy needs to be developed because it affects student learning outcomes (Markauskaite, 2006; Solar et al., 2013; Tadesse et al., 2018; Thammasaeng et al., 2016). Current mathematics learning has integrated ICT learning media. Many applications can be used in learning mathematics, such as spss, maple, math lab, GeoGebra, Microsoft mathematics, and

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others (Ekawati, 2016). By integrating mathematics learning through ICT, it makes it easier for students to understand concepts to solve mathematical problems (Sivakova et al., 2017). Research by Toma et al. (2023) revealed that with the use of ICT in learning there is a significant difference to improve performance, develop participatory skills, and have the ability to provide positive results to students.

GeoGebra is one of the software that is often used in learning mathematics Al-Alawi (2017) defines GeoGebra as an electronic program that contains a set of tools that equip students with mathematical skills. This software is very useful for teachers and students, but it cannot replace the role of the teacher. The main topics in mathematics that can use GeoGebra software consist of Algebra, Geometry, and Maths (Al-Noaimi, 2016). In this GeoGebra software, the system used can be classified into 2 systems, namely: Computer Algebra System (CAS), because it contains algebraic and conceptual processes involving equations and coordinates; the second is Dynamic Geometry Software System (DGS), because it contains geometry concepts such as points, lines, 2D shapes, and 3D objects. This makes students understand information about the relationship between concepts.

Meanwhile, Al-Balawi (2013) stated that GeoGebra is a tool that can help students acquire mathematical skills easily and interestingly. GeoGebra is designed to enable students to gain a deep understanding of mathematical theories and facts through the exploration and practice of these concepts. Using GeoGebra in learning mathematics creates a new dimension in the process of acquiring a mathematical concept, especially the topics of algebra and geometry.

One of the most important topics in learning mathematics is algebra. This is in line with the opinion of Wang (2015) who states that algebra has been recognized as an important part of mathematics learning as well as a lot of emphasis in to overcome the difficulties and challenges in learning algebra. Algebra is a complex material and is dominated by abstract concepts (Hodgen et al., 2015; Hodgen et al., 2018). Abstract concepts and the variety of symbols used in learning concepts, procedures, and problem-solving strategies (Cousins-Cooper et al., 2017; Ferretti et al., 2018). make it difficult for teachers to find the best method to teach algebra and students have difficulty learning algebra (Cousins-Cooper et al., 2017; Garzón & Bautista, 2018). Nevertheless, teachers can still improve student learning by implementing evidence-based learning strategies and teachers are expected to have a deep understanding of algebra knowledge content and forms of intervention in algebra learning (Cousins-Cooper et al., 2017; Lee et al., 2020).. The form of intervention can be done by using GeoGebra software in learning algebra. Research by Latifi et al. (2021) revealed that using GeoGebra in learning can improve students' conceptual abilities in differential equation material.

The theme of research on learning algebra using GeoGebra software is interesting to study. However, we consider it necessary to conduct a bibliometric analysis on this theme. Bibliometric analysis is conducted to update research information on mathematics education (Julius et al., 2021). Using bibliometric analyze makes it possible to analyse data from citation indices to see the reputation and influence of specific research papers, authors, and publications (Julius et al., 2021). In addition, bibliometric analysis also allows one to quantitatively evaluate major journal titles and keywords and stream publications in an academic context in a more coordinated way. As for other relevant data relating to the academic community, one can visualize the interaction between authors from different universities, institutions, and countries.

According to Cancino et al. (2017), the existence of bibliometric studies as a literature greatly contributes to the art of introducing many fields of interest. For example, certain phenomena can be assessed and investigated in various fields ranging from the field of social sciences (Aria et al., 2020; Uribe-toril et al., 2020) to science and technology (Andreo-Martínez et al., 2020; Jiang et al., 2020), engineering (Haleem et al., 2020; Marzi et al., 2020), education (Gil-Doménech et al., 2020; Shen & Ho, 2020), etc. Recently, Wei et al. (2023) have conducted a bibliometric analysis by comparing the current research status, research hotspots, and development trends of teachers' attention in mathematics education. In mathematics education research, the literature search method systematically uses bibliometric tools combined with a more qualitative approach.

In general, this study aims to look at research trends related to algebra learning that integrates GeoGebra. Therefore, in this study, a bibliometric analysis will be conducted (Hawkins DT, 2001; Linnenluecke et al., 2020) to systematically analyze existing works that focus on learning algebra that integrates GeoGebra. To systematically analyse existing works that focus on learning algebra using GeoGebra; by sorting out research advances, drawing a visual knowledge map and relevant literature, and visually revealing learning algebra using GeoGebra that pays attention to research and developmental trends in this file. Do not underline words for emphasis. Use italics instead. Both numbered lists and bulleted lists can be used if necessary. Before submitting your manuscript, please ensure that every in-text citation has a corresponding reference in the reference list. Conversely, ensure that every entry in the reference list has a corresponding in-text citation.

Method

This research uses bibliometric methods. This technique incorporates a systematic analysis of published articles, including citations, to assess the impact of these articles (Maditati et al., 2018). The bibliometric analysis used in this study is descriptive bibliometrics that describes the characteristics or features of a literature. Bibliometric analysis techniques are divided into 2 categories, namely work analysis and mapping (Donthu et al., 2021)

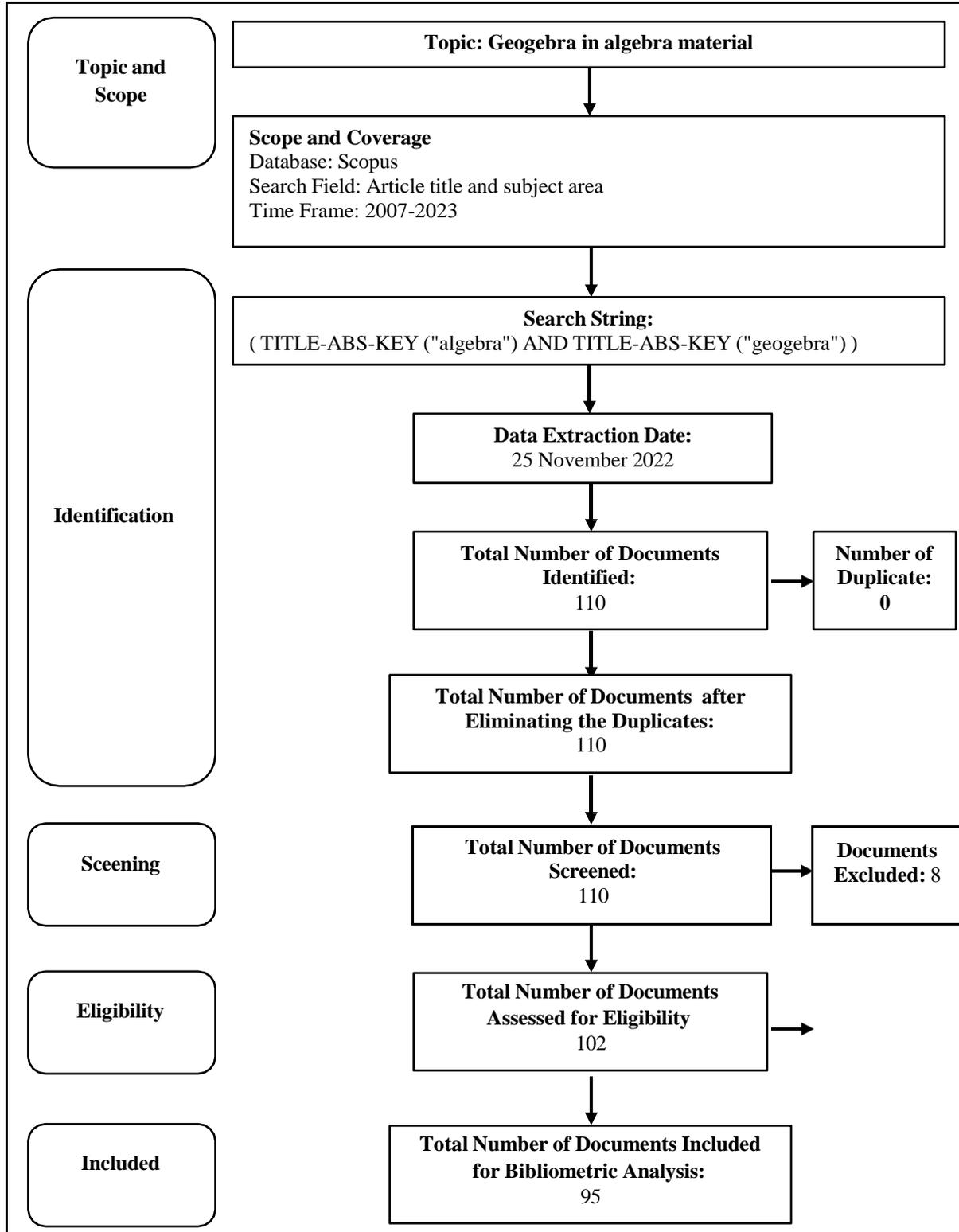


Figure 1. Data collection process

In searching for data sources related to "GeoGebra on algebra material", researchers use the Scopus database because of its very broad interdisciplinary coverage. There are several steps in refining the data that has been collected as shown in Figure 1. First is identification, then proceed with the screening step, eligibility, and finally the inclusion step (Moher et al., 2009).

The first step, identifying relevant publications using a search string and removing the same or duplicate publications. The topic and scope is "GeoGebra on algebra material" There are 110 publications and no duplicates were obtained. The second step, screening is done by selecting publications on the type of document required. That is, to find the publications needed to be more effective, an advanced search is carried out by limiting the type of document, namely only documents of the article and conference paper type that will be included in the next stage. At this stage, 102 publications were obtained and will be continued at the next stage.

In the third step, 102 publications will be assessed for eligibility. Titles and abstracts will be manually assessed by researchers to identify which publications match the inclusion criteria, namely research that includes GeoGebra in algebra material. This means that only publications that fit the criteria are included in the analysis related to the discussion of the research. The language that must match the needs of the researcher is English because it is the most widely used international language in communication in scientific work. At the end of this stage, 7 publications were deleted because they used a language other than English. At the end of this third stage, 95 publications remained. The purpose of this study is to see the trends and landscape of research related to GeoGebra in algebra material, for all publications, namely 95 publications, are included in the inclusion stage to ensure the objectivity of the interpretation results. This data was collected on 4 November 2023 during the inclusion stage.

Data Analysis Method

Publication trends related to GeoGebra in algebra material are carried out by descriptive analysis taken from the Scopus database with bibliometric. The number of publications and the linear trend of publications each year from 2007 to 2023 will be displayed in a graph using Microsoft Excel software. Publication citation trends related to GeoGebra in algebra material are separated by year. The average citation per publication is also calculated using Microsoft Excel software. As for finding the h-index and g-index of the publication, researchers used Harzing's Publish or Perish software.

In displaying the journals with the highest number of articles as well as seeing the quartile value, researchers use Microsoft Excel software to display journal ranking diagrams. In displaying the distribution of publications by country, researchers also use Microsoft Excel software. Analysis of events along with keywords related to GeoGebra in algebra material is carried out to determine the focus of the research. The data to be analyzed is taken from the Scopus database which must first be processed. The research focus can be determined from the shared keywords visualized by VOS viewer Software.

Results and Discussion

The number of publications obtained at the inclusion stage is 95 selected publications in the last decade, starting from 2007 to 2023. The data source was taken from articles with 47.4% then conference papers with 52.6%.

Publication Trend

The distribution of publications is shown in Figure 2 from 2007 to 2023. The highest number of publications occurred in 2021, namely as many as 18 articles published in that year if it is presented in 2021 (19%), then in 2022 (14%).

A significant increase in the number of publications per year related to GeoGebra on algebra material occurred from 2020 to 2021, namely a 6-fold increase. Judging from the linear line or publication trend, it shows that publications are increasing every year. In 2008 there were no articles published. The next lowest number of publications is 1 publication per year which occurred in 2007, 2009, and 2010. This means that the development of publications related to GeoGebra in algebra material has increased since 2011. Although initially, from 2007 to 2010, there was at most only one publication per year, this situation has changed dramatically in the last few years. In recent years, there has been a drastic surge in the number of publications related to GeoGebra and

algebra. The fact that the number of publications in 2021 increased 6 times compared to 2020 shows the increasing interest and focus of researchers in exploring and publishing information related to GeoGebra in the context of algebra. In 2008, no publications related to GeoGebra and algebra were found, but since then, the trend has been positive. The use of GeoGebra tools in teaching and learning algebra has become an increasingly important research subject for academics and researchers. This change reflects the growing interest in the application of technology in learning mathematics, especially in the context of algebra, and shows that GeoGebra has become a very relevant and valuable tool in the world of mathematics education.

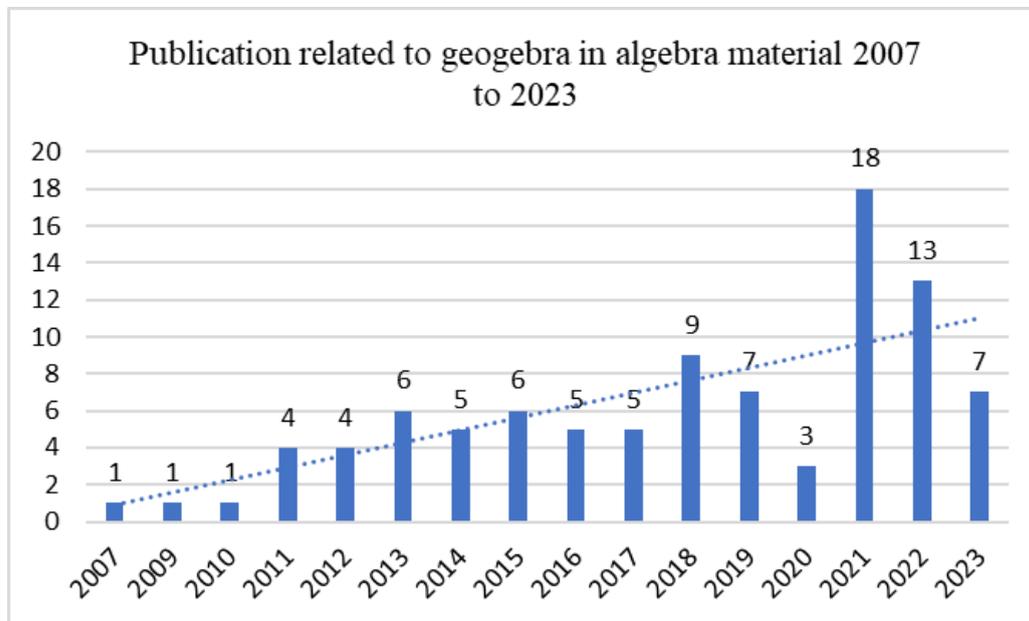


Figure 2. Publications from 2007 to 2023

These developments have made a significant contribution to the understanding and methods of teaching algebra. With the number of publications increasing every year, it can be assumed that mathematics researchers and educators are increasingly recognising the value and potential of GeoGebra in helping students understand algebraic concepts more interactively and visually. In addition, this positive trend also reflects a response to technological developments and the need for more innovative and dynamic approaches to learning. GeoGebra provides opportunities for practical mathematical exploration, allowing students to better visualize algebraic concepts, which in turn can improve their understanding (Suryawan & Permana, 2020; Yanti et al., 2019). In the academic context, the increasing number of publications also shows that the scientific community recognizes the value of GeoGebra-related research in the context of algebra. Findings and innovations in the use of GeoGebra in algebra learning have the potential to penetrate the formal education curriculum and help refine mathematics teaching methods at various levels of education. Therefore, seeing these positive developments, it can be expected that research and publications related to GeoGebra and algebra will continue to grow in the future. This will not only benefit the teaching and learning of mathematics, but will also open the door for discoveries in the world of mathematics education that can shape a generation of students who are more skilled and knowledgeable in the field of algebra.

Quote Trends

Citation trends over the past decade related to GeoGebra in algebra as shown in Table 1 from 2007 to 2023. The Table 1 shows that the number of publications related to GeoGebra on algebra material cited (NCP) in 2021 is the highest with (NCP = 9). The highest total citation was in 2015 with 139 total citations, although the highest number of publications was in 2021, several publications in the previous year had a very large research impact, such as from 2014 when only 18 citations rose sharply to 139 citations. Looking at the h-index calculated per year shows that in 2015 the h-index reached its highest with an h-index of 5. This means that this data also provides important insights into the dynamics of research and citations. While the number of publications in 2015 may not be as many as in 2021, the impact on the scientific community is huge. This emphasizes the importance of not only looking at the number of publications but also measuring the influence and acceptance of research by academics and other researchers.

Table 1. Citation analysis of publications

Year	TP(%)	NCP	TC	C/P	<i>h</i>	<i>g</i>
2023	7	1	1	0,14	1	1
2022	13	8	14	1,08	2	3
2021	18	9	45	2,50	4	6
2020	3	1	1	1	1	1
2019	7	5	23	3,29	3	4
2018	9	8	25	2,78	3	4
2017	5	5	14	2,80	2	3
2016	5	4	38	7,60	3	5
2015	6	6	139	23,17	5	6
2014	5	5	18	2,40	2	4
2013	6	5	29	4,83	2	5
2012	4	2	10	2,50	2	3
2011	4	2	9	2,25	2	3
2010	1	1	2	2	1	1
2009	1	1	30	30	1	1
2008	-	-	-	-	-	-
2007	1	1	74	74	1	1

Notes. TP=total of publications, NCP=number of cited publications, TC=total citations, C/P=average citations per publication, *h*=*h*-index, *g*=*g*-index.

The importance of 2015 in the history of GeoGebra and algebra research can also be interpreted as a turning point in the development of knowledge in the field. Research in that year may have introduced new concepts, innovative methods, or revolutionary applications of GeoGebra in learning algebra. As such, these publications have paved the way for further research, inspiring other researchers to explore the new ideas introduced that year. One of the most cited publications in 2015 was the research conducted by Botana et al. (2015). Botana et al. (2015) said the use of GeoGebra's performance, which is equipped with automatic deduction tools, is already very promising as many complex theorems can be proved in less than 1 second. Therefore, we believe that many new and exciting ways of using GeoGebra in the classroom are coming soon.

Analyzing this data also provides direction for future research. While 2021 showed an increase in the number of publications, it is important to understand the factors that made 2015 such an influential year. Further research could be conducted to identify the characteristics of research in 2015 that made it so successful, as well as to understand how the findings are still relevant and applicable in the current context of mathematics education. In conclusion, this data provides a deeper look into the complexities and dynamics of scientific research. Progress in GeoGebra and algebra is not only reflected in the numbers but also in the tangible impact that these studies have on the scientific community and mathematics education. Therefore, understanding the context and true value of scientific publications can provide valuable clues for future research directions and help enrich our understanding of GeoGebra's role in improving algebra learning.

Journal Ranking Mapping Distribution

Based on the Scopus database, the Quartile (Q) value of a journal is obtained. From the 95 publications obtained, grouping is then carried out based on the number of articles in each journal.

Table 2. Sources with the highest number of articles related to GeoGebra

Source	Number of Articles	Quartile
Lecture Notes in Computer Science	15	Q3
Mathematics in Computer Science	9	Q3
Journal of Physics: Conference Series	5	Q4
CEUR Workshop Proceedings	5	Not included
Proceedings of the Asian Technology Conference in Mathematics	4	Not included

From the table above, articles related to GeoGebra on algebraic material are mostly written in Q3 and Q4 journals in the journal ranking system, from the top 5 journals 2 journals do not yet have a quartile value. This is because journals that have a Q value are more selective in choosing articles so it is more difficult in terms of

publication. This means that the writing of articles related to this field must be further improved so that more articles will be published in journals that have a Q value. The focus of writing articles related to GeoGebra in algebra material should be strengthened in journals ranked above quartile Q3 and Q4. Although writing articles in these journals may be more difficult due to high selectivity, this is what makes it a very valuable target. Researchers and academics need to strive to improve the quality of research, methodology, and contribution to knowledge in every article they write. In addition, researchers need to keep abreast of the latest developments in GeoGebra and algebra. By understanding research trends and the needs of the scientific community, article writing can be directed to topics that are more relevant and significant. Strengthening cooperation between researchers and institutions can also be an effective strategy to produce higher-quality research that is relevant to the needs of quality journals.

In this context, increasing the number of articles published in journals with high quartile scores can also support the development of academic and institutional reputations. Quality articles published in prestigious journals will contribute greatly to improving the image of researchers, institutions, and even countries in the global scenario. Therefore, authors, researchers, and educational institutions need to work together to produce high-quality research and submit it to journals with high quartile scores. This will not only increase the visibility and impact of the research, but will also advance the field of GeoGebra and algebra as a whole. With an awareness of the importance of publication in quality journals, the scientific community can spur themselves to achieve higher standards of excellence in their research, thereby enriching the scientific literature and supporting the future development of mathematics education.

Geographical Distribution of the Publications

Countries are identified based on the country of origin of the journal. Figure 3 shows the geographical distribution of publications, based on which, there are 10 countries with the highest number of publications. Figure 3 shows that Spain and Austria are the most influential in this field. Spain has published 29 articles, while Austria has published 27 articles. These two countries combined account for more than 55 percent of the total publications. This means that the geographical distribution of publications reveals the significant influence of two countries, Spain and Austria, in the field of research related to GeoGebra and algebra. With a total of 29 publications for Spain and 27 for Austria, both countries have made an enormous contribution to the scientific literature in this field. When the number of publications from these two countries is combined, they account for more than half, i.e. 55 percent of the total.

In other words, Spain and Austria have played a key role in the development of knowledge about the use of GeoGebra in algebraic contexts. This success may reflect the existence of active research centers, strong scientific cooperation, or innovative teaching approaches in higher education institutions in both countries. The important role of Spain and Austria highlights the importance of cross-border collaboration in scientific research. International collaboration can enrich perspectives, broaden the scope of research, and produce more holistic solutions to complex challenges in GeoGebra and algebra.

In addition, these results provide an overview of the global diversity in approaches and research into GeoGebra in the context of algebra, which may inspire researchers from other countries to engage in similar studies or collaborate with researchers from Spain and Austria. In the context of mathematics education, understanding the dominant role of Spain and Austria also provides opportunities for other countries to learn from their experiences and approaches to the use of GeoGebra. By engaging various perspectives and best practices from different countries, the scientific community can continue to enrich learning methods and improve students' understanding of algebra, creating a positive impact on global mathematics learning.

It is important to recognize that GeoGebra was first developed on Austria by Hohenwarter (2001). Therefore, it is not surprising that Austria has a significant impact in GeoGebra-related research, given the country's origins in the development of this software. Austria's strong contribution to GeoGebra-related publications reflects the continuity and depth of domestic research into GeoGebra applications in algebraic contexts. Thus, Austria's presence as the second country with the highest number of publications is very natural. This achievement reflects Austria's commitment to advancing mathematical knowledge, especially in the field of algebra, through the use of GeoGebra as an effective and innovative learning tool. Austria's success in GeoGebra-related publications also illustrates how the home country of educational technology development can lead and inspire research at the international level, bringing benefits to the global scientific community.

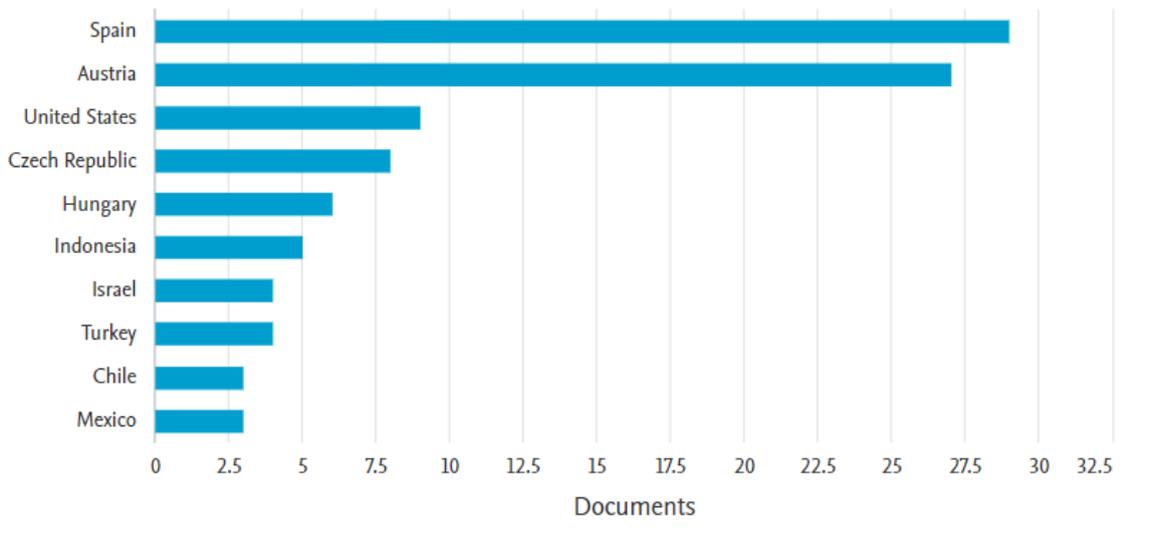


Figure 3. Geographical distribution of publications

Research Focus

Keyword co-occurrence analysis was conducted to determine the focus of research on GeoGebra on algebra material. Researchers set a threshold of at least 3 publications containing the same keywords. From these, results 529 keywords were reduced to 33 keywords.

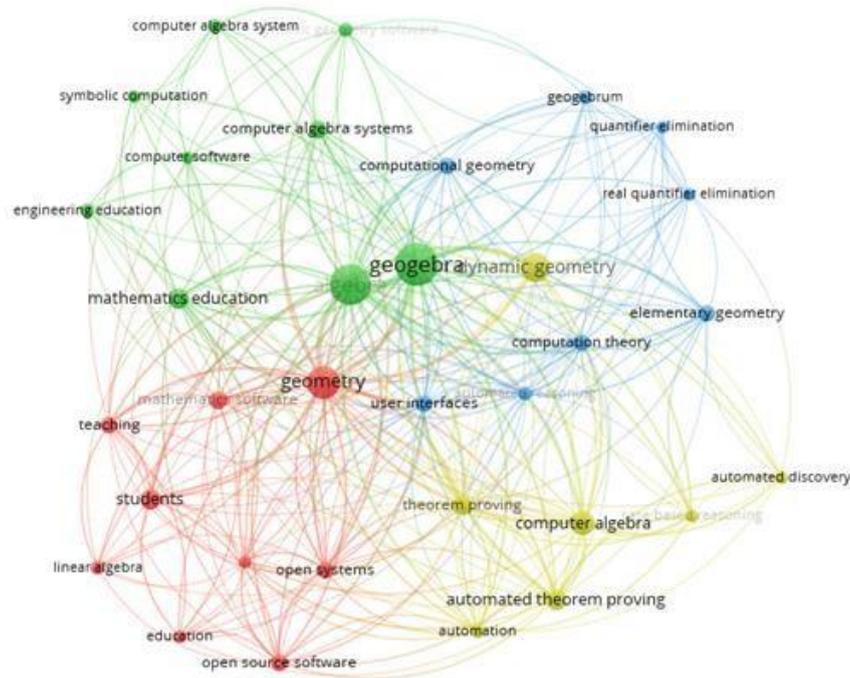


Figure 4. Keyword co-occurrence network (Occurrence Threshold ≥ 4)

The results of the network visualization in Figure 4 show that there are 4 clusters with 33 items regarding GeoGebra on algebra material, namely, 1) Cluster 1 (in red) is the largest cluster consisting of 9 items, the keywords geometry and student have the largest circle among other cluster 1, meaning that these keywords reflect the first research focus; 2) cluster 2 (in green) consists of 9 items with the keywords GeoGebra and algebra having a large circle than the others, meaning that these keywords reflect the second research focus; 3) cluster 8 (dark blue) consists of 4 items where the circle on the keywords elementary geometry and computation theory is the largest in the cluster, meaning that the keywords reflect the third research focus; 4) cluster 4 (yellow) consists of 7 items with the keywords dynamic geometry and computer algebra, meaning that the

keywords reflect the fourth research focus. This means that the results of the network visualisation in Figure 4 provide in-depth insight into four research clusters related to GeoGebra in algebra material. The first cluster, marked in red, highlights the keywords "geometry" and "student" as the main focus of research. These two keywords stand out with the largest circles, indicating that the research in this cluster mainly focuses on the use of GeoGebra in teaching geometry concepts to students. This reflects the great interest in understanding the interaction between algebra and geometry, particularly in the context of student learning.

The second cluster, represented in green, shows that the focus of the research is on the keywords "GeoGebra" and "algebra". The large circles around these two keywords indicate that the research in this cluster is more focused on the application of GeoGebra in teaching, and learning algebra. This reflects efforts to investigate how GeoGebra can be used to facilitate algebraic understanding, emphasizing the importance of technology integration in mathematics learning. The third cluster, marked in dark blue, highlights the keywords "elementary geometry" and "computation theory" as the main focus of research. The large circles on these two keywords indicate that the research in this cluster focuses on specific aspects of geometry and computation theory, exploring how GeoGebra can be applied in these contexts. This shows the diversity in the application of GeoGebra, including at the level of basic geometry and computation theory.

The fourth cluster, represented by yellow, shows that the research in this cluster focuses on the keywords "dynamic geometry" and "computer algebra". The large circles on these keywords depict research that explores the interaction between dynamic geometry and computer algebra, showing how GeoGebra is used to incorporate these concepts in mathematics learning. Taken together, the results of this visualisation provide an in-depth look at the research focus within the field of GeoGebra on algebraic materials. By highlighting different aspects of geometry, algebra and computation, these studies make a diverse and knowledge-rich contribution to the use of GeoGebra in mathematical contexts, enriching understanding and approaches to learning in this area.

Impact and implementation

The results of the study that identified various research focuses related to GeoGebra in algebra materials provide a clear picture of the impact and implementation of this technology in the context of learning mathematics. The use of GeoGebra in teaching algebra not only allows students to visualize abstract concepts more concretely and interactively but also facilitates independent exploration and problem-solving. With the integration of GeoGebra in algebra learning, students can be more actively involved in the learning process, improve their understanding of algebraic concepts, and develop critical and analytical thinking skills. In addition, the results of this study also provide an in-depth look at how GeoGebra can be implemented in the mathematics curriculum. By understanding the diverse focus of the research, educators can design more focused and relevant teaching strategies. The development of learning materials that integrate GeoGebra can help overcome the challenges of learning algebra, such as students' difficulties in understanding abstract concepts or boredom with less interactive learning.

This positive impact is not only felt by students, but also by educators and researchers. Educators can improve the quality of their teaching by utilizing GeoGebra as a dynamic and interactive tool. Researchers have the opportunity to deepen their research by focusing on specific areas that have been identified, paving the way for discoveries in the use of GeoGebra in the context of algebra. Overall, this research provides a strong foundation for strengthening GeoGebra integration in algebra learning. By utilizing these findings, educators can design more dynamic and relevant learning experiences, provide students with the ability to better understand and master algebraic concepts, and ultimately, strengthen their grounding in mathematics that will be useful in various contexts of their future lives.

Novelty of Research

In Figure 5, the novelty of GeoGebra-related research on algebra material is indicated by yellow circles, yellow circles indicate new keywords used in recent years. The keywords with the new theme are symbolic computation, quantifier elimination, and real quantifier elimination. The use of symbolic computation keywords indicates that the research involves manipulating mathematical symbols to explain algebraic concepts symbolically without regard to specific numerical values. In addition, the keyword quantifier elimination indicates the use of mathematical techniques of logic and model theory to eliminate quantified variables in mathematical formulas or statements, while real quantifier elimination emphasizes the use of these techniques in the context of real numbers. Thus, this research highlights the application of GeoGebra in simplifying complex

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Living in Camps Impacts on the Mental Health and Quality of Life of Displaced People in Northwest Syria

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Abstract: The research aimed to study the impact of living in displacement camps on mental health and Quality of life among Syrians in Northwest Syria. A descriptive and analytical approach was utilized, where two scales of mental health (SCL – 90 - R) and Quality of life (WHOQOL – BREF) were applied, with (306) participants. Results show that symptoms of mental health disorders appear at different levels, where the most common disorder is Depression, and the least common is Psychoticism. Quality of life results show that the most common issue was General Health, and the least common was environmental health. Differences between educational status and gender were statistically significant when studying the presence of mental health disorders, where it was lower in males than in females. Quality of life results showed significant differences between all demographic characteristics except the duration of stay in the camp. It was higher in females than in males. It was higher among the employed than the unemployed, and the age (under 18 years) had the highest Quality of life .Regarding marital status, it was highest in the (single and widowed). The Quality of life was highest among the university degree holders. There was a moderate and inverse correlation between Symptoms of mental health disorders and Quality of life, where the correlation coefficient was (-0.382), and this indicates a lower level of mental health with increasing deterioration in Quality of life. The results showed that Quality of life contributes to interpreting the variance in Symptoms of mental health disorders. The beta value ($\beta = - 0.391$) means that whenever Quality of life improved by one unit, Symptoms of mental health disorders decreased by (0.391) unit . To conclude, quality of life statistically significantly contributes to explaining mental health disorders among Syrians in displaced camps.

Keywords: Mental health, Quality of life, Displacement, Displaced people

Introduction

The Syrian war began in March 2011 and has rapidly developed into an ongoing public health crisis and humanitarian disaster (Erum, 2021). Violence and displacement have led to a noticeable increase in the prevalence of trauma and severe mental health problems among Syrians inside and outside the country (Alhaffar & Janos, 2021). This requires the provision of mental health care in war zones, refugee camps, and internally displaced people. Syria suffered from one of the most significant humanitarian and displacement crises worldwide due to the 2011 uprising and its escalation into an armed revolution by the summer of 2012. About 15.3 million Syrians need humanitarian support (Aburas et al., 2018; Barkil-Oteo et al., 2018; Ocha, 2018). More than a million internally displaced people reside in camps, and many more live in overcrowded and poor conditions, including exposure to traumatic events and ongoing stressors such as unemployment, impoverishment, social disintegration, and loss of social support (Lindert et al., 2017). Forced displacement harms displaced people's safety, existence, health, and psychological well-being (Ozkaleli, 2018).

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The impact of living in displacement camps on displaced peoples' mental health and quality of life is an important topic (Riyadh & Al-deen, 2022), focusing on the positive aspects of individuals' mental health and ability to withstand psychological stress. Studies have shown that forced displaced people face severe psychological and physical stress before, during, and after displacement (Knappe et al., 2023). Displacement camps significantly impact displaced peoples' mental health and quality of life (Rizzi et al., 2022). Studies have shown that displacement can lead to mental disorders such as depression, anxiety, and post-traumatic stress disorders (Schäfer et al., 2023).

In recent years, several studies and research have focused on these camps to better understand the effects of displacement and improve the physical and psychological well-being of the displaced. These initiatives yielded essential results, revealing details and clear concepts concerning the effects of displacement on mental health. Despite the valuable insights provided by past studies, there are still several knowledge gaps in our understanding of the mental health and quality of life of displaced people in camps, notably in Syria. Current research considers conducting studies to investigate the long-term impact of displacement and the role of social determinants on mental health and quality of life among displaced persons in camps, as well as understanding the contribution and impact of quality of life on mental health among Syrian displaced people. Despite the numerous research undertaken, studies specializing in mental health are nearly non-existent, prompting us to examine this topic to contribute to the lack of studies in this field. Further research is needed to understand the social factors that contribute to the impact of displacement and to address the specific psychological needs of displaced people.

The study's goal is to determine the level of mental health and quality of life among the displaced, as well as the differences in symptoms of mental health disorders and quality of life caused by variables such as gender, age, marital status, duration of stay in the camp, working status, and educational status among the camps in northwest Syria. This focuses researchers' attention on the issues that society needs to address. By conducting this research, we aim to improve the understanding of this field and contribute to enhancing the quality of life of displaced persons while also providing them with the support they need to overcome the mental challenges they experience. Psychosocial support programs and community-based interventions may be used to improve resilience and well-being. Encourage collaboration among researchers, humanitarian organizations, and policymakers to ensure that research findings are turned into effective policies and actions. This would make it easier to apply evidence-based practices while also improving the mental health and quality of life outcomes for the Syrian displaced. Three camps in northwest Syria were chosen to implement this study based on the study's goals.

Literature Review

The displacement of individuals due to conflict and humanitarian crises has become a global concern (Troup et al., 2021). Large and sudden waves of displacement that occur in a short period put enormous pressure on the displaced, as well as on host communities and various organizations working in the field of mental health (Vito et al., 2015). Displaced people living in camps often face numerous challenges that can significantly impact their mental health and quality of life (Cogo et al., 2022). The literature synthesizes the existing research findings on the mental health and quality of life among displaced people in camps, explicitly focusing on the situation in Syria. A study was conducted on the mental health, quality of life, and life satisfaction of internally displaced persons (IDPs). The findings revealed that IDPs experienced high levels of psychological distress and a lower quality of life compared to the general population (Zelenska, 2022). The studies highlighted the need for mental health interventions and support services for IDPs to improve their well-being and overall quality of life (Getanda et al., 2015; Mandishekwa, 2021). Findings from various studies underscore the importance of addressing the specific needs and experiences of refugee women to improve their mental health and overall well-being (Jesuthasan et al., 2018). IDPs who leave their homes are exposed to severe distress factors during and after the migration and displacement process (UN Refugee Agency (UNHCR), 2015). These factors significantly affect mental and physical health and greatly increase the likelihood of experiencing mental health problems (Porter & Haslam, 2005) because the effects of displacement can be severe in the long term (Jbour & Sammour, 2016).

Internally displaced people are among today's most vulnerable individuals (Vito et al., 2015). Cardozo's study showed high levels of symptoms of depression and anxiety among displaced people in camps. The study showed that the primary psychological and social risk factors that contribute to and weaken the psychological health and social interaction of displaced people include poor nutrition, an increased number of traumatic incidents, previous psychological illnesses, and landmine and war injuries. Cardozo recommended the need to

implement innovative programs in the field of mental and psychosocial health and carefully monitor and evaluate them to ensure their effectiveness (Cardozo et al., 2004). Post-traumatic stress disorder, depression, and anxiety disorders are among the most common psychological problems among displaced people affected by war trauma and who have negative experiences in their lives (Morina et al., 2018). By prioritizing mental health services and implementing community-based interventions, it is possible to improve the psychological well-being of displaced people in camps and help them recover from the trauma and psychological stress resulting from displacement (Miller & Rasmussen, 2017; Nouri, 2019). As noted by mental health researchers at SAMS, many Syrians were suffering from Symptoms of mental health disorders associated with disorders such as anxiety, depression, and post-traumatic stress disorder (PTSD) (Aburas et al., 2018; Hughes et al., 2016). Available data strongly indicate that both war-related trauma and post-displacement stress factors significantly affect mental health (Tadese et al., 2022). A study showed that there is an increase in levels of depression among displaced Syrians residing in displacement camps in Jordan. She explained that the conditions of war and displacement to which they were exposed have significantly affected their psychological health, as many of them suffer from anxiety and severe depression. This is due to social and economic instability and constant anxiety about an unknown tomorrow (Susan Brown, 2018). Miller's studies have shown that the mental health of displaced people and refugees is affected not only by exposure to violence and loss associated with war but also by ongoing stressors associated with the displacement experience itself (Miller & Rasmussen, 2017).

These stressors include social isolation, unemployment, poverty, discrimination, domestic violence, and lack of safety in displacement camps (Riyadh & Al-deen, 2022). In addition, displacement-related stressors can range from chronic, low-intensity stressors to potentially traumatic events, increasing the risk of psychological disorders (Miller & Rasmussen, 2017). The post-displacement housing environment plays a crucial role in either enhancing or hindering the process of recovery from trauma and grief resulting from war (Askar et al., 2019; Valle & Romania, 2019). Additionally, ongoing stressors related to displacement, such as personal safety concerns, war-related loss, material loss, and personal hardships, are positively related to Symptoms of mental health disorders severity (Thomas et al., 2022). The Getanda study showed that IDPs who are younger, married, and receive health, social, and government care are more protected against poor mental health. In general, the IDPs studied have poor mental health and well-being. The results indicate that forced displacement has a significant negative impact on mental health (Getanda et al., 2015). Therefore, urgent support and assistance must be provided to IDPs in these circumstances to improve their health and psychological well-being in the long term, especially for internally displaced people who are concerned about the well-being of their families, lack social support, and suffer from Symptoms of mental health disorders (Kim et al., 2022; Romanova et al., 2023). This poses a major challenge to mental health and social services in such contexts, which witness significant and complex health and social care needs, further complicated by lack of resources, stigma, and lack of awareness in society in general (Bucy & Cross, 2023; Kariotis et al., 2019).

Alaiwi's study showed the exposure of the displaced to many heart and chronic diseases and Symptoms of mental health disorders. The emergence of deviance and crime in displacement camps, the increase in divorce and family disintegration, and the loss of many families of their children. These results highlight the significant challenges faced by displaced people and indicate the impact of forced displacement on the mental health, social relations, and level of education of these individuals (Ulaiwi, 2020). In a study that dealt with psychological distress among internally displaced persons showed that most displaced people are male and aged 50 years or over, most have primary education, and most people had a job before displacement. Displaced people suffer from a moderate level of psychological distress. There are significant relationships between psychological distress, age, level of education, profession, monthly income, and the period of displacement (Hussein et al., 2018). Providing temporary housing during the disaster recovery phase is critical for ensuring comfort, protection, privacy, and a gradual return to normal life activities, according to "The Role of Local Building Systems in Enhancing the Sustainability of Post-Disaster Temporary Housing," 2022. Quality of life is found to be associated with symptoms of mental health disorders (Sagayadevan et al., 2018; Snoek et al., 2018). The depressive disorder group had the lowest quality of life and the highest level of depressive and anxiety symptoms (Colovic et al., 2017). Depressive symptoms were found to have the most significant impact on the quality of life impairment in stress-related disorders. These findings suggest that quality of life contributes to explaining variation in symptoms of mental health disorders, with depressive symptoms having a powerful impact. In this study, we will look at the impact and contribution of quality of life on mental health, emphasizing understanding the correlation between the two.

Methods

Study Design

This prospective cross-sectional study was conducted in the camp area of northwestern Syria, notably the northern region of Idlib and Aleppo, where camp gatherings are concentrated due to their proximity to the Syrian-Turkish border. The study focused on displaced Syrians in three northern Syrian camps: the olive camp outside Azaz, the new Al-Hayat camp on the borders of Al-Bab, and the town of ATAA village in Atama in Idlib. According to data from camp administration, administrative authorities, and official local councils, there were approximately (10108) displaced individuals in the three camps. This investigation was conducted from July to November 2023. Before beginning the study, the Institutional Ethics Committee from the camp management provided approval. This analysis was performed in adherence to The Belmont Report.

Participants

The study includes displaced people living in northern Syrian camps as participants. The study sample was selected using the random sampling approach. The researchers conducted personal interviews with all sample participants (n = 306). A total of 300 persons volunteered to participate. According to the MORGAN equation, it accounted for 3 percent of the study community. The questionnaire, Symptom Checklist (SCL - 90 - R), and Quality of Life (WHOQOL - BREF) were all explained thoroughly. The specialist completed the questionnaires appropriately after resting for at least 15 minutes in a quiet place free of visual and auditory disturbances. Two teams from the Ataa Humanitarian Relief Organization, Department of Mental Health and Psychosocial Support, who are in the study region in northwestern Syria, have been working to administer questionnaires to camp residents, where all of the experienced and specialized personnel were.

Participants who needed to finish all the questions were excluded (N = 6). All participants provided informed consent. The investigation was conducted utilizing a structured questionnaire. The questionnaire consisted of three sections. In the first section, the subjects' sociodemographic information was included. The participants were queried regarding their mental health in the subsequent segment (Derogatis & Unger, 2010). In the final section, they were asked about the quality of life (Malibary et al., 2019; Skevington et al., 2004). Participants were requested to answer all questions.

Measures

The mental health scale (SCL - 90 - R) and the WHOQOL - BREF were employed following the American Psychiatric Association's DSM-V symptom criteria. The (SCL - 90 - R) is a set of 90 self-report items that test for nine symptoms of mental health problems (somatization, interpersonal sensitivity, obsessive-compulsive, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism). The WHOQOL-BREF comprises 26 self-report items assessing six aspects of quality of life (psychological, physical, environmental, social relationships, general health, and overall quality of life). Participants respond to the questions using a 5-point Likert scale (1 = not at all, 5 = excessively). The internal consistency validity of the mental health and quality of life scale dimensions has been established. The Lehman classification was used to estimate this study's degree of correlation coefficient (Lehman, 2005). According to the Cronbach Alpha method, the questionnaire is highly reliable (McHorney et al., 1992).

Statistical Analysis

The sample size was calculated to be 306 people. It was expected to have at least 330 participants with a 10% margin of error. The sample size was calculated using an online Morgan equation and calculator (<https://clincalc.com/>). The categorical variables are numbers and percentages (Krejcie et al., 1996). The variables were analyzed using both descriptive and analytical methods. The numerical variables are reported as mean \pm standard deviation or median (interquartile range). The distribution of the groups was determined using the Kolmogorov-Smirnov test. The categorical variables were analyzed using the chi-squared test. The numerical variables were analyzed using the student t-test and the Analysis of Variance ANOVA test. Linear regression analysis was employed to examine the data. Pearson correlations were used to analyze the relationships between psychological factors. The statistical significance criterion was set as ($p < 0.05$). Lehman (2005) reported optimal item-intercorrelation (0.593) and excellent internal consistency (Cronbach's $\alpha = 0.921$). They indicated the suitability of the data for factor analysis. The statistical analysis was performed using SPSS® for Windows version 27.0 (IBM, Chicago, IL, United States) (SPSS, 2019).

Results

The study involved 306 participants, with six failing to complete the questionnaire (n=6). The final analysis comprised 300 participants. More than 32% of participants were above 40, with women accounting for 53.3%. The baseline demographic characteristics of the participants are shown in (Table 1).

Table 1. Basic demographic characteristics of participants and p-values

Variables	Values, n (%)	Mental health (p-value)	Quality of life (p-value)
Gender		0.046	0.027
Male	140 (46.7)		
Female	160 (53.3)		
Age		0.825	> 0.001
Under 18 years old	28 (9.3)		
From 19 - 30 years old	87 (29)		
From 31 - 40 years old	88 (29.3)		
More than 40 years	97 (32.3)		
Marital status		0.378	> 0.001
Single	44 (14.7)		
Married	236 (78.7)		
Widow	17 (5.7)		
Divorced	3 (1.0)		
Educational level		0.008	0.004
I don't know how to read and write	82 (27.3)		
High school or below	(62.3) 187		
Institute	(6.0) 18		
University	13 (4.3)		
Duration of stay in the camp		0.45	0.085
From 1-2 year	58 (19.3)		
From 3-4 year	82 (27.3)		
More than five years	160 (53.3)		
Working status		0.245	0.027
Employed	64 (21.3)		
Unemployed	236 (78.7)		

*The statistical significance at the 0.05 level (2-tailed).

The findings revealed that 64.6% of displaced persons living in camps had low levels of mental health disorders, 31% had moderate levels, and only 4.4% had high levels. By presenting the findings, we can conclude that displaced persons have poor mental health. Furthermore, the findings revealed that 44% of displaced individuals living in camps have a low quality of life, 47% have a moderate level, and only 9% have a reasonable level. The results show that the displaced have a moderate quality of life. This is illustrated in (Table 2).

Table 2. The level of mental health and quality of life among displaced people in camps

Variable	level	Values, n	Values, (%)
mental health symptoms	Low	194	64.6
	moderate	93	31
	High	13	4.4
Quality of life	Low	132	44
	moderate	141	47
	High	27	9

*The statistical significance at the 0.05 level (2-tailed).

Aspects of mental health disorders symptoms are present as reported by participants in the study sample, where depression ranks first with a prevalence of 57.2% and is classified as moderate on a five-point Likert scale. Psychoticism ranked lowest, with a prevalence of 36%. This is demonstrated in (Table 3).

Sample responses to questions about quality of life: General health ranks first, with a prevalence rate of 64.0%, indicating a moderate level on a five-point Likert scale. Environmental health scored last, with a prevalence rate of 40.2%, considered low on a five-point Likert scale. The data is presented in (Table 4).

Table 3. Analysis of the opinions of the study sample's responses on the dimensions of the mental health

The dimension	Mean	Std. Deviation	Prevalence rate %	Rank	level
Somatization	2.6	0.836	52	3	moderate
Interpersonal sensitivity	2.41	0.78	48.2	5	low
Obsessive-Compulsive	2.83	0.785	56.6	2	moderate
Depression	2.86	0.812	57.2	1	moderate
Anxiety	2.26	0.836	45.2	6	low
Hostility	2.1	0.814	42	7	low
Phobic anxiety	1.95	0.728	39	8	low
Paranoid ideation	2.53	0.946	50.6	4	low
Psychoticism	1.8	0.578	36	9	low
Total (mental health)	2.39	0.555	47.8		low

*The statistical significance at the 0.05 level (2-tailed).

Table 4. Analysis of the opinions of the study sample's responses on the dimensions of the quality of life

The dimension	Mean	Std. Deviation	Prevalence rate %	Rank	level
Psychological health	2.82	0.647	56.4	4	moderate
Physical health	3.11	0.775	62.2	3	moderate
Environmental health	2.01	0.733	40.2	6	low
Social relationships	3.15	0.728	63.0	2	moderate
General Health	3.2	1.302	64.0	1	moderate
Overall Quality of Life	2.43	1.121	48.6	5	low
Total (Quality of Life)	2.65	0.541	53.0		moderate

*The statistical significance at the 0.05 level (2-tailed).

The Pearson correlation coefficient test was used to investigate the association between mental health symptoms and quality of life, with a correlation coefficient -0.382. The Lehman classification was used to calculate the degree of correlation coefficient (Lehman, 2005). The results are presented in (Table 5). A linear regression model was used to investigate the impact of quality of life on displaced peoples' psychological health symptoms (Table 6).

Table 5. Pearson correlation coefficient test between mental health symptoms and quality of life

Dependent Variable	Correlation coefficient	p value
mental health	-0.382	0.00

*Correlation is significant at the 0.05 level (2-tailed).

Table 6. Results of linear regression analysis of quality of life with mental health

Dep Variable	Indep Variable	R	R ²	F (p value)	B	T (p value)	VIF
Mental Health	Quality of life	0.382	0.146	50.855(0.000)	-0.391	-7.131(0.000)	1.000

*The statistical significance at the 0.05 level (2-tailed).

A linear regression model was utilized to investigate the association between mental health symptoms and quality of life, with mental health symptoms as the dependent variable and quality of life as the explanatory variable. These findings emphasize the importance of psychosocial therapies and mental health services in meeting the mental health needs of those affected by displacement .

Discussion

According to our findings, indications of mental health disorders arise at varying levels, with a 47.8% prevalence rate among displaced people. The most frequent was moderate depression, with a prevalence rate of 57.2%, while the least common was low psychoticism, with a prevalence rate of 36%. These findings are consistent with several studies, including one (Weiss Becker & Leichner), which found that many displaced persons live in camps and lack necessities such as housing, food, education, and health care. In addition, they suffered from psychological symptoms and disorders, with a significant prevalence of anxiety and depression. Depression was the most common, accounting for 54%, whereas psychotic disorders accounted for only 11%. These findings are congruent with ours. Similarly, Miller's research revealed the incidence of depression, psychological problems, and psychosis among Syrian refugees and displaced people. Many studies have found a

significant frequency of depression among refugees and displaced persons living in displacement camps (Abas, 2018; Hamid & Musa, 2010; Kabunga & Anyayo, 2020; Lavdas et al., 2023; Llosa et al., 2014).

While the quality of life was moderate, with a prevalence rate of 53%, the most frequent was general health, with a prevalence rate of 64%, and the least widespread was environmental health, with a prevalence rate of just 40.2%. According to research, refugees living in cities are more satisfied with their overall environmental health than those living in camps (Behnke et al., 2020). Displaced people living in internal displacement camps are more sensitive to mental health problems due to the adverse effects of environmental change and other detrimental factors (Vossoughi et al., 2018). Environmental health measures such as water supply, excreta management, solid waste management, and disease vector control are critical during the emergency phase of displacement. However, there needs to be more research on environmental health conditions during the transitory phase of migration, which lasts six months to two years (Cooper et al., 2021). Despite the importance of environmental health, there remain barriers to change, including institutional, political, and implementation issues (Wardeh & Marques, 2021).

According to the results of the Symptoms of mental health disorders study, there were substantial disparities in gender and education level. Females averaged 2.45, whereas males averaged 2.32. Other demographic factors did not show significant variations. This suggests that females are more likely to experience stress and symptoms of mental health disorders than males. Women are noted for caring for their families, including children and the elderly. However, when they are displaced, the load of these tasks increases, causing psychological stress and symptoms of mental health conditions. Displacement can result in a loss of security, social support, income, and housing. This increased societal pressure causes symptoms of mental health issues. This is evident in a study conducted by N. Rizkalla on Syrian refugees in Jordan, which dealt with the significant psychological and social pressures that women face, as this additional pressure is a source of the emergence of symptoms of mental health disorders, which disproportionately affect women (Rizkalla et al., 2020). This is similar to the findings of Jarallah and Vromans, who discovered that refugee and displaced women suffer from more significant psychological diseases and illnesses than men (Jarallah & Baxter, 2019). Other Middle Eastern studies have found that refugee women experience higher levels of psychiatric symptoms (Tahir et al., 2022).

Quality of life results revealed substantial disparities between all demographic categories except the length of stay in the camp. The discrepancies were as follows: males and females averaged 2.58 and 2.72, respectively. This is congruent with a study on refugees in Greek camps, which found that female participants were more satisfied with their quality of life than males (Plakas et al., 2023). Regarding employment status, the average was 2.077 for employed and 2.62 for unemployed people. The amount of money a person earns from his job significantly impacts his ability to improve his quality of life. Furthermore, when relocated men cannot provide for and defend their families, they may feel helpless and inept, resulting in a much lower quality of life (Affleck et al., 2018). The age group (under 18 years) had the highest average, at 2.90. This is similar to prior research, which found that age substantially affects quality of life, with younger people having more significant rates of healthy quality of life than older participants (Plakas et al., 2023). The variation in marital status is attributable to the disparity between (single/widower) and (married/widower), with an average of 0.668 and 0.384, respectively. Our findings that widows had significantly worse mental health than married IDPs, this situation can be explained by the fact that the death of a partner constitutes a significant loss in psychological and social support. It also raises the likelihood of additional trauma (Nickerson et al., 2014), depression (Gilman et al., 2012), and loneliness (Caserta et al., 2013). Other research has found that single people in refugee camps have more significant quality of life scores than married, divorced, and widowed people (Plakas et al., 2023). The variations in education level are attributable to those with a university degree, with a value of 2.96, followed by those who have completed secondary school or less, with a value of 2.71. This finding is consistent with earlier studies on the importance of education (Hui, 2022; Xu, 2022). According to research, displaced people in camps with greater levels of education live more fulfilled and quality lives than those with lower levels of education (Plakas et al., 2023).

There was a moderate inverse correlation between symptoms of mental health disorders and quality of life, with a correlation coefficient of -0.382 and statistical significance (p -value < 0.001). This suggests a poorer degree of mental health and a worsening quality of life, and vice versa. There was also a moderate and statistically significant negative connection between mental health condition symptoms and quality of life in both genders. The correlation coefficients for males and females were -0.432 and -0.379, respectively. Overall, mental health suffers as the quality of life declines, and vice versa. This test demonstrates the significance of prioritizing quality of life to obtain mental health. It is important to note that this link is not constant between individuals and can be influenced by social, economic, cultural, and environmental factors. This shows that men may suffer

more negative effects on their mental health as a result of quality of life issues than women (Hooper et al., 2023). According to (Ciešlik, 2023), quality of life encompasses family conditions, stability, and other things that positively impact mental health. Therefore, mental health is strongly tied to quality of life. The findings revealed that quality of life contributes to approximately 14.6% of the variation in symptoms of mental health issues. (-0.391) was a statistically significant value of (β). This suggests that for every one-unit improvement in quality of life, symptoms of mental health issues decrease by (0.391) units. The regression equation can also be written as:

$$Y = 3.43 - 0.39 * X + \epsilon.$$

This finding complements recent research by Dana Bdier, which found that Quality of Life is inversely connected to symptoms of mental health issues (Bdier et al., 2023). The findings show promise for future research to understand better how the current study's factors are connected. This could help specialized mental health service providers develop suitable therapies to reduce the harmful consequences of camp living. Furthermore, it could improve the quality of life for displaced people and promote healthy coping mechanisms. Our findings demonstrated the importance of quality of life, as well as social and demographic determinants, in the symptomatology of mental health disorders among displaced people. These findings demonstrated that quality of life has a statistically significant impact on explaining heterogeneity in symptoms of mental health issues. This observation illustrates the beneficial influence that enhancing quality of life has on mental health, as ameliorating conditions and factors that impact quality of life can lead to a reduction in the symptoms of mental health disorders. According to Cohen's d effect size, the influence of quality of life on mental health was 0.29, which suggests that quality of life positively affects mental health (Bakker et al., 2019; Cohen, 1988).

Limitations

The current study has several limitations. It was a cross-sectional qualitative study, and the nature of surveys limits the responses. We invited displaced individuals to camps. Six of them declined to participate and fill out the questionnaire. Being the first to investigate mental health and its relationship to quality of life, this study will provide the framework for future research. Participants may have overestimated or underestimated their answers. More accurate demographic figures must be, and it is not easy to move about in northwest Syria. Because of the challenges caused by the man's absence at home, it is recommended that the questionnaire be administered at an opportune time.

Conclusion

We have obtained essential results that highlight the need to focus on providing psychological and social support to displaced people experiencing various stresses and obstacles due to displacement. We also provided several ideas for future research that can help advance understanding of the domains covered in this study. We recommend upgrading infrastructure, providing essential services such as water and sanitation, and transitioning from tent shelters to permanent housing units that provide adequate refuge for the displaced. Directing efforts towards addressing these characteristics can help improve the displaced people's quality of life and alleviate any psychological stresses caused by their living conditions. Because the study's participants' mental health and quality of life ranged from average to poor, we advocate creating mental health treatment and psychosocial support centers in displacement camps. This includes guidance, therapy, training, and awareness programs that help displaced individuals deal with the social challenges and psychiatric diseases they experience daily, allowing them to adjust and fully integrate into society. Given the significantly high unemployment rate and its significant impact on the quality of life of the displaced, we propose increasing the provision of psychological and social support and assisting in the search for job opportunities to improve their psychological and living circumstances. Due to the poor level of education, with roughly 28% of individuals illiterate, there is an urgent need to improve literacy programs in displacement camps. These programs are a critical step towards boosting reading and writing skills among displaced people.

As a result, we advocate creating personalized educational programs that consider the requirements and peculiarities of the displaced population. Based on the findings, which show that improving quality of life is an effective way to reduce symptoms of mental health disorders among displaced people, we recommend developing and enhancing programs and strategies to improve quality of life, particularly in contexts where displaced people face psychological and social stressors. We advocate performing additional studies and research that include other forms of mental diseases and levels of quality of life in displacement camps while

considering new advancements and changes. In conclusion, existing research sheds light on the mental health and quality of life of displaced persons in camps. However, more research is needed to fill knowledge gaps and provide comprehensive interventions and services that meet the unique needs of displaced people, notably in Syria.

Ethical approval

All participants were required to provide informed consent before proceeding to the questionnaires, whether online or in person. Contact information for the research team was given at the beginning and end of each study for any inquiries that may occur during the research. Participants could end questionnaires or interviews anytime without justifying and facing any consequences. Furthermore, participants had up to one week after completing the questionnaires or responses to contact the researcher if they wanted to remove their data. If a person withdraws, their data will be permanently deleted and not included in any analysis published in this research.

Authors Contributions

Study concept and design (D.B., M.H.), acquisition of the data (D.B., M.H.), analysis and interpretation of the data (D.B., M.H.), drafting of the manuscript (D.B., M.H.), critical revision of the manuscript for important intellectual content (D.B.).

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Authorship Contribution Statement

Dujana Baroudi: Writing—review and editing, Writing—original draft, Visualization, Supervision, Project administration, Methodology, Investigation, Validation, Data curation, Conceptualization.

Muhammed Humeydi: Writing – review & editing, Writing – original draft, Visualization, Supervision, Methodology, Formal analysis, Data curation.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author

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RME Educational Game Based on Android Mobile to Increase Students' Mathematical Understanding Ability

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Abstract: This research aims to: 1) create an RME educational game based on Android about integers called Story Math Game as an edutainment medium for 1st grade elementary school students that contains stories about basic concepts of counting (addition and subtraction), practice questions, and learning evaluations (with various varying levels of difficulty) with the characteristic of using real problems; 2) assess whether the game is suitable for learning mathematics; and 3) describe the increase in students' mathematical understanding abilities who have used RME educational games in learning. This research is research and development (R&D) with a 4D development model. There are four stages: define, design, develop, and disseminate. Data analysis techniques include expert assessment (feasibility test and media quality test) and development testing (one-group pretest-posttest design experiment). The feasibility of the RME educational game was evaluated by media and materials experts. The research results showed that 1) educational games reached a feasibility level of 75.00% with good criteria from media experts and 82.32% with good criteria from material experts, 2) the media was tested publicly by 100 parents of students, and the test results The public obtained application quality results of 83.20% with good criteria, and 3) development testing resulted in an increase in the mathematical understanding abilities of 1st grade elementary school students. Based on the results of the data obtained, it appears that the RME educational game is suitable for use as a mathematics learning medium and can increase the students' mathematical understanding abilities in 1st grade elementary school.

Keywords: RME, Android, Educational game, Mathematical understanding

Introduction

Students must have problem-solving skills (Hilda & Siswanto, 2021), creativity (Siswanto et al., 2019), and especially technological skills (Sagita et al., 2019) to face the fourth industrial revolution (Nurhayati et al., 2020). Technological progress cannot be avoided in this life; technological development goes hand in hand with the development of science, especially in education (Levano-Francia et al., 2019; Teräs et al., 2020; Tri et al., 2021). Education is a crucial aspect that benefits from advances in information technology. As technology

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develops today, every innovation created must be able to provide benefits and be used appropriately to help and make things easier in various ways, especially for learning (Oke & Fernandes, 2020).

The 2013 curriculum (Indonesian education curriculum) emphasizes information and communication technology (ICT) literacy in learning, where all subjects must be integrated with the use of ICT (Hilda & Siswanto, 2021; Machmud et al., 2021; Nurhayati et al., 2020), which is known as ICT-based learning. ICT subjects are no longer part of the curriculum but are part of learning in all subjects (Akib et al., 2020; Mahdum et al., 2019). The presence of ICT is expected to improve the quality of learning, as the aim of integrating ICT into the education curriculum in Indonesia must be to support learning (Kristiawan & Muhaimin, 2019; C. Zhang et al., 2022). ICT can help solve educational problems. Especially for mathematics learning, ICT can be used to turn the abstract into concrete (Caena & Redecker, 2019; Malik et al., 2019).

Teachers and students are required to use and utilize technology in the learning process (Halili, 2019; Rachmadtullah et al., 2020; Susanto et al., 2020; Tohara, 2021). In an effort to instill concepts, learning is not enough just through lectures; ideally, teaching in schools needs to be provided with adequate media so that students can observe, explore, and try to discover principles through daily activities. Mathematics learning will be faster if it is part of classroom learning activities. Media was introduced that effectively describes the application of mathematics in everyday life, known as realistic mathematics education, or RME (Siswanto et al., 2023). Therefore, we need a learning medium that can maximize and help children learn by seeing, hearing, and carrying out mathematical activities in everyday life, known as realistic mathematics education, or RME.

RME is a mathematics learning approach that provides real things for students (Hilda & Siswanto, 2021). The main idea of the RME approach is that students must be given the opportunity to rediscover mathematical ideas and concepts with teacher guidance through exploring various situations and problems that are real to them (Suryadi, 2015). RME is based on three basic principles: guided reinvention through progressive mathematization, didactic phenomenology or phenomena in learning, and emergent models or generating models (Maudy et al., 2017). Through realistic learning, students will understand the concept and operation of integers through mental activities because RME has the potential to improve students' mathematical understanding (Saleh et al., 2018). Based on this argument, mathematics is not only to be studied but also to be implemented in daily life activities (Sumirattana et al., 2017). Therefore, the operational definition of RME in this paper is learning that utilizes contextual problems of everyday life and concrete objects to understand selected mathematical concepts and problems.

The goals of learning mathematics are to solve problems, apply what has been learned in the real world, and develop mathematical abilities. As a result, mathematics lessons in schools place a strong emphasis on concepts (Herawati et al., 2010; Zulkardi, 2003, 2006). Mathematical ideas make sense in connection to other pertinent concepts and create a fundamental framework for the subject when students study it because the concepts are presented in a way that makes them interrelated (Mumcu & Aktürk, 2020). One of the most crucial skills for children to acquire in order to overcome challenges in the future is the capacity to comprehend mathematics (Auliya & Munasiah, 2016). This refers to the idea that the foundation of studying mathematics in the classroom is the capacity to comprehend mathematical ideas. This means that comprehension of mathematical ideas is a must for all math classes in the classroom. But there are a number of issues with math education in schools. First, incomplete and imprecise grasp of mathematical ideas is a common challenge that students have when studying mathematics in the classroom (Ramadhina et al., 2021). The purpose of learning mathematics itself is impeded when pupils are unable to comprehend a mathematical idea, and they face challenges in each and every math class (Banowati & Siswanto, 2023). Therefore, difficulties that students encounter in grasping concepts may have an effect on the objectives of mathematical education itself.

Polya (Banowati & Siswanto, 2023) states that there are four levels of mathematical understanding: 1) mechanical understanding, or the capacity to apply and retain laws accurately; 2) Inductive understanding may be applied to comparable circumstances by applying rules or formulas to simple examples and trusting in the laws or formulae; 3) Rational understanding, which is the capacity to demonstrate the validity of the law or formula in question; and 4) intuitive understanding, which is the capacity to accept the validity of the law as true without question and to offer evidence supporting the validity of the prediction. There are several signs that someone understands mathematical ideas. The following are the NCTM-based indicators of conceptual understanding that were used in this study: 1) verbal and written concept definitions; 2) the identification and creation of examples and non-examples; 3) the use of models, diagrams, and symbols to represent concepts; 4) the switching between different forms of representation; 5) the recognition of multiple interpretations and meanings of concepts; and 6) the identification of a concept's characteristics and conditions that determine a concept (Banowati & Siswanto, 2023).

In this research, an RME educational game based on Android about integers was developed called “Story Math Game” as an edutainment medium in mathematics learning for 1st grade elementary school students which contains material about stories about basic concepts of counting (addition and subtraction), practice questions, and learning evaluation. (with various levels of difficulty), with the characteristics of using contextual problems from daily life, focusing on improving mathematical understanding abilities, as well as the relationship between lesson material and case examples developed based on RME. Story Math Game functions as an edutainment medium that combines elements of education and entertainment. This educational game is packaged attractively on mobile devices or smartphones so that it can be used as a medium and reference source to make it easier for teachers to teach and especially to make it easier for students to learn integer material wherever and whenever (García et al., 2016), so that students’ interest and independence in learning are also increasing (Hilda & Siswanto, 2021).

The consideration in developing educational games on smartphones is the basis of the system used, namely Android. According to the results of the StatCounter Globalstats survey of smartphone users in Indonesia from 2017 to 2023, Android is the dominant operating system for smartphones in Indonesia at 76.86%, followed by iOS at 5.66%, Series 40 at 4.65%, BlackBerry at 2.69%, SymbianOS at 2.4%, Nokia at 1.6%, Samsung at 0.47%, and others at 5.66% (Statcounter Global Stats, 2023). This means that the majority of smartphones in Indonesia use the Android mobile operating system. In addition, smartphones have great potential to be developed into interactive media for students because mobile technology will continue to have a big impact on the student learning process (Churchill, 2008; Churchill et al., 2015), making it easier for students to learn (Portelli & Eldred, 2016), practical and can be taken anywhere (Kennewell & Beauchamp, 2007), and has supported the presentation of various multimedia such as video recording, graphics, and integrated media (Zhang & Wu, 2016).

Research on the development and use of ICT has been widely carried out, such as by Hilda & Siswanto, (2021), who designed and developed an Android application about learning permutations of the same elements based on realistic mathematics education, or RME, and Siswanto et al. (2019), who developed an RME-based combinatorics learning application for an Android-based smartphone. Meanwhile, in this research, it is an RME educational game based on Android about integers called “Story Math Game” as an edutainment medium in mathematics learning for 1st grade elementary school students that contains material about stories about basic concepts of counting (addition and subtraction), practice questions, and evaluation of learning (with varying levels of difficulty) of integer material with the characteristics of using contextual problems from daily life, focusing on developing mathematical understanding abilities, as well as the relationship between lesson material and case examples developed based on RME.

Method

This research is development research. Development research is research used to develop or produce products or improve existing products (Widodo, 2017) and test the effectiveness of these products (Sugiyono, 2019). The result of product development is an RME educational game based on Android called "Story Math Game" as an edutainment medium in mathematics learning for 1st grade elementary school students, which contains material about stories about basic concepts of counting (addition and subtraction), practice questions, and learning evaluations (with various variations in level of difficulty) from integer material with the characteristic of using contextual problems of daily life, focusing on improving mathematical understanding abilities, as well as the relationship between lesson material and case examples developed based on RME.

The product development model used refers to the 4-D model developed by Thiagarajan et al. (1974) Thiagarajan et al. (1974) and Gall & Borg (1996), namely definition, design, development, and dissemination. The advantages of the 4-D model include: it is more appropriate to use as a basis for developing learning tools and media rather than developing learning systems; the description seems complete and systematic in its development involving expert judgment, so that before being tested in the field, the learning tools have been revised based on assessments, suggestions, and input from experts (Hilda & Siswanto, 2021; Siswanto et al., 2019; Widodo, 2017, 2020).

In the definition stage, in principle, it is a preliminary study that does not attempt to test a hypothesis, but rather to obtain information related to the variables to be studied. The definition stage includes (1) front-end analysis; (2) analysis of student characteristics (learned characteristics analysis); (3) task analysis; (4) concept analysis; and (5) specific instructional objectives (Thiagarajan et al., 1974). Meanwhile, the design stage includes designing an RME educational game based on Android (Story Math Game) and research instruments. At the

development stage, we obtain an RME educational game based on Android product (Story Math Game final) that is fit and good and a valid instrument for measuring research variables (final instrument) that is fit and good. The development stage includes expert assessment with feasibility tests and media quality tests (Thiagarajan et al., 1974). Product feasibility criteria include validity, practicality, and effectiveness (Hilda & Siswanto, 2021; Siswanto et al., 2019; Widodo, 2017, 2020). The validity criteria were performed by presenting experts in the fields of mathematics and media, namely 1 mathematics education lecturer, 2 grade 1 elementary school teachers as experts, and 1 educational technology lecturer as an expert. Practicality criteria are based on teacher activities in managing learning. Meanwhile, the effectiveness criteria will be seen in ordinary learning with teachers who teach mathematics using RME educational games in mathematics learning at school. To determine the quality of the application that has been developed, a public test was performed on 100 parents of students at partner schools before it was distributed widely. The choice of parents as respondents was because the educational game application was developed for 1st grade elementary school students, while these students could not provide objective assessments. Furthermore, at the dissemination stage, development testing or small-scale limited trials were performed with a one-group pretest-posttest design experiment to see the increase in students' mathematical understanding abilities. This experimental research design didn't have a control group, but a group of students were given special treatment during some time. After the pretest and posttest data are collected, the data will be collected, reused, and anatomized descriptively and statistically to determine the results of the trials that have been performed.

Results and Discussion

In this research, an RME educational game based on Android called "Story Math Game" was produced as an edutainment medium in mathematics learning for Grade 1 elementary school students. It contains material about stories about basic concepts of counting (addition and subtraction), practice questions, and learning evaluations (with various variations in level of difficulty) from integer material with the characteristic of using contextual problems from daily life, focusing on improving mathematical understanding abilities, as well as the relationship between lesson material and case examples developed based on RME.

At the define stage, the researcher determines and defines development terms. At this definition stage, development needs analysis activities are performed, product development requirements are according to user needs, as well as research and development of models suitable for product development. Analysis can be performed through literature studies or preliminary studies. Determining the term for the product being developed begins with (a) curriculum analysis, (b) material analysis, (c) analysis of student characteristics, and (d) formulating objectives. Curriculum and material analysis are based on the book Thematic Integrated Curriculum 2013 Revised for Elementary/Class I/MI," published by the Ministry of Education and Culture in 2017. At the design stage, researchers designed a draft design or prototype of the RME (Story Math Game) educational game and appropriate research instruments within the framework of the analysis of the curriculum, materials, and student characteristics. Figure 1 shows basic illustrations at the design stage, as graphic designs for the characters that will be used in the RME educational game.



Figure 1. Characters in the rme educational game

At the development stage, researchers obtained an Android-based RME educational game product (Story Math Game final) that was fit and good and a valid instrument for measuring research variables (final instrument) that was fit and good based on feasibility testing and product quality testing by the team expert judgment consisting

of mathematics lecturers or teachers through Focus Group Design (FGD). The results of the FGD, as criticism and suggestions, are then used as a basis for revising the product.

The feasibility of the RME educational game was evaluated by media and materials experts. Product eligibility criteria include validity, practicality, and effectiveness. Validity testing is done by experts in educational technology, namely Mr. GA as an expert lecturer who tests display aspects, writing aspects, software engineering aspects, and dubbing. Meanwhile, the validity test was performed by experts in mathematics education, namely Mr. JS as an expert lecturer and Mrs. M and Mrs. SR as 1st grade elementary school teachers, who tested aspects of material, learning, evaluation, and practicality based on teacher activities in managing learning. Meanwhile, the effectiveness criteria will be seen in ordinary learning with teachers who teach mathematics using the RME educational game in mathematics learning at school. To determine the quality of the application that has been developed, a public test was performed on 100 parents of students at partner schools.

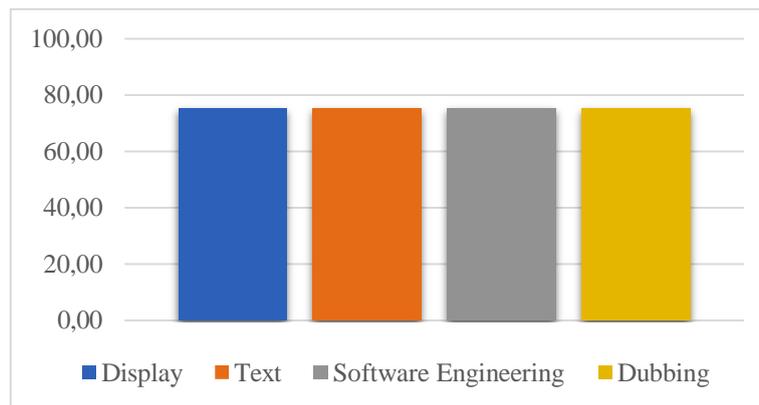


Figure 2. Media expert's assessment

The results of the media expert assessment carried out by educational technology lecturers on the display quality aspect were 75.00% with good criteria, the writing aspect 75.00% with good criteria, the software engineering aspect 75.00% with good criteria, and the voice dubbing aspect 75.00% with good criteria. Overall, the quality of learning media assessed by media experts is 75.00% with good criteria.

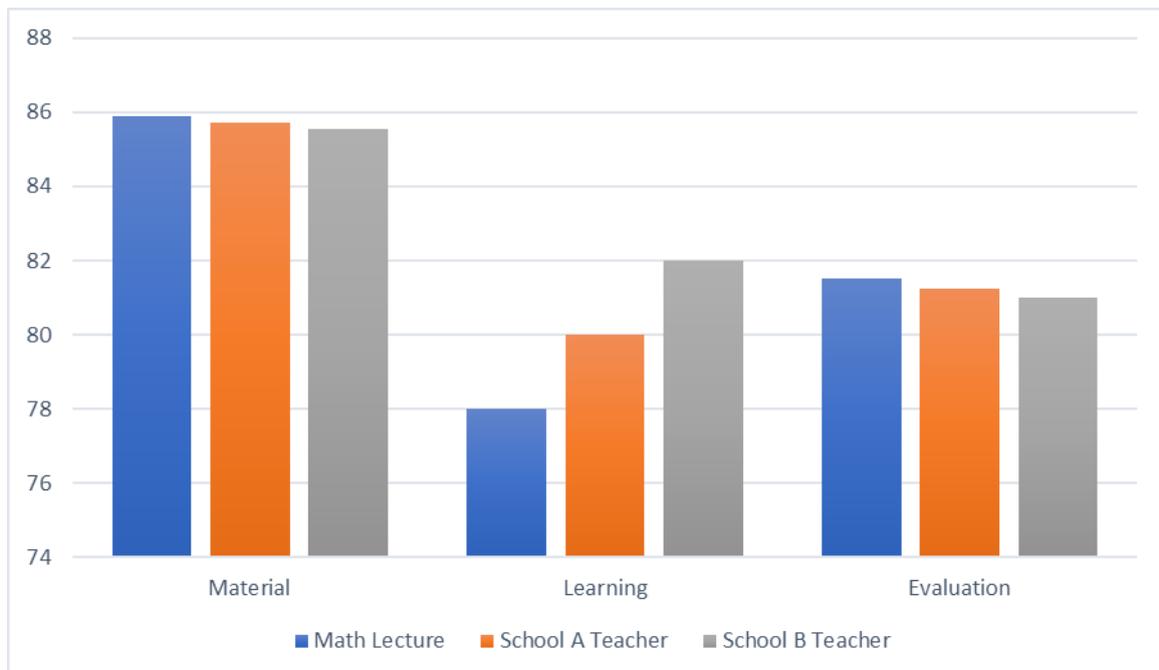


Figure 3. Material expert's assessment

The results of the assessment as the first material expert were mathematics education lecturers in the material aspect 85.88% with good criteria, the learning aspect 78.00% with good criteria, and the evaluation aspect 81.5% with good criteria. The results of the second material expert assessment, 1st grade elementary school teachers at school A, in the material aspect, were 85.71% with good criteria, the learning aspect was 80.00% with good criteria, and the evaluation aspect was 81.25% with good criteria. The results of the third material expert assessment, 1st grade elementary school teachers at school B, in the material aspect, were 85.54% with good criteria, the learning aspect was 82.00% with good criteria, and the evaluation aspect was 81.00% with good criteria. Overall, the quality of the material in learning media as assessed by 3 material experts was 82.32% with good criteria.

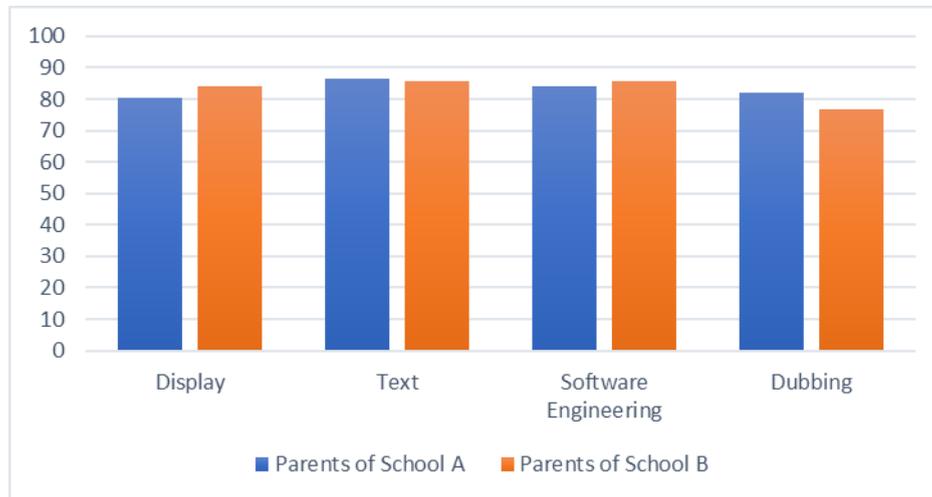


Figure 4. Application trial result

The results of a public trial of 57 parents of school A, obtained the results of application quality in the aspect of display quality by 80.56% with good criteria, writing aspects by 86.34% with very good criteria, software engineering aspects by 84.26% with good criteria, and sound dubbing aspects of 82.10% with good criteria. The results of a public trial of 43 parents of school B, obtained the results of the quality of the application in the aspect of display quality by 84.24% with good criteria, writing aspect by 85.60% with good criteria, software engineering aspects by 85.73% with criteria good, and the sound dubbing aspect is 76.81% with good criteria. Overall, the quality of learning applications assessed by 100 parents of partner schools was 83.20% with good criteria. Based on the results of data acquisition, it shows that the RME educational game based on Android called "Story Math Game" is suitable for use as a source or media for mathematics learning for 1st grade elementary school students.

The RME educational game prototype (Story Math Game final) is used to carry out limited or small-scale trials at the dissemination stage performed at partner schools with the aim of describing improvements in students' mathematical understanding abilities who have used the RME educational game in learning. At the dissemination stage, development testing was performed using a one-group pretest-posttest design experiment to see the increase in students' mathematical understanding abilities.

The results of the mathematical understanding ability test accord of pretest and posttest scores, which are used to decide the increase in students' mathematical understanding ability in learning with the RME educational game RME (Story Math Game). rested on data processing from pretest and posttest scores, the maximum score (X_{max}), minimal score (X_{min}), average score (\bar{X}) and standard deviation (Ds) were earned. Complete data can be noticed in Table 1

Data	N	X_{min}	X_{max}	\bar{X}	Ds	Achievement (%)
Pretest	30	7	11	9,23	1,25	51,27
Posttest	30	10	17	13,43	1,92	74,61
N-Gain	30	0,10	0,67	0,39	0,17	2,16

*Ideal Maximum Score = 18

Data analysis was conducted using the mean difference test. Before the data is anatomized, the prerequisite tests for statistical analysis are first conducted, videlicet the normalcy test and the variance homogeneity test. Normalcy testing of mathematical understanding ability data was calculated using the Shapiro- Wilk test with the support of SPSS 20 software. The results of computations and normalcy testing for students' mathematical understanding ability data for the pretest and posttest can be noticed in Table 2

Table 2. Normality test results for mathematical understanding ability

Data	Shapiro-Wilk			Conclusion
	Statistic	df	Sig.	
Pretest	0,911	30	0,015	H ₀ is rejected
Posttest	0,938	30	0,079	H ₀ is accepted

From table 2, it can be seen that the pretest of mathematical understanding ability obtained a significance value smaller than 0.05, meaning that H₀ was rejected, or, in other words, the pretest score data was not normally distributed. Meanwhile, in the posttest, mathematical understanding ability obtained a significance value greater than 0.05, which means that H₀ was accepted; in other words, the posttest score data was normally distributed. Because one of the data comes from a population that is not normally distributed, a non-parametric test, namely Mann-Whitney, was used to determine the significance of the difference in data improvement in mathematical understanding ability between the pretest and posttest. The results of calculations and testing of differences in ranking of pretest and posttest data on students' mathematical understanding abilities can be seen in Table 3.

Table 3. Test Results for differences in pretest and posttest rankings of mathematical understanding ability

Data	Mann-Whitney U Sig. (2-tailed)	Conclusion
Enhancement	0,000	H ₀ is rejected

Based on Table 3, the test results for differences in ranking of pretest and posttest data on students' mathematical understanding abilities with Mann-Whitney obtained a significance value of 0.000, so H₀ was rejected. It can be concluded that in learning with the RME educational game (Story Math Game), the ability to understand mathematics before treatment (pretest) and after treatment (posttest) is significantly different. Furthermore, based on Table 1, it can be seen that in learning with the RME educational game (Story Math Game), the student's mathematical understanding ability increased by 2.16%, thus it can be concluded that in learning with the RME (Story Math Game) educational game, students' mathematical understanding ability increased.

ICT in education is a learning innovation to foster student enthusiasm and motivation as well as assist teachers in the teaching process so that learning becomes practical and effective (Guma et al., 2013; Muhaimin & Dasari, 2022; Siswanto et al., 2023; Zakaria & Khalid, 2016). This statement is in line with research results that found that the use of Android games in learning can help students' mathematical understanding (Enjelita et al., 2023). In their research, Nisa & Susanto (2022) and Mujahadah et al. (2021) also show that the use of Android games in learning mathematics increases interest and motivation to learn, so that mathematics learning outcomes also increase.

Conclusion

Based on the development research that has been carried out, it can be concluded that 1) an Android-based RME educational game about integers called Story Math Game as an edutainment medium for 1st grade elementary school which contains stories about basic concepts of counting (addition and subtraction), practice questions and learning evaluation (with various levels of difficulty) with the characteristic of using real problems reached a feasibility level of 75.00% with good criteria from media experts and 82.32% with good criteria from material experts, 2) the media was tested publicly by 100 parents students, and the results of public trials obtained application quality results of 83.20% with good criteria, the RME educational game is suitable for use as a mathematics learning medium, and 3) Development testing resulted in an increase in the mathematical understanding abilities of 1st grade elementary school students, based on the results of data acquisition. The results show that the RME educational game can improve the mathematical understanding abilities of 1st grade elementary school students.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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The Study of Language Resources Revealing Mental Disorders in a Literary Text

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Abstract: Different writers try to organize and refine the raw material of facts to empathize and clarify what is the most significant in life in diverse ways. Each writer's style is unique. Nothing is straightforward in the world of literary taste. Just there are writers who worship figurative language; there are others who apart from figurative language use graphic devices for narratives and sending messages to readers. The way in which authors manipulate these means as well as how they apply them in the context evoke readers' appropriate comprehension. As a result, readers draw inferences as they are expected to do. The present paper aims at clarifying what graphic means are applied while portraying Charlie in "Flowers for Algernon" by Daniel Keyes, a mentally disabled person and his hurt and sufferings. In the world of fiction authors often violate the accepted rules in order to achieve particular purposes. Being one of graphic means, punctuation is frequently ignored by the author in "Flowers for Algernon". Therefore, the author creates the appropriate atmosphere. The other device that helps the author affect readers is graphic realization of mispronounced words, whose importance is also analyzed in the work. One more device analyzed and illustrated in the paper is a spelling mistake that is deliberately made by the author to achieve particular goals. Graphic means are considered visual effects that have a great influence on readers since authors want their readers to infer their main message. The way the author uses to portray a vivid image of a mentally disabled person is marked by the application of some graphic devices.

Keywords: Language resources, Visual language, Graphic devices, Great influence, Mentally disabled.

Introduction

Different writers try to organize and refine the raw material of facts to empathize and clarify what is the most significant in life in diverse ways. Each writer's style is unique. Nothing is straightforward in the world of literary taste. Just there are writers who worship figurative language; there are others who apart from figurative language use graphic devices for narratives and sending messages to readers. The way in which authors manipulate these means as well as how they apply them in the definite context evoke readers' appropriate comprehension. As a result, readers draw inferences as they are expected to do.

Graphic means are considered visual effects. Therefore, they belong to the visual language. Although the latter is an extremely broader term that comprises diverse elements. We refer to the visual means that are commonly used in fiction for portraying different characters. Their application has a great influence on readers since authors want their readers to infer their main message. The way how Daniel Keyes portrays a vivid image of a mentally disabled person is marked by the application of some graphic devices.

The present paper aims at clarifying what graphic means are applied while portraying Charlie, a mentally disabled person and his hurt and sufferings. Graphic devices are classified in relation to the way they are transmitted. In the world of fiction authors often violate the accepted rules in order to achieve particular purposes. This time they become meaningful devices so called unspoken codes. Being one of graphic means, punctuation is frequently ignored by the author in "Flowers for Algernon". Therefore, the author creates the

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appropriate atmosphere. Another device that helps the author affect readers is so called graphic realization of mispronounced words, whose importance is also analyzed in the work. Spelling and grammatical mistakes are also overused to depict Charlie's mental disorders. All the above listed graphic (visual) devices are inescapable parts of Charlie's portrait. Graphic devices in a spatial content and the author's wording are parallel and often interdependent means by which readers get the exact image of Charlie.

Different Approaches to the Visual Language

Visual Language, a term introduced by Robert Horn, refers to "language based on tight integration of words and visual elements". The visual elements include shapes, as well as images (e.g., icons, clip art). The appropriate use of images usually makes information more memorable, but visual language has considerably more to offer than that. (Horn, 1998).

Although researchers still argue about a single, universally agreed-upon definition of exactly what a visual language is, most of them have some common elements. The **visual language** is a system of communication using visual elements. Language is not just verbal or written. Speech as a means of communication cannot strictly be separated from the whole of human communicative activity which includes the visual and the term 'language' in relation to vision is an extension of its use to describe the perception, comprehension and production of visible signs.

The word "imagination" definitely suggests that we can also think in images. An image which dramatizes and communicates an idea presupposes the use of a visual language. Just as people can verbalize their thinking, they can visualize it. A diagram, a map, and a painting are all examples of uses of visual language. Its structural units include line, shape, color, form, motion, texture, pattern, direction, orientation, scale, angle, space, and proportion. The elements in an image represent concepts in a spatial context, rather than the time-based linear progression used in talking and reading. Speech and visual communication are parallel and often interdependent means by which humans exchange information. (Josiah, 2015).

Trying to reflect and comprehend the world through what we see and not through what one has to say with words, engages the mind in a more powerful way. The transformation of the world onto two-dimensional surfaces requires a deep understanding of the unspoken codes and symbols. These help to build the visual language and how one chooses to introduce their understanding of the world is how diversity within a visual language is created.

Through the use of art elements, artists not only create their own impressions of the world but also their own meaning. Understanding that art conveys messages and communicates ideas makes almost every picture an element of the visual language. These pictures, thanks to the individual use and understanding of art elements and design principles, such as rhythm, contrast, or texture, help create a thousand vivid stories. (Lloyd, 2015).

Literacy (communicating in words by means of writing and reading) and numeracy (communicating information by means of numbers) are already well-developed achievements of the human species. The development of the visual aspect of human communications as a parallel discipline to literacy and numeracy has been referred to as *graphicacy*, still far from being a familiar term. The ability to think and communicate in visual terms—both the understanding and conception of the visual—becomes of equal importance with that of literacy and numeracy in today's learning process. (Josiah, 2015).

Graphic Devices Used to Highlight Mental Disorders

As we have already stated a language is not just verbal or written and the visual language is there to be mentioned and studied. All the graphic means that are analyzed and illustrated in the present paper are based on deliberate violations of conventions, this time they turn into particular images, special codes having nothing in common with just the written language. We focus on punctuation, as a graphic device, whose main purpose is to show intonation layout of an oral speech in writing. Punctuation gives possibility to underline major elements in writing and give rhythmical –intonation division to an expression. Intonation, in itself, is one of the means for revealing syntactic structure of speech. Hence, it is possible to state that punctuation expresses syntactic structure of speech. However, it draws our attention and becomes an invaluable device when punctuation is used inappropriately.

Method

Descriptive and comparative research methods have been used to find out what language resources are mostly applied by the author to portray a vivid image of a mentally disabled person. Punctuation and grammatical errors, incorrect written units have been detected, analyzed and compared to get a deep insight of the complete story.

Results and Discussion

Punctuation and Grammatical Errors

By manipulating and evaluating ideas before putting them on paper the author makes deliberate errors that can form images in a mind's eye of a reader. Visual thinking institutes a cognitive system equivalent with, but different from, the verbal language system. In order to show Charlie's inability to write and thus, to highlight his mental disorders the author refers to the use of lots of errors in punctuation as well as grammatical accuracy. The use of apostrophe in the following examples.

*I **dont** know why but he says its importint so they will see if they will use me.* (Keyes,1965, p.285).

*... maybe now they **wont** use me.* (Keyes,1965, p.285).

*I **couldnt** see any pictures.* (Keyes,1965, p.285).

***Ill** get it in a few minits becaus **Im** no so fast sometimes.* (Keyes, 1965, p.285)

*I told him I think **a** inkblot but that **wasnt** rite eather.* (Keyes, p.285)

The use of inverted commas in direct speech.

*He **sed** Charlie what do you see on this card. **Instead of He said:** "Charlie what do you see on this card?"* (a question mark and quotation marks are missing) (Keyes,1965, p.285).

*He **said** now sit down Carlie we are not **thru** yet. **Instead of** He said "now sit down Carlie, we are not **thru** yet."* (Keyes,1965, p.285).

*I **said** please let me try **agen**. **Instead of** I said "please let me try agen."* (Keyes,1965, p.285).

*They **said** Miss Kinnian **told that** I was her bestist pupil in the adult nite scool becaus I tried the hardist and reely wanted to lern.* (Keyes,1965, p.286).

*They **said** you **know it will** probly be tempirery.* (Keyes,1965, p.286).

The following examples illustrate some grammatical mistakes: the use of will after I hope and the use were with plural noun forms.

*I **hope** they use me **instead of** I hope they **will** use me.* (Keyes,1965, p.285).

*.....there **was** pictures there....* (Keyes,1965, p.285).

Capitalization is used inappropriately in the middle of the sentence.

*Miss Kinnian says **Maybe** its another langwidge or something.* (Keyes,1965, p.289).

Incorrect Written Units

Another graphic device used to portray Charlie is an incorrect written unit. Incorrect written units may fall into two major categories a) Spelling mistakes that are words fixed in writing incorrectly and b) so called

“graphones” that are used to expose phonetic mistakes graphically with the violation of all the accepted rules in writing.

Sometimes it is rather hard to draw a hard and fast line between non-standard written units (spelling mistakes) and non-standard phonetic units (graphic realization of phonetic mistakes) since both of them are based on errors in the conventionally accepted form of a word spelling. However, while reading readers almost always visualize these errors and are aware whether they represent spelling or phonetic mistakes.

The following examples of spelling mistakes represent Charlie’s image as a mentally handicapped person the best. In fact Daniel Keyes uses them a lot. *Dr Nemur who looked at some of my other ones says I spell PROGRESS WRONG and he told me how to spell it and REPORT too. I got to try and remember that. I have a very bad memory for spelling.* That is how Charli admits that he cannot write properly because of his bad memory.

Mr. Strauss says I shud rite (the error based on the word - put /should write) down what I think and evrey (the error based on the word- key/ every) thing that happins to me from now on. (Keyes,1965, p.285).

He rote something down on a paper. (Keyes,1965, p.285).

I have nuthing (the error based on the word- nut / nothing) else to rite now so I will close for today. P.285(Keyes,1965).

I had a test today. I think I faled (the error based on the word- name/ fail) it (Keyes,1965, p.285).

I got skared of faling the test. (Keyes,1965, p.285).

He sed (the error based on the word- red/ said) Charlie what do you see on this card. (Keyes,1965, p.285).

I was very skared (the error based on the word- sky/ scared) even tho (though) I had my rabit (rabbit) foot in my pockit(pocket). (Keyes,1965, p.285).

.... When I was a kid I always faled tests in school and I spilled ink to. (too) (Keyes,1965, p.285).

I thot (the error based on the word- lot/ thought) that was all but when I got yp to go he stopped me. (Keyes,1965, p.285).

He said now sit down Carlie we are not thru (through)yet. (Keyes,1965, p.285).

Then I dont remember so good but he wantid me to say what was in the ink. (Keyes,1965, p.285).

I reely tryed (really tried) to see. Then I said if I had my glases (glasses) I could see better I usually ware (the error based on the word bare/ wear) my glases in the movies or TV. (Keyes,1965, p.285).

I said please let me try agen (again). (Keyes,1965, p.285).

Ill get it in a few minits becaus (minutes because) Im no so fast sometimes. (simple spelling errors) (Keyes,1965, p.285).

I told him I think a inkblot but that wasnt rite eather. (right either)

I reely tryed (really) to see. P.285(Keyes,1965).They said Miss Kinnian told that I was her bestist pupil in the adult nite scool becaus I tryed the hardist and reely wanted to lern. (rite / nite right/ night tebts to omit gh / (other simple spelling errors) (Keyes,1965, p.286).

I said I askd pepul and sumbody told me where I shud go to lern to read and spell good. P.286 (the error based on the word- pub/ somebody; in the previous example pupil is correct here- pepul) (Keyes,1965, p.286).

Dr. Strauss brot me in. (the error analogues to another error thot based on the use of- ot instead of ought in brought/ thought) (Keyes,1965, p.286).

Miss Kinnian says *Maybe its another langwidge or something.* (correct language). (Keyes,1965, p.289).

Almost all the examples have been analyzed and compared to some analogies, based on which Charlie most likely comes up with some incorrect forms. His memory refuses to recall correct forms and totally mixes spelling and pronunciation rules. Spelling mistakes outnumber totally all other graphic devices.

The following examples illustrate how Charlie distorts the pronunciation of certain words. Actually, readers might not find it difficult to figure out the way these words are pronounced by Charlie. He tends to say short (i) instead of (a) in the following two sentences.

..... *thing that happins to me from now on.* (Keyes,1965, p.285).*happins/happind*

..... *but he says its importint so...* (Keyes,1965, p.285).

Instead of /'pju:p(ə)l/ he says /'pepul/

There was pictures there other pepul saw some pictures (Keyes,1965, p.285).

Instead of /'prɒbəbli/ he says /'prɒbli/ and /'tempirəri/ instead of /'temp(ə)rəri/

They said you know it will probly be tempirery. (Keyes,1965, p.286). (probably/ temporary)

He says /,ɒpə'rəʃun/ instead of /,ɒpə'reɪʃ(ə)n/ and /'dɪnt/ instead of /'dɪd(ə)nt/

The operashun dint hurt. (operation) (Keyes,1965, p.287).

Focal Changes and Graphic Devices

Since mentally handicapped Charlie yearns to be smarter and knows that he is not normal when he gets the chance to undergo a scientific experiment that will inject him with a solution to make him smarter, he says yes. The author shows the evolution of Charlie in journal entries within the book. Charlie gradually becomes smarter. The following examples show how Charlie improves his writing by making fewer and fewer mistakes after operation.

Joe Carp said I shoud show the girls how I mop out the toilet in the factory and he got me a mop. (after being operated on the difference is vivid; **shud** turned into **shoud** but still **I** is missing.) (Keyes,1965, p.290).

Everybody laffed and we had a good time and they gave me lots of drinks and Joe said Charlie is a card when hes potted. (Obviously Charlie's IQ is increasing. The author reveals this process by using fewer non-standard written units). (Keyes,1965, p.290).

Burt said no Algernon is a very specshul mouse with an operashun like mine, and he was the first of all the animals to stay smart so long. (In words special/ operation suffixes cial/ tion are replaced by **cs hul/ shun**) (Keyes,1965, p.291).

Miss Kinnian teaches me to spell better. She says look at a word and close your eyes and say it over and over until you remember. I have lots of **truble** with *through* that you say *threw* and *enough* and *tough* that you **dont** say *enew* and *tew*. You got to say *enuff* and *tuff*. **Thats** how I use to write it before I started to get smart. **Im** confused but Mss Kinnian says **theres** no reason in spelling. (In this particular example Charlie himself describes how he tries to handle his problems and how excited he feels about his progress) (Keyes,1965, p.291).

Today, I **lernerd**, the comma, this is a *comma* (,) a period, with a tail, Miss Kinnian, says its **important**, because, it makes writing, better, she said, somebody, **coud** lose, a lot of money, is a comma, **isnt**, in the, right place, I dont have, any money, and I **dont** see, how a comma, keeps you, from losing it. (In this example Charlie tends to show excessive use of comma). (Keyes,1965, p.291).

Everyone was looking at me and laughing and I felt naked. (improving spelling of **laugh -laffed**) (Keyes,1965, p.292).

Anyway, now I know I'm getting smarter every day. I know punctuation and I can spell good. I like to look up all the hard words in the dictionary and I remember them. I'm reading a lot now, and Miss Kinnian says I read very fast. Sometimes I even understand what I'm reading about, and it stays in my mind. There are times when I can close my eyes and think of a page and it all comes back like a picture. (Keyes,1965, p.293).

As Charlie gets the surgery and his intelligence quickly blooms his writing becomes polished. His intelligence tops out at 185, where he is deemed a certified genius. At this point, he is frantically soaking up all the knowledge he can and his journal entries are characterized with no use of graphic devices analyzed in the previous examples.

I've given up using the typewriter completely. My co-ordination is bad. I feel that I'm moving slower and slower. Had a terrible shock today. I picked up a copy of an article I used in my research, Krueger's *Uber psychische Ganzheit*, to see if it would help me understand what I had done. First I thought there was something wrong with my eyes. Then I realized I could no longer read German. I tested myself in other languages. All gone. (Keyes,1965, p.303).

At the end of the story Charlie is showing all the signs of decline that mouse Algernon did. Charlie himself is becoming aware of a sharp decrease in Algernon's intelligence. He begins to research the effect and eventually publishes his findings, having realized that he will suffer the same decline and return to his original mental state. Told entirely in journal entries ("progress reports"), the book does a wonderful job of showing how Charlie's intelligence changes. Since he also loses the intelligence he gained, his motor activity slows and he loses his coordination. Hence, the graphic devices, having disappeared for some time, become visible again.

Then all of a sudden I remembered some things about the operashun and me getting smart and I said holy smoke I reely pulled a Charlie Gordon that time. (Keyes,1965, p.305).

The solution that had been making him smarter fails, and he devolves back into his original self, leaving Alice forever in love with the man inside Charlie that is, yet again, hidden by his disability. Before he loses his intelligence, he tries to correct the formula throughout his journal entries, but the story ends with Charlie back to his original self but with fond memories, making him more contented.

Conclusion

Recent analysis suggests that the use of graphic means can influence readers' perception; For example, a great deal of evidence provided proves that readers tend to perceive things in ways that are influenced by the manner in which the author creates the image of mental disorders. In order to function efficiently the number of graphic devices vary throughout the story. The beginning of the book is marked by numerous non- standard written units; they gradually decrease when Charlie gets an operation and eventually, they disappear. Once the mouse Algernon shows signs of mental decline Charlie undergoes the same process. This time the number of non -standard written units drastically soars. Graphic devices are used to encode particular meaning, they are first visualized and then perceived by readers. Therefore, readers create the exact image of mentally handicapped man with some focal mental increases and decreases. We can conclude that graphic devices analyzed in the paper serve to be special images or codes. They are the only tools the author could rely while portraying Charlie.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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Development of an Evaluation Tool for Mathematical Communication Based on RPG Educational Games

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Abstract: This research aims to develop an innovative and interesting evaluation tool in assessing and improving students' mathematical communication through Role-Playing Game (RPG) based educational games. RPG educational games were chosen because they can provide an in-depth context for students' learning experiences, while facilitating interaction and collaboration. This evaluation tool includes a variety of mathematical tasks that students must complete through interaction in a carefully designed virtual world. The research method used is the research and development method, with the research model being the ADDIE model which consists of five steps, namely: (1) analysis, (2) design, (3) development (development), (4) implementation, and (5) evaluation. This research was tested for practicality on 15 respondents consisting of 8 students and 7 students, and validated by one supervisor. The results of this research were obtained as follows: (1) the practicality test assessment for the game operation indicator was 82.22% (very good), the game presentation indicator was 83.96% (very good), for the game benefit indicator it was 90.00 % (very good), and for the overall indicator obtained 85.83% (very good). In the validity test, the percentage obtained for the game presentation indicator was 93.75% (very valid), the percentage for the game benefit indicator was 84.88% (very valid) (2) the cognitive ability assessment obtained was 90.53% (very good) for the value student average, the student's achievement of completeness in each indicator has met very well, seen from the average of each question, the first question obtained a score of 98%, the second question was 86.3% and the third question was 87.3% of maximum score of 100% for each indicator. This research contributes to the mathematics education literature by combining aspects of technology, educational games, and mathematical communication

Keywords: Evaluation tool, Mathematical communication, RPG educational games

Introduction

Mathematics is a field of study that occupies an important role in the school curriculum. Republic of Indonesia Law Number 20 of 2003 concerning the National Education System article 37 expressly confirms that mathematics is one of the compulsory subjects for schools at the primary and secondary education levels. One of the objectives of learning mathematics according to the National Education Standards Agency (BSNP) is for students to be able to use mathematics as a way of reasoning (logical, analytical, systematic, critical, creative thinking and the ability to work together). In mathematics, students are not only limited to calculating, but students must have comprehension skills, mathematical communication skills, reasoning and problem solving (Sabandar, 2009). One of the mathematical skills that students must have is mathematical communication.

Mathematical communication skills are part of the basic skills that students must master to understand mathematical concepts or ideas conveyed by the teacher. According to Lestari and Yudhanegara (2015), mathematical communication skills are useful for understanding and receiving mathematical ideas from peers and teachers. In learning mathematics, mathematical communication skills are also useful in expressing their

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ideas about mathematics and clarifying their understanding. According to Chasanah et al. (2020), mathematical communication also plays a role in understanding mathematical concepts and procedures, representing these concepts, and applying them in everyday life. In line with the statement (Yaniawati, 2019) that mathematical communication skills can also affect many things in mathematics learning and everyday life.

In the process of learning mathematics, communication skills to transform a problem into another form so that it is easier to understand both orally and in writing are very important. According to (Hirschfeld-Cotton, 2008), mathematical communication is an important key to understanding and exploring mathematical ideas. Good mathematical communication skills must be possessed by students, because mathematical communication skills are one of the basic abilities that must be developed in learning mathematics. According to NCTM (2000) mathematical communication skills are the ability to organize ideas or understanding clearly and logically to others both orally and in writing. So that mathematical communication skills can help internalize mathematical concepts better. According to Cai (1996), mathematical communication skills are communication between students and teachers in the process of learning, understanding, and conveying mathematical ideas, especially in expressing student thinking related to the problem solving process either in writing or orally. NCTM (2000) emphasizes that strong mathematical communication skills are important to help students become good problem solvers. Therefore, mathematical communication skills are very important for students to be able to solve mathematical problems by using good reasoning, illustrating mathematical ideas into mathematical models, then connecting the process to various mathematical concepts, into the context of everyday life, or into other contexts and disciplines. Mathematical communication is not only limited to concept mastery, but also the ability to convey mathematical ideas clearly and persuasively. Therefore, the development of evaluation tools that focus on aspects of mathematical communication skills is essential.

Evaluating mathematical communication skills is often challenging. Conventional evaluation methods that mainly focus on written answers do not fully reflect students' mathematical communication skills. A good evaluation tool should be able to measure various aspects or indicators of mathematical communication skills (Ramdani, 2012) Therefore, there is a need for dynamic and contextual evaluation tools that can provide a more comprehensive picture of students' mathematical communication skills. One of the dynamic evaluation tools is by utilizing information technology.

According to Restiyani et al. (2014) information and communication technology is a set of tools that can be used to collect, process, store, analyze, prove, and disseminate important information effectively and efficiently. To support the student-centered learning process in the digitalization era is to utilize information and communication technology. According to OECD (2018) Mastery of ICT is needed to equip students to have the ability to create new values through creative, innovative, collaborative, algorithmic, and open-minded thinking. The benefits of information and communication technology have been felt by all circles of society including teachers and students. One of the mathematics learning media that utilizes information and communication technology is mathematics educational games.

One of the evaluation tools that can be used to assist the learning process is educational *game* media, one of which is found in *role playing* games (RPG). According to Pramudtya et al. (2017) Educational games are games designed or made with learning elements to stimulate thinking including increasing learning motivation. While RPG games are a type of game that is played by playing a character who has a story or story in it. So, RPG educational games are defined as a form of game that has a story in it and is designed with elements of mathematics learning in it so that it is useful to support the teaching and learning process in a more enjoyable and more creative way. It is used to provide teaching or increase knowledge. Based on Froebel's experience as a teacher, he realized that play activities and toys that children enjoy as students can be used to attract attention and develop their knowledge (Tedjasaputra, 2001). The existence of *role playing games* (RPG) in assisting the learning process is based on the increasing use of *smartphones* which are generally widely used by students and teachers. Educational games have been proven to be an effective tool in increasing student engagement and understanding of mathematical concepts. The integration of game elements can make learning more fun and encourage students to actively engage. In this context, the use of educational games as the basis for evaluation tools promises to be an interesting approach to measuring students' mathematical communication skills.

This research aims to develop an evaluation tool that utilizes educational game principles to measure students' mathematical communication abilities. This tool is expected to create a dynamic and contextual evaluation environment, reflecting the actual situation where mathematical communication skills are needed. The research question is: How is the design of RPG game media based on students' mathematical communication skills? and How is the quality of RPG *game* media in terms of two aspects, namely validity and practicality?

Method

This research is a development research. The development research method is a research method used to produce certain products, and test the effectiveness of these products (Sugiyono, 2016). Researchers conducted research on the development of evaluation tools for mathematical communication skills based on RPG educational games in flat-sided space building material. In this study, the research flow used refers to the procedure proposed by Roiser and Molenda and Tegeh and Irna(2013), the ADDIE model consists of five steps, namely: (1)*analyze*, (2)*design*, (3)*development*, (4)*implementation*, and (5)*evaluation*. The following is the research flow of developing an evaluation tool for mathematical communication skills using RPG educational games:

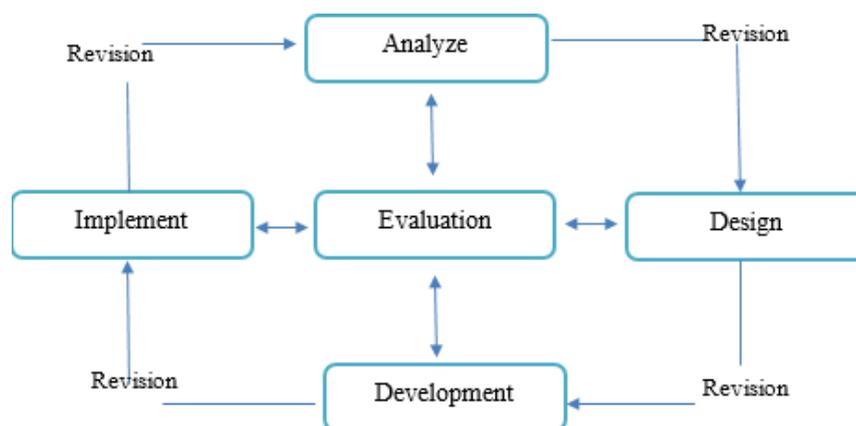


Figure 1. Addie development research flowchart (Branch, 2009).

The subjects of this study were VIII grade junior high school students, the students involved as research subjects consisted of 15 student respondents, and were tested for validation by one supervisor in a limited trial. The data collection techniques used are questionnaires and question instruments. According to Sugiyono (2016) Questionnaire is a data collection technique that is done by giving a set of questions or written statements to respondents to answer. Questionnaire is a data collection tool in research in the form of a series of questions submitted to respondents to get answers (Kurniawan: 2021). The preparation of questionnaire instruments is used to analyze the quality of games based on two aspects of validity and practicality in terms of respondents' responses regarding their RPG game tools. Meanwhile, the instrument functions as a tool to measure a person's knowledge in a particular subject (Fraenkel, Wallen, & Hyun: 2018). The test question in the study is a research instrument that contains a series of questions to test students' maematis communication skills on flat-sided space building material integrated with the RPG game. The data analysis technique used to determine the validity of RPG game media on flat-sided flat building material is by using a questionnaire. Research expert validators in RPG game development research are flat-sided flat building material experts, media experts, and small groups of junior high school students.

Results and Discussion

Analysis Stage

According to Pramuditya et al. (2018) that students' mathematical abilities are still undeveloped because learning is still teacher-centered. In addition, according to Pramuditya et al. (2022) based on the results of interviews with students that the teaching materials used are still focused on textbooks. The textbooks used cannot be studied independently by students because they are not accompanied by illustrations that support the learning process.

Based on the results of a questionnaire given to 70 respondents from various types of work, 43 respondents stated that flat-sided building material was a difficult material. Of the 43 respondents who said it was difficult, there were 26 students, 14 students, 3 employees. The parts of flat-sided geometric figures that are considered difficult for students to understand are the calculations and answering various questions.

Teaching materials are really needed to support the delivery of material in class, based on the results of the questionnaire, it is stated that the teaching materials used by students in learning to build flat-sided spaces are varied, including using school modules/LKS, textbooks, e-books, the internet and teaching aids. Based on the results of the questionnaire, 40 out of 70 respondents were of the opinion that the teaching materials used could not be studied independently but had to be guided by teachers in face-to-face classes. But not only that, 48 out of 70 respondents stated that learning activities require fun evaluation tools as a supplement to teaching materials to make it easier to understand the material.

This was then complemented by 32 out of 70 respondents stating that they often use computers/laptops/smartphones to support mathematics learning and 64 out of 70 respondents stated that they agreed to the existence of teaching media made from educational games and 58 out of 70 thought that RPG game teaching media was very interesting and interactive. This resulted in 60 out of 70 respondents thinking that educational games were suitable to be applied to flat-sided building materials. And for understanding the material, 24 out of 70 respondents stated that it was easier to understand through pictures/illustrations/animations, presentation of the material, example questions and examples of application in everyday life.

Design Stage

At this stage, several activities are carried out, including the following:

- a. Create a story scenario taken from the Wuragil folklore which contains an overview of the game storyline being developed.
- b. Create and design basic components that will be used in Dewatis games. These components include:

1) *Map*. The map creation is adjusted to the story scenario chosen in the learning media being developed. The map is made as interesting and similar as possible to the story of the Wuragil so that students really feel the storyline in the game. The Dewatis game is made into 4 maps with each map designed not to be too complicated by taking into account the students' time in exploring the map so that it will not result in students getting bored.



Figure 2. Map 1



Figure 3. Map 2



Figure 4. Map 3



Figure 5. Map 4

2) Character generator, character generator is a term that indicates the creation of a character in the game. Having the right characters will certainly make students more interested in using the game. The main characters for exploring the map are made into 7 characters. However, in the game only 4 characters can be displayed.

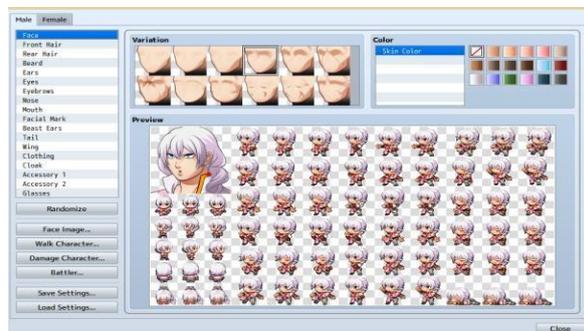


Figure 6. Character generator

3) Animation. The animation chosen in this game is adapted to the flat-sided spatial material. The animation inserted into the game is in the form of a learning video.

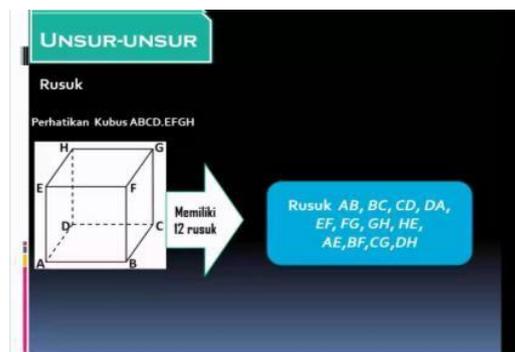


Figure 7. Animation video

4) Sounds and music. In this media there are several sounds and accompanying music that are adapted to the situation and place in the game. even though it's in the same place. RPG Maker MV software has provided it all in the database.

5) Text. The conversation text is adapted to the wuragil story scenario. Then conversation texts are created for each character in the game. Texts for various things supporting the storyline in the game are also created, such as texts for prologues, epilogues, and so on.



Figure 8. Text conversation

c. Create evaluation questions for flat-sided geometric material that has indicators of students' mathematical communication skills.

Table 1. Lattice of mathematical communication questions

Mathematical communication ability indicators	Aspects analyzed	Question indicator	Number of question
Express and illustrate mathematical ideas into mathematical models	<ol style="list-style-type: none"> 1. Identify data from the question sentence 2. Create a mathematical model 3. Solving the math model 4. Accuracy in calculating using mathematical symbols 	1. Connecting everyday language with mathematical language by using symbols.	1
Express and illustrate mathematical ideas into mathematical models	<ol style="list-style-type: none"> 1. Create a mathematical model of the picture problem 2. Able to solve the math model in writing 3. Accuracy in calculating using mathematical symbols 	2. Reflect and clarify thinking about mathematical ideas.	2
Express and illustrate mathematical ideas into mathematical models	<ol style="list-style-type: none"> 1. Accuracy in making mathematical models from what is heard 2. Able to interpret mathematical ideas into the form of mathematical models 3. Able to solve the model model in writing 4. Accuracy in calculating using mathematical symbols 	3. Using the skills of reading, listening, evaluating, interpreting mathematical ideas.	3

d. Preparation of research instruments to be used, namely a media validation questionnaire for media experts and a media practicality questionnaire for students.

Development Stage

Development of an RPG Game Evaluation Tool

At the development stage, the action process of making evaluation tools with the help of RPG Maker MV software is carried out. This stage is a continuation of the design stage where researchers begin to translate the previously designed design into a real product. In addition, researchers carried out the process of integrating mathematical communication questions into the RPG game.



Figure 9. Question number 1 on rpg games



Figure 10. Question number 2 on rpg games



Figure 11. Question number 3 on rpg games

Media Validation

Based on the Table 2, the assessment by the validator is divided into two indicators, namely the presentation of the game and the benefits of the game. The game presentation indicator consists of games that have clear objectives (1a) given a score of 3, the presentation of material about flat-sided space in the game is easy to understand (1b) given a score of 4, the presentation of questions in the game (1c) given a score of 4, the game application has no bugs in the application (1d) given a score of 4. The game benefit indicator consists of the game giving curiosity about the folklore of the wuragil (2a) given a score of 3, the game raises the interaction

between the user and the game presented (2b) given a score of 4. The percentage obtained on the game presentation indicator is 93, 75% (very valid), the percentage on the game benefit indicator is 87, 5% (very valid).

Table 2. Media expert validation results

Respondent	Number of question game presentation tool				Benefits of game tools	Total score
	1a	1b	1c	1d	2a	
S1	3	4	4	4	3	22
total score	15				7	22
percentage	93,75 %				87,5 %	91,67%

Media Practicality

This section aims to test the product through game design practicality assessment. This RPG game assessment is carried out by junior high school students who have studied flat-sided space building material.

a. Assessment of mathematical RPG si wuragil game products by the supervisor as a reviewer, and filling out an assessment instrument that contains a description of several indicators / aspects of learning media quality criteria.

b. Testing the product produced to 15 student respondents and asking for assessments and responses.

c. Analyzing the results of the RPG game assessment.

Table 3. Rpg game practicality questionnaire by users

Respondent	Game presentation as an evaluation tool												Benefits of games as an evaluation tool	Total Score		
	Game operation															
	1a	1b	1c	2a	2b	2c	2d	2e	2f	2g	2h	3a			3b	3c
S1	3	3	3	4	3	4	4	3	4	2	2	3	4	3	45	
S2	2	3	2	3	3	3	3	3	3	2	3	3	3	1	37	
S3	4	3	4	3	3	3	4	4	3	2	3	4	4	3	47	
S4	4	3	4	4	3	4	4	4	4	3	4	4	3	3	51	
S5	4	3	4	3	3	3	4	4	3	2	3	4	4	3	47	
S6	4	3	4	4	3	4	4	3	4	4	4	4	4	4	53	
S7	4	3	4	4	4	4	3	4	4	3	4	4	4	4	53	
S8	4	1	4	4	3	1	4	3	3	4	3	4	4	4	46	
S9	4	4	4	3	4	2	4	3	3	3	3	4	4	3	48	
S10	4	1	4	4	4	1	4	3	4	3	3	4	4	2	45	
S11	3	1	4	4	4	1	4	4	4	3	4	4	4	4	48	
S12	4	2	4	4	4	3	4	4	4	3	4	4	4	4	52	
S13	3	4	3	4	3	4	3	3	3	4		3	3	4	48	
S14	3	3	4	4	3	3	4	3	3	3	4	4	3	4	48	
S15	3	3	3	3	3	2	4	3	3	3		4	4	3	45	
Total score	53	40	55	55	50	42	57	51	52	44		57	56	49	713	
Total Score	148			403									162			
Percentage %	82,22			83,958												84,88

Based on the data table above, it is obtained that: for the game operation indicator obtained 82.22% or included in the very good category with the game can provide instructions during the game that facilitate the operation of the game and can be operated on PC and Android; for the game presentation indicator obtained 83.96% or included in the very good category with the game can be understood clearly and easily, both in terms of language, purpose, or flow that provides material and story information as well as the appropriate sound and image background in the game; For the indicator of the benefits of the game, 90.00% or included in the very good category with the game can foster curiosity, flexible to play, and no errors occur when played; and for the overall indicator obtained 84.88% or very good category with the game can fulfill all the provisions of the indicator in the very good category. Therefore, it can be concluded that the RPG game as a learning media on the material of flat-sided space building junior high school grade VIII is very good or very practical to use for students.

Implementation Stage

Results of Students' Cognitive Scores

Based on the Table 4, the presentation consists of three questions with 20 questions each. The presentation of the questions is adjusted to indicators of mathematical communication skills, the first question is based on the indicator of connecting everyday language with mathematical language using symbols, the second question is based on the indicator of reflecting and clarifying thoughts about mathematical ideas, the third question includes two indicators, namely using the skills of reading, listening, evaluating, interpreting mathematical ideas and the indicator of using mathematical ideas to make conjectures and make convincing arguments. From the 15 respondents, a total score of 1358 was obtained with an average of 90.53% based on the conversion of the percentage of learning completeness. The information obtained was A for the students' average score, the students' attainment of completeness in each indicator was very good, seen from the average percentage of each question, the first question was obtained at 98 The second question's % was 86.3% and the third question was 87.3% of the maximum score of 20. Students getting the maximum score indicates that students have fulfilled all aspects of each indicator. Students got a score of 18 on indicators 1, 2, 3, this is because students are not precise in including mathematical unit symbols, this indicates that students are not observant and do not check their answers again when they have finished working, students who get a score of 10 on question number 2 because students only write down the volume of the building without including identification of what is known, step find the volume of blocks and cubes. Meanwhile, students who got a score of 15 completed the steps correctly at the stage of finding the volume of blocks and cubes, but the students did not continue to find the results asked about in the question. The student who got a score of 12 on question number 3 answered correctly, but the accuracy of including mathematical symbols and the accuracy of calculating were still wrong

Table 4. Results of student and university student scores

Name	Score			Total Score
	Question 1 (Max 20)	Question 2 (Max 20)	Question 3 (Max 20)	
S1	20	18	15	88,33
S2	20	18	18	93,33
S3	20	18	20	96,67
S4	20	18	18	93,33
S5	20	20	20	100
S6	18	15	18	85
S7	18	18	18	90
S8	20	20	20	100
S9	20	15	15	83,33
S10	20	20	12	86,67
S11	20	18	20	96,67
S12	20	10	20	83,33
S13	20	18	18	93,33
S14	18	18	15	85
S15	20	15	15	83,33
Total	294	259	262	1358
percentage (%)	98	86,3	87,3	90,53

Based on the research results above, from 15 respondents the overall average was 90.56 with a scale value of A and very good information. It was concluded that students' mathematical communication skills using RPG were categorized as good.

Evaluation Stage

The evaluation tool based on mathematical educational game design has several advantages and disadvantages including:

Advantages

- a. Learning media in the form of educational games makes students more interested in learning
- b. Has interesting animation and storyline

- c. Easy to operate because it doesn't have many buttons, making it easier to operate the game
- d. The material and questions about flat-sided shapes in the game are easy to understand
- e. There are no bugs
- f. The language and flow of conversation are easy to understand
- g. The sound background and presentation of the game are appropriate

Disadvantages

- a. The main players in the RPG application game character are a maximum of 4 players
- b. The duration of the material video is too long

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Mathematical Critical Thinking Skills through STEM/STEAM Approach: A Systematic Literature Review

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Abstract: The STEM/STEAM approach provides opportunities for students to develop critical thinking skills through the integration of different disciplines. This study aims to provide a comprehensive picture of the extent to which the STEM/STEAM approach develops critical thinking skills in mathematics teaching and learning. A systematic literature review (SLR) was conducted using guidelines from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). We searched Springer Link, Eric, and Google Scholar for 21 articles on critical thinking published between 2018 and 2022. The results show that most of the lead authors studying critical thinking through STEM/STEAM are from Indonesia, with fewer contributions coming from the United States, Taiwan, Saudi Arabia, Turkey, Japan, and Malaysia. The most common research methods used are quantitative research and R & D. These methods correspond to the types of data collection tools used by researchers and critical thinking tests to identify critical thinking skills for the cognitive aspect and questionnaires for the affective aspect. The best practice for improving learner's mathematical critical thinking skills in STEM/STEAM is Project-Based Learning (PBL). However, this practice is not used by many development researchers. The authors find distinctive features in the interventions used by researchers to improve the critical thinking of learners from each country. The most common intervention was an analysis of the implementation of the STEM/STEAM approach in Indonesia. Many Indonesian researchers also developed learning models and media. Other countries focused more on computer-based activities, developing community programs, and identifying participants' perceptions of critical thinking. These differences give each country its own characteristics in improving and identifying the critical thinking skills of its people. These differences in practices and interventions can also provide alternatives for researchers in their research on critical thinking through the STEM/STEAM approach.

Keywords: Critical thinking, STEM, STEAM, Mathematic literature review

Introduction

In facing the world's challenges in the future, critical thinking is a very important ability to sort out correct information from wrong or biased information. Critical thinking focuses on deciding what to do or believe (Ennis, 1987). The amount of information that is abundant, spread without accurate validation, and cannot be trusted, requires students to be able to filter information, analyze its sources, and make decisions based on valid evidence. The demands of the modern world, where everyone has to find, select and use information in their lives, is one of the reasons why the development of critical thinking skills is essential. (Maulana, 2017). The development of critical thinking skills is often listed as the most important reason for formal education because the ability to think critically is essential for success in the contemporary world where the rate at which new

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knowledge is created is rapidly accelerating (Marin & Halpern, 2011). Schools are required to provide education that is able to foster student character to think critically, creatively, be able to communicate, and collaborate sebagai keterampilan yang dibutuhkan abad 21 (Setiana et al., 2021). Critical thinking became an important skill that helps students improve their ability to make judgments, inform well, explain reasons, and solve unknown problems (Facione, 1991).

Although everyone agrees that critical thinking is very important, critical thinking does not come naturally to anyone, regardless of background. 'critical thinking is hard . . . and most people are just not very good at it' (Gelder, 2005). The difficulty of having critical thinking skills can be seen in the low achievement of critical thinking skills in the field of mathematics education. In Indonesia, students' ability to think critically about mathematics is still relatively low (Farib et al., 2019). This fact is supported by the results of research between 2017 and 2023 at the elementary, junior high and senior high school levels which state that the average mathematical critical thinking ability of students is low. (Anggraini et al., 2022; Benyamin et al., 2021; Danaryanti & Lestari, 2018; Dores et al., 2020; Irawan et al., 2017; Septiana et al., 2019; Widana & Widyastiti, 2023). In other countries such as Malaysia, the scores of high school graduates obtained in the National Examination do not reflect mathematical thinking skills including critical thinking (Singh et al., 2018). Then, a study in Turkey revealed that out of 63 articles published in ERIC in 2016-2019, only 43% of articles focused on teaching approaches to critical thinking. (Costa et al., 2020).

The low level of critical thinking skills is influenced by several things, including students' tendency to memorise formulas rather than concepts design (Andriani & Jatmiko, 2018). Helf and Scharff (2017) believed that the deficiency in critical thinking education was due to the faculty not having the knowledge needed to teach these skills effectively. Teachers should be able to find and choose learning strategies that are appropriate to the characteristics of the learners (Susmariani et al., 2022), because critical thinking skills in mathematics can be developed by using the right learning model. (Widana & Widyastiti, 2023).

Many studies have been conducted to develop critical thinking skills. Many education programs provide learners with activities and experiences to foster and develop their critical thinking skills (Evangelisto, 2021). However, the results obtained are still not at their best. Multiple studies have concluded that higher education at large has not been very effective in developing students' critical thinking skills (e.g. Arum & Roksa, 2011). This lack of development of critical thinking skills is not due to a lack of motivation or indifference from teachers, but rather to a misunderstanding and lack of awareness of effective techniques for teaching these critical thinking skills to students (Heft & Scharff, 2017).

Based on these conditions, it is important to examine how these critical thinking skills can be developed effectively, especially in the field of mathematics. Holmes et al said that critical thinking skills can be taught (2015), and a mixture of explicit and content centered instruction is best (Ennis, 2018). Suggested teaching techniques included skill based rather than fact-based instruction and assessment (Ernst & Glennie, 2015; Nelson, 2017). Specific techniques suggested in the literature included similar techniques as STEM teachers, modelling the desired outcome, allowing students to practice and assessing based on skill learned (Co, 2019, Hacisalihaglu et al., 2018; Nelson et al, 2018). Studying in a transdisciplinary STEAM space can help students develop creativity collaboratively, and the essence of this position is STEAM as a collaborative practice (Henriksen et al., 2019; Liao et al., 2016). In this learning activity, students can build confidence to make selective choices for their lives and be able to face future challenges. The position of STEM/STEAM in this context is that of a learning approach.

The STEM/STEAM approach integrates disciplines such as science, technology, engineering, art, and mathematics that require students to understand the relationships between different concepts and apply knowledge to solve problems. Students are invited to think deeply, analyze information and evaluate ideas by integrating disciplines. This process requires critical thinking skills in understanding the context of the problem as a whole, analyzing, evaluating and determining the correct solution. Well-integrated instruction provides opportunities for students to learn in more relevant and stimulating experiences, encouraging the use of higher-level critical thinking skills (Stohlmann et al., 2012). Therefore, the STEM/STEAM approach could enhance students' critical thinking skills.

The STEM/STEAM approach in improving students' critical thinking skills is certainly an important demand in the world of education. Although the teaching of critical thinking has been extensively studied in other disciplines, there is a surprising lack of critical thinking research in STEM (Evangelisto, 2021). This study will examine the extent of research that has been done previously on the relationship between the STEM/STEAM approach and students' critical thinking skills. This research is conducted to see how the

application of the STEM/STEAM approach to improve students' mathematical critical thinking skills is generally carried out in various parts of the world. It will also reveal the types of research designs and best practices that have been conducted to improve mathematical critical thinking through the STEM/STEAM approach. We will also analyze the types of interventions that researchers have undertaken to illustrate the distinctive nature of their research.

To achieve the objectives of this study, the Systematic Literature Review (SLR) method will be used to help researchers collect, review and synthesize relevant studies that have been conducted previously. This method can contribute to further research that examines the improvement of mathematical critical thinking skills through STEM /STEAM approach and contributes to educational attainment worldwide that has yet to make STEAM a critical, integrated.

Literature Review

Critical Thinking Skills

John Dewey (1910) described the concept of critical thinking more broadly by referring to it as reflective thinking. Reflective thinking involves actively, persistently, and carefully considering any belief or supposed form of knowledge in light of the supporting grounds and the potential further conclusions it may lead to (Dewey, 1910). The process of thoughtful and confident consideration is a critical attitude that is exercised when receiving or acquiring information from others. It avoids passivity and mere acceptance of acquired information without justifying its validity.

Critical thinking skills can be developed through the process of learning mathematics. Improving critical thinking skills in mathematics learning is crucial for students to develop problem-solving abilities and analytical thinking. Mathematics teachers play a significant role in fostering critical thinking skills among their students (As'ari et al., 2017). Teachers can employ various teaching approaches with stages that sharpen students' thinking abilities through various project-based learning. The process of critical thinking in learning mathematics can be facilitated by presenting non-routine and open-ended contextual problems based on students' prior knowledge (Setiana, et al., 2019). Students need to be accustomed to contradictory and novel problems, so they can construct their thinking to seek truth and appropriate reasoning (Romberg, 2000).

STEM/STEAM Approach

STEM is an integration of four disciplines: science, technology, engineering, and mathematics, using an interdisciplinary approach and applied based on real-world context and problem-based learning. STEM education represents a teaching approach that combines these four disciplines to train individuals in developing various 21st-century skills. The aim is to enable them to provide solutions to challenges from an interdisciplinary perspective (Bybee, 2010). STEM education has been described as a standards-based, meta-discipline present at the school level, where all teachers, especially those in science, technology, engineering, and mathematics (STEM) fields, employ an integrated approach to teaching and learning. In this approach, discipline-specific content is not divided but rather addressed and treated as one dynamic, fluid study (Merrill, 2009).

In recent years, the term STEM has come to be affiliated with the field of science, technology, engineering, and mathematics education (Henriksen et al., 2019). However, once STEM was established as a handy way of referencing these four fields in a concise acronym, scholars urged a further expansion to include the arts—and thus was born the term STEAM (Robelen, 2011). Adding arts and design to the equation will transform STEM into STEAM (Liao, 2016). The notion of STEAM is an emerging discipline unique in its desire to provide a well-rounded approach to education (Rolling, 2016).

People think about STEM or STEAM in many different ways. In the field of education, they are the same approach and differ only in the number of disciplines integrated. STEM/STEAM approach incorporates the idea of transdisciplinary learning which is the idea that students learn through a true blending of the disciplines and that they are solving problems set in a real context (Quigley & Herro, 2016). Integrating the arts and sciences in educational settings is essential, as historical evidence shows that the most effective and innovative STEM practitioners draw on scientific and artistic knowledge and experience (Piro, 2010; Shlain, 1991; Simonton, 1988). In practice, however, the education sector has found it difficult to realistically integrate these disciplines

into a STEAM approach (Jolly, 2014). The essence of STEAM is not simply the application of art to science or vice versa. STEAM as an educational paradigm is broad and has enormous value in broadening perspectives on the intersection of art and STEM (Henriksen et al., 2019). On the other hand, (Jolly, 2014, 2016; Madden et al., 2013) state that the core of STEAM education lies in the interdisciplinary approach that celebrates the arts and sciences, among other disciplines, by engaging equally analytically, intuitively, logically, and aesthetically.

Research studies on enhancing critical thinking skills through STEM/STEAM approaches in mathematics education can be summarized into two important questions: (1) What is the distribution of research in terms of publication years and countries of researchers between 2018 - 2022?; (2) What are the best designs used in these studies in terms of research methodology, data collection instruments, instructional models, and types of interventions?

Method

Research Design

The methodology used is a Systematic Literature Review (SLR) with guidelines from Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). SLR is a method of gathering appropriate data on a topic that meets predetermined eligibility criteria (Mengist et al., 2020). This SLR is used to find main database articles in answering research questions. PRISMA establishes a standardized, peer-reviewed methodology that employs a guideline checklist to contribute to the revision process's quality assurance and replicability (Conde et al., 2020; Moher et al., 2015). The four main steps in PRISMA are identification, screening, eligibility, and inclusion. By following PRISMA guidelines, we could accurately search for the best practices in STEM/STEAM in mathematics education. The four main step in PRISMA are elaborated as follows:

Identification

The identification phase is carried out based on predetermined research questions. Search articles in online databases using keywords according to research questions. Keywords are used as a filtering tool on search engines in some indexed journals.

Table 1. The keywords

Keyword	Search terms
STEM or STEAM	("STEAM" OR "STEAM approach" OR "STEAM Education" OR "science, technology, engineering, art, mathematics")
Mathematics education	("mathematics education" OR "mathematics")
All keyword	((("STEAM" OR "STEM") AND ("critical thinking skills" OR "critical thinking ability" OR "mathematical critical thinking") AND ("mathematical learning" OR "mathematical teaching" OR "mathematics education" OR "mathematics"))

Table 1 specifies the keywords used by researchers to find articles on search engines in several indexed journals. The author compiles a list of synonyms and alternative terms based on the most popular searches. The database used in this study includes three indexed journals, namely Springer, Eric, and Google Scholar. These four databases serve as a place to see the distribution of research on critical thinking skills in STEM/STEAM in mathematics education. Identification using search strategies with keywords on search engines produces 214 Springer-indexed articles, 88 Eric-indexed articles, and 17,300 Google Scholar-indexed articles. As a result, 17,602 journal articles have been classified at this stage.

Screening

In this phase, screening was carried out using the inclusion and exclusion criteria in Table 2. Articles identified in the previous identification phase were screened using the established inclusion and exclusion criteria.

Table 2. Inclusion and exclusion criteria

Inclusion criteria (IC)	Exclusion criteria (EC)
Publish since 2018 (last 5 years)	< 2018
Journal articles, conference proceedings	Non-journal articles, review journals, chapters in books, master dissertations, prefaces, opinion
Published in English language	Not published in the English language
Mathematics Education	Not research in mathematics education
Open access	Not open access

Table 2 is the inclusion and exclusion criteria for filtering articles based on publication time, language, the field of study and search access. The articles retrieved were only published in the last five years between 2018 and 2022. The data retrieved were journal articles. No books, book chapters, were excluded in the selection. Furthermore, we only focus on English articles to minimize the possibility of difficulties in language translation. For the field of study, the articles taken are particular in mathematics education, and outside this field are excluded. Finally, we focus on open-access publications, not open-access journals are excluded. After the screening stage, 629 articles were identified for selection.

Eligibility

The feasibility phase is generated from articles relevant to the eligibility criteria. After the screening phase, articles screened through the inclusion and exclusion criteria are then identified for eligibility through re-screening using the eligibility criteria.

Table 3. Eligible criteria

Eligibility Criteria (EC)	
EC1	Studies in the field of mathematics education
EC2	Research methodology (qualitative, quantitative, mixed method, and R&D), not a systematic review
EC3	The abstract contains the main research keywords, namely STEM or STEAM and critical thinking
EC5	Research on students and teachers at all levels of education (elementary school, junior high, high school, and college students)

Table 3 is a guideline for selecting articles in the feasibility phase. Articles identified in the screening phase still contain many articles in other fields such as science, physics, and biology in the STEM/STEAM approach. Therefore, research articles outside the field of mathematics education are discarded. The title, abstract, and methodology are thoroughly reviewed to ensure that the articles comply with the criteria and research objectives. We screened articles by title and abstract containing keywords, as shown in Table 1. Furthermore, we focused on all research methodologies except SRL because they have similarities with our study. Finally, excellent articles are also viewed based on the research object. We chose research that studied students or teachers at all levels of education, not a literature review. As a result, 58 articles were identified in this phase.

Inclusion

The final phase of the PRISMA approach is the inclusion of articles that have undergone several screening stages. The inclusion stage of this article is carried out through an overall article review of eligible articles to determine which articles are selected as the primary literature. All answers to research questions must be available and relevant to the research objectives, including the research design, research practices, data collection method and the kind of research intervention. In this phase, duplicate removing is also carried out. The same article is selected from several data based. Articles that do not contain answers to the research questions that have been set will be discarded. In the final stage, it was determined that 21 articles were included in the primary literature data. PRISMA's stages in this study are shown through the flow diagram in Figure 1.

The PRISMA stages shown in Figure 1 establish articles as the primary literature for review based on research questions. Fifteen articles have been identified that are suitable for use. This number is minimal compared to the number of articles identified in the initial phase of 17,602. These data shows that during the last five years, there have been very few studies of critical thinking skills using STEM/STEAM approaches, specifically in

mathematics education. We will see how the research study was carried out in terms of the characteristics of the research, the methodology used, and the specific objectives of the research.

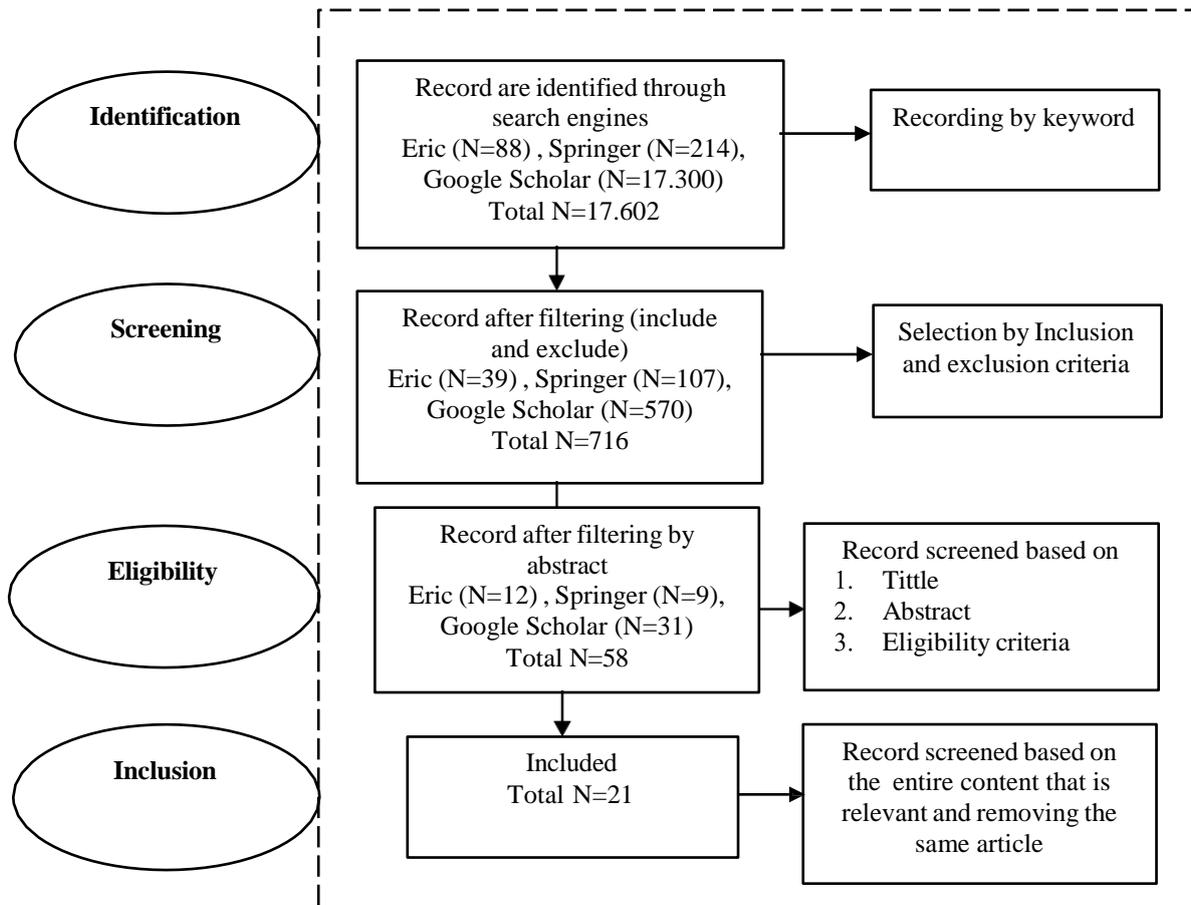


Figure 1. Flow diagram of prisam stage

Results and Discussion

Result

Data from the literature review results were obtained based on the six main questions in this study. The research questions focus on developing critical thinking skills in mathematics education through the STEM/STEAM approach. Research data can be an essential finding for educators and researchers to consider their studies on critical thinking skills in mathematics education and how STEM/STEAM is used to develop critical thinking skills.

Article Distribution

The distribution of article is grouped by year of publication, journal name and indexing, place of research, level of education of research participants. The mapping result of article distribution can be seen at Table 1. The results show that the largest distribution of articles was found in 2021.

Distribution of Publication Years in Literature Articles

The first research question focuses on the distribution of publication years from 2018 to 2022. This distribution of publication years will show the number of publications on critical thinking through STEM/STEAM studies in mathematics education over the past five years (Figure 2).

Table 1. Article distribution

No	Study	Publisher Journal Indexing	Journal or Proceeding Name	Country	Participants
1.	Singh et al., 2018	Eric	Internation Electronic Journal of Mathematics Education	Malaysia	Student at Senior High School
2.	Aldahmash et al., 2019	Scopus	Cogent Education	Saudi Arabia	Mathematics Teacher
3.	Priatna et al., 2020	Scopus	Journal for the Education of Gifted Young Scientists	Indonesia	Student at Junior High School
4.	Retnowati et al., 2020	Eric	Online Journal of Education and Teaching	Indonesia	Student at Junior High School
5.	Oktavia & Ridlo, 2020	Google Scholar	Journal of Primary Education	Indonesia	Student at Elementary School
6.	Suherman et al., 2021	Google Scholar	Journal of Advanced Sciences and Mathematics Education	Indonesia	Student at Senior High School
7.	Twiningsih & Elisanti, 2021	Google Scholar	International Journal of Emerging Issues in Early Childhood Education	Indonesia	Student at Elementary School
8.	Y. R. Kim et al., 2021	Scopus	International Journal of Education in Mathematics, Science, and Technology	USA	Student at Elementary School
9.	Bulu & Tanggur, 2021	Google Scholar	Al-Jabar: Jurnal Pendidikan Matematika	Indonesia	Student at University
10.	Safira et al., 2021	Google Scholar	THE 12th International Conference On Lesson Study (ICLS-XII)	Indonesia	Student at University
11.	Makhmudah et al., 2021	Google Scholar	Unnes Journal of Mathematics Education Research	Indonesia	Student at Senior High School
12.	Insani et al., 2021	Google Scholar	Journal of Physics	Indonesia	Student at Senior High School
13.	Astuti & Riswandi, 2021	Google Scholar	Asia-Pacific Forum on Science Learning and Teaching	Indonesia	Student at Elementary School
14.	Chang et al., 2021	Springer	Education Tech Research Dev	Taiwan	Student at Junior High School
15.	Kijima et al., 2021	Springer	International Journal of STEM Education	Japan	Female Youths
16.	Aydin Gürler, 2021	Eric	Participatory Educational Research	Turkey	Primary School Teacher
17.	Evangelisto, 2021	Eric	Journal of STEM Education	USA	College Teachers in Science, Technology, Engineering, and Mathematics.
18.	Siew, 2021	Eric	The 4th International Baltic Symposium on Science and Technology Education, BalticSTE2021	Malaysia	Student at Senior High School
19.		Google Scholar	Early Childhood Education	Indonesia	Student at Elementary School
20.	Pahrudin et al., 2021	Eric	European Journal of Educational Research	Indonesia	Student at Senior High School
21.	Arini & Utomo, 2022	Google Scholar	International Journal of Multicultural and <u>Multireligious Understanding</u>	Indonesia	Mathematics Teacher

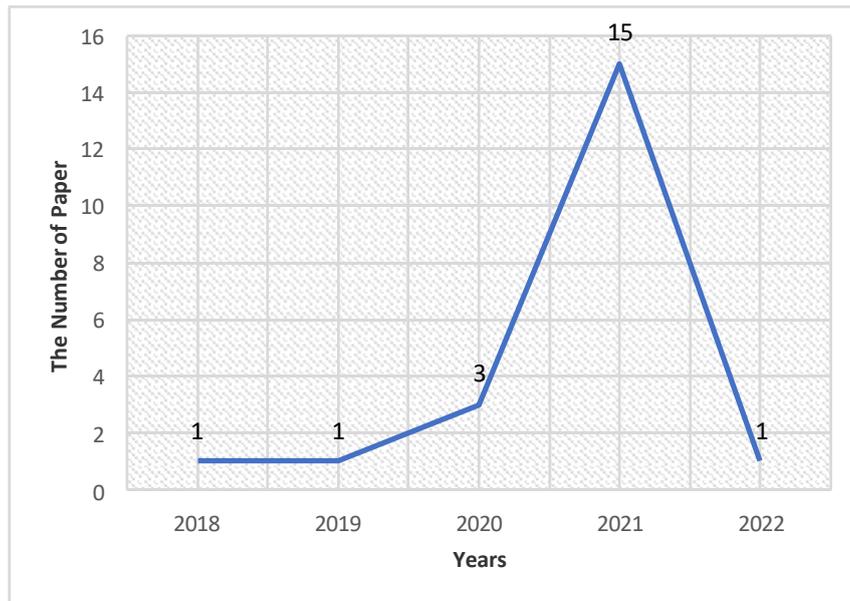


Figure 2. Distribution of publication years

Figure 2 The data shows that there has been an increase in research on critical thinking skills through STEM/STEAM from 2020 to 2021 and will decline again in 2022. Most research will be conducted in 2021, amounting to 71,42% of the existing research.

Distribution of Publication Countries in Literature Articles

The results that focus on geographical distribution show the contributions of researchers from different countries who study critical thinking skills in STEM or STEAM approaches to mathematics. The results show a distribution in the affiliation of the first author. Most of the research was conducted in the country of origin of the first author.

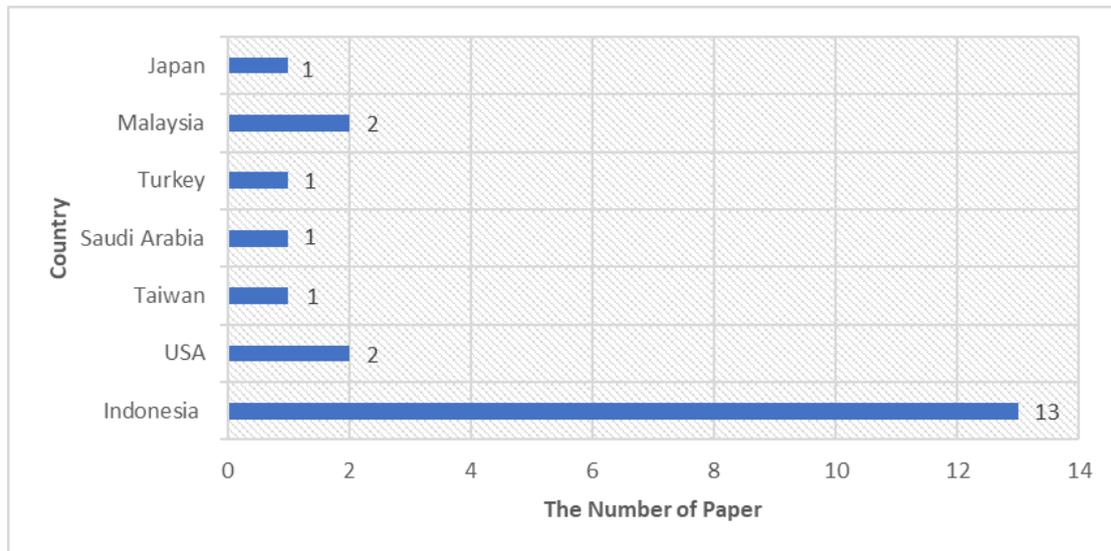


Figure 3. Author's country of affiliation

Figure 3 shows how the contribution of researchers by country of affiliation. Only seven countries have studied critical thinking skills in the STEM/STEAM approach to mathematics in the last five years. This number of countries is still very small when compared to the number of countries in the world that should have the potential to develop the critical thinking skills of its people through STEM/STEAM-based education. This study is still of low interest. Indonesia has the most significant number of authors, with 61,90% contributing to this study, and other countries still need more interest.

Research Methodologies in Literature Articles

One of the essential factors in research is research design as a framework for research methods and instrument to achieve the researcher's goals. The research design determines how the researcher's thinking style determines a suitable way of developing critical thinking skills with STEM/STEAM and type of data collection tool to improve Critical thinking ability through STEM (STEAM) used researcher to collected data.

Table 4. Types of method and instrument on research design

Method	Study	Instrument	
Quantitative	Suherman et al., 2021	Critical thinking tests	
	Bulu & Tanggur, 2021	Critical thinking tests	
	Astuti & Riswandi, 2021	Critical thinking tests	
	Chang et al., 2021	Critical thinking tests, rubrics for evaluating the STEM project work, and the collaboration tendency, critical thinking awareness	
	Aldahmash et al., 2019	Questionnaire	
	Aydin- Gurler, 2021	Critical thinking scales	
	Pahrudin et al., 2021	Critical thinking tests	
	Singh et al., 2018		
	Qualitative	Kim et al., 2021	Critical thinking tests
		Evangelisto, 2021	Interview sheets
Siew, 2021		Open-ended questions; focus group observation and interviews	
Mix method	Wijayanti & Latiana, 2021	Interview and observation sheets	
	Makhmudah et al., 2021	Critical thinking tests	
	Kijima et al., 2021	Pre- and post intervention surveys	
Development	Oktavia & Ridlo, 2020	questionnaire, critical thinking tests	
	Priatna et al., 2020	Assessment of content validity, face validity, and construct validity	
	Twiningsih & Elisanti, 2021	Media validation sheet, a teacher response questionnaire, a student observation sheet, and a student learning result sheet	
	Arini & Utomo, 2022	Expert validation questionnaire and teacher questionnaires	
	Safira et al., 2021	Observations sheets	
	Insani et al., 2021	Observations sheets	
	Retnowati et al., 2020	Critical thinking tests	

Table 4 shows the research design and instruments used to develop critical thinking skills with a STEM/STEAM approach. This type of quantitative method is the most widely used compared to other types. Furthermore, development method and experimental design is used second most. The percentage of the use of the type of research method is quatitative 38.09%, development 28.57%, qualitative 19.05% and mix method 14.28%.. The most widely used type of research instrument is the critical thinking test. The test is designed to measure the critical thinking skills of participants and its use is seen not only in quantitative methods but also in other methods such as qualitative, mixed methods and development.

Type of Research Practice in Literature Articles

The results of the review reveal that there are many research practices used as models or strategies by researchers. Table 5 reveals 13 different types of practices used by the researchers reviewed. Two articles use project-based learning as a best practice and one for each type of practice. In addition, two articles need to mention the types of research practices used, and most of the research practices in STEM/STEAM use project-based approaches and technology applications. These results indicate that project-based learning is the most suitable learning model for use in the STEM/STEAM approach, while other models that vary are more directed at the purpose of identifying critical thinking skills both cognitively and effectively (Sun Han et al., 2014; Priatna et al. al., 2020; Tseng et al., 2013). There were 6 out of 21 articles that did not use models or strategies integrated with the STEM/STEAM approach.

Table 5. Research practices

Research Practices	Study
Project-based learning	Bulu & Tanggur, 2021, Oktavia & Ridlo, 2020
Technological integration	Suherman et al., 2021
Colored two-dimensional figure mixing	Twingsih & Elisanti, 2021
Android-based application	Arini & Utomo, 2022
Robotic coding activities	Y. R. Kim et al., 2021
Peer Assessment Facilitated	Chang et al., 2021
Blended learning	Safira et al., 2021
Problem-based learning	Makhmudah et al., 2021, Singh et al., 2018
Inquiry learning	Pahrudin et al., 2021
Learning Community	Insani et al., 2021
Design Thinking Workshop	Kijima et al., 2021
Professional development program	Aldahmash et al., 2019
Mentee Outreach Program	Siew, 2021
Not mentioned (non-practices)	Priatna et al., 2020, Astuti & Riswandi, 2021, Retnowati et al., 2020, Aydin -Gürler, 2021, Evangelisto, 2021, Wijayanti & Latiana, 2021

The Kind of Intervention in Literature Articles

Intervention in this research question is defined as the main activity of the stated research objectives. Many types of interventions are found in assessing critical thinking skills through STEM/STEAM in mathematics education.

Table 6. The kind of intervention of the paper

Activities	Study
Developing of learning model	Priatna et al., 2020, Safira et al., 2021
Comparing of critical thinking skills between genders	Suherman et al., 2021
Conducting educational interventions for adolescent female youths' perceptions of STEM topics	Kijima et al., 2021
Developing of media	
Developing the colored two-dimensional figure mixing media	Twingsih & Elisanti, 2021
Developing android based application	Arini & Utomo, 2022
Developing lesson plans, worksheets, and instrument tests of critical thinking ability	Insani et al., 2021
Developing of rectangular module	Retnowati et al., 2020
Conducting of Robotics coding activities	Kim et al., 2021
Using of Web e-learning School	Suherman et al., 2021
Analyzing the implementation of STEM approach in learning mathematics	Astuti & Riswandi, 2021, Wijayanti & Latiana, 2021, Pahrudin et al., 2021, Oktavia & Ridlo, 2020, Singh et al., 2018, Bulu & Tanggur, 2021
Identifying of peer assessment – facilitated STEM (PA-STEM) approach	Chang et al., 2021
Identifying State of prediction of the critical thinking dispositions	Aydin Gürler, 2021
Describing community college teachers' method and techniques in STEM disciplines	Evangelisto, 2021
Integrating STEM through Short professional development program	Aldahmash et al., 2019
Tackling the STEM learning gap	Siew, 2021

Table 6 shows that 12 types of interventions can be identified from 21 literature articles. The highest type of intervention, at 28.57%, was through Analyze the implementation of STEM approach in learning mathematics. Some researchers tried to develop critical thinking skills through various media such as the coloured two-dimensional figure mixing media, android, lesson plans, worksheets, instrument tests, and modules. Various

interventions have been used by researchers to develop or analyse critical thinking skills in mathematics education. Another exciting type of intervention is through robotic coding and peer assessment activities to see how this critical thinking ability is achieved.

Discussion

The research findings show that in the last five years (2018-2022), research examining critical thinking skills through STEM/STEAM in mathematics education still needs to be made public. Of the 17,602 articles identified through search keywords in three large databases, namely Eric, Springer, and Google Scholar, only 21 were identified as relevant to the purpose of this study. The low number of relevant articles relates to specific research topics with three main keywords: critical thinking, STEM/STEAM, and mathematics education. Based on the findings, most of the research in this study was conducted in 2021. This data has increased since 2020 and decreased again in 2022. The significant increase in research in 2020 and 2021 was investigated due to the increasing popularity of STEM/STEAM for enhancing 21st-century skills. STEM is a critical issue recognized internationally as a foundation for economic growth and advancing skills people need in the 21st century (Chai, 2019; Maass et al., 2019). Especially in mathematics education, the results show that integrating STEM into learning can improve the students' accomplishment in algebra, geometry, and probability (Han et al., 2016). The decline in publications in 2022 is that most of the STEM/STEAM research in mathematics education does not lead to developing critical thinking. Most of the research was conducted to examine the perceptions of teachers and prospective mathematics teachers about STEM (Pathoni, Ashyar, Maison & Huda, 2022; Hoon et al., 2022; Rahman et al., 2022). Hoon et al. (2022) say that the importance of STEM contrasts with their concerns about teachers' knowledge and readiness to implement STEM. Identifying and evaluating the perceptions of teachers and prospective teachers regarding their knowledge, readiness, experience, and efforts to practice STEM will become more important for research in 2022.

Regarding the distribution of the author's countries and the same time the research was conducted, the findings show that in the last five years, only five countries have been interested in conducting critical thinking studies through STEM/STEAM in mathematics education. Indonesia has the highest number of studies compared to other countries. Indonesian researchers' interest in developing critical thinking skills through STEM/STEAM is based on the low mathematics achievement of Indonesian students in PISA (Suherman et al., 2021). Based on PISA results in 2018, 72% of Indonesian students are considered low achievers in mathematics (Schleicher, 2019). PISA results become a reference for educators in Indonesia to improve the quality of Indonesian students' mathematical abilities in various ways, one of which is through the STEM/STEAM approach. The research results show that STEM learning can improve students' critical thinking skills (Suherman et al., 2021). STEM step will provide students with new information on what has been observed, allowing them to analyze and think critically (Borrego & Henderson, 2014; Hobbs et al., 2018; Kusumah, 2019). Other countries such as the USA, Taiwan, Saudi Arabia, Turkey, and Malaysia have made small contributions to this study. The small number of countries that contribute shows the need for more diversity of countries to study critical thinking through STEM/STEAM. Even the USA, as a STEM pioneer country, only contributes a little to studying critical thinking skills through STEM/STEAM. Researchers from the USA conducted research through robotic coding activities in math class. Robotic coding activities have transferability implications that afford STEM learning access and opportunities for students to develop mathematical reasoning and critical thinking skills that are operable in a coding environment (Kim, 2012).

Other findings regarding the research methodology used in the research articles reviewed, most researchers use quantitative research, followed by Research and Development (R&D). Meanwhile, qualitative and mixed-method research was used by a small number of researchers. R&D research is mainly used by Indonesian researchers, including developing learning tools such as lesson plan sheets and student worksheets based on the STEM approach to improve students' critical thinking skills (Insani et al., 2021). The existence of various research designs also influences the type of data collection tool used. The findings show that there are seven types of data collection tools or research instrument used yaitu critical thinking tests, questionnaire, critical thinking scales, critical thinking awareness, interview sheets, open ended questions, observations sheets, interview sheets, survey, assesment of validity, collaboration tendency and STEM project work. Test instruments are this study's most used types of data collectors. The test instrument was used to measure and determine the achievement of critical thinking skills using the STEM approach as a cognitive aspect of students. For the affective aspect, a questionnaire was used to find student responses to the learning being carried out (Insani et al., 2021). Identifying critical thinking skills can use tests as quantitative data, and perceptions about critical thinking can use questionnaires, peer assessments and interview sheets as qualitative data. Several researchers (Arini & Utomo, 2022; Insani et al., 2021; Retnowati et al., 2020; Twiningsih & Elisanti, 2021) use

validation sheets to validate product development. In addition, observation sheets and documentation tools are used to collect research data during the research process.

This study also revealed that many types of research practices are used to examine critical thinking through STEM/STEAM in mathematics education. Of the 13 types of research practices, the project-based learning method is used the most. However, many of them do not use research practices in their research including (Priatna et al., 2020; Astuti & Riswandi, 2021; Retnowati et al., 2020; Aydin- Gurler, 2021; Evangelisto, 2021), (Wijayanti & Latiana, 2021). These results align with the results of a literature review by (Pahmi et al., 2022), which examined the influence of STEM in mathematics education. Fahmi found that from 2012 – 2021, project-based learning was the most widely used model, namely, 43% of the total research sample. Project-based learning is a dynamic learning approach where students actively explore real-world problems and challenges and gain more profound knowledge (Bell, 2010; Kricsfalusy et al., 2018; Wiek et al., 2014). The main characteristic of this project-based learning is directed learners and engages learners in finding the concept of discipline through a constructive investigation (Gülbahar & Tinmaz, 2006; Yadav et al., 2011). Project-based learning is very suitable for the STEM/STEAM approach because it can increase student interest in the studied field. In addition, project-based learning can improve critical thinking skills as a 21st-century skill. The characteristics of project-based learning follow the 21st-century learning paradigm, and current research shows that projects can increase students' interest in STEM studies. The many types of practice used in literature articles indicate that critical thinking skills can be improved through various practices or research models. This type of practice also fits the characteristics of STEM/STEAM as an interdisciplinary approach.

Finally, findings on the types of interventions carried out by researchers show results as varied as the types of practice. This type of intervention refers to the specific goals of the research and the way the researcher achieves his goals. This intervention is described through research activities, such as comparing critical thinking skills between the sexes (Suherman et al., 2021). Sherman stated that there were differences in the ability to think critically mathematically between male and female students in STEM learning. Female students have higher critical thinking skills than male students. In another study, (Aldahmash et al., 2019) developed a teacher profession program by integrating STEM into it. Aldahmash analyzes math and science teachers in Saudi Arabia concerning the way teachers teach STEM. This short STEM program is expected to improve critical, creative, and analytical thinking skills in Saudi Arabian teachers. The most widely used type of intervention was development activity by 46.7% of the research literature sample. Development activities in this study include the development of learning models, media, and teacher professional programs. This development research trend is mainly carried out in Indonesia (Arini & Utomo, 2022; Insani et al., 2021; Priatna et al., 2020; Retnowati et al., 2020; Safira et al., 2021; Twiningsih & Elisanti, 2021). The trend of this development intervention is based on the popularity of STEM in Indonesia, which is still growing in the last five years. The various identified interventions show various ways and research activities that can be carried out to examine critical thinking through STEM/STEAM in mathematics education. Researchers, especially researchers in mathematics, can use this finding as an alternative to developing various 21st-century skills through STEM/STEAM.

Conclusion

STEM has become a popular approach in the last five years specially on mathematics education, but only a few have been explicitly identified in the study of critical thinking. Research on critical thinking through STEM/STEAM in mathematics education from 2018 to 2022 was mainly conducted in 2021. There was a significant increase from 2020 and a sharp decrease in 2022. The most primary authors who study critical thinking through STEM/STEAM come from Indonesia, and contributions are evenly distributed from the USA, Taiwan, Saudi Arabia, Turkey, and Malaysia. The most widely used research methodology in this finding is development research or R & D and quantitative research. This methodology aligns with the types of data collection tools the researchers used. They used a variety of test instruments and questionnaires to see the results of the study. The SLR results show the types of interventions from each country as a typical way to assess mathematics critical thinking skills through STEM/STEAM. The best practice for improving learner's mathematical critical thinking skills in STEM/STEAM is Project-Based Learning (PBL). However, this practice is not used by many development researchers. The authors find distinctive features in the interventions used by researchers to improve the critical thinking of learners from each country. The most common intervention was an analysis of the implementation of the STEM/STEAM approach in Indonesia. Many Indonesian researchers also developed learning models and media. Other countries focused more on computer-based activities, developing community programs, and identifying participants' perceptions of critical thinking. These differences give each country its own characteristics in improving and identifying the critical thinking skills of its people.

These differences in practices and interventions can also provide alternatives for researchers in their research on critical thinking through the STEAM approach.

Recommendations

The SRL findings illustrate how each researcher from different countries has their own characteristics to analyze and develop mathematical critical thinking skills for their communities through the STEM/STEAM approach. Therefore, we recommend researchers who are interested in this study try to conduct research using the best practices and interventions used by other researchers outside your country. It will provide new nuances, experiences, and interesting results if we try a new things outside the customs of our country. We can also see different result from our reseacrh with others.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Assessment within the Context of Positive Psychology: Examples from Ahmet Yesevi and Hacı Bektaş-i Veli

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Abstract: The aim of this study is to elucidate the concepts associated with positive psychology found in the thoughts of Ahmet Yesevi and Hacı Bektaş-ı Veli. The research utilized the document analysis technique. According to the findings obtained at the conclusion of the study, it is evident that concepts such as patience, encouragement, gratitude, optimism, social interest, and perseverance are associated with the thoughts of Ahmet Yesevi investigated in the research. Additionally, it is observed that the concepts of optimism and perseverance are also linked to the thoughts of Hacı Bektaş-ı Veli examined in the research. Consequently, it is determined that the thoughts of both Ahmet Yesevi and Hacı Bektaş-ı Veli encompass concepts that can be correlated with positive psychology within the scope of this research. This underscores the presence of themes promoting positive psychological attributes within the philosophical and spiritual perspectives of these influential figures.

Keywords: Positive psychology, Hacı Bektaş-ı Veli, Ahmet Yesevi

Introduction

Concepts of Positive Psychology

Positive psychology is a scientific discipline that assists individuals in establishing a positive connection at every stage of life and enhancing their lives by providing positive life experiences and insights (Peterson, 2000). It offers a perspective where not only illness, weakness, and harm are examined but also focuses on strengths and positive qualities. Additionally, positive psychology encompasses various life domains such as work, education, insight, love, personal development, and enjoyment (Seligman, 2002).

One of the significant concepts addressed within positive psychology is "flow." Hefferon and Boniwell (2018) define flow as being fully immersed in a physical or cognitive activity moment by moment. Flow is characterized by the individual's intense focus on the task at hand, where they become so engrossed that thoughts of failure disappear, and they are unable to think about anything else outside of that task (Dietrich, 2004). Achieving flow can be considered as an important method aimed at disregarding negative thoughts and increasing positive emotions (Hefferon & Boniwell, 2018).

The concept of gratitude is also addressed within positive psychology. Emmons (2004) describes gratitude as a feeling of satisfaction and also as a phenomenon that includes a cognitive dimension. It is observed that the term gratitude is used interchangeably with thankfulness and is also considered as a positive character strength (Sari

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& Yıldırım, 2017). The word gratitude, of Latin origin, is associated with concepts of kindness, generosity, the beauty of giving and receiving gifts (Emmons, 2007).

Patience is a concept frequently encountered in positive psychology. Patience is the process of acceptance, endurance, and struggle in the face of any kind of difficulty, stress, loss, or hardship. Patience, which helps individuals cope with the challenges encountered throughout life, contributes to their success and ultimately to their happiness (Dogan & Gulmez, 2014). The tendency of calmly waiting while dealing with disappointment, distress, or pain is considered as patience, a desired character strength that supports individual well-being (Harned, 1997; Schnitker, 2012).

Encouragement is one of the important concepts addressed within positive psychology. Encouragement, which involves individuals having confidence in their potential to achieve their goals, is a process supported by psychological counselors (Cheston, 2000). This process helps individuals achieve their goals by encouraging them to have confidence in their abilities.

The concept of optimism is highly important in positive psychology. Seligman (1998) challenged the view of behaviorists, who believed that individuals' behaviors are shaped solely by rewards and punishments. According to him, behaviorists ignore individuals' consciousness and argue that the only way to change is to change environmental factors. Seligman (1998) argued that individuals can develop in a positive direction by changing their thought patterns. As the opposite concept of learned helplessness, the concept of learned optimism suggests that individuals can learn not only helplessness but also optimism in the face of negative events.

Social interest refers to caring about humanity in general and not putting one's own interests first. This type of interest involves individuals focusing on the well-being of society and people by empathizing with others (Leak and Leak, 2006). Social interest is essential for both individual and societal mental health.

Perseverance refers to the determination and resilience that do not diminish even after years of failure. This characteristic is seen as the determination of individuals to achieve their goals without giving up in the face of difficulties. In short, perseverance contributes to individuals achieving positive outcomes through steadfast effort (Pappano, 2013).

Ahmet Yesevi

Ahmet Yesevi was born in the town of Sayram in Western Turkistan. It is estimated that he was born in the second half of the 11th century. It is known that he passed away in 1116 (Bice, 2016). Concepts that can be associated with positive psychology are prominent in the wisdom of Ahmet Yesevi. In this context, it is seen that examining the life and wisdom of Ahmet Yesevi in the light of positive psychology is important for both history and psychology fields.

Hacı Bektâş-ı Velî

The probable birth and death dates of Hacı Bektâş-ı Velî are determined as 1209 and 1271, respectively, and it is thought that he passed away at the age of 63 (Coşan, 2013). The fundamental basis of Hacı Bektâş-ı Velî's perspective on people lies in the philosophy of Ahmet Yesevi. His aim is to ensure that people have the will to live together with good, right, and beautiful values (Bayar & Bayar, 2016).

Hacı Bektâş-ı Velî's Understanding of Ethics

When we look at Hacı Bektâş-ı Velî's work "Makâlât," it is generally seen that he mentions some moral virtues specifically in the understanding of "four gates forty stations," especially in the gates of gnosis and truth (Bayar and Bayar 2016). According to this Yılmaz et al. (2007):

- **The Stations of the Gate of Sharia:**

1. Believe
2. Learn knowledge

3. Earn halal (lawful) income
4. Worship
5. Be beneficial to one's family
6. Do not harm the environment
7. Obey the Prophet's commands
8. Be compassionate
9. Be clean
10. Avoid useless and unnecessary tasks

• **The Stations of the Gate of Tariqat:**

1. Repent
2. Obey the advice of the guide (spiritual leader)
3. Dress cleanly
4. Fight for goodness
5. Love to serve
6. Fear injustice
7. Do not fall into despair
8. Take lessons
9. Distribute blessings
10. See oneself as poor

• **The Stations of the Gate of Truth:**

1. Be humble
2. Do not see anyone's flaws
3. Do not refrain from any good deeds
4. Love everything created by God
5. See all people as one
6. Aim for and direct towards unity
7. Do not hide the truth
8. Know the meaning
9. Learn the divine secret
10. Reach the divine existence (Unity of Being)

• **The Stations of the Gate of Knowledge (Marifat):**

1. Be courteous
2. Stay away from selfishness, malice, and resentment
3. Excessive desires
4. Patience and contentment
5. Modesty
6. Generosity
7. Knowledge
8. Tolerance
9. Know oneself
10. Wisdom

Hacı Bektâş-ı Velî's Thoughts on Education

When we examine the life and works of Hacı Bektâş-ı Velî, we see that morality, personality, and spiritual education are prioritized. His ideal human model is someone who, even if hurt, does not hurt others, and is a mature and virtuous individual. In Hacı Bektâş-ı Velî' s approach to education, we see that there is no place for limiting thoughts and conventional ideas.

Furthermore, instead of using intimidating expressions like "you will go to hell" or "you will burn in fire," Hacı Bektâş-ı Velî employs an approach that does not rely on fear and terror, but rather engages readers with stories and narratives using a fluent language that encourages them to think (Bayar & Bayar, 2016).

According to Hacı Bektaş-ı Velî, the perfect human type is, above all, a person whose inner world is free from evil. Additionally, Hacı Bektaş-ı Velî's perspective on human beings and humanity transcends all narrow and prejudiced ideas, considering loving all humans and refraining from criticizing others as prerequisites for being human (Ozturk, 1995). Another aspect emphasized by Hacı Bektâş-ı Velî is gender equality. He advocated that there is no distinction between men and women in the eyes of God, that both genders are equal, and there is no superiority between them. This perspective is affirmed by the following quatrain: "In the language of love, male and female are not asked / Everything created by God is in its rightful place / In our view, there is no difference between male and female / Deficiency and lack are in your views" (Menemencioglu, 2011).

In schools, the concept that facilitates the definition of positive psychology is positive education (Güngör, 2017). Green et al. (2011) defined positive education as the application of positive psychology in education. In the surviving works of Hacı Bektâş-ı Velî, we see that there are no restrictions on thought and no conventional ideas in his educational approach (Bayar & Bayar, 2016). While the conceptualization of positive psychology may have a recent history, the concepts of positive psychology have found their place in oral and written language since the existence of humanity. In this context, it is thought that evaluating the views of individuals who have influenced the science and thought of humanity in their eras and subsequent generations would be beneficial for positive psychology. Therefore, the aim of the research is to evaluate the thoughts of Ahmet Yesevi and Hacı Bektaş-ı Velî in terms of the discipline of positive psychology.

Method

Research Model

Qualitative research encompasses approaches that involve qualitative data collection methods such as observation, interviews, and document analysis. In this study, document analysis has been utilized. The aim of qualitative research is to examine individuals' perceptions and events in a naturalistic and comprehensive manner (Yıldırım & Simsek, 2016, p. 39). Merriam (2009) has divided document analysis into stages: (1) finding appropriate documents, (2) checking the originality of documents, (3) creating a systematic approach to coding and cataloging, and (4) analyzing data (conducting content analysis). In this study, the thoughts of Ahmet Yesevi and Hacı Bektaş-ı Velî have been examined, and the focus has been on concepts that can be associated with positive psychology. The aim of the research is to describe these concepts. Data were collected through document examination method in the data collection phase. Document examination involves analyzing written materials related to the phenomenon or phenomena under investigation (Yıldırım & Simsek, 2016).

Data Collection

In this study, data were collected through the method of document examination. Document examination is a method that involves analyzing written materials related to the subject of research (Yıldırım & Simsek, 2016). In the process of collecting data, the book "Günümüzün Aşk Yolcuna Divanı Hikmet" by Bice (2016) for discussing the positive psychology concepts of Ahmet Yesevi and the book "Makalat" by Yılmaz et al. (2007) for discussing the positive psychology concepts of Hacı Bektaş-ı Velî were used as primary sources. While examining these sources, concepts related to positive psychology were identified and evaluated.

Data Analysis

The data collected through document analysis method were analyzed using descriptive analysis. The main aim of descriptive analysis is to reach concepts and relationships that can explain the collected data. Descriptive analysis consists of four stages: creating a framework for descriptive analysis, processing data according to the thematic framework, identifying findings, and interpreting findings (Yıldırım & Simsek, 2016). In this study, information related to Ahmet Yesevi and Hacı Bektaş-ı Velî was searched, and then these sources were matched with positive psychology concepts based on their relevance. Themes were determined according to these concepts, and data were evaluated and discussed based on the appropriate positive psychology concept.

Limitations of the Research

The research is limited to the accessible written sources of Ahmet Yesevi and Hacı Bektaş-ı Veli's words and thoughts.

Validity and Reliability

To ensure the validity and reliability of the research, the concepts classified by the researcher through descriptive analysis were presented to a subject matter expert for evaluation. In line with the opinions of the subject matter expert, certain keywords were added to the thematic frameworks. During the descriptive analysis of keywords, the common opinions of the researchers and the subject matter expert were taken into account, thus ensuring validity and reliability.

Results and Discussion

Evaluation of Ahmet Yesevi's Thoughts in terms of Positive Psychology

Gratitude

When the concept of gratitude, meaning giving thanks for what one has, is considered, it can be explained within the framework of focusing on strengths. Gratitude is also emphasized implicitly or explicitly in the wisdom of Ahmed Yesevi. For example (Bice, 2016):

"I swallowed blood, said 'God,' He showed mercy; He took my sorrow, saying, 'Don't let him stay in hell'; I became happy and went underground; This is how I came after hitting the stone."

In another example;

"What comes, you must see it from God; They separated his Yusuf from that Kenan; I came from that blessed Turkestan where I was born; I came after beating the stone."

Patience

Patience is considered one of the essential traits of a strong personality in positive psychology (Peterson & Seligman, 2004). The concept of patience is also emphasized in the wisdom of Ahmed Yesevi. For example (Bice, 2016):

"The one who forgives, he who helps the poor; He who knows the grace, he who does not feel sad; It is, he who does not get angry, he who does not envy; They are patient, and their virtue is high."

In another example;

"Don't blame me for being patient; It is my habit to be patient and to persevere; My heart is a lion, my love is Yusuf; I don't eat his teeth, I die."

Encouragement

Encouragement, the practice of inspiring and uplifting others, is an essential aspect of positive psychology (Seligman, 2002). In the teachings of Ahmed Yesevi, encouragement is often highlighted. For instance (Bice, 2016):

"Whoever claims to be righteous, to be a believer;
Should harbor no anger, harbor no malice;
To forgive, to do good to those who do wrong;
This is true greatness, this is the mark of the noble."

In another instance;

"If you seek the path of faith, how do you tread?
How do you ascend the mountain the Prophet once led?"

If unsure, then seek; May God grant you grace,
To embody forgiveness, and walk in noble embrace."

Optimism

A pessimistic outlook, perceiving negative events as generally permanent and pervasive, negatively affects individuals' life satisfaction, while an optimistic outlook or learned optimism perceives negative events as generally temporary and specific, and positive events as permanent and pervasive, positively impacting life satisfaction (Szczesniak & Soares, 2011). In the wisdom of Ahmed Yesevi, evil is associated with hell while goodness is associated with heaven. It is evident that optimism is closely related to the tendency to focus on the positive, a concept frequently addressed in positive psychology.

Social Interest

When examining the wisdom of Ahmed Yesevi, it is observed that he focused on the well-being of society. In this regard, Ahmed Yesevi and his teachings are directly relevant to the domain of social interest in positive psychology. Indeed, when explaining Islam to the newly converted community or imparting Sufi etiquette and guidance to his disciples, he acted with a social consciousness devoid of selfishness. An example of this can be seen in the following excerpt (Bice, 2016):

"Oh friends, in the path, I saw the market; I found my earnings and set up shop there; My heedless heart awakened there on its own, If pleased, I would endure night and day in love."

Another example of his abandonment of self-interest for social concern is evident in his addressing those who would receive spiritual guidance through his wisdom:

"In the fields of eternity, I shall guide them; If troubled, I shall be their remedy."

Social interest entails a concern for humanity in general and putting one's own interests aside. This type of interest involves focusing on the well-being of society and individuals through empathy (Leak & Leak, 2006). It contributes to an individual's belief in their own success, thus aiding in their motivation (Kandemir, 2015). Social interest is indispensable in positive psychology for both individual and societal well-being. In the wisdom of Ahmed Yesevi, there is a concept of "we" rather than "I". Social interest is evident in the following lines from Ahmed Yesevi's wisdom (Bice, 2016):

"I took pearls from the sea of truth, I served the perfect guide perfectly, I released those who strayed from the path, I became a leader for those followers."

"The perfect guide from Hemedan, The cherished abode of the inner and outer saints, The source of light within and without, At the age of seven, I received a share from the guide."

"If I were to utter their names, my tongue would burn, The word of the perfect guide is my condition, Both the guide and the guidance of soul and tongue, I remained separate from the guide in this way."

Perseverance

Perseverance refers to the determination to overcome difficulties and the unwavering interest and determination that persists despite years of failure (Pappano, 2013). In the field of positive psychology, concepts such as perseverance and determination are emphasized. Accordingly, if an individual possesses these qualities, they are closer to realizing their potential. Ahmed Yesevi valued the concept of perseverance and being perseverant in his teachings. In the etiquette of the Sufi order, both disciples and spiritual guides are obligated to wake up early in the morning and perform their prayers with a certain principle, while also fulfilling their worldly duties. In doing so, their sole aim is to become beloved servants of God. It is stated that only through perseverance can the disciple and spiritual guide achieve the mentioned goal, as expressed in the following lines (Bice, 2016):

"The disciple and spiritual guide will achieve the mentioned goal only through perseverance; They will rise with tears and walk, They will fear God and express their plea at dawn."

Evaluation of Hacı Bektaş-ı Veli's Thoughts in terms of Positive Psychology

Optimism and Perseverance

In line with the optimistic perspective of positive psychology, it can be observed that the ideal human model defined by Hacı Bektaş-ı Veli, which emphasizes qualities such as humility, being free from demonic attributes, being at peace with society, and being good, righteous, and beautiful, parallels the principles of positive psychology. Hacı Bektaş-ı Veli considered loving all people and refraining from blaming others as prerequisites for being human (Ozturk, 1995). Positive psychology argues that focusing on individuals' positive traits will enhance their quality of life and develop their potential (Gungor, 2017). In Hacı Bektaş-ı Veli's educational approach, there are no punitive reinforcements directed towards negative situations such as "you will go to hell" or "you will burn in fire". According to Hacı Bektaş-ı Veli's view of the perfect human, the truly uninjured person is the one who is not hurt, even if they are physically hurt (Bayar & Bayar, 2016).

In relation to Hacı Bektaş-ı Veli's moral understanding, it is observed that a variety of moral virtues are mentioned in all forty stations of the "four gates forty stations" understanding, especially in the stations of marifat (knowledge) and hakikat (truth) (Bayar & Bayar, 2016). Accordingly, being humble, not seeing anyone's faults, not withholding any good deeds you can do, loving everything God has created, seeing all people as one, directing towards unity, being courteous, being free from selfishness, enmity, and resentment, practicing moderation (limiting excessive desires), patience and contentment, generosity, tolerance, self-knowledge (Yılmaz et al., 2007) are directly related to positive psychology. The station of moderation (limiting excessive desires) can be associated with the concept of flow in positive psychology. In the concept of flow, there needs to be a balance between competence and challenge in an individual's life for continuity to exist. When an individual faces situations that are either too easy or too difficult for their competence level, an imbalance occurs. Therefore, the concept of moderation (limiting excessive desires) is important for the existence of balance.

Conclusion

In this study, the thoughts of Ahmet Yesevi and Hacı Bektaş-ı Veli were evaluated in terms of positive psychology. As a result of the research, it was determined that both Ahmet Yesevi and Hacı Bektaş-ı Veli emphasized concepts such as gratitude, patience, forgiveness, love, and compassion in their wisdom. These concepts are among the main components of positive psychology. Therefore, it can be said that the thoughts of Ahmet Yesevi and Hacı Bektaş-ı Veli have significant contributions to positive psychology. The evaluation of the wisdom of Ahmet Yesevi and Hacı Bektaş-ı Veli in terms of positive psychology can shed light on both psychology and philosophy. Positive psychology can benefit from the thoughts of these two thinkers, who have played a significant role in the development of Turkish-Islamic culture and thought.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

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Number Sense: Flexibility in Thinking about Numbers

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Abstract: The aim of this research is to understand the flexibility of students in solving problems related to number sense. Flexibility can be observed through the strategies used by students, whether they employ standard algorithmic procedures or utilize intuitive thinking strategies. This study is a qualitative research with a case study method. The research sample consists of 35 eighth-grade students who have covered the material of integers and have been given a written test. Test results are divided into two categories: students who solve problems using number sense strategies and students who do not use number sense strategies. In-depth interviews were conducted with two representative students who took the written test. The interview results indicate that students who solve problems with number sense strategies understand the concept of number density, while students who do not use number sense strategies do not yet have an understanding of the meaning of numbers. Overall, students tend to use procedural methods to solve the given problems. The results of this research are expected to be used as a basis for designing learning activities that accommodate number sense abilities.

Keywords: Numbers, Number sense, Flexibility in thinking.

Introduction

All humans, from the first year of their lives, have a well-developed intuition about numbers. Even in the early stages of development, humans possess the ability to recognize changes in a small collection, when, without direct knowledge, an object has been removed or added to their collection. This ability is referred to as number sense (Tobias Dantzig, 1967). Number sense involves rational, creative, effective, and flexible thinking, allowing students with adequate number sense to solve problems effectively, creatively, analytically, and flexibly. Number sense is built on meaningful learning experiences and not on the use of standard algorithms, such as complex formulas and written calculations. Furthermore, NCTM (1989) states that number sense is an essential skill to be developed in the mathematical process.

In the mathematical assessment dimension within the National Assessment of Educational Progress document (Nelson et al., 2003), number sense is considered a content strand implying that almost all mathematical topics always involve numbers. Someone with good number sense does not require written calculations to answer simple arithmetic but can process them mentally. Students' understanding of numbers aims to develop calculation skills so that this understanding can be used as a flexible thinking strategy in everyday life. For example, when students are confronted with the question "is 87×0.09 less than 87, slightly less, slightly more, or much more?" To answer this question, a strong sense of numbers is crucial, with the expectation that students can respond that 87×0.09 is much less than 87.

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The ability of number sense can be examined based on the strategies employed by students in solving problems, whether using number sense strategies or standard procedures (Yang et al., 2004). Students utilize standard procedure strategies when they apply written algorithms to solve problems (Yang et al., 2004). Furthermore, Yang also states that students are considered to use number sense strategies if they can apply one or more of several number sense indicators, such as the basic meaning of numbers, equivalent forms and representations of numbers, benchmarks, estimation, and the relative impact of arithmetic operations.

Indicators of Number Sense

Number sense can be observed by examining an individual's flexibility with numbers. In the context of learning, this flexibility is observed when students apply one or more of the three components of number sense: understanding the meaning of numbers, understanding arithmetic operations, and applying knowledge of the meaning and operations of numbers to computational settings (McIntosh et al., 1992; McIntosh et al., 1997). These three components are further broken down into six indicators, namely:

1) Understanding of the meaning and size of numbers (number concepts)

The first indicator measures the understanding of the base-ten number system (integers, fractions, and decimals), including patterns and place value that convey the meaning or size of a number. For example, $\frac{5}{6}$ is a fraction less than one, approaching one due to the relationship between the numerator and denominator. Similarly, 1000 is a large number when referring to the school population but a small number when referring to the city population. Additionally, the first indicator involves relationships and/or comparisons of numbers to standard benchmarks, including comparing the relative size of numbers within a single representational form.

2) Understanding and use of equivalent forms and representations of numbers (multiple representations).

The second indicator measures the ability to identify and/or rephrase numbers to generate equivalent forms. This ability is related to the use of decomposition and recomposition to rephrase numbers to make them more manageable in processing. Additionally, the second indicator also assesses the ability to associate and/or compare numerical magnitudes with physical references (such as a set of items, shaded areas, or positions on a number line), including intersections between various representational forms.

3) Understanding the meaning and effect of operations (effect of operations).

The third indicator measures the understanding of the meaning and effects of an operation, either in general or related to a specific set of numbers. For example, division means breaking numbers into a certain number of equivalent subgroups, or multiplying by a number less than 1 results in a product less than another factor. This includes assessing the reasonableness of results based on the understanding of numbers and operations used.

4) Understanding and use of equivalent expressions (equivalent expressions).

The fourth indicator is used for reevaluation and/or processing computations more efficiently. This includes understanding and applying the properties of arithmetic (commutative, associative, distributive) to simplify expressions and develop solution strategies (for example, using the distributive property to multiply 7×52).

5) Computing and counting strategies

The fifth indicator applies various components of numerical understanding as previously explained in the formulation and implementation of solution processes for calculation or computation situations (estimation, mental computation, paper/pencil, calculator). For example, determining whether 29×38 is greater or less than 400, or estimating the number of birds in the sky.

6) Measurement benchmarks

The sixth indicator examines the application of various components of numerical understanding, as previously explained, in formulating and implementing solution processes for measurement situations. Additionally, it considers the understanding and use of standard, non-standard, and/or personal benchmarks (for example, a textbook weighing about one kilogram or 5 oranges equaling one pound, or an angle slightly smaller than a right angle, measuring approximately 85 degrees). It also involves attributes of measurement such as mass, length, capacity, volume, time, and angle.

Method

Research Design

This research employs a qualitative research method with a case study approach. A case study is a type of research that focuses on a social phenomenon and requires in-depth investigation into that phenomenon. It involves the use of various data sources to understand a specific phenomenon (Crowe et al., 2011; Feagin et al., 2016; Heale & Twycross, 2018). This study utilizes a case study as the primary method to identify the strategies used by students in solving a problem on the topic of integers by examining the flexibility of their thought processes.

Participants

This research was conducted at one of the Public Junior High Schools in the city of Palembang in October 2023. The sample selection for the study utilized the purposive sampling technique (Etikan, 2016). Purposive sampling is a method of selecting samples based on specific considerations. The participants in this research were 35 eighth-grade students who had previously studied the material on integers in their previous class. The research was divided into three stages, which are explained as follows.

Stage 1

The first stage is the pre-research stage. In this stage, the researcher validates and tests the questions with eighth-grade students who have covered the material on integers to assess the readability of the questions. The students used for the trial are from a different class than the one involved in the actual research.

Stage 2

The second stage is the implementation stage of the research. In this stage, students are given a written test on the topic of integers that accommodates their number sense abilities. The test consists of seven multiple-choice questions and three essay questions, designed to assess students' number sense abilities. The students' responses are evaluated using a scoring rubric created beforehand. A score of 1 is given if students employ number sense strategies, and a score of 0 is given if students use non-number sense strategies.

Stage 3

The third stage is the post-research stage. In this stage, an evaluation of the students' test results is conducted. A score of 1 is given if students use number sense strategies, and a score of 0 is given if students use non-number sense strategies. After scoring each question, the accumulated scores are used to determine the students' overall test scores for number sense abilities. Students are considered to have good number sense abilities if they score ≥ 70 .

After the test results are evaluated, a semi-structured interview (Magaldi & Berler, 2020; Schmidt, 2004) is conducted with representatives from each group: the group of students who answered using number sense strategies and the group who answered using non-number sense strategies. Selecting one participant for an in-depth interview from each group is sufficient for this case study since this qualitative research does not aim to generalize to the chosen sample population. In-depth interviews are conducted to confirm students' written responses, and the obtained results are recorded and transcribed. Interview questions focus on their thought patterns, experiences, and perceptions regarding problem-solving approaches. One of the goals of the student interviews is to understand how students interpret numbers, their thinking processes, and their flexibility in thinking.

Data Analysis

Data analysis in this research is conducted with reference to Huberman and Miles (2002). In the qualitative data analysis stage, it consists of three simultaneous activities: data reduction, data presentation, and drawing conclusions. The present figure illustrates the process.

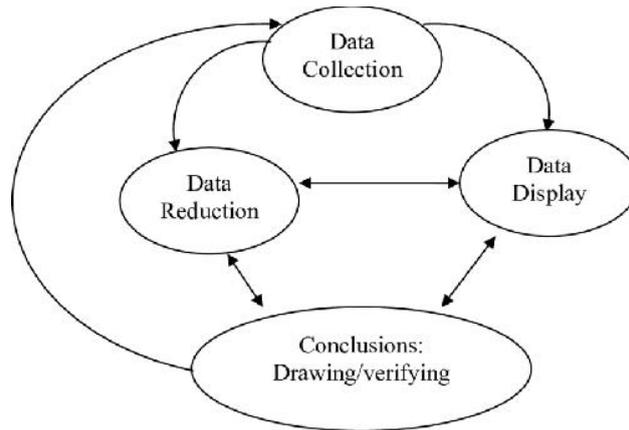


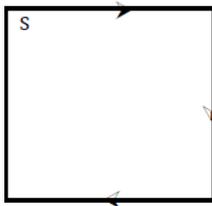
Figure 1. Flowchart of qualitative data analysis

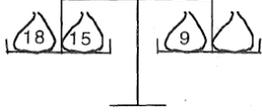
Results and Discussion

Number Sense Test

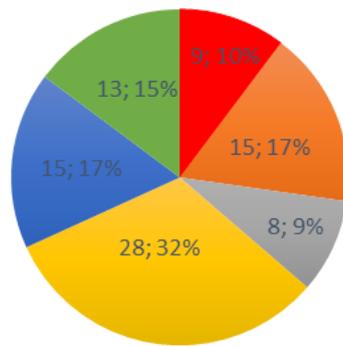
The results of the author's student test are presented based on number sense indicators and questions representing these indicators. Additionally, students who answered using number sense strategies are also presented and can be seen in the following Table 1.

Table 1. Test result number sense for Indicators

Indicator Number Sense	Question	Students with NS Strategy
(i) Understanding of the meaning and size of numbers (Number Concepts)	<p>➤ How many different fractions are there between $\frac{2}{5}$ and $\frac{3}{5}$.</p> <p>a. None. Why? b. One (Name it: _____) c. A few (Name it: _____) d. Lots (Name it: _____)</p>	P1, P4, P6, P7, P18, P23, P28, P31, P32
(ii) Understanding and use of equivalent forms and representations of numbers (Multiple Representations).	<p>➤ You are going to walk once around a square-shaped field. You start at the corner marked S and move in the direction shown by the arrow. Mark with an X where you will be after $\frac{1}{3}$ of your walk.</p> 	P1, P3, P4, P5, P6, P7, P9, P10, P11, P12, P13, P16, P18, P22, P35
(iii) Understanding the meaning and effect of operations (Effect of Operations).	<p>➤ When a 3-digit number is added to a 3-digit number, the result is ...</p> <p>a. Always a 3-digit number b. Always a 4-digit number c. Either a 3 or-digit number d. Either a 3, 4, or 5-digit number</p>	P1, P3, P5, P6, P11, P16, P32, P35
(iv) Understanding and use of equivalent expressions (Equivalent Expressions).	<p>➤ Ayu has balance some bags of marbles. The numbers show how many marbles are in the unmarked bag? Circle your answer.</p>	P1, P2, P3, P4, P5, P6, P7, P11, P12, P13, P14, P15, P16, P17, P19, P20, P21, P22, P24, P25, P26,

		P27, P28, P29, P32, P33, P34, P35
(v) Computing and Counting Strategies.	<p>➤ About how many days have you lived? Circle your answer.</p> <p>a. 300 c. 30.000 b. 3000 d. 300.000</p>	P1, P3, P6, P7, P9, P10, P13, P14, P17, P23, P24, P25, P30, P31, P32
(vi) Measurement Benchmarks.	<p>If your heart rate after exercising is 110 beats per minute. How many heartbeats do you feel when you are resting?</p> <p>a. 30 times c. 150 times b. 70 times d. 180 times</p>	P1, P6, P8, P10, P11, P12, P15, P16, P17, P18, P21, P25, P33

The number of participants and the percentage of those who answered the number sense test results can be seen in Figure 2.



Indicator 1 2 3 4 5 6
Figure 2. Test result number sense

Understanding of the Meaning and Size of Numbers (Number Concepts)

The first indicator looks at students' understanding of number density. Questions focusing on number density and the concept of "betweenness" are consistently challenging for students. For instance, when given the question "How many different fractions are there between $\frac{2}{5}$ and $\frac{3}{5}$?" only 10% of students responded correctly and used number sense strategies to solve it. This result indicates that students' understanding of fraction density is still weak. Below are some of the student responses.

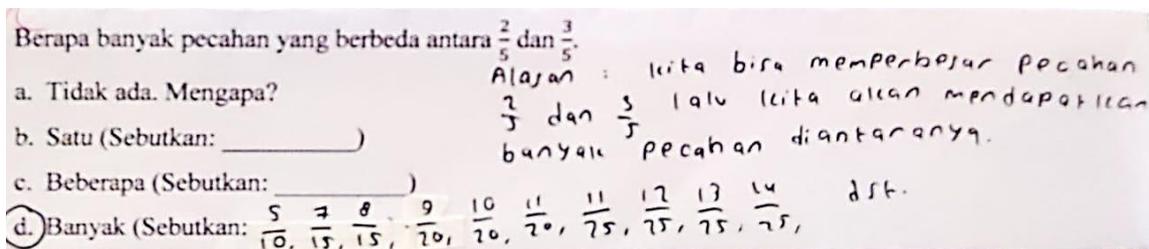


Figure 3. Students' responses to the first indicator with number sense strategies

Students with number sense will answer that there are an infinite number of fractions between the numbers $\frac{2}{5}$ and $\frac{3}{5}$. In this case, students can comprehend the concept of the density of numbers and are also capable of providing examples of infinite numbers as mentioned in the research (Yang, 2005). Furthermore, students also understand how to operate numbers flexibly, using mental calculations and logical estimations, making predictions, and understanding the numerical relationships among mathematical concepts, facts, and skills (Guedj, 1998; Yang et al., 2008; Reys et al., 1999).

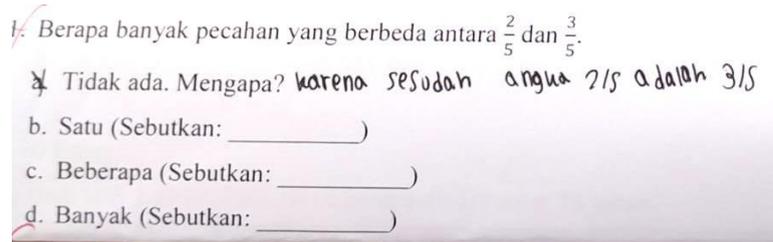


Figure 4. Students' responses to the first indicator with non-number sense strategies

Students who answer with non-number sense strategies do not recognize the infinite number of different fractions between $\frac{2}{5}$ and $\frac{3}{5}$, and they may not have an understanding of the meaning of numbers, as evidenced by responses that state there are no fractions between $\frac{2}{5}$ and $\frac{3}{5}$ namely $\frac{5}{10}$.

Understanding and Use of Equivalent Forms and Representations of Numbers (Multiple Representations)

The question representing the second indicator representing a position one-third of the way around a square as represented in second question was difficult for most students. Incorrect responses to this question highlight the lack of a benchmark with which to compare and make judgments about $\frac{1}{3}$. In designing the question, researcher felt that students who used each side of the square to represent $\frac{1}{4}$ would only need to be able to understand the relationship between $\frac{1}{4}$ and $\frac{1}{3}$ to respond correctly to the question. An alternative approach would be to think about the line making up the entire square as a "smooth" one and then to mentally section off the line into three equal segments. In fact, many of the incorrect responses related to using the vertices as "thirds" markers. In other words, think of standing at one corner of the square. What you see from this vantage point is three corners and each might be viewed (incorrectly) as representing a third of the square. Other students reasoned that the mark should go beyond the first corner but not as far as the second (halfway) corner. They then concluded that the $\frac{1}{3}$ mark should go halfway down the second side (be halfway between $\frac{1}{4}$ and $\frac{1}{2}$).

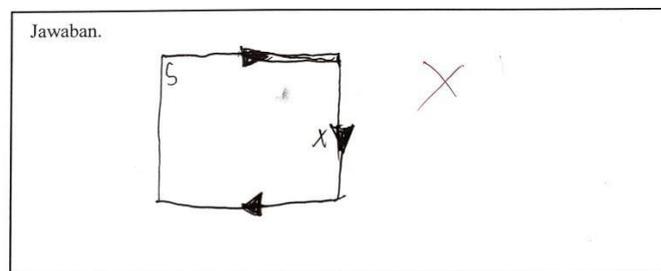


Figure 4. Students' responses to the second indicator

Understanding the Meaning and Effect of Operations (Effect of Operations)

Questions measuring the third indicator required the correct response to recognize that the sum of two 3-digit numbers would be either a 3- or a 4-digit number. The percentages of correct responses are quite low, suggesting that despite the numerous addition computation exercises undertaken by these students, they do not seem to have a sound concept of what occurs when two numbers are added. It would have been interesting to observe how the students handled this item.

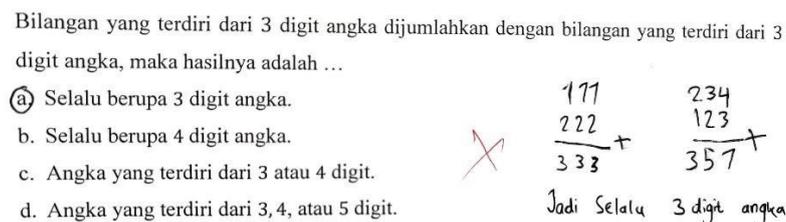


Figure 5. Students' responses to the third indicator

Understanding and Use of Equivalent Expressions (Equivalent Expressions)

Students in Grade VIII of junior high school, who have studied integers, were given a diagram with a beam balance showing two bags containing 18 and 15 marbles respectively, balancing two other bags - one with 15 marbles and the other with an unknown number to be identified. The percentage of students who correctly identified the number in the unlabeled bag was 28 students. This result indicates that there are still students who do not seem to understand the concept of commutativity in the addition of whole numbers.

Ayu menyimpan kelereng dalam kantong yang diletakkan pada timbangan. Angka pada gambar menunjukkan banyak kelereng yang ada di dalam kantong. Jika Ia ingin menyimbangkan timbangan tersebut, berapa banyak kelereng yang harus diletakkan pada kantong bertanda x .

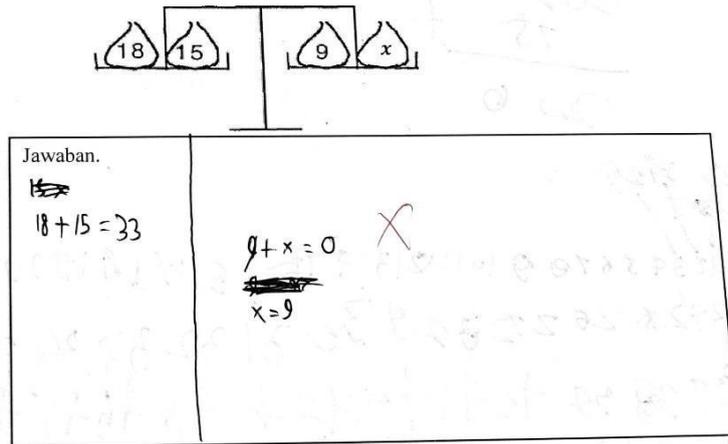


Figure 6 Students' Responses to the fourth indicator

Computing and Counting Strategies

The next question students are asked to estimate how many days they had lived from four given choices. The results show that students had great difficulty in distinguishing between 300, 3000, 30 000, and 300 000 days as their approximate age. Obviously this problem is complicated for the students who are used to thinking of their age in years. However, performances again indicate a poor grasp of larger numbers among students.

Estimasilah berapa banyak hari yang telah kamu lalui selama hidup di dunia.

- a. 300
- b. 3.000
- c. 30.000
- d. 300.000

Figure 7. Students' responses to the fifth indicator

Measurement Benchmarks

In this question, students are asked to estimate the number of heartbeats after exercising and during rest. In fact, many students still do not understand the standard units of human heart rate. So when asked about the number of heartbeats during rest, students have difficulty determining whether the number of heartbeats will increase or decrease compared to after exercising.

Jika detak jantungmu setelah berolahraga sebanyak 110 kali dalam setiap menitnya.

Berapakah detak jantung yang kamu rasakan ketika sedang beristirahat.

- a. 30 kali
- b. 70 kali
- c. 150 kali
- d. 180 kali

Figure 8. Students' responses to the sixth indicator

Interview Results

Based on the written test results provided above, the author selected one student from each category. The first student (S1) is the one who answered the questions using number sense strategies, while the second student (S2) is the one who employed non-number sense strategies in their responses. A number sense strategy is defined as the ability to utilize one or more indicators, such as the fundamental meanings of numbers, equivalent forms, and numerical representations (Yang et al., 2004). Consequently, the author conducted in-depth interviews with the students, focusing on indicators that gauge conceptual understanding and numerical proficiency. The interviewer is identified as I. The following excerpt from the interview transcript pertains to the flexibility of students' thinking.

The first student,

- I : According to S1, are there numbers between 2 and 3?
S1 : Yes
I : Can you mention them?
S1 : 2.1, 2.2, 2.3, and so on
I : How about between 2.1 and 2.2, are there numbers?
S1 : Hmm... (appears to be thinking). I think there are.
I : Please mention them
S1 : 2.11, is that correct?
I : It could be. Why did you come up with the number 2.11?
S1 : (student is silent for a moment, there is a delay of about 5 seconds) ... I just added numbers behind the decimal point.

Then, the interviewer shifted to questions involving fractional numbers to further explore information related to S1's answer to question number 1.

- I : If there are other numbers between $\frac{2}{5}$ and $\frac{3}{5}$?
S1 : Is this the question you gave yesterday, ma'am? (the student smiles)
I : Yes, I want to know why you chose D (D is the selected answer).
S1 : I enlarged the denominator, ma'am. Initially, I made it 10, then there's $\frac{5}{10}$. Then I multiplied the denominator to 15, 20, and so on. It turns out there are many numbers between $\frac{2}{5}$ and $\frac{3}{5}$.

From the interview results, it is evident that student S1 can mention many numbers between $\frac{2}{5}$ and $\frac{3}{5}$. The student is already able to apply their understanding of the base-ten number system and formulate different fractions to generate equivalent forms, making them more manageable in processing.

The second student,

- I : According to S2, are there numbers between 2 and 3?
S2 : No, ma'am, it's already 2, approaching 3
I : Are you sure there are none? Is 2.1 a number or not?
S2 : (pauses for a moment) ... yes, ma'am, that's also a number. I thought the answer shouldn't have a decimal point.
I : It's allowed as long as it's a number. How about between 2.1 and 2.2, are there numbers?
S2 : (pauses for a moment) ... just add one number behind it, right, ma'am? ... (the student seems unsure and seems to follow a previous pattern, not based on knowledge)
I : Maybe yes.
S2 : (remains silent)
I : For question number 1, why did you choose answer A?
S2 : because the denominator is the same, ma'am, and the number 2 is almost 3. But can we add a decimal point like before?
I : It's possible.
S2 : I'm confused, ma'am, it's a bit strange because it's not usually like that. We have never been given such a question before.

From the interview results, it is evident that student S2 has not yet grasped the concept of the density of numbers. The student seems to be memorizing question patterns and answering without relying on their knowledge of numbers. Most students do not understand the meaning of numbers and are often taught routine problems that do not encourage flexible thinking.

Conclusion

This study found that many students still lack flexible thinking in solving problems. On average, students tend to use standard procedures often taught by teachers. Additionally, classroom learning inadequately accommodates the development of number sense skills.

Recommendations

A suggestion for further research is to develop a learning design that focuses on instilling concepts and understanding of numbers because all mathematical topics always involve numbers. Furthermore, understanding numbers aims to develop computational skills that can be used as thinking strategies in everyday life. The learning design can consider mathematical knowledge from scholarly knowledge so that the constructed concepts can be justified for their accuracy.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Transformation of Women from Silent Lambs to Rational Nightingales in Shakespeare's Play "Taming of the Shrew" and its Modern Re-Writing "Vinegar Girl"

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Abstract: Throughout the centuries, every individual living in society takes certain bias and beliefs into centre. These beliefs determine the way they treat each other and play a crucial role in daily life. Gender as a notion affects general perception of women's role at this point. In this study, the subject matter of gender inequality and discrimination will be handled in Shakespeare's well-known play "Taming Of The Shrew" and its modern interpretation named "Vinegar Girl" in terms of representation of women according to social codes. Thus, the difference between sex and gender will be firstly examined in a detailed way. As a debated matter, gender is a social construct whereas sex is based on biological level. Then, the universality of Shakespeare's plays are still there since the social regulations and codes have validity in the modern world. In this sense, no matter how many years have passed, the characters in the novel of "Vinegar Girl" present the issue of discrimination and inequality between women and men on social level. The aim of this study is to highlight accepted role of women in society through various discourses, acts and behaviours. For this reason, descriptive research method which describes the features of phenomenon will be used to get necessary information about stated problem. Furthermore, the discussions about women's perception as gender roles and transformation of them as individuals having a voice on their own in "Vinegar Girl" by a female author will be handled and presented to the reader by comparing this contemporary version to Shakespeare's specific play.

Keywords: Gender, Inequality, Sex, Feminism, Shakespeare

Introduction

The accepted belief that gender shapes everything related to society constitutes the core of social order. The mentality of patriarchal system in this sense lies in gender inequality. From the very early years, women and men as two groups are treated differently in many ways according to patriarchal order. The patriarchal understanding which puts the father's authority into centre determines hierarchical relationship between women and men. Although being powerful and superior are directly linked with being men in societies where patriarchal system reigns, this perception not only affects women but men in a negative way as well. Because, there are certain roles and duties which are expected to perform for two sexes in the stated system. The women and men who can't perform these responsibilities and duties are labelled as the 'other', 'marginalized' or 'wild' on social order. Considering all these expectations and distributed roles, it can be said that the problematic issues about gender inequality and discrimination go back to the early ages in history. In this sense, Shakespeare's specific play "The Taming of the Shrew" and its modern re-writing "Vinegar Girl" by Anne play a crucial role in reflecting the inequality and unfair attitudes between genders in society despite the huge gap of time difference in which two literary works are published.

At this point, literary works have an essential role in drawing a picture of society in which they are produced. This study aims to present the characters in terms of their position and their expected roles in the patriarchal system in Shakespeare's "Taming of The Shrew" and its re-writing "Vinegar Girl". Furthermore, the changes including gender issues and general perception of women after four hundred years will be handled. In

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Shakespeare's play, it is clearly observed the gender discrimination, humiliating acts towards women as a reflection of social order of that time. At this point, in 16th century which is known as the Renaissance, women were described through a male starting from their birth to every stage of life. In other words, the relations of the sexes were reconstructed to one of female dependency and male domination (Kelly 20). Women maintained a life of second-class individuals since their status were inferior to men in every layer of society. Men had authority over all institutions including marriage, education, culture, religion, the economy and legal system. Male dominance as a result of patriarchal order determined the fate of of that time.

In her book, with help of contract theory, Pateman discusses the imbalance between two sexes which supports feminine oppression as well (Pateman, 1988, p. 16). As a British feminist, she deals with issues related to systemic gender inequality which continues in modern world. By applying to 'feminist storytelling' she illustrates how contracts affect womanhood in various ways such as sexual exploitation, harassment through the most basis of society, marriage. She asserts that the institution of marriage is seen as a way to help women integrate into society. It is a kind of contract which puts women into an unequal position. Marriage regards them as natural subordinate and provides men to mistreat their women since they gain possession of them. In Shakespeare's time as well as his works, general perception of women's role in marriage are rendered in that way. In later lines, this study will focus on Shakespeare's period. Before that, it can be concluded that despite the gap of time, many things about view of women in recent years are still valid. So, she gets help from social contract theory to discuss the problematic issues about women position and definition in different aspects. According to social contract theory, law and political order are not natural, but have been created by humans. Because the ultimate power is mostly attributed to men, it is them deciding in which way the rules function. In this sense, via all social rules including legal, political, and moral and the economic ones, women's submissive and docile role is rationally justified. From Tyrrel's perspective, the greatest victory that a woman wins is being mentioned by men to the lowest degree (Tyrrel, 1999, pp. 37-51). So, a woman is expected to keep her voice down and do her duties as a wife, mother or daughter.

Shakespeare is one of the playwrights who has achieved to go beyond his time since he tackles universal subject matters such as gender roles, women's relation to men in terms of social regulation through his works. His plays mostly deal with issues of being woman in patriarchal society. The difficulties they encounter as well as involving domestic and social roles which are imposed on women are displayed to the reader. He maintained his life during the reign of Queen Elizabeth. The figure who rules England is a woman but the dominant mentality still advocates the existence of patriarchal order. Elizabethan England was an example of male's superiority with legal system which confined women to certain areas, mostly domestic ones. They were not allowed to have education which meant they couldn't get economic independency. Apart from this, women were deprived of rights such as voting or buying property on their own. On a larger scale, there is a division between duties which are expected from men and women. This distinction causes to develop a perception about women's and men's nature. From this view of point, we face a fragile and weak woman figure both emotionally as well as physically who can't sustain her life on her own and needs a male figure. All a woman can do is bringing children up, cleaning, cooking and some craftworks. On the contrary, a strong man figure with rationality and having potential to gain his money in terms of economy comes to foreground (Bora, 2012, pp. 178-179). So, a woman's whole life is restricted to her house and doing some errands. In addition to legal restrictions, Elizabethan women were responsible for some social duties and roles which were expected from them. The burden of being a mother and a wife is the thing that victimizes them since the strict social duties were not applied to men in the same way. In the oppressive nature of marriage, it was women who were exposed to ill-treatment and emotional manipulation by their husbands (Allen, 1974, p. 136). That's why it can be said that Elizabethan era encouraged women to be silent, submissive and obedient to powerful male figure whether it was their husband or their father.

As a reflection of its time, literary works were shaped according to society's patriarchal structure. Witnessing the strict regulations of Elizabeth's reign, William Shakespeare mostly deals with the institution of marriage and the conditions, mostly financial ones under which women are condemned to marry. Without taking their consent, women, at a very early age, are married to the men whom their father demands. Marriage results in the husband's authority over his wife. In his play, "The Taming of the Shrew", Shakespeare presents woman's status within marriage as underlying sex when Petruchio mentions his wife as "my goods, my chattels... my ox, my ass, my anything" (Act III, scene II). As it is seen in Petruchio's depiction of his wife, the more power male authority figures have, the more they ruin women's lives by mistreating them in both public and private sphere.

Unlike Shakespeare's play, Anne Tyler presents new generation women by rewriting their usual role as a wife, daughter on social order. As a female author, she gives a detailed depiction of women and emphasizes the

discriminative acts, difficulties they have to experience because of their position in modern society from a woman's point of view.

This study, in this sense, will focus on changes about representation of women by having a closer look into main characters in two literary works. That's why; it will touch similarities as well as differences between Shakespeare's women and Anne Tyler's new generation women by comparing their behaviour and attitude under the pressure of patriarchal system. Considering the changing conditions after four hundred years, the readers witness the transformation of women from the natural subordinate to powerful, rational individuals in every aspect. But before this radical change, in the next section, we will firstly handle the notion of ideology since gender relation is directly linked with it.

Gender in Invisible Relation to Ideology

According to Oxford Language Dictionary, gender is in accordance with male or female sex mainly considering social or cultural differences rather than biological ones, or refers to other identities that do not conform to established ideas of male and female (Oxforddictionary.com). So, it can be said that gender reflects features which are attributed to men and women that are constructed socially. These socially constructed values change from society to society over years. Gender not only determines distinctions between sexes but also states unequal power relations between them as Fatmagül Berktaş has noted (Berktaş, 2016, p. 16). In this study, inequality resulted from being superior or inferior in terms of power. So, this inequality lies in daughter-father relationships as well as husband- wife relationships. In his work named, *Ideology and Ideological State Apparatuses*, he confirms this notion by saying that the individuals act according to doctrines imposed on them rather than free will (Althusser, 2014, p. 256). Through social codes and gender roles, the individual internalizes the societal expectations consciously or unconsciously and behave in that way. He will be labelled as marginalized if he doesn't accept them as something normal. Thus, all of us, as a member of society, start to live a life which the society assigns. Even we shape our lives through experiences and our characters, we should take the approval of society in our choices, or we will have to be responsible for the bad results of our acts (Irzik & Parla, 2017, p.105).

In *The Taming of the Shrew*, the accepted values about gender roles and societal expectations are presented to the readers. The submissiveness of women and their silence are exemplified through two women characters, Katherina and her sister, Bianca in the play. Katherina who is famous for her being shrew in Padua is embodiment of untamed, wild, angry and assertive woman. She tends to insult or even attack whoever makes her angry. Baptista who holds power as a father wants to get rid of her daughter, Katherina. The reason why she is so wild, stubborn, rude and aggressive is totally opposite to the submissive role of conventional woman in society. In order to solve this matter, he decides to get her elder daughter married firstly. He expresses his decision with these words: "Before I have a husband for the elder, that is, not to bestow my youngest daughter" (22). Katherina doesn't conform to any expectations as a woman and daughter on social level. That's why the male figure who is powerful in patriarchal system doesn't want her. Through ideology of the specific time, individuals perform expected roles and duties which are attributed to them. So, ideology is the one that shapes which roles are for females and males in this sense. Women are expected to be keep their voices down, docile and obedient to male dominance which is the father before marriage. So, Katherina as a disobedient and ill-tempered girl is marginalized in both public and private sphere.

In Shakespeare's comedy the unconventional type of woman presented to the readers through Katherina is domesticated by getting help of a husband, Petruchio. So, this perspective supports the idea that society, normalizing dominance of patriarchy, needs another male figure to get rid of unwanted problems. In Act 1, the readers witness that Katherina's identification having all negative connotations by other male figures. From Tranio's perspective, she is depicted as "stark mad" or headstrong (23). In contrast to Katherina's personal traits, her younger sister, Bianca is described with her silence and docile behaviour by Lucentio (23). Another speech which serves to certain ideology is given to the readers through Baptista's mentioning his younger daughter as a "good Bianca". So, it proves that Baptista consciously or unconsciously serves to patriarchal order. Nearly all male characters praise Bianca for her submissive, silent, kind nature while curses Katherina for her rude, rebellious traits and scolding tongue which clash with patriarchal society. Baptista's ultimate decision to get Katherina married firstly is criticized by other male figures. They regard this decision as a punishment for beautiful and submissive Bianca. She is punished because of "this fiend of hell" according to Gremio (24). Thus, Hortensio and Gremio plan to find a husband for her. According to them, it is nearly impossible for a husband to put up with Katherina. At this point, Hortensio says that maybe, there is a man who accepts her as a wife just for her money (25). As a woman Katherina is so untamed and furious that the basis of marriage is just

for money rather than love in this sense. This supports the general idea that the institution of marriage is based on economic reasons and needs as well as the representation of women in Elizabethan Era. Gremio disagrees that by saying he prefers being whipped to getting married to her (26).

As a result of general perception of ideal woman in society, all good connotations such as beautiful like the daughter of Agenor and silent as a lamb are used for Bianca (27). Every suitor is ready to struggle for her love. In continuing scene, Hortensio welcomes his friend Petruchio, the most suitable man for Katherina. He wants to marry for money and he thinks that he can even cope with a cursed and ill-tempered woman if she has much money. Hortensio describes Katherina as shrewd. Adding to negative connotations, he expresses that he will not marry to her just for sake of gold (34). When Petruchio introduces himself, Baphista warns him against unhappy words by emphasizing Katherina's sharp-tongued nature (48). In accordance with her wild nature, from the very first moment when Petruchio has a dialogue with Katherina, a quarrel and dispute take place mostly between them. While he is wooing her, Petruchio normalizes the humiliating way towards women in patriarchal society with these words: "Women are made to bear and so are you" (51). He tries to persuade Katherina into marriage and in doing this; he unconsciously serves to the general perception of women in the dominant ideology. So, the male characters support distributed gender roles by maintaining social arrangements. Thus, this play focuses on common beliefs about genders. All these beliefs can be named as gender ideology as well (Kellner, 2007: 19). As a male force, he expresses his intent fearlessly which is expected from males in this system. He asserts that he is here to tame her. His duty is to turn Katherina from a wild, untamed girl to domestic one like other household girls (55). The fact that woman has no voice on her own appears in the decision of marriage. Petruchio is the one who decides to marry ignoring Katherina's acceptance and at this point, taking Baptista's consent will be enough. This proves that within patriarchal order, initially father figure then a husband gains possession over woman.

In Act three, when the day of marriage comes, Petruchio isn't seen. No matter how reluctant Katherina is to get married, as a young woman, she feels irritated with Petruchio's reckless attitude. The fact that if Petruchio bothers and comes for his wedding shows that it is the man who decides in what way this special event goes (67). Woman isn't equal to man even on wedding day. After getting married, Petruchio hurries to leave the event without having bridal dinner. As an official bride, Katherina wants to attend the after wedding ceremony, but again it is male force who holds the power and his word is accepted three times over a woman's. Petruchio is indifferent to have joyful times under the name of bridal dinner, so they leave (76). These scenes verify the accepted perception of gender roles between men and women on social order. That's why it can be said that a literary work displays the features and the general ideology of its time. It is men who benefit from the ideology that males are superior to females, so they should dominate us. And this mentality is still valid today (Hooks, 2016, p. 9). In accordance to this mentality, Petruchio's perspective towards women is taken into consideration by another man, Hortensio in the play as well. From the very scene, Bianca who is depicted as ideal by her physical appearance and silent behaviour meets the readers in a different way towards the end of the play. Hortensio abandons Bianca because of her improper behaviours towards another suitor. This shows the fact that nothing is as it seems actually. While Bianca seems to be mostly beloved by all male figures due to her submissive nature expected from women in society, the readers witness the reality behind this. After being disappointed, Hortensio decides to "tame" a shrew like Petruchio (89). A different result appears then. Once again, man's duty to domesticate a woman comes to foreground.

In the last act, the transformation or the success in taming Katherina is presented the readers. All characters gather and take a feast. Petruchio makes an assertion with other men about their wives. He expresses that her wife has changed a lot since they are married. Furthermore, he asserts that his wife is the most obedient wife among others (122). When each man asks for his wife in turn, no one comes except Katherina. This proves that Petruchio as a male figure has achieved to turn her into a docile and obedient woman. The play ends with the speech by Katherina who is an ideal woman now. She renders women's duties as a wife towards their husbands (127). This speech clearly illustrates the radical change which happens in her nature. Whereas she rebels against all accepted societal rules at the beginning of the play, now she turns into an obedient maid who serves to her "governor" (127). She accepts the gender role which makes women weak, silent and submissive. This transformation in itself actually reflects the mentality of Elizabethan period. So, it can be concluded that Shakespeare's play conforms to the ideology which affects gender roles.

On the other hand, Anne Tyler's *Vinegar Girl* presents to the readers an alternative way of living for women. While displaying that it is possible to turn gender roles upside and down through characters in the novel, this study uses the feminist theory, another ideological approach. In the next section, the aim of this study is to give detailed information about the feminist theory and how it works in modern world. *Vinegar Girl* retells the story of *The Taming of the Shrew* under the changing social conditions. As an updated version, the plot takes place in

Baltimore. Considering the way gender roles are distributed in Shakespeare's play, Anne Tyler, via characters, deals with problematic issues about perception of women in modern world. In Shakespeare's world, women are silenced in various spheres and ignored by society. While re-writing the story of *The Taming of the Shrew*, Anne Tyler make the main characters change at some certain points. The main reason is that the modern time differs from 16th century. Depending on distinctions of societal expectations and gender relations, this work will enable the readers to have a closer look into the world of characters. In the next section, we will focus on the method of this study and the feminist theory which deals with the social process of gender issues and what to do about them.

Method

Written by a female author Anne Tyler, the novel "Vinegar Girl" was published in 2016. It is the third of "Hogarth Shakespeare" project in which contemporary authors rewrite Shakespeare's some plays. This study aims to analyse gender inequality via Kate Battista who suffers from the constrained circumstances in *Vinegar Girl* by Anne Tyler. The author as a female uses feminist theory to illustrate how women and men are treated differently and have significantly distinctive lives because of the gendered social order. The descriptive research method is applied to the texts and the data was provided by reading the novel many times, taking notes about the stated problem, describes the features of phenomenon and categorizing crucial data in this sense.

This study results in some findings; Kate Battista searches for a way to resist to societal expectations which are imposed on her and she resists to them at certain points. She tries to cope with the gender role as a daughter and woman without losing her identity. In contrast with "The Taming of the Shrew" which was written at the end of the 16th century, the novel by Anne Tyler softens the strict rules of Elizabethan Era at some points. So, in the light of feminist theory and Jacques Derrida's deconstruction theory, this study will present to the readers how gender discrimination works and in which way the major social institutions support this artificial system of gender relation. With the help of deconstruction theory, it is aimed to subvert the relations between males and females based on harsh and clear distinctions. Derrida believes that as a result of hierarchy between binary oppositions such as mind and body, men and women, superior and inferior, the group of people that are attributed to the first terms are praised whereas the second group of people carrying the features of their opposites are treated in a different way. In Western thought, because of this categorization, women are regarded as natural subordinate. Woman is the "other" of men (Eagleton, 2017, pp. 158-159). Feminism and deconstruction allow us to rethink about what is politic and discover that there can be another life behind identity politics (Elam, 1994, p. 3).

In "The Taming of the Shrew" as this study focuses on the earlier section, all males' speech and attitudes show that male dominance comes foreground. On the other hand, women are identified as objects rather than individuals who are dependent on men. Before marriage, it is father and within marriage, this dominant figure becomes the husband. At this point, thanks to deconstruction theory, the part which clearly reflects the existing ideology of patriarchal order in Shakespeare's play is updated considering the changing circumstances and gender equality. Deconstruction questions binary oppositions and hierarchy that Western thought puts forward. Derrida rejects the idea which justly focuses on the central meaning. He believes that not only the central meaning but also the marginalized one should be taken into consideration. At this point, deconstruction theory comes about. Thus, he criticizes the accepted Western philosophy by emphasizing other possibilities and meanings rather than the existence of centred, specific ones.

A center vanishes the other possibilities in every field including within a text. By applying to binary oppositions, Derrida highlights the center and its opposite, the marginalized or the other. In other words, men versus women or good versus evil are examples of this binary opposition. Instead of separating them from each other, Derrida advocates that each term is identified with its opposite. In this sense, men take central role by leaving women another choice as secluded or marginalized, but, women's existence as opposites cannot be ignored. That's why in rewriting process, women play a crucial role turning the usual order upside and down.

Finally, a work from a new perspective appears which proves that other meanings are possible in the retold version of work. So, thanks to deconstruction theory, the dominant ideology which distributes certain roles to women by restricting them to certain fields mostly in private spheres is replaced by other possibilities. In dominant ideology, women are expected to be docile, obedient, silent and submissive. In this regard, women have opportunities to get rid of constrained circumstances via retelling a story from the other's perspective. Thus, as the second group, the marginalized gets an opportunity to have a voice herself. Adding to gender roles, culture is redefined from women's perspective as well (Hirsch & Smith, 2002, p. 3). In this sense, from feminist

point of view, it is possible to present a different kind of life and criticize the reigning ideology on social level. Anne Tyler's rewriting version of Shakespeare's play "The Taming of the Shrew" enables the readers to have a closer look into the women's struggle throughout the novel. Via main character, Kate Battista who has to take a role nurtures the conventional womanhood in this sense. At the end of the novel, the readers witness the transformation of this woman since she raises her voice against male dominant order and its expectations as a daughter and woman. In the next section, this study will focus a feminist analysis of "Vinegar Girl".

A Feminist Analysis of *Vinegar Girl*

In the earlier sections, we have discussed gender inequality, the distributed gender roles and how gender distinctions function in society. Throughout many ages, the major social institutions as well as religions legitimate the social arrangements which produce inequality and discrimination justifying them as right and proper. Thus, from religious point of view, male supremacy is again valid where individuals worship a supreme being that is male. The gendered social order constrains the behaviours of gender deviants through punishment and legal ostracism. Its power is so effective that that people act in gendered ways based on their positions within the gender structure without question. Injustice and discriminative acts are observed in paid work as well. Most women do the same work but they earn less than men in the same positions.

Furthermore, women still continue to do the most of the domestic work. Considering unequal circumstances which women are exposed to in male dominant society, feminist theory deals with the emergence of these social processes and issues about the way they operate. On basis, these are the subject matters of feminist theories. What to do about them is the aim of feminist politics. It criticizes patriarchal system that makes men dominant and women subordinate. When we learn our place as a member of gendered social order, we do gender and participate in its construction. And the accepted beliefs and constructions maintain the gendered social order. Gender equality, feminists argue, ends up with women becoming like men. In this sense, they believe that making women and men equal necessitates social solutions rather than individual attempts. Thanks to re-writing process and change of social order, women surpass beyond their gendered identity by leaving the role of underlying sex behind and get a powerful, rational role. In the earlier sections, the study has discussed the distributed gender roles and how gender distinctions function in society. So, here, we will analyse Anne Tyler's novel *Vinegar Girl* in frame of feminist approach. In re-writing of Shakespeare's play, the main characters as Kate Battista, Pyotr Shcherbakov, Bernice (Bunny) Battista and Dr. Louis Battista are presented to the readers. The name of novel derives from the word which Pyotr uses for Kate, "vinegar girl". The opposites describing Katherina and Bianca in "The Taming of the Shrew" are evident in its re-writing as well.

Anne Tyler is an American author who was born in Minnesota in 1941 and grew up in North Carolina. She spent the most of her years away from people as isolated and secluded. As a resident in Baltimore, she chooses this place in her writings. In her novel, she puts Baltimore into centre as well. In the beginning, Kate is portrayed as a young woman who has duties such as preparing sandwiches for her father, running house and doing errands (2). As a conventional woman type, Kate is responsible for her little sister Bernice as well. She takes role of daughter and a kind of mother for Bernice since their mother has passed away. As far as feminist considerations are concerned in the novel, Kate's characteristic features and her relationship with other men, mostly her father play a crucial role in illustrating general perception of women from different point of views. Dr. Battista's depiction of Kate reflects usual patriarchal mentality. When she is introduced to Pyotr, Dr. Battista describes her "domestic" (10). He praises her with societal expectations. The fact that he wants to marry Kate to Pyotr is based on business. Pyotr isn't American and his visa is about to expire and needs renewed. It is possible through a marriage to an American. In this regard, not to lose his assistant, Dr. Battista tries to convince her daughter to this marriage. Father Battista cares about his work more than Kate. She says that her father likes his mice more than them (44). Initially, the readers think that they will meet the same strict hierarchical distinctions between men and women. But throughout novel, we witness behaviours and dialogues different from what we expect.

In contrast to original play, when Pyotr meets Kate, he is attracted by her outspoken nature (7). Not only her unusual behaviours but also her physical appearance, long hair attracts him (37). In Shakespeare's play, Petruchio even makes Kate starve to death to pacify her. On the other hand, we meet a male, Pyotr who offers help Kate to wash the dishes after dinner (65). This is unexpected since all works related to house are associated with women in history. Whereas Petruchio mistreats Katherina, Pyotr doesn't attempt to change her. On the contrary, he appreciates her outspoken attitude and likes the way Kate acts. He regards her as an independent girl who can choose any man for marriage (99). Realizing his mistake, he comes home to apologize to Kate since he and Dr. Louis make a marriage arrangement without her consent (98). This situation can be expressed

with feminist theory and changing patriarchal ideology. Through the end of novel, after getting married, Pyotr even asks Kate if she wishes to go back to university or continuing gardening in their new home (182) Anne Tyler as a female, gives equal voice to all characters whereas Shakespeare puts forward male dominance in accordance with patriarchal order. At first sight, though Kate is described as a conventional woman with excessive duties and responsibilities towards her family, this portrayal changes throughout novel. Kates decides to stop doing the duties related to other members of family by leaving Bernice's dirty clothes on floor (85). Similarly, when father asks her to do taxes, Kate raises her voice by saying that "you should do your own taxes" (88). In contrast to original play, her sister supports Kate in re-writing version with these words: "Go, Katherine" (88). This proves that changing ideology doesn't make women a rival to each other. On the contrary, woman solidarity which can be expressed with feminist theory is evident.

Conclusion

This study focuses on analysing gender inequality, perception of women, gender differences and certain societal expectations as a result of patriarchal ideology in relation to the notion of gender which is a social construct. With social and legal rules, the distributed gender roles are normalized in society. It determines the way of life every individual maintains. These two works carry the traces of ideology of their time as well. In this sense, the examples of gender inequality, discriminative attitudes towards a special group, mostly women, are presented to the readers via the characters in selected works.

To sum up, the close readings of two works present the general perception of women, gender roles and the attempts to provide gender equality are illustrated through feminist theory as well as how changing social order affect the lives of women on larger scale.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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“Awur Eser” to Explore Number Sense: Hypothetical Learning Trajectory for Integer Material Facilitating Learning Speed

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Abstract: This article aims to explore the concept of "Awur Eser" as a potential learning method to enhance students' number sense, especially in the context of learning integer concepts, and to develop more effective and inclusive strategies for mathematics education. We conducted a literature review to identify students' barriers to understanding integers based on their number sense and learning speed. Then, we conducted a second literature review to design a Hypothetical Learning Trajectory (HLT) for integer learning. Subsequently, we held a Focus Group Discussion (FGD) with mathematics education experts and teachers to discuss and validate the selection of HLT for integer learning. Based on the FGD results, we compiled the final design of HLT for integer learning. This design involves adjustments based on input from experts and teachers, ensuring alignment with students' characteristics and needs. The implementation of HLT hopefully can improve students' conceptual understanding and accelerate the learning process.

Keywords: Number sense, Learning speed, Hypothetical learning trajectory

Introduction

Mathematics education plays a central role in the cognitive development of students. However, many students encounter various barriers in learning mathematics (Smith et al., 2021; Jones, 2020). These barriers can range from a lack of understanding of basic concepts to differences in learning speed (Brown & Miller, 2019). A specific focus on integer concepts is crucial, given that this material is the foundation for further mathematical understanding.

Understanding integers over time is crucial, significantly as a lack of solid comprehension directly impacts the development of students' number sense (Thompson & Smith, 2018). Number sense encompasses the ability to understand and use numbers flexibly, including comprehension of the relationships between numbers, numerical comparisons, and the practical use of numbers in everyday contexts (Johnson, 2019). In general, research related to the numbers has been widely conducted. But students often struggle to translate contexts into mathematics or vice versa, have an imperfect understanding of algebraic expressions, face challenges in applying arithmetic operations in numerical and algebraic expressions, and encounter difficulties in understanding mathematical

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symbols, which is the most commonly observed difficulty (Jupri et al., 2014; Pramesti et al., 2019; Muchoko et al., 2019).

One of the leading causes of barriers to understanding integers is the lack of profound comprehension when students study them (García & Rodriguez, 2020). Varying learning speeds among students poses a challenge, considering each student possesses different levels of understanding and learning capabilities (Huang et al., 2022). In this context, learning integers becomes critical. Developing a learning design that not only facilitates students' learning speed but also enhances their number sense can be an effective solution to overcome these barriers (Brown et al., 2021). An optimal learning design must consider the differences in students' learning speeds while ensuring a deep understanding of integer concepts (Wang & Chen, 2019).

By understanding the complexity of this issue, this article aims to explore the concept of "Awur Eser" as a potential learning method to enhance students' number sense, especially in the context of learning integer concepts. By discussing the potential benefits of this approach, it is anticipated that this article can contribute to developing more effective and inclusive strategies for mathematics education.

Method

This research is part of design research in the preliminary research stage, aiming to understand the context and design an innovative learning approach to enhance students' understanding of integers. The research stage is described in figure 1.

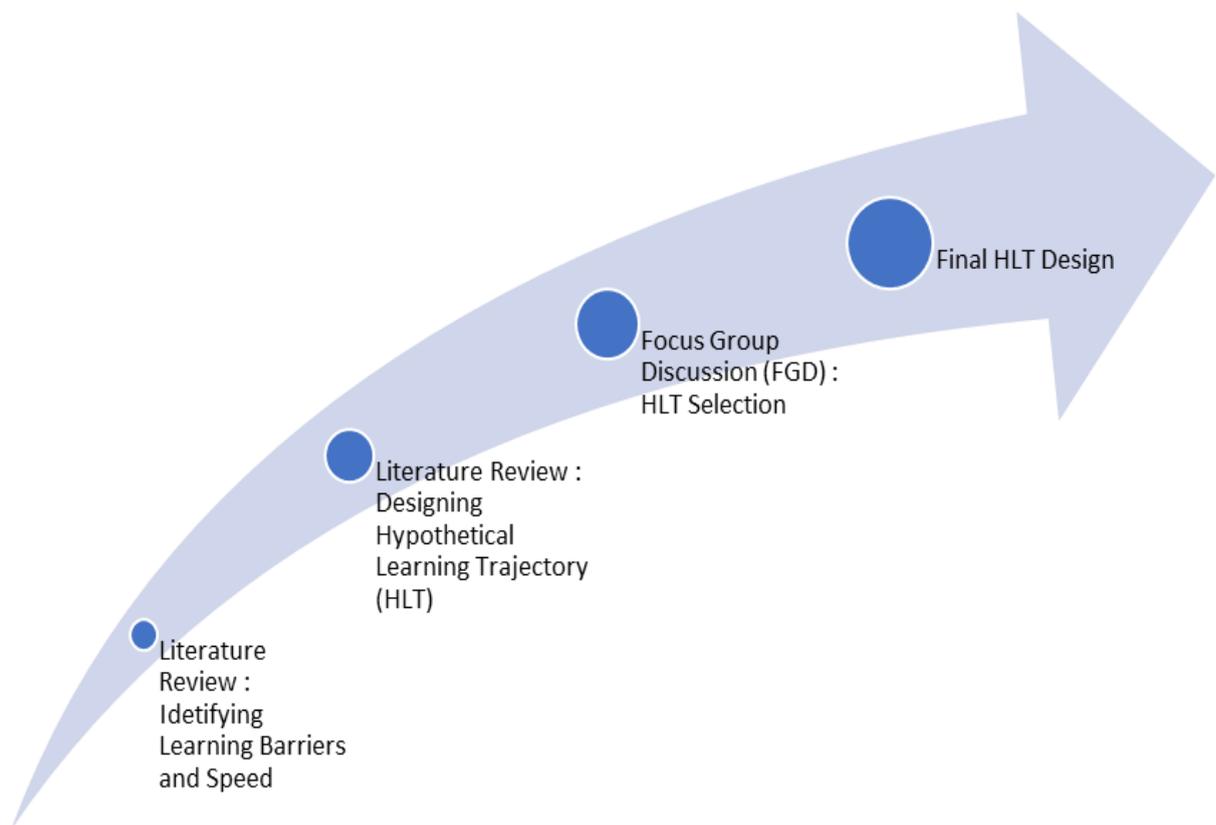


Figure 1. The research stage

Firstly, we conducted a literature review to identify students' barriers to understanding integers based on their number sense and learning speed. Recent studies indicate that a deep understanding of basic integer concepts can influence students' ability to develop a strong number sense (Johnson & Smith, 2023). Then we conducted a second literature review to design a Hypothetical Learning Trajectory (HLT) for integer learning. Understanding how students gradually build integer concepts becomes the focus of HLT design (Brown et al., 2022). Subsequently, we held a Focus Group Discussion (FGD) with mathematics education experts and teachers to discuss and validate the selection of HLT for integer learning.

The FGD results indicate that the active participation of teachers in designing HLT can enhance acceptance and effectiveness of implementation (García & Rodriguez, 2021). Based on the FGD results, we compiled the final design of HLT for integer learning. This design involves adjustments based on input from experts and teachers, ensuring alignment with students' characteristics and needs. Implementing HLT is expected to improve students' conceptual understanding and accelerate the learning process.

Results and Discussion

Literature Review: Identifying Learning Barriers and Speed

The expanded literature review findings affirm that addressing learning barriers in understanding integers requires a multifaceted approach. In addition to emphasizing the significance of understanding basic concepts and learning speed variability, recent research highlights the role of metacognition and the potential benefits of integrating technology. These additional perspectives contribute to a comprehensive understanding of the challenges associated with integer concepts and pave the way for more nuanced and effective instructional strategies.

Lack of Understanding

Jones (2020) identifies that students' lack of understanding of the basic concepts of integers is a primary barrier to building "number sense." The study suggests that an incomplete understanding of basic concepts can hinder students' comprehension of integers. Johnson and Smith's recent research (2023) underscores the role of metacognition in overcoming learning barriers, particularly in integer concepts. The research argues that metacognitive strategies are crucial in helping students navigate challenges and enhance their understanding of integer concepts. Swanson et al. (2022) explore the application of Cognitive Load Theory in integer learning. The research indicates that understanding the cognitive load in processing integer concepts is vital to designing effective instructional strategies. Smith and Johnson (2022) provide insights from neuroscience perspectives on how the brain processes integer concepts. The research emphasizes that understanding the neural mechanisms can inform targeted interventions to overcome learning barriers.

Learning Speed

Brown and Miller's study (2019) emphasizes significant variations in students' learning speed when understanding integer concepts. The research suggests that varied levels of understanding can pose a severe barrier of students' learning process, particularly in the context of integer concepts. Wang and Chen (2019) note that variations in students' learning speeds can complicate the learning process. According to them, diverse learning speeds can hinder creating an inclusive and effective learning environment.

Number Sense

Thompson and Davis (2020) present an assessment-focused study on developing numbersense. The study suggests that assessing the nuanced facets of number sense is crucial for understanding and addressing learning barriers in integer concepts. Integer material is fundamental for students to hone their mathematical abilities, particularly their number sense. Researchers attempt to formulate indicators for number sense in algebraic operations through adjustments (Maghfirah, 2019). The indicators used in this study are 1) identifying the sequential properties of numbers and regularities in the number system, 2) determining the nearest estimation in a numerical operation and representing it, 3) identifying the characteristics of numerical operations and their implications on various types of numbers, and 4) assessing the reasonableness of a calculation result.

Other Influence

Kim and Lee (2021) delve into the cultural aspects influencing integer learning. The research highlights that cultural considerations significantly shape students' perspectives and challenges in understanding integer concepts. Chen et al. (2023) investigate the impact of adaptive learning platforms on integer comprehension. The

findings suggest that adaptive platforms can cater to individual learning styles, potentially mitigating barriers in integer understanding.

Literature Review: Designing Hypothetical Learning Trajectory (HLT)

Designing a learning framework that facilitates learning speed and develops students' number sense in integer learning is crucial. Below are some findings elements of the learning design:

Instructional Differentiation

The need for differentiated learning is meant to embrace the diversity in students characteristics. Among them may be learning speed, learning style, students' initial mathematical abilities, hobbies etc. Teachers can focus on the diversity of these characteristics before learning. Facilitating students' characteristics through learning has long been encouraged in Indonesia, as evidenced by initiatives to promote inclusive education (Balkist et al., 2020). Implementation and integration of the Merdeka curriculum also play a role in providing learning based on students' characteristics (Balkist et al., 2022; Sadieda et al., 2022; Muslimin et al., 2022). Internationally, differentiated learning is still practiced and analyzed (Handa, 2019; Morgan, 2013; Balkist et al., 2022). The research focused on students' learning speed which of course needs to be determined before the learning starts. Researches measured learning speed based on three things, namely 1) students' IQ scores; 2) diagnostic test of students' mathematical abilities; 3) interviews with teachers about students' daily lives when studying mathematics.

Realistic Mathematics Education

Realistic Mathematics Education (RME) is a specific mathematics teaching theory developed in the Netherlands since the 1970s. The characteristics of RME are rich and realistic situations, which play an important role in the learning process. This situation serves as a resource to begin the development of mathematical concepts, tools, and procedures and as a context in which students can apply their mathematical knowledge at later stage. Then it gradually becomes more formal, general, and context-specific (Van den Heuvel-Panhuizen & Drijvers, 2020). This is also by the view that mathematics must always be meaningful for students and seen as a human activity, so that problem situations must be experientially real for students (Freudenthal, 1991). So the problem situations presented can be problems that can be encountered both in everyday life and in abstract mathematical problems as long as the problem is meaningful for students. There are five main principles in RME (Treffers, 1987; Bakker, 2004; Jupri, 2008), which the author then reinterprets as Phenomenological exploration, the existence of models and symbols for progressive mathematics, the existence of models and symbols for progressive mathematics, various context problems, models, Independence. The students' constructions and strategies must have meaning for the students and be interactive and related.

Cooperative and Collaborative Learning

Cooperative and collaboration approaches are crucial for creating effective learning environments in mathematics education. These methods enhance students' understanding of mathematical concepts and foster essential social skills. Students develop teamwork and communication skills by working together to solve math problems, leading to deeper learning outcomes (Slavin, 2015; Hattie, 2009; Vygotsky, 1978). Additionally collaborative learning reduces math anxiety among students, as they feel supported by their peers during the learning process. Thus, it is about mastering formulas and building an inclusive and supportive learning community.

Modeling and Visual Representation

In mathematics education, Integrating modeling and visual representation plays a pivotal role in enhancing students' understanding and problem-solving skills. Visual representations provide concrete illustrations of abstract mathematical concepts, making them more accessible and comprehensible for learners (Hegedus & Moreno-Armella, 2009). Additionally, modeling allows students to apply mathematical concepts to real-world scenarios, fostering deeper conceptual understanding and promoting critical thinking (Lesh & Lehrer, 2003). By

combining these approaches, educators can create dynamic learning environments that engage students and facilitate meaningful learning experiences (NCTM, 2000).

Hypothetical Learning Trajectory (HLT) Design

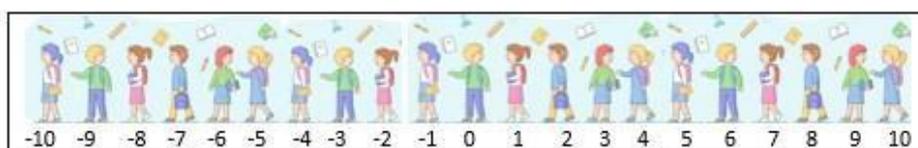
"Awur Eser" is an abbreviation derived from the Sundanese (One of The tribes in Indonesia), which translates to "aktifitas nawur atanapi dipeser," meaning the activity of paying or being bought. "Nawur" (paying) implies encountering a debt collector (thug) representing negative numbers. On the other hand, "Dipeser" (being bought) implies encountering a buyer representing positive numbers. A student takes on the role of a merchant selling goods from the starting point (point 0). If the student moves towards negative numbers, they encounter a thug demanding money, resulting in a debt..

Table 1. Hypothetical learning trajectory of "awur eser"

Stage of Learning Design

Stage 1

Students are asked to form groups, with each group consisting of a minimum of 22 people. 21 individuals are assigned to represent the integers -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, arranged side by side.



Those assigned as negative numbers act as debt collectors moving towards the negative direction (indicating trouble ahead). Meanwhile, those assigned as positive numbers act as buyers and hold unit money (indicating buyers ahead in the positive direction). The individual assigned to the number 0 remains stationary, maintaining their initial position. The remaining students act as sellers of goods, moving either left (towards negatives with trouble) or right (towards positives with buyers).

Stage 2: Observing positive, zero, and negative integers.

1. Observe each of your friends; how many groups of friends are there in the line?
2. On which side are the debt collectors? To reach -7, how many steps do you need to take? How many debt collectors have you encountered?
3. Investigate other scenarios for negative numbers!
4. On which side are the buyers? To reach 5, how many steps do you need to take? How many buyers have you encountered?
5. Find other scenarios for positive numbers!

Stage 3: Observing the positions of integers and comparing them.

1. Which do you think will generate more money for you, -3 or 2? Why?
2. Which do you think will result in more losses for you, 10 or -5? Why?

Stage 4: Solving operations with integers.

1. If you are at 6 and have to move towards the debt collectors for 10 steps, where are you now? Write it in a mathematical sentence!
2. If you are at -3 and have to move towards the buyers for 9 steps, where are you now? Write it in a mathematical sentence!
3. If you are at -5 and have to move against the direction of the debt collectors for 10 steps, where are you now? Write it in a mathematical sentence!
4. If you are at 5 and have to move against the direction of the buyers for 10 steps, where are you now? Write it in a mathematical sentence!
5. If you are at -5 and have to move to 7, how many steps do you need to take? Write it in a mathematical sentence!
6. Find similar cases! For example, from 3 to 9, -10 to -4, and so on!

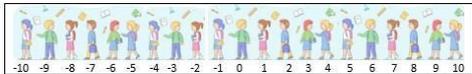
Conversely, moving towards positive numbers, they meet a buyer purchasing goods with money, resulting in earnings. The Sundanese phrase "awur eser" means to scatter and shift, signifying spreading and sharing knowledge with others. This activity is developed from the findings of previous research stages that concluded learning activities for students. "Awur eser" requires collaboration and cooperation among diverse students with varying characteristics (learning speed and mathematical abilities). Therefore, "Awur eser" serves as a facilitator

for differentiated, cooperative, and collaborative learning. Additionally, it presents problems that students need to solve, leading to modeling and visual representation through their movements. Guidance from the teacher, along with different learning assessment processes, is a characteristic of this activity, including varied evaluation formats and narrative teaching

Focus Group Discussion (FGD): HLT Selection

Expert also discussed the development of the Hypothetical Learning Trajectory (HLT) embedded in "Awur eser" in a Focus Group Discussion (FGD). The FGD involved three speakers: a lecturer, a mathematics expert, and a mathematics teacher. The results are shown in Table 1.

Table 2. Hypothetical learning trajectory of "awur eser" results of fgd

Stage of Learning Design	Results of FGD
<p>Stage 1</p> <p>Students are asked to form groups, with each group consisting of a minimum of 22 people. 21 individuals are assigned to represent the integers -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, arranged side by side.</p>  <p>Those assigned as negative numbers act as debt collectors moving towards the negative direction (indicating trouble ahead). Meanwhile, those assigned as positive numbers act as buyers and hold unit money (indicating buyers ahead in the positive direction). The individual assigned to the number 0 remains stationary, maintaining their initial position. The remaining students act as sellers of goods, moving either left (towards negatives with trouble) or right (towards positives with buyers).</p>	<p>In stage 1, it is necessary to provide more detailed instructions for students, and perhaps the illustrative representation can be further clarified. Real-life stories about sellers being extorted by thugs and their struggle to find buyers in the surrounding environment can be presented to make the meaning of 'awureser' more tangible, clear, and contextual for students. Additionally, these facts will enrich and enhance students' numeracy literacy skills</p>
<p>Stage 2: Observing positive, zero, and negative integers.</p> <ol style="list-style-type: none"> 1. Observe each of your friends; how many groups of friends are there in the line? 2. On which side are the debt collectors? To reach -7, how many steps do you need to take? How many debt collectors have you encountered? 3. Investigate other scenarios for negative numbers! 4. On which side are the buyers? To reach 5, how many steps do you need to take? How many buyers have you encountered? 5. Find other scenarios for positive numbers! 	<p>The activities in stage 2 are pretty good; however, there might be a need for confirmation of answers and a general review of the material learned. This is also the introduction of an institutionalization phase in the learning process.</p>
<p>Stage 3: Observing the positions of integers and comparing them.</p> <ol style="list-style-type: none"> 1. Which do you think will generate more money for you, -3 or 2? Why? 2. Which do you think will result in more losses for you, 10 or -5? Why? 	<p>The activity in stage 3 is pretty good; however, it might be beneficial to add more probing questions that can enrich the mental actions of students during learning through 'awur eser'.</p>
<p>Stage 4: Solving operations with integers.</p> <ol style="list-style-type: none"> 1. If you are at 6 and have to move towards the debt collectors for 10 steps, where are you now? Write it in a mathematical sentence! 2. If you are at -3 and have to move towards the buyers for 9 steps, where are you now? Write it in a mathematical sentence! 3. If you are at -5 and have to move against the direction of the debt collectors for 10 steps, where are you now? Write it in a mathematical sentence! 4. If you are at 5 and have to move against the direction of the buyers for 10 steps, where are you now? Write it in a mathematical sentence! 5. If you are at -5 and have to move to 7, how many steps do you need to take? Write it in a mathematical sentence! 6. Find similar cases! For example, from 3 to 9, -10 to -4, and so on! 	<p>The activities in stage 4 are pretty good; however, there might be a need for confirmation of answers and a general review of the material learned. This is also the introduction of an institutionalization phase in the learning process.</p>

Discussion

"Awur Eser" is developed from the findings of previous research stages that concluded learning activities for students. "Awur eser" requires collaboration and cooperation among diverse students with varying characteristics (learning speed and mathematical abilities). Therefore, "Awur eser" serves as a facilitator for differentiated, cooperative, and collaborative learning. Additionally, it presents problems that students need to solve, leading to modelling and visual representation through their movements. Guidance from the teacher and different learning assessment processes are a characteristic of this activity, including varied evaluation formats and narrative teaching.

Number sense encompasses the ability to understand and use numbers flexibly, including comprehension of the relationships between numbers, numerical comparisons, and the practical use of numbers in everyday contexts (Johnson, 2019). One of the leading causes of barriers in understanding integers is the lack of profound comprehension when students study them (García & Rodriguez, 2020). Varying learning speeds among students poses a challenge, considering each student possesses different levels of understanding and learning capabilities (Huang et al., 2022). Developing a learning design that not only facilitates students' learning speed but also

enhances their number sense can be an effective solution to overcome these barriers (Brown et al., 2021). An optimal learning design must consider the differences in students' learning speeds while ensuring a deep understanding of integer concepts (Wang & Chen, 2019).

Final HLT Design

Table 3. Final hypothetical learning trajectory and students' response prediction of "awur eser"

Stage of Learning Design	Students' Response Prediction	Teachers' Follow-Up Plan
<p>Stage 1:</p> <p>Students are asked to form groups, with each group consisting of a minimum of 22 people. 21 individuals are assigned to represent the integers -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, arranged side by side.</p>  <p>Those assigned as negative numbers act as debt collectors moving towards the negative direction (indicating trouble ahead). Meanwhile, those assigned as positive numbers act as buyers and hold unit money (indicating buyers ahead in the positive direction). The individual assigned to the number 0 remains stationary, maintaining their initial position. The remaining students act as sellers of goods, moving either left (towards negatives with trouble) or right (towards positives with buyers).</p>	<p>Students will be interested and immediately enthusiastic about participating in "awur eser" activities.</p> <p>Students may not be interested but still participate in "awur eser" activities.</p>	<p>The teacher motivates the students to engage in activities.</p>
<p>Stage 2: Observing positive, zero, and negative integers.</p> <ol style="list-style-type: none"> 1. Observe each of your friends; how many groups of friends are there in the line? 2. On which side are the debt collectors? To reach -7, how many steps do you need to take? How many debt collectors have you encountered? 3. Investigate other scenarios for negative numbers! 4. On which side are the buyers? To reach 5, how many steps do you need to take? How many buyers have you encountered? 5. Find other scenarios for positive numbers! 	<p>Students can comprehend the material participate in the "awur eser" activity.</p> <p>Students still need to fully understand the positions of integers.</p>	<p>Students who have not fully understood the positions of integers can change roles to become sellers so that they will move step by step while understanding each position of the integers.</p>
<p>Stage 3: Observing the positions of integers and comparing them.</p> <ol style="list-style-type: none"> 1. Which do you think will generate more money for you, -3 or 2? Why? 2. Which do you think will result in more losses for you, 10 or -5? Why? 	<p>Students can comprehend the material participate in the "awur eser" activity.</p> <p>Students have yet to fully grasp which integer is greater or smaller.</p>	<p>Students who have not fully grasped which integer is greater or smaller can change roles to become sellers so that they will move step by step while understanding which position is most advantageous for them as sellers.</p>
<p>Stage 4: Solving operations with integers.</p> <ol style="list-style-type: none"> 1. If you are at 6 and have to move towards the debt collectors for 10 steps, where are you now? Write it in a mathematical sentence! 2. If you are at -3 and have to move towards the buyers for 9 steps, where are you now? Write it in a mathematical sentence! 3. If you are at -5 and have to move against the direction of the debt collectors for 10 steps, where are you now? Write it in a mathematical sentence! 4. If you are at 5 and have to move against the direction of the buyers for 10 steps, where are you now? Write it in a mathematical sentence! 5. If you are at -5 and have to move to 7, how many steps do you need to take? Write it in a mathematical sentence! 6. Find similar cases! For example, from 3 to 9, -10 to -4, and so on! 	<p>Students can comprehend the material participate in the "awur eser" activity.</p> <p>Students still need to fully understand integer operations.</p>	<p>For students who have yet to fully understand integer operations, they can be assisted by their peers while continuously exchanging roles.</p>

Conclusion

"Awur Eser" serves as a facilitator for differentiated, cooperative, and collaborative learning. Additionally, it presents problems that students need to solve, leading to modelling and visual representation through their movements. Guidance from the teacher and different learning assessment processes are a characteristic of this activity, including varied evaluation formats and narrative teaching.

Recommendations

"Awur Eser" needs to practice in teaching experience from the stage of design research. So the effectiveness and the students' response could be confirmed and improved even more.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Assessing the Severity of Earthquake Trauma on Syrian Refugee Survivors in Southern Turkey and Displaced Individuals in Northwest Syria

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Abstract: The study sought to investigate the extent and intensity of earthquake-related psychological distress experienced by Syrian refugee survivors residing in southern Turkey and displaced individuals in northwest Syria. A technique focused on providing detailed descriptions and conducting thorough analysis was employed. Three scales of post-traumatic stress disorder (PTSD), Trauma History Screen (THS), and Brief Trauma Questionnaire (BTQ) were used. The study included 600 participants, with 300 participants from each region. The prevalence rate of PTSD among survivors one year after the 2023 Turkey earthquake was high, around 68%. while the prevalence rate of THS and BTQ was low. The results for PTSD indicated that there were statistically significant differences only between age and marital status in southern Turkey. As for northwest Syria, there were statistically significant differences only in gender. The results for THS and BTQ indicated statistically significant differences only between gender, age, and working status in southern Turkey. As for northwest Syria, there were statistically significant differences between gender, education level, and working status. There was a positive direct correlation between PTSD on the one hand and THS and BTQ on the other hand. This indicates that the level of PTSD increases as THS and BTQ increase. In regression analysis, the results showed that THS and BTQ contribute to interpreting the variance in PTSD. When THS and BTQ increase, they contribute to increased symptoms of PTSD. The beta value for THS in southern Turkey and northwestern Syria was ($\beta = 1.127$, $\beta = 0.793$), respectively. While the beta value for BTQ in southern Turkey was ($\beta = 0.70$). Conclusions: Both THS and BTQ make a statistically significant contribution to explaining the variations in PTSD among survivors in the research of the two locations. The incidence of Post-Traumatic Stress Disorder (PTSD) among survivors was 68%. PTSD was found to be linked with older age, female gender, widowhood, and divorce.

Keywords: Earthquake trauma, Syrian refugee, Displaced people

Introduction

Earthquakes are classified as natural disasters that arise from geological and atmospheric events occurring on the Earth's surface. They are one of the most pressing concerns of the modern period, and they have become a public health concern affecting everyone, including psychological disorders and trauma. According to the International Catastrophe Database, natural catastrophe incidences have increased significantly from the mid-twentieth century to the present (Saeed & Gargano, 2022). The global frequency of earthquakes has grown sixfold in the last forty years (Farooqui et al., 2017). On February 6, 2023, two powerful earthquakes struck southern Turkey's Kahramanmaraş, measuring 7.7 and 7.6 on the Richter scale. They also had a widespread impact, notably in northwestern Syria. The seismic event was the most severe in 80 years, with the greatest earthquake-affected region to date, earning it the title "century disaster." The incident resulted in a significant number of casualties among Turkish citizens and Syrian refugees and widespread destruction of residential properties and infrastructure.

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The earthquake-damaged region in southern Turkey affected 1.7 million of the 3.8 million Syrian refugees (Karlsen, 2023). According to the Turkish Presidency of Disaster and Emergency Management, more than 54,000 people died and 107,000 were injured. Furthermore, around 2.4 million people were displaced (Reliefweb, 2023). The earthquake caused severe destruction in many areas, including health, the economy, social dynamics, and mental health. Despite the obvious risk to physical health and life, the mental health impact is frequently overlooked. Earthquakes substantially impact psychological well-being, causing both short-term and long-term distress.

A review of scientific data suggests that post-traumatic stress disorder occurs at extremely high rates following earthquakes. Furthermore, collective trauma among communities worsens societal psychological difficulties and disturbances (Goldmann & Galea, 2014). Earthquakes and their repercussions pose a global public health risk. Research suggests that survivors of earthquakes are more likely to acquire psychological problems such as post-traumatic stress disorder, anxiety, and depression. It also causes physical and psychological anguish in survivors, perhaps inflicting irreversible harm (Hong & Efferth, 2015). Internally displaced families living in partially ruined homes are among those who have been affected in northwestern Syria (Lindert et al., 2018). Homes, properties, and public infrastructure were severely destroyed across the region (UNHCR, 2023). As a result, survivors sustained considerable physical and psychological suffering.

As a result, governments must focus on this understudied area to avoid and manage the health difficulties linked with the recent earthquake's early onset and massive impacts. While Turkey's policies towards Syrian refugees have been supportive of their access to healthcare, the ongoing crisis in Syria has resulted in refugees staying in Turkey for a lengthy period. This has created refugee hurdles and obstacles (Mavrouli et al., 2023). Following the earthquake, hospitals collapsed, infrastructure was destroyed, and nearly 1.5 million people were displaced in Turkey (Qu et al., 2023). Clear and considerable needs have surfaced in the areas of mental health and social support for both citizens and refugees. Over 100 countries urgently assisted Turkey's humanitarian efforts following the earthquake (Karaođlan Kahilogulları et al., 2020).

The key problem is to provide long-term and effective mental health support despite a shortage of specialized human resources. This needs ongoing funding for mental health studies, research, specialized training, and program development in southern Turkey and northern Syria. Although earthquakes have received more study attention, there are still gaps in our understanding of their psychological impact on Syrian refugees and displaced individuals. There is still a lack of specialized studies into earthquake trauma. Current efforts center on conducting analytical research better to understand the long-term impact and close knowledge gaps. In the present study, we looked at the relationship between PTSD, THS, and BTQ in earthquake survivors. We hypothesized that PTSD, THS, and BTQ would be highly associated and had similar risk factors. We also hypothesized that exposure to earthquakes and THS would increase the likelihood of PTSD symptoms. The study's goal is to assess levels of post-traumatic stress disorder (PTSD), Trauma History Screen (THS), and Brief Trauma Questionnaire (BTQ) in displaced people in northwestern Syria and refugees in southern Turkey. It also seeks to explore disparities in PTSD, THS, and BTQ based on factors such as gender, age, marital status, employment status, and educational level. The purpose of this research is to improve mental health outcomes, notably in PTSD, THS, and BTQ, by providing needed support and implementing psychosocial programs and community-based interventions that promote resilience and well-being.

Literature Review

This literature review aims to bring together study findings on PTSD symptoms among earthquake survivors. Earthquakes are catastrophic events with far-reaching psychological consequences, bringing emotional suffering ranging from frustration to serious mental disorders. According to Baryshnikova and Pham (2019) and Du et al. (2018), it may have short-term and long-term consequences on mental health. Assessing and addressing psychological needs is critical following earthquakes (Wang et al., 2015). Survivors, particularly the elderly, frequently develop PTSD symptoms and major psychological disorders in the months following earthquakes (Jia et al., 2010). Following the earthquake, symptoms of PTSD and trauma appeared (Sangalang et al., 2019).

Furthermore, a study conducted following the Nepal earthquake found an increase in the prevalence of common mental diseases (Zhang & Ho, 2011). Individuals exposed to earthquakes are up to four times more likely to develop significant psychological distress (Lavenda et al., 2017). Furthermore, THS is regarded as a critical element in shaping the outcomes of psychological diseases following natural catastrophes (Tang et al., 2014). THS exposure increases persons' susceptibility to psychiatric diseases and stress in the future (Gargano et al., 2019; Stroud, 2018). As a result, when trauma survivors are exposed to THS, they are more than twice as likely

to experience signs of depression and other disorders (Lilly et al., 2010). PTSD symptoms have been present throughout human history (Friedman, 2013). Gender, age, economic status, level of education, social status, employment status, exposure to THS, and lack of social support are the primary risk factors associated with the development of PTSD symptoms in the aftermath of natural disasters.

Younger age and female gender are more commonly regarded as risk factors (Chen et al., 2020; Goldmann & Galea, 2014). Women are thought to be the most prone to developing PTSD symptoms after disasters (Acierno et al., 2007; Dai et al., 2016; Doocy et al., 2013). Individuals who have lost their property due to earthquakes and floods, particularly widows and divorcees, experience more psychological disorders and issues. They have increased PTSD symptoms (Telles et al., 2009). According to Farooqui, the prevalence rate of PTSD symptoms following earthquakes ranged from 4.10% to 67.07% among adults (Farooqui et al., 2017).

The diagnosis of PTSD symptoms comprises four major factors: continual re-experiencing of the incident, avoidance of trauma-related symptoms, unfavorable changes in general reactivity, and heightened arousal (Bowles, 2013; Farooqui et al., 2017). According to Sonmez and Hocaoglu (2023), the level of trauma, loss of relatives and property, reduced coping abilities, displacement, and direct exposure to the disaster all contribute to the development of PTSD symptoms (Sonmez & Hocaoglu, 2023). The educational level significantly improves their ability to adapt after the disaster (S. Chen et al., 2020).

Individuals who have been frequently exposed to natural disasters and THS exhibit reduced levels of resilience and coping in the face of trauma (Mao & Agyapong, 2021). THS raises the risk of acquiring mental health issues and reduces the rate of recovery following earthquakes (Chen et al., 2020). An individual's exposure to two earthquakes poses a larger danger to mental health (Xie et al., 2017). The prevalence of PTSD symptoms was 42% after one month and 13% after thirteen months following Turkey's 1999 Golcuk earthquake (Lavenda et al., 2017). Following the 1999 Marmara earthquake, 25% of people experienced PTSD (Altindag et al., 2005; Tural et al., 2004). Önder et al. (2006) found that three years after the earthquake, it reached 19.2% (Onder et al., 2006). 48.2% of people have PTSD after the 2008 Sichuan earthquake in China (Xu & Song, 2011a).

According to İlhan et al. (2023), 51.4% of respondents reported experiencing PTSD symptoms three months following the earthquake (İlhan et al., 2023). Another study found a 62.8% frequency of PTSD one month after the Sichuan earthquake (B. Wang et al., 2011). It reached 40.1% a year after the earthquake (Xu & Song, 2011b). On the other hand, eight years after the same earthquake, the frequency of PTSD was 18.6% (Reinhardt et al., 2021). A study of survivors of the Japanese earthquake and tsunami found that older adults are more prone to experience PTSD symptoms (Gautam & Khadka Mishra, 2023). A study of Hurricane Katrina survivors found that PTSD symptoms increased, as did suicide rates, which increased from 3% to 6%. It revealed that 27% of post-traumatic stress disorder symptoms and 47% of suicidal behavior occurred in the future (Kessler et al., 2008). A study conducted one month after the earthquake revealed a prevalence rate of 18.7% for PTSD. It was discovered that people who experienced more of these symptoms were elderly, female, had lower educational levels, lacked social support, did not take preventative measures, and had THS. Prompt intervention and psychological rehabilitation during a disaster are vital for building resilience and facilitating a rapid recovery (Chen et al., 2014).

Several studies have indicated that the lifetime prevalence rate of thirdhand smoke (THS) has reached 39.1%. The prevalence of post-traumatic stress disorder (PTSD) symptoms among individuals who were exposed to traumatic events was found to be 23.6%, according to a study conducted by Breslau et al (Breslau et al., 2014) in 2014. A study revealed that the prevalence of post-traumatic stress disorder (PTSD) symptoms related to the earthquake was 42% one month after the event and decreased to 23% after thirteen months. The intensity of PTSD symptoms showed a notable decrease over time with medical follow-up, dropping from 49.53% to 31.35% (Lavenda et al., 2017; Lilly et al., 2010; Xu & Song, 2011a). The incidence rates of post-traumatic stress disorder (PTSD) among individuals who survived earthquakes varied from 10% to 87% (Altindag et al., 2005).

There is a limited amount of research that has assessed the extent and consequences of severe traumatic experiences (BTQ) on mental diseases associated with disasters. A study conducted by Harville found that BTQ resulting from disasters related to a depression rate of 67% (Harville et al., 2015). Upon careful examination of prior research, it became evident that there was a lack of adequate focus on the correlation between post-traumatic stress disorder (PTSD) symptoms, traumatic health symptoms (THS), and behavioral and psychological trauma symptoms (BTQ) among individuals who have experienced earthquakes. This study is notable for its extensive investigation of the interaction between earthquake survivors in southern Turkey and northern Syria. As acknowledged by the researcher, these regions have not received sufficient attention in

previous studies. Prior research has demonstrated increased levels of symptoms associated with post-traumatic stress disorder (PTSD) after earthquakes, underscoring the significance of our work in doing a more thorough analysis of this issue. The study stands out due to its approach, which involved the utilization of three scales about PTSD symptoms, THS and BTQ. Until now, no prior research has attempted to integrate these three scales, which enhances the thoroughness and comprehensiveness of detailing and analyzing this occurrence. This study aims to investigate the influence and contribution of Traumatic Head Injury (THI) and Blast Traumatic Brain Injury (BTBI) on symptoms of Post-Traumatic Stress Disorder (PTSD), with a specific emphasis on comprehending the correlation between these factors.

Methods

Study Design

This investigation was carried out in regions impacted by the earthquake. The study was conducted on Syrian refugees living in camps located in southern Turkey (Hatay Province), namely in Al-Sinaa, Adib, and AlSafa camps. It also included Syrian displaced individuals staying in camps in northwestern Syria (Jenderes area), specifically in Hayel, Abu Yarub, Rahmat, Ahl al-Khair, and Hurya camps. According to data from camp management, administrative authorities, and official local councils, the population in the camps in southern Turkey was around 3130 individuals. In comparison, the population in the camps in northern Syria was approximately 5166 individuals. The study was conducted using personal interviews performed by experts with the camps' occupants from October 2023 to March 2024. Before conducting the study, the Institutional Ethics Committee of the camp administration approved it. This study was carried out in compliance with The Belmont Report.

Participants

The study encompassed Syrian individuals who survived the earthquake in southern Turkey and northern Syria. The study sample was selected using the random sampling technique. The researchers successfully contacted all participants of the sample through face-to-face interviews. According to Morgan's calculation, 315 persons in Turkey and 311 people in Syria were accepted to participate in each sample, accounting for more than 3% of the study population. The questionnaire, PTSD, THS, and BTQ were all explained clearly. After at least 20 minutes of relaxation in a quiet environment free of visual and auditory stimuli, specialists completed the questions in a personal interview format. Teams from the Ataa Humanitarian Relief Organization and Department of Mental Health and Psychosocial Support, present in the research locations in Turkey and Syria, worked on administering questionnaires to earthquake survivors, with all personnel having relevant expertise and specialization. Participants who did not complete all questionnaire items were eliminated (N = 15 in Turkey and 11 in Syria), leaving each sample with 300 participants. All participants provided informed consent. The study was conducted utilizing a four-part structured questionnaire. The individuals' sociodemographic traits were discussed in the first section. In the second section, individuals were questioned about post-traumatic stress disorder. The third section inquired about the Trauma History Screen, while the fourth section asked about the Brief Trauma Questionnaire. Participants were instructed to answer all questions.

Measures

PTSD, THS, and BTQ were classified using the American Psychiatric Association's symptom criteria. PTSD is a set of 30 items developed by researcher Dr. Jassim Al-Khawaja in 1996 to assess trauma-related reactions. The scale covers four significant aspects that correspond to DSM-V PTSD criteria: the sensation of reliving the event, emotional problems, avoidance of thinking about the trauma, and hyperexcitability. Participants responded to the questions using a 5-point Likert scale (1 = not at all, 5 = excessively). THS is made up of fourteen binary items (yes or no) meant to assess previous traumatic events by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (Carlson et al., 2011). The Brief Trauma Questionnaire (BTQ) is a modified self-report questionnaire that includes ten traumatic incidents (Koenen et al., 2009; Schnurr et al., 1999). It is intended to assess exposure to severe trauma as defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), with a focus on life-threatening occurrences and crucial episodes. The internal consistency and validity of the items on the PTSD, THS, and BTQ scales have been proven. The Lehman classification was used to estimate this study's degree of correlation coefficient (Lehman, 2005). The Cronbach Alpha technique revealed the questionnaire is reliable (McHorney et al., 1992).

Statistical Analysis

The study had a total of (600) participants, with (300) coming from southern Turkey and another 300 from northwestern Syria. The sample size was calculated using the online Morgan equation and calculator (<https://clincalc.com/>). Both the analytical and descriptive approaches were used to analyze the variables. The categorical variables were shown as numbers and percentages (Krejcie et al., 1996). The numerical variables were represented as mean ± standard deviation. The groupings' distribution was determined using the Kolmogorov-Smirnov test. The categorical variables were analyzed using the chi-square test. The Analysis of Variance (ANOVA) test and the student t-test were used to examine the numerical variables. The data was analyzed using standard linear regression analysis. Pearson correlations were used to evaluate the relationships between the psychological factors. The statistical significance level was defined as $p < 0.05$. The mean item intercorrelation was optimum, and the internal consistency, as measured by Cronbach's α , was outstanding (Lehman, 2005). The statistical analysis was performed using SPSS® for Windows version 27.0 (IBM, Chicago, IL, United States) (SPSS, 2019).

Table 1. The relationship between sociodemographic characteristics and the scores of PTSD, THS, and BTQ

Variables /Study area	n (%)		PTSD		THS		BTQ	
	Southern Türkiye	Northern Syria	Southern Türkiye (p-Value) mean±SD	Northern Syria (p-Value) mean±SD	Southern Türkiye (p-Value) mean±SD	Northern Syria (p-Value) mean±SD	Southern Türkiye (p-Value) mean±SD	Northern Syria (p-Value) mean±SD
Gender			(0.556)	(0.041)	(<0.001)	(<0.001)	(0.005)	(<0.001)
Male	141 (47)	142 (47.3)	3.42±0.61	3.36±0.55	0.42±0.14	0.47±0.15	0.30±0.16	0.44±0.19
Female	159 (53)	158 (52.7)	3.46±0.63	3.49±0.57	0.34±0.14	0.36±0.19	0.24±0.16	0.
Age			(0.004)	(0.166)	(0.037)	(0.184)	(0.003)	(0.631)
From 19-30 years old	108 (36)	104 (34.7)	3.27±0.63	3.39±0.57	0.35±0.15	0.42±0.19	0.22±0.15	0.33±0.24
From 31-40 years old	78 (26)	81 (27)	3.52±0.55	3.34±0.62	0.39±0.13	0.41±0.17	0.28±0.15	0.36±0.22
From 41-50 years old	66 (22)	63 (21)	3.60±0.63	3.53±0.49	0.39±0.14	0.45±0.17	0.30±0.18	0.37±0.20
More than 51 years	48 (16)	52 (17.3)	3.48±0.60	3.51±0.55	0.42±0.15	0.37±0.18	0.31±0.16	0.34±0.20
Marital status			(0.014)	(0.330)	(0.418)	(0.055)	(0.118)	(0.145)
Single	16 (5.3)	19 (6.3)	3.21±0.71	3.21±0.44	0.34±0.17	0.37±0.16	0.26±0.19	0.36±0.24
Married	256 (85.3)	257 (85.7)	3.42±0.62	3.44±0.57	0.38±0.14	0.42±0.18	0.26±0.16	0.35±0.22
Widow	23 (7.7)	22 (7.3)	3.74±0.40	3.44±0.65	0.40±0.14	0.32±0.20	0.34±0.15	0.24±0.22
Divorced	5 (1.7)	2 (0.7)	3.90±0.32	3.71±0.58	0.46±0.17	0.50±0.05	0.34±0.25	0.30±0.28
Educational status			(0.882)	(0.526)	(0.612)	(<0.001)	(0.412)	(0.013)
Not knowing how to read and write	47 (15.7)	71 (23.7)	3.40±0.71	3.39±0.57	0.37±0.14	0.33±0.18	0.27±0.16	0.27±0.20
High school or below	233 (77.7)	205 (68.3)	3.45±0.60	3.43±0.55	0.38±0.15	0.43±0.18	0.26±0.16	0.37±0.22
Institute	7 (2.3)	9 (3)	3.36±0.65	3.68±0.57	0.45±0.18	0.41±0.15	0.35±0.13	0.32±0.24
University	13(4.3)	15 (5)	3.54±0.61	3.39±0.81	0.40±0.12	0.52±0.17	0.31±0.19	0.39±0.21
Working status			(0.461)	(0.959)	(0.002)	(<0.001)	(0.032)	(0.003)
Employed	94 (31.3)	80 (26.7)	3.42±0.66	3.43±0.57	0.36±0.14	0.39±0.19	0.25±0.16	0.33±0.23
Unemployed	206 (68.7)	220 (73.3)	3.48±0.53	3.42±0.56	0.42±0.14	0.47±0.14	0.30±0.17	0.41±0.19

*The statistical significance at the 0.05 level (2-tailed).

Results

The study began with 315 individuals from southern Turkey. A total of fifteen individuals still need to finish the questionnaire. Three hundred earthquake survivors participated, with 159 (53%) females and 141 (47%) males. The most significant percentage was aged 19 to 30, at 108 (36%). In northwest Syria, 311 participants were initially included. Eleven people still need to finish the questionnaire. Of the 300 participants, 158 (52.7%) were female and the remaining 142 (47.3%) were male. The most considerable percentage was in the 19 to 30 age group, with 104 (34.7%). In terms of PTSD, the findings revealed statistically significant differences in age ($p=0.004$) and marital status ($p=0.014$) in southern Turkey, with no significant differences identified in other variables ($p>0.05$). In northwest Syria, the only difference was gender ($p=0.041$). Only gender, age, and job status showed statistically significant differences in southern Turkey's THS and BTQ outcomes. Gender, education level, and working status differed in northwest Syria (Table 1). In southern Turkey, 56.3% of refugees had severe PTSD, while in northwest Syria, 55.7% of displaced people had PTSD. In terms of THS, statistics from southern Turkey showed that 55.7% of refugees had (5-8) traumatic events. Similarly, in northwestern Syria, 58.7% of the refugees had been subjected to 5-8 traumatic events. According to the findings, 68.8% of refugees in Southern Turkey had PTSD, whereas 38.21% and 27.38% of Syrian refugees had THS and BTQ episodes, respectively (Table 2).

Table 2. The Level of PTSD, THS, and BTQ in earthquake survivors in southern Turkey and northwestern Syria

Variable		n (%)		Mean (Std. Deviation)		Percentage %	
		Southern Türkiye	Northern Syria	Southern Türkiye	Northern Syria	Southern Türkiye	Northern Syria
PTSD (level)	Low	32(10.7)	25(8.3)	3.44(0.623)	3.43(0.571)	68.8	68.6
	moderate	99(33)	108(36)				
	High	169(56.3)	167(55.7)				
THS (events)	(1-4)	120(40)	99(33)	0.382(0.150)	0.416(0.186)	38.21	41.67
	(5-8)	167(55.7)	176(58.7)				
	(9-13)	13(4.3)	25(8.3)				
BTQ				0.273(0.166)	0.351(0.225)	27.38	35.13

*The statistical significance at the 0.05 level (2-tailed).

The study's findings in Southern Turkey revealed that 89.70% of participants had experienced at least one traumatic event. The most prevalent traumatic event THS that persons were subjected to was the sudden loss of house and property or a sudden move, accounting for 269 (89.70%). There were a total of 508 traumatic occurrences. People subjected to a tropical storm, flood, earthquake, or fire came in second, accounting for approximately 230 (76.70%). There were a total of 284 traumatic occurrences. In contrast, the least traumatic experience was being exposed to or forced to have sexual intercourse as a youngster, with only four (1.30%). They were exposed to an average of five traumatic experiences. Each individual was subjected to at least one traumatic experience and up to nine traumatic occurrences. In northwest Syria, the survey found that 84% of individuals had been exposed to at least one traumatic event. The most prevalent traumatic event THS that persons were subjected to was the abrupt loss of house and property or a sudden move, accounting for 252 (84%). There were a total of 516 traumatic occurrences. In contrast, the slightest traumatic incident was being exposed to or compelled to engage in sexual intercourse as an adult, with only 5 (1.7%) reported. They had been exposed to an average of five traumatic occurrences. Each subject had at least one stressful incident and up to eleven traumatic occurrences (Table 3).

People in southern Turkey have experienced severe trauma (BTQ) and a variety of significant injuries throughout their lifetimes. The most common severe trauma they reported was being exposed to a large natural or technical disaster, such as a fire, hurricane, flood, earthquake, or chemical leak. 223 (74.3%), whereas the least severe occurrence was, Before the age of 18, have you been subjected to physical punishment or beating by a parent, educator, or teacher to the point where you were terrified, felt you would be wounded, or were you exposed to cuts, bruises, or other injuries? which achieved a percentage of 50, equivalent to 16.7%. People who feared their lives were at risk or may be gravely injured: The majority, 198 (88.79%), have experienced a major natural or technical disaster, such as a fire, storm, flood, earthquake, or chemical spill. Individuals who sustained severe injuries: The most significant number, 26 (35.61%), were individuals who feared their lives were in danger or could be gravely hurt and had previously been in a severe vehicle accident, a profound work accident, or another situation where something serious occurred. Table 4 displays the results in northwestern Syria.

Table 3. Rates of endorsement for traumatic events and total number of traumatic events for participants

Events THS	Rates of endorsement for traumatic events				Total number of traumatic events	
	Southern Türkiye		Northern Syria		Southern Türkiye	Northern Syria
	n (%)	R	n (%)	R	n	n
A really bad car ,boat, train, or airplane accident	89(29.7)	6	130(43.3)	6	114	204
A really bad accident at work or home	87(29)	7	113(37.7)	7	134	195
A hurricane, flood, earthquake, tornado, or fire	230(76.7)	2	200(66.7)	4	284	235
Hit or kicked hard enough to injure – as a child	50(16.7)	11	64(21.3)	10	149	235
Hit or kicked hard enough to injure – as an adult	53(17.7)	10	34(11.3)	12	183	79
Forced or made to have sexual contact – as a child	4(1.3)	13	0	0	3	0
Forced or made to have sexual contact – as an adult	0	0	5(1.7)	13	0	5
Attack with a gun, knife, or weapon	59(19.7)	8	65(21.7)	8	86	121
During military service – seeing something horrible or being badly scared	50(16.7)	12	60(20)	11	104	128
Sudden death of close family or friend	210(70)	4	242(80.7)	2	380	474
Seeing someone die suddenly or get badly hurt or killed	144(48)	5	190(63.3)	5	269	386
Some other sudden event that made you feel very scared, helpless, or horrified	220(73.3)	3	204(68)	3	476	422
Sudden move or loss of home and possessions	269(89.7)	1	252(84)	1	508	516
Suddenly abandoned by spouse, partner, parent, or family	61(20.3)	9	66(22)	9	77	73

The statistical significance at the 0.05 level (2-tailed). R=Rank

Table 4. Rates of endorsement for Severe trauma (BTQ) for Southern Turkey and Northern Syria participants

Event BTQ	Southern Türkiye				Northern Syria			
	Rates of endorsement for Has this ever happened to you?		If the event happened, did you think your life was in danger or you might be seriously injured?	If the event happened, did you think your life was in danger or you were seriously injured?	Rates of endorsement for Has this ever happened to you?		If the event happened, did you think your life was in danger or you might be seriously injured?	If the event happened, did you think your life was in danger or you were seriously injured?
	n (%)	R	n (%)	n (%)	n (%)	R	n (%)	n (%)
-Have you ever served in a war zone, or have you ever served in a noncombat job that exposed you to war-related casualties.	68(22.7)	5	53(77.94)	10(18.86)	122(40.7)	5	85(69.6)	30(35.2)
-Have you ever been in a serious car accident, or a serious accident at work or somewhere else?	94(31.3)	3	73(77.65)	26(35.61)	134(44.7)	4	103(76.8)	37(35.9)
-Have you ever been in a major natural or technological disaster, such as a fire, tornado, hurricane, flood, earthquake, or chemical spill?	223(74.3)	1	198(88.78)	19(9.59)	160(53.3)	2	117(73.1)	29(24.7)
-Have you ever had a life-threatening illness such as cancer, a heart attack, leukemia, AIDS, multiple sclerosis, etc.?	61(20.3)	7	25(40.98)	N/A	65(21.7)	8	40(61.5)	N/A
-Before age 18, were you ever physically punished or beaten by a parent, caretaker, or	50(16.7)	8	12(24)	4(33.33)	44(14.7)	9	27(61.3)	8(29.6)

teacher so that: you were very frightened; or you thought you would be injured; or you received bruises, cuts, welts, lumps or other injuries?

-Not including any punishments or beatings you already reported in Question 5, have you ever been attacked, beaten, or mugged by anyone, including friends, family members or strangers?

-Has anyone ever made or pressured you into having some type of unwanted sexual contact?

-Have you ever been in any other situation in which you were seriously injured, or have you ever been in any other situation in which you feared you might be seriously injured or killed?

-Has a close family member or friend died violently, for example, in a serious car crash, mugging, or attack?

-Have you ever witnessed a situation in which someone was seriously injured or killed, or have you ever witnessed a situation in which you feared someone would be seriously injured or killed?

81(27)	4	37(45.67)	6(16.21)	84(28)	7	47(55.9)	12(25.5)
0	0	0	0	9(3)	10	0	0
101(33.7)	2	N/A	24(23.76)	153(51)	3	N/A	8(22.8)
0	0	N/A	0	165(55)	1	N/A	12(20)
62(20.7)	6	N/A	N/A	124(41.3)	6	N/A	N/A

The statistical significance at the 0.05 level (2-tailed). R=Rank

The Pearson correlation coefficient test was utilized to determine the association between PTSD, THS, and BTQ. The information is presented in Table 5. The Lehman classification was used to calculate the degree of correlation coefficient (Lehman, 2005). The findings show a favorable and statistically significant association between PTSD, THS, and BTQ. In general, higher exposure to THS and BTQ leads to an increase in PTSD symptoms (Table 5).

Table 5. Pearson correlation coefficient test between PTSD, THS, and BTQ

Variables	PTSD	THS	BTQ
Southern Türkiye	PTSD 1	THS 0.390**	BTQ 0.630**
Northern Syria	PTSD 1	THS 0.292**	BTQ 0.677**

*Correlation is significant at the 0.05 level (2-tailed). *p<0.05 **p<0.001

Table 6. Results of linear regression analysis of THS and BTQ with PTSD

Dependent Variable	Independent variable	R	R2	F (p value)	B	T (p value)	VIF	
Southern Türkiye	PTSD	0.417	0.174	31.177(0.000)	THS	1.127	4.007(0.000)	1.210
	BTQ				0.70	2.757(0.006)	1.210	
Northern Syria	PTSD	0.294	0.086	14.043(0.000)	THS	0.793	3.431(0.001)	1.094
	BTQ				0.124	0.649(0.517)	1.094	

*The statistical significance at the 0.05 level (2-tailed).

A linear regression model was employed to investigate the effects of THS and BTQ on PTSD. The findings revealed that THS and BTQ help to explain the variance in PTSD. For example, in southern Turkey, when THS increased by one unit, PTSD symptoms increased by (1.127) units, and when BTQ increased by one unit, PTSD

symptoms increased by (0.70). However, the result ($\beta = 0.124$) for BTQ is not statistically significant in northwest Syria (see Table 6).

Discussion

Trauma levels were measured one year later in earthquake survivors in southern Turkey and northwestern Syria. The average PTSD scale score among refugees in southern Turkey was 68.8%, while in northwest Syria was 68.6%. Half of the earthquake survivors in the sample exhibited a high rate of trauma response. The findings in southern Turkey revealed that 56.3% of the earthquake survivors who were refugees exhibited a significant degree of post-traumatic stress disorder (PTSD). In comparison, 33% displayed a moderate level of symptoms. In northwest Syria, a significant majority of the displaced population, precisely 55.7%, experienced a severe degree of post-traumatic stress disorder (PTSD). In comparison, 36% had a moderate level of PTSD. This conclusion corroborated prior research conducted on individuals who had experienced other stressful situations, such as natural catastrophes and earthquakes (Farooqui et al., 2017; Ilhan et al., 2023; Lavenda et al., 2017; Lilly et al., 2010; B. Wang et al., 2011; Xu & Song, 2011a).

Statistical analysis of the data from southern Turkey revealed that there were no significant differences in symptoms of post-traumatic stress disorder (PTSD) between males and females. This finding aligns with the findings of other investigations (Gay et al., 2020). This is because both male and female migrants were subjected to identical events with equal intensity and timing. Several research has found no correlation between post-traumatic stress reactions and gender (El hamaoui et al., 2002; Sheeran & Zimmerman, 2002). Furthermore, the findings on post-traumatic stress disorder (PTSD) indicated that there were no notable disparities in education level and work status, which aligns with the observations made in earlier studies (Bliwise et al., 2022).

Significant statistical differences were seen among different age groups. The age group with the highest number of individuals was between 41 and 50, followed by the age group between 31 and 40. This is because individuals in older age frequently have more difficulties and obligations throughout their lives. This encompasses challenging encounters, encountering health issues, and additional distressing occurrences. Due to the inherent characteristics of these difficulties, individuals in older age are more susceptible to distressing events that can result in post-traumatic stress disorder (PTSD). In addition, individuals may possess a more extensive historical background of prior experiences that can impact their capacity to adjust to traumatic occurrences. The findings also indicated notable differences among the marital statuses, with the highest observed among the divorced, followed by the widowed participants. Consistent with the results of prior research (Telles et al., 2009).

The correlation between social support, solid marital connections, and the ability to manage PTSD is that these factors strengthen one's capacity to deal with the condition. Conversely, traumatic events like divorce and the loss of a partner have a notable influence on mental health. Several studies investigating the relationship between marital status and stress response have made contrasting claims. Some studies suggest that being married decreases the risk of stress, while others show the opposite (Englert et al., 2008; Javidi, 2012). The study findings in northwest Syria indicate that there were no statistically significant variations in the prevalence of PTSD among different age groups, marital statuses, education levels, and occupational status. Nevertheless, there were statistically significant differences based on gender, with males demonstrating lower levels of PTSD in comparison to females. This finding aligns with the results reported in research by S. Chen et al. (2020) and Goldmann and Galea (2014) (S. Chen et al., 2020; Goldmann & Galea, 2014). Research has shown that women are more susceptible to developing symptoms of post-traumatic stress disorder (PTSD) during disasters, as evidenced by studies conducted by Acierno et al. (2007), Dai et al. (2016), and Doocy et al. (2013). The findings suggest that females exhibit elevated levels of stress and post-traumatic stress disorder (PTSD) compared to males (Fan et al., 2015). Previous research has indicated that post-traumatic stress disorder (PTSD) is more commonly seen in girls compared to boys, as observed by Meiser-Stedman et al. in 2012 (Meiser-Stedman et al., 2012).

The incidence of THS in southern Turkey was relatively low, with a prevalence rate of 38.21%. On average, each individual encountered approximately five stressful events. The findings indicated that 89.70% of the participants encountered at least one stressful event. The reason for this is the adverse circumstances of war and forced migration that Syrians have endured. The prevailing traumatic experiences that individuals encountered were abrupt displacement from their residence and possessions or immediate migration. These findings are consistent with prior research on the cumulative occurrence of traumatic events that individuals experience

throughout their lives (Breslau et al., 2014; Ghannam & Thabet, 2014; Joseph et al., 2000). The THS study is a crucial and regular component of evaluating mental health, as it can significantly enhance the identification of symptoms related to PTSD (McCloskey, 1999). In northwest Syria, the incidence of THS was found to be 41.67%, indicating a relatively low level of prevalence. The mean number of traumatic episodes per individual was approximately five. Each individual experienced at least one traumatic incident and, at most, eleven traumatic occurrences. The prevailing traumatic experience that individuals encountered was the abrupt deprivation of their residence and belongings or the unexpected displacement. This discovery aligns with previous studies carried out in various traumatic events (Vrana & Lauterbach, 1994). Prior studies have demonstrated that the presence of previous traumatic experiences and preexisting emotional problems are significant factors that contribute to the ongoing presence of post-traumatic stress disorder (PTSD) (Mayou et al., 2002; Wang et al., 2000).

The findings in southern Turkey indicated no statistically significant variations in the THS based on marital status and level of education. Although there were statistically significant disparities based on gender, the mean value for males exceeded that of girls. The findings of this study align with earlier research, indicating that males are more susceptible to the effects of cumulative traumatic incidents (Vrana & Lauterbach, 1994; Wilker et al., 2021). This could be attributed to the heightened psychological burden on the family's primary care person. Furthermore, there were notable variations in the data based on age, with the most significant proportions observed among individuals aged 51 years and above. The findings indicated that individuals between 19 and 30 exhibited reduced levels of THS, indicating a preference for this age range. When comparing the work status of individuals, it was discovered that employed individuals had higher levels of THS than unemployed ones. This indicates that the individual's employment situation has a substantial influence on their psychological well-being since individuals who experience difficulties such as loss of income or financial instability tend to exhibit more signs of psychological disorders. There were no significant variations in THS based on age and marital status in northwest Syria. However, there were notable differences based on gender, with males having a higher average THS than females. Significant differences were seen based on the education level variable, with the greatest education level being university in THS. The results favored the education level of the inability to read and write, which exhibited low levels of THS. Significant statistical differences were seen in the THS averages of employed and jobless individuals. Employed individuals exhibit a greater level of total mental health status than those unemployed. The findings of this study are incongruent with those of other investigations (Brattstrom et al., 2015).

The incidence of BTQ in southern Turkey was 27.38%. The prevailing BTQ encountered by individuals was "being subjected to a significant natural disaster, such as a conflagration, cyclone, deluge, seismic event, or chemical spill." In northwest Syria, the incidence rate of BTQ was 35.13%. The most frequently encountered BTQ was "The violent death of a family member or close friend, such as in a severe car accident, robbery, or attack." Research conducted within these environments could have been more frequent. The findings in southern Turkey indicated no statistically significant variations in BTQ based on marital status and degree of education. Nevertheless, there were statistically significant disparities based on gender, as the average BTQ for males exceeded that of girls, suggesting that males experienced higher levels of BTQ than females. Furthermore, there were statistically significant variations based on age, with the highest groups being individuals aged 51 years and above. The findings indicated that the age group between 19 and 30 years had reduced levels of BTQ exposure compared to the other age groups. Regarding work status, there were substantial disparities in the average BTQ levels between employed and unemployed individuals. Employed people had higher BTQ levels, suggesting that work position significantly influences BTQ. The findings in northwest Syria indicated no statistically significant variations in BTQ based on age and marital status. Nevertheless, gender had a role in the observed differences, as BTQ levels were higher in males than females, suggesting that males had greater exposure to BTQ than females. This can be attributed to the fact that males, who take on the task of providing care for the entire family, may encounter heightened psychological stress. Furthermore, there were statistically significant disparities based on the education level variable, with university-educated individuals having the highest exposure to BTQ. The findings indicated that individuals with an "illiterate" education level exhibited lower levels of BTQ than those with a university or secondary school education or below. Regarding employment status, there were statistically significant variations in BTQ levels between employed and unemployed individuals. Employed individuals had greater BTQ levels than the jobless. This suggests that the individual's employment status substantially influences their BTQ. A statistically significant moderate positive connection was found in southern Turkey between the overall scores of PTSD and the combined scores of THS and BTQ ($p < 0.05$). The correlation value between PTSD symptoms and THS is 0.39, and the correlation coefficient between PTSD and BTQ is 0.36. This implies that there is a positive correlation between the THS and BTQ scores and the severity of PTSD symptoms. This study discovered a direct relationship between the occurrence of psychiatric diseases and the response to trauma, which aligns with earlier research conducted by

Auxéméry (2012) and Basoglu et al. (2004) . A substantial positive association was found in northwest Syria between the total scores of post-traumatic stress disorder (PTSD) and the total scores of the traumatic history scale (THS) and B. trauma questionnaire (BTQ), with a p-value of < 0.05 . This correlation suggests that elevated THS and BTQ scores are linked to heightened levels of PTSD symptoms. The correlation coefficients indicate a favorable relationship between PTSD symptoms and both THS and BTQ, with correlation values of 0.292 and 0.224, respectively. This conclusion supports the results of earlier research that suggest a positive correlation between prior traumatic events and heightened reaction to subsequent traumas (Attfield et al., 2015; Auxéméry, 2012; Javidi, 2012; Kilic, 2005).

The findings in southern Turkey indicate that THS and BTQ account for roughly 17.4% of the variation in PTSD symptoms. The β coefficient, representing the correlation between PTSD and THS, was found to be statistically significant ($\beta = 1.127$, $p < 0.05$). This indicates that for every incremental rise in THS, there is a proportional increase of 1.127 units in PTSD symptoms. In addition, the β coefficient representing the association between PTSD symptoms and BTQ was shown to be statistically significant ($\beta = 0.70$, $p < 0.05$). This suggests that a one-unit increase in BTQ results in a 0.70-unit rise in the degree of PTSD. Consequently, the symptoms of PTSD can be anticipated by both THS and BTQ, indicating the direct impact of increased THS and BTQ on PTSD symptoms. Regression analyses conducted in several studies have consistently demonstrated a positive correlation and significant impact between post-traumatic stress disorder (PTSD) and prior traumatic experiences (Gould et al., 2021; Hoppen & Morina, 2021). The findings in northwest Syria indicate that THS and BTQ account for approximately 8.6% of the variability in PTSD symptoms. The β coefficient representing the connection between PTSD symptoms and THS was found to be statistically significant ($\beta = 0.793$, $p < 0.05$). This demonstrates a positive correlation between THS and PTSD symptoms, with a coefficient of 0.793. This means that for every one-unit increase in THS, there is a corresponding increase of 0.793 units in PTSD symptoms. Nevertheless, the β coefficient representing the correlation between PTSD symptoms and BTQ was found to be 0.124, with a p-value greater than 0.05, indicating that the link was not statistically significant. Therefore, only THS can forecast PTSD symptoms in this situation. It may be inferred that there is a positive correlation between the degree of PTSD symptoms and the amount of traumatic life events (THS) experienced. This suggests that high levels of THS directly contribute to the severity of PTSD symptoms .

Limitations

The current study has several limitations. Questionnaires that needed to be completed or were untrustworthy were not included. Reliable population statistics are limited. Access to several locations in northwest Syria is restricted due to security concerns. Individuals residing in these regions experience challenging psychological states due to armed conflicts and forced migration, which can impact their survey responses and hinder their capacity to concentrate and offer precise information. In certain areas, people have low levels of self-awareness and education; thus, data must be gathered directly and in a simple way.

Conclusion

We have reached practical conclusions indicating the importance of directing efforts toward providing psychological and social support to earthquake survivors. Additionally, we have presented a series of proposals for future research that could contribute to expanding knowledge in the areas covered by this study. Syrian refugees and displaced people who survived the earthquake in southern Turkey and northwestern Syria suffer from a high level of PTSD symptoms. Therefore, it is recommended that mental health and psychosocial support centers be established in areas affected by the earthquake. These centers should provide guidance, awareness, educational training, and treatment programs to raise awareness, address social problems and psychological disorders, and assist earthquake survivors in recovering, adapting, and integrating into society properly. PTSD symptoms were more common in older age groups than in younger age groups. They were also more prevalent among social groups such as divorced individuals and widows. It was found that the prevalence of THS and BTQ was low. The low level of education in the study areas, especially in northwestern Syria, highlights the need to take adequate measures to improve the education level in those areas, including strengthening literacy programs. Unemployment rates have witnessed a significant increase, especially in northwestern Syria. This necessitates strengthening the provision of psychological and social support and supporting the search for job opportunities, aiming to enhance economic opportunities and improve psychological and living conditions. Increased PTSD symptoms were observed in individuals exposed to higher levels of THS and BTQ. Finally, it is recommended that psychological support programs that offer resilience strategies, recovery from trauma, and disaster management techniques be implemented. This includes strengthening both immediate response and

long-term recovery and resilience strategies to address the mental health needs of earthquake-affected populations. Additionally, adopting electronic mental health methods can help broaden the reach of beneficiaries. Conducting further studies and research encompassing other types of trauma and psychological disorders that earthquake survivors may encounter is advisable.

Ethical Approval

All participants were required to provide informed consent before proceeding to the questionnaires. Contact information for the research team was given at the beginning and end of each study for any inquiries that may occur during the research. Participants could end questionnaires or interviews anytime without justifying and facing any consequences. Furthermore, participants had up to one week after completing the questionnaires or responses to contact the researcher if they wanted to remove their data. If a person withdraws, their data will be permanently deleted and not included in any analysis published in this research

Authors Contributions

Study concept and design (D.B., M.H.), acquisition of the data (D.B., M.H.), analysis and interpretation of the data (D.B., M.H.), drafting of the manuscript (D.B., M.H.), critical revision of the manuscript for important intellectual content (D.B.).

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Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors

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Cognitive and Pragmatic Features of English Paired Phrases in Use by the Kyrgyz-Speaking Audience

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Abstract: The article touches upon the issue of significance and difficulties in using English paired phrases by Kyrgyz-speaking audience. There were involved the cognitive and pragmatic peculiarities of paired phrases and their functional aspect can bring the necessity for learning them thoroughly. The relevance of the paper is that the English language has so many categories of phraseological units where paired words carry a great deal of functions and pragmatic features, which in its turn can cause some difficulties in English learning process. Therefore, the main aim of the article is to investigate cognitive and functional features of English paired words and identify their pragmatic role in the speech by Kyrgyz-speaking learners. Those phrases need to be studied separately by considering their structural and cognitive properties as possessing idiomaticity and non-idiomaticity. There were defined and analyzed the classification of paired phrases and their roles in different pragmatic usage. For attaining the aim of the research our task was to conduct method of university student survey to find out the frequency of using English paired phrases and to reveal possible misunderstandings they face. As a result of the paper we have discussed and maintained the solutions of those issues.

Key words: Paired phrases, Pragmatics, Idiomaticity, Function, Survey

Introduction

Education is a priority for all national economies. Nowadays, rapid changes are happening in every field. areas of our lives. In today's globalizing world, it is important to develop language skills and use them at skill level necessary (Revak & Csiszarik-Kocsir, 2023). In the age we live in, learning at least one language other than your mother tongue is of great importance. Since English is generally used as a common language internationally, the second language choice of the majority of people is English. There is a surprising variety of funny expressions in the English language. Most of them are known to native speakers, but they do not appear often in textbooks. In this paper we will focus on funny pairs of words in English. They are called paired phrases that are formed by reduplication, in English it means to double or repeat. Paired phrases are considered two-component formations, the components of which, in most cases, express grammatically equal, semantically and syntactically correlated

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concepts. Paired phrases are usually connected through coordinating conjunctions. The concept of pairing reflects the ability of the human mind to unite, compare, and contrast thoughts about objects, phenomena, and events of the objective world in the process of its perception and cognition.

The basic properties for distinguishing different types of paired phrases are the followings:

a) phraseological property – that is related to the structural characteristics of a phrase and including such features as super-verbalism and stability (reproducibility in the form of ready-made language units that are not created again each time);

b) idiomaticity – a semantic feature associated with the presence of a figurative meaning in at least one of the components of the phrase.

Considering the above-mentioned two main criteria, there are distinguished two classes of paired phrases:

- 1) phraseological non-idiomatic paired phrases;
- 2) phraseological idiomatic paired phrases.

Phrases belonging to the first class are characterized by:

- a combination of lexical units based on their commonality;
- stability of use;
- lack of idiomaticity.

e.g. *peace and quiet*

Paired phrases belonging to the second class are characterized by super-verbalism, reproducibility as a rule, in the same composition, and the obligatory presence of idiomaticity. The second class is heterogeneous, it includes the following subclasses:

- idioms themselves – semantically integral units of indirect nomination (e.g. *odds and ends, town and gown*)
- stable phrases with one component having a figurative meaning (e.g. *heart of gold, bitter sweet*)
- pseudo-phraseological paired phrases, which are formed with conjunction and include two components, which, however, are not equal (e.g. *here and there, salt and pepper, black and white*)

Methods

For gaining assurance in investigation there were used qualitative and quantitative data collecting methods. In its turn it gives the benefits before holding survey and gave us the right direction of research discussions and drawing results and conclusions. As qualitative and quantitative data shows us various lexical and grammatical types of phraseological paired phrases included in a sentence/utterance expand and generalize their semantic potential, expressing emotional and evaluative meanings, as well as meanings of intensity, categoricity, repetition, and some others. Coordinating paired phrases function quite widely in modern English, and play an important role in the formation of grammatical, semantic and pragmatic aspects of both individual sentences/utterances and discourse as a whole. Paired phrases can function in different speech acts as independent units and express different pragmatic meanings – praise, regret, surprise, fear, etc.

*Everything, as you expected, comes out **hunky-dory**.* – The speaker in the utterance tries to praise and encourage the situation with the help of the paired phrase “*hunky-dory*”, which means amazing, remarkable, marvelous.

*Well, there is a **teeny-weeny** problem.* – The pragmatic feature of this utterance is showing that the problem is not so significant and easy to solve without bothering and worrying.

Functioning in dialogical discourse as independent speech acts, phraseological paired phrases convey a wide range of pragmatic meanings: advice, order, indignation, admiration, warning, assurance in sincerity, etc.

*They think I'm an old **fuddy-duddy** because I don't approve of tattoos.* – The paired phrase “*fuddy-duddy*” helps the speaker express his indignation in a situation.

*You're being a **silly-billy**, now stop it.* – This utterance expresses someone's advice or warning in a different types of situation, and paired phrase “*silly-billy*” means foolish man.

Olga Verkhovtsova states that people use paired words, because, they provide linguistic richness, aid communication, and allow for creative expression. They have become an integral part of language and contribute

to its effectiveness, aesthetics. They add color and depth to the language, making it more expressive and nuanced.

Findings

Student Survey

For identifying the difficulties in learning target language we have surveyed university students. There participated 44 students from the American Studies and Translation Department of the Faculty of World Languages and Cultures of Osh State University. With the help of survey we had opportunity to reveal some aspects of understanding our students' abilities and lack of confidence in separate fields in EFL. In this paper there is an attempt to help Kyrgyz learners to make them more engaged in learning idiomatic expressions which help them in cross-cultural communication, where our students in their further life can deal with conversations with native English speakers from all over the world without obstacles, and we set the task for ourselves to find all the drawbacks in their lexical ability and solve the issue accordingly. Our research results are going to carry benefits for the next generation's English teachers and interpreters preparation in our university and in its turn it will have development contribution for communication through the cultures and breaks down walls between different nations relationships beginning from brotherhood to business or political negotiations. For this purpose, there were set the following ordinary question types as shown below with the result indicators.

2. What is the level of your knowledge of phraseological units as idioms, paired words, proverbs, etc.?

44 ответа

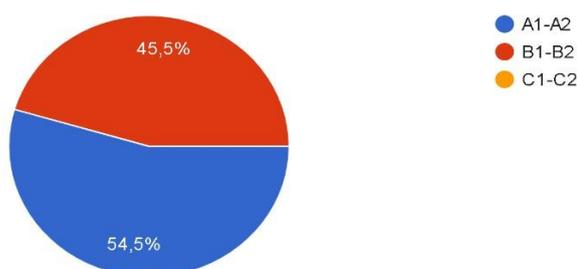


Figure 1. Level of phraseological units

Here students were concentrated on their true level orientation. As shown in Figure 1 our students consider their lexical knowledge of English is 45,5% B1-B2, 54,5% A1-A2.

3. Could you find the meaning of the following paired phrase "itsy-bitsy"?

44 ответа

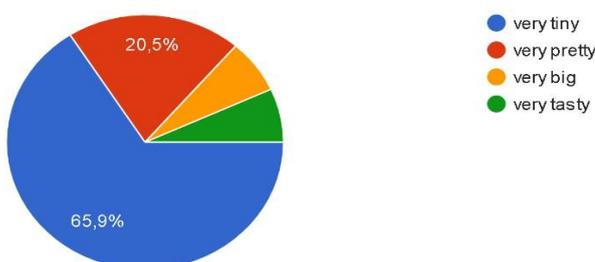


Figure 2. Finding the meaning of the paired phrase

The question about paired phrase was requested for identifying the meaning. The meaning of the paired phrase "itsy-bitsy" is very tiny. In pragmatic use it carries the function of surprise or admiration. For instance, one can admire someone's cute baby and say "She has these *itsy-bitsy* little hands and feet!"

From the results we see in the Figure 2, that 65,9% have answered right as 20,% guessed the meaning "very pretty".

4. Which of the following paired phrases have you ever used in your English speaking?

44 ответа

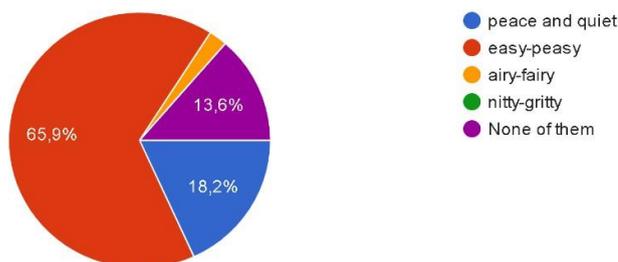


Figure 3. Paired phrases used

The Figure 3 shows the indicators for production of students' knowledge on phraseological units, and in this case the 65,9% have been using the paired phrase "easy-peasy", 18,2% - "peace and quiet", 13,6% - have never used any of them.

Discussion and Conclusion

We have drawn attention to each student's answer and in the result, it is obvious that there should be created a new method or new application for enhancing the students' lexical abilities, in this case we had focused on one of the types of phraseological units, paired phrases with idiomaticity and non-idiomaticity. For preparation specialists in language sciences we consider that there is the necessity of finding out ways and methods which will be helpful in this purpose. Trying to make our research issue possible to solve we have the hypothesis of Corpus Linguistics which deals with this kind of difficulties not only for the students, but also for language teaching professors. And for the next paper investigation we have a tentative guideline which will be devoted to the implementation into Corpus Linguistics theory and ways of its applying in language learning.

In live communication, paired phrases can act as independent units or be part of a statement. In the first case, they act as certain illocutionary speech acts: directives (advice, order), expressive means that convey various psychological states of the speaker: surprise, admiration, warning, indignation, assurance of sincerity, etc. In addition, they often act as means metacommunications, i.e. to establish, complete verbal interaction, summarize what was said, etc.

In the case when paired phrases are part of a statement, they are a means of expressing the emotive meaning of the statement, emotional assessment, the degree of its intensity, as well as the categorical nature of the action. The analysis carried out allows us to assert that paired phrases are an interesting, unique and original linguistic means that has unique characteristics and performs diverse functions that give speech natural liveliness and imagery.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Likelihood of AI Tools Adoption and Interest in Professional Development Opportunities in Higher Education: An Ordinal Logistic Regression Analysis

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Abstract: This study explored the factors influencing academic staff’s readiness to use artificial intelligence (AI) tools and participate in AI-related professional development, utilizing a quantitative approach. Data from 95 academic staff members of the University of Vlora “Ismail Qemali” were gathered via an online survey. The analysis, conducted using univariate ordinal logistic regression, pinpointed key predictors of educational AI tools adoption likelihood and interest in attending AI professional development opportunities. Rigorous evaluation of model fit, influence diagnostics, and cross-validation was conducted to ensure the findings’ reliability and accuracy. Results highlight the critical role of interest in AI educational tools development, technological proficiency, and past use of AI educational tools in determining the likelihood of adopting educational AI tools, underscoring the pivotal importance of fostering a genuine interest in AI. Furthermore, the research identifies gender as a significant factor influencing interest in attending AI professional development opportunities, while negative perceptions of AI’s role in education tend to reduce such interest. These findings stress the need for targeted efforts to enhance educators’ readiness for AI, mitigate gender disparities, and correct misconceptions about AI. By revealing the complex factors affecting educators’ willingness to adopt AI technologies, this study advocates for a holistic strategy encompassing a broader range of influences. It provides actionable insights for educational policymakers, curriculum developers, and AI tool creators to create an environment conducive to AI adoption in higher education. Although limited by its use of convenience sampling and focus on a single institution, this research offers essential insights into the dynamics of AI adoption in education. It lays a foundation for strategies that encourage innovation, inclusivity, and a forward-thinking approach to integrating AI into future teaching and learning.

Keywords: Artificial intelligence, Ordinal logistic regression, AI tools adoption, AI professional development

Introduction

The integration of artificial intelligence (AI) into academic environments and communities holds the potential to bring significant changes in pedagogical approaches. Through this integration, it will be possible to improve the quality of learning and optimize administrative procedures. To guarantee the effective integration and utilization of AI-driven tools and applications, the academic community must be opened and prepared to accept these technological developments. As the educational landscape progresses under the influence of AI, UNESCO advocates for the protection of teachers’ rights and working conditions. It underscores the importance of AI as a complementary tool that enhances, rather than replaces, the vital human elements of learning and cooperation. The requirement to strengthen teacher training and implement capacity-building initiatives is prioritized by UNESCO in its call (UNESCO [7387], 2019).

The private sector has mainly influenced AI adoption and implementation in higher education institutions, despite challenges posed by the absence of comprehensive public policies and sufficient governmental support. Collaboration among policymakers, educational institutions, and both private and public research entities is of

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critical importance to ensure that the infrastructure for AI integration is adequately established (Lainjo & Tmouche, 2023). Countries such as France, Australia, Estonia, South Korea, China, and the United States are recognizing the potential of AI to enhance educational equity and quality, and are actively integrating AI into their educational programs. However, these efforts encounter barriers, especially in developing countries, due to inadequate technological infrastructure and the lack of highly trained AI professionals, underscoring a global disparity in readiness for AI-driven educational reforms (Pedró et al., 2019).

Albania, an upper-middle-income country (World Bank Blogs, 2023), has been adjusting its educational policies to incorporate recent technological advancements more effectively, particularly in the field of AI. A specialized study (Tataj & Kola, 2021) examined the consequences of these strategic changes in Albania on the development of innovative educational methodologies. This examination illustrated how the Albanian education system responds to labor market demands by incorporating AI-related college faculties and courses. The study highlights the challenges inherent in AI education in Albania, including a deficiency of AI-specialized faculty and a limited availability of AI curricula, especially in private establishments. These circumstances underscore the critical need for more thorough AI educational opportunities. One of the prerequisites for EU integration in Albania is the digitization of higher education. However, a significant lack of specialized information and communication technology (ICT) educators prevents this objective, with 77% of vocational instructors acknowledging the need for further ICT methodological training. The country's strategic plan for higher education and ICT (2021–2027) focuses on the inclusive integration of ICT to strengthen the educational digital infrastructure through technological enhancements and e-learning platforms (Xhindi & Toci, 2023).

In this research, we aim to examine the influence of a set of predictors—demographic characteristics, educational background, technological proficiency, perceptions of AI's role in education, past use of AI educational tools, and interest in AI educational tools development—on understanding their impact on two outcome variables: the likelihood of academic staff at the University of Vlora “Ismail Qemali” adopting AI tools in their future pedagogical and scholarly endeavors (educational AI tools adoption likelihood) and their interest in engaging with professional development opportunities related to AI in education (interest in attending AI professional development opportunities). Our objective is to ascertain the degree to which these predictors, separately, can predict each of the outcome variables. This investigation aims to contribute to a deeper understanding of the variables that promote or slow the adoption of AI technologies among higher educators. The findings of this study are important to cultivate the academic dialogue on AI in higher education and inform the development of interventions, training programs, and policies that enhance educators' skills and readiness for AI integration.

This research paper's organization is as follows: The second section gives an overview of the literature relevant to the subject under investigation. The third section details the methods used for collecting, processing, and analyzing data. The fourth section presents the study's findings, while the fifth provides a discussion of these results. The sixth section presents the research conclusions.

Literature Review

Research into the adoption and integration of virtual and digital technologies within higher education across various regions, including the Western Balkans and Albania, underscores a complex landscape of engagement and readiness among educators and institutions. In the Western Balkans it is pointed out a moderate familiarity but low implementation (9%) of augmented reality (AR) and virtual reality (VR) technologies among academic staff, despite a high interest and positive attitude towards these technologies. Factors such as teaching experience, hardware infrastructure, and lab usage frequency come out as significant determinants of educators' confidence and the timeline for integrating VR into pedagogy (Kamińska, et al., 2022). Furthermore, the integration of virtual learning environments into education is expected to fundamentally transform the creation and distribution of content, necessitating adjustments to accommodate learners' digital competence. This highlights the significance of AI in promoting educational fairness, and a sustainable framework consistent with socioeconomic goals (Jokhan et al., 2022). In addition, the advocacy for improved accessibility to education and technology marks the potential of AI and Fourth Industrial Revolution technologies to further sustainable development objectives, specifically in the realms of equitable education and lifelong learning (Ally & Perris, 2022).

Evaluating higher education's response to the AI labor market's demands, an investigation pinpointed fundamental technical, interdisciplinary, and soft skills, affirming the need for educational institutions to certify graduates' proficiency (Benhayoun & Lang, 2021). A three-stage framework at a pedagogical university

promotes advancing digital proficiency, creating digital portfolios, and installing a competency-based evaluation system to augment educational processes with digital technologies, aiming to boost both digital infrastructure and educational outcomes (Voronin et al., 2020). Furthermore, in (Al-Slehat et al., 2023), faculty perceptions underscored the necessity for upgrading educational environments and infrastructure to ease AI adoption, aligning with international educational advancements. Also, in (Huang et al., 2021) it is found that the integration of AI in education needs new digital teaching skills, adjustments in students' learning styles, and a collaborative effort to develop an AI-based educational ecosystem that ensures fairness, ethical data handling, and safe technology use.

The productiveness of AI in education, particularly in personalized learning for primary grades, relies on its lining up with the different needs and perspectives of both learners and educators, necessitating advancements in AI technologies like reinforcement learning (Chaudhry & Kazim, 2021). The supportive potential of AI and its learning analytics in enhancing teaching activities, while stressing the need for greater emphasis on ethical considerations and data privacy in the evolving landscape of teacher training is revealed in (Salas-Pilco, Xiao, & Hu, 2022). An exploratory review accentuates the ethical integration of AI into pedagogy as the primary focus of the field of AI in education. It emphasizes the central role of educators in leveraging AI to facilitate personalized learning experiences (Lameras & Arnab, 2022). A comprehensive analysis focusing on teachers' perspectives underscores their essential role in AI-based educational research, regardless of challenges related to AI's technical capacity, reliability, and the sector's infrastructural deficiencies. Further analysis highlights AI's multifaceted utility in academia, including personalized teaching, risk identification, and administrative automation, indicating its transformative potential in both the pedagogical and operational domains of higher education (Tarisayi, 2023). Nevertheless, AI is recognized for its ability to facilitate educational planning, implementation, and assessment, suggesting a generally positive outlook on its contribution to teaching methodologies (Celik et al., 2022).

A thorough synthesis of research examining the integration of AI technologies in education in Romania, Serbia, and other regions emphasizes the complex relationship between educators' readiness and the complicated nature of AI implementation in higher education institutions. Empirical evidence supports the notion that, despite the fact that AI tools have a large capacity to improve educational aims, their integration into pedagogical practices is hindered by barriers that impede teachers' tendency to employ them (Bucea-Manea-Țoniș, et al., 2022). Another study probed generative AI's dual impact in developing countries, focusing on its potential to advance or slow down progress across sectors, including education, while calling for strategic interventions to provide broad development and diminish disparities in technology access (Mannuru et al., 2023). According to Cathrin and Wikandaru (2023), the integration of AI technology into education is considered an inevitable trend, necessitating the development of academic and ethical standards in a balanced manner to tackle contemporary social challenges. A bibliometric analysis further demonstrates a lack of literature on the pedagogical implications of AI and machine learning (ML), identifying significant barriers to their effective integration in educational settings. This analysis predicts the development of sophisticated AI and ML tools to overcome these challenges, enhancing teaching and learning, especially for learners with disabilities (Okagbue et al., 2023).

As a result of increased academic recognition and the impact of AI on education during the COVID-19 pandemic, a bibliometric analysis conducted since 2018 reveals a substantial increase in AI-related educational research, with the United States and China making the most significant contributions (Karaca & Kılcan, 2023). Surveys and quantitative assessments of educators' engagement with generative AI tools and ChatGPT for teaching and research purposes disclose a foundational use among participants and a moderately positive bias towards these technologies, despite a low frequency of participation in related training initiatives (Ruiz-Rojas et al., 2023; Abbas et al., 2023).

Method

Study Design and Data

The research strategy employed in this study was a comprehensive quantitative analysis aimed at exploring the impact of various predictors on the likelihood of academic staff at the University of Vlora "Ismail Qemali" to adopt AI tools in their future pedagogical and scholarly endeavors (Y1), and their interest in engaging with professional development opportunities related to AI in education (Y2). Specifically, the strategy consisted of a structured approach to data collection through a survey, capturing responses across demographic characteristics (X1, X2), educational background (X3, X4), technological proficiency (X5), perceptions of AI's role in education (X6), past use of AI educational tools (X7), and interest in AI educational tools development (X8).

Table 1 provides an overview of the survey’s items, categories, codes, measurement scales, and response frequencies.

Table 1. Overview of survey items, categories, codes, measurement scales, and response frequencies

Variable	Question	Shorten version of question	Categories	Code	Measurement scales	Frequency
X1	What is your gender?	Gender	Male	1	Nominal	26
			Female	2		69
X2	What is your age?	Age	25-34	1	Ordinal	12
			35-44	2		34
			45-54	3		31
			55 or older	4		18
			Humanities and social sciences	1		22
X3	Which field of study are you currently in?	Field of study	Natural sciences	2	Nominal	23
			Engineering and technology	3		22
			Medical and health sciences	4		11
			Business and economics	5		17
			Master’s degree	1		20
X4	What is your level of education?	Education level	Doctoral degree	2	Ordinal	75
			Beginner	1		1
X5	How would you describe your level of proficiency in using technology?	Technological proficiency	Intermediate	2	Ordinal	15
			Proficient	3		60
			Expert	4		19
			Don’t know	1		3
X6	How do you perceive the role of AI in education?	Perception of AI’s role in education	Worsen	2	Nominal	7
			No impact	3		42
			Moderately	4		39
			Significantly improve	5		12
			Not very likely	1		27
Y1	How likely are you to use AI-powered tools or applications in your studies or teaching in the future?	Educational AI tools adoption likelihood	Somewhat likely	2	Ordinal	56
			Very likely	3		58
			No	0		37
X7	Have you used any AI-powered tools or applications in your studies or teaching?	Past use of AI educational tools	Yes	1	Nominal	5
			No	1		11
			Not sure	2		79
X8	Would you be interested in attending a workshop or training on the use of AI in education?	Interest in attending a professional development opportunities	Yes	3	Ordinal	72
			No	0		23
			Yes	1		

We collected the data by distributing an online survey via Gmail and using computer-assisted self-enumeration, which allowed the academic staff to complete the survey on their own. A sample frame of 145 academic staff members' private email addresses was used for the investigation. The study's sample population consisted of 95 academic staff members who answered the survey.

We executed this procedure from May 11, 2023, to June 22, 2023, using convenience sampling to ensure efficient response collection. Despite this limitation, the results obtained from this sample remain representative of the academic community at the University of Vlora "Ismail Qemali". This method was chosen because of its efficiency and accessibility to a readily available subset of the target population. However, the method's reliance on academic staff who were more readily available or prone to participate introduced the possibility of bias, which may have compromised the sample's representativeness.

Model Analysis and Performance

In pursuit of the research objective—distinguish the direct effects of different predictors on an ordinal outcome variable—the following subsections provide the rigorous statistical methods employed. To determine the relationship between the ordinal outcome variable Y and the predictor variable X , the univariate ordinal logistic regression model, known also as the Proportional Odds Cumulative Logit Model (POLR), was utilized. The formula for the POLR model (McCullagh, 1980; Agresti, 2010; Scott & Freese, 2014) is presented as:

$$P(Y \leq j | X) = \frac{1}{1 + \exp(-(\alpha_j - X\beta))},$$

where $P(Y \leq j | X)$ denotes the probability of the response Y being less than or equal to category j , given predictor matrix X , α_j represent category-specific intercepts (threshold for category j), and β denotes the vector of regression coefficients. For the POLR model (Venables & Ripley, 2002; R Core Team, 2023), the `polr` function from the MASS package in R was used to perform model fitting. By employing the variance-covariance matrix estimate, this method calculates standard errors for ordinal response variables. In order to ensure that the Hessian matrix is computed correctly, the `Hess=true` option is provided. After the model was built, its assumptions were checked to ensure they were met. Throughout the subsequent statistical analysis, a significance level of 0.05 is used as the threshold for statistical significance.

Model Assessment

Through the utilization of various diagnostic tests, the univariate POLR model's adequacy was evaluated. The degrees of freedom were calculated as the discrepancy between the number of observations and the model parameters. t-values were derived for each coefficient in order to assess its significance. The purpose of calculating p-values is to examine the null hypothesis that each coefficient has no impact or is equivalent to zero. This is accomplished through the application of the t-distribution, in which the calculation for the negative absolute value of the t-statistic (Agresti, 2010; Venables & Ripley, 2002) entails doubling the cumulative distribution function value. Odds ratios were calculated by exponentiating the coefficients in order to quantify the influence of predictor variables.

The model's fit was assessed using likelihood ratio tests (LRT) with the `lrtest` function from the `lmtest` package (Zeileis & Hothorn, 2002). This involved comparing a fitted model with a single predictor to a null model consisting simply of the baseline intercept. The objective was to ascertain whether the predictor's inclusion improved the explanatory capability of the model. The LR, defined as

$$LR = -2(\log(L_{\text{null}}) - \log(L_{\text{model}}))$$

compares the log-likelihoods of the fitted model and null (intercept-only) model using a chi-square distribution with degrees of freedom representing the difference in parameter counts between the models. To identify observations that had a large impact on the model's estimates, we performed systematic evaluations as part of the analysis of influence and outliers (Kutner, Nachtsheim, Neter, & Li, 2005). The standard errors for the POLR model coefficients were calculated from the diagonal of the variance-covariance matrix. Influence

measures for each observation were computed by recalculating the model coefficients with each observation excluded in turn. The change in coefficients was normalized by the standard errors, squared, and summed to quantify the influence of each observation.

Outliers were identified using deviance residuals of the model. Residuals that exceeded the 95th percentile of their absolute values were classified as outliers. Influential observations were those where the influence measure exceeded the 95th percentile of all calculated influence measures. Two new models were fitted after removing the outliers and influential points separately. Their quality was evaluated through a comparison of the Akaike Information Criterion (AIC) (Akaike, 1974) values with the original model.

Model Evaluation

We employed a 10-fold cross-validation strategy, facilitated by the caret package (Kuhn, 2008), to assess the predictive capability and generalizability of our univariate ordinal logistic regression model. The data set was partitioned at random into ten subsets. The validation set was assigned to each subset in a sequential manner, and the remaining data was utilized as training. By systematically applying the cross-validation method to each subset, we ensured that each subset served as the validation set exactly once.

This approach aimed to obtain a reliable estimate of the model's predictive accuracy. Using the train function in conjunction with the polr method, the model was trained on nine subsets and its performance was assessed on the tenth subset. A random seed() was established prior to the initiation of model training in order to ensure the reproducibility of our findings. To evaluate the explanatory power of our univariate ordinal logistic regression model, we calculated pseudo-R-squared values using McFadden's (McFadden, 1974), Cox and Snell's (1989), and Nagelkerke's (1991) metrics. Each version of these metrics provides a distinct viewpoint regarding the adequacy of the model:

$$R^2_{\text{McFadden}} = 1 - \frac{\log(L_{\text{model}})}{\log(L_{\text{null}})}$$

$$R^2_{\text{Cox\&Snell}} = 1 - \left(\frac{L_{\text{null}}}{L_{\text{model}}} \right)^{2/n}$$

$$R^2_{\text{Nagelkerke}} = \frac{R^2_{\text{Cox\&Snell}}}{1 - (L_{\text{null}})^{2/n}}$$

where L_{model} and L_{null} are the likelihoods of the fitted and null model, respectively, and n is the sample size.

Results

Model Assessment

The associations between outcome variables (Y1 and Y2) and a variety of predictors (X1, X2, X3, X4, X5, Q6, Q7, and Q8) is investigated using univariate POLR models. The results indicated that only a subset of the predictors (X1, X5, X6, X7, and X8) showed statistically significant associations with the outcome variables (Y1 and Y2). Details related to these models are presented in Table 2.

Assumptions Checks for Univariate Logistic Regression Models

The outcome variables Y1 and Y2 were treated as ordinals, given that their categories possess an inherent order, yet the precise distances between these categories were neither constant nor quantifiable. Furthermore, the assumption of the independence of observations was satisfied, ensuring that the data collected from one participant did not influence the data collected from another. The assumption of linearity in the log-odds of the predictors was not applicable due to the ordinal nature of these variables; in particular, the predictors lacked continuity.

Table 2. Summary of the univariate POLR models for Y1 and Y2

	Component	Estimate	Stand. Error	t-value	Coef. p-value	Odd ratios	Residual Deviance	AIC	LR test p-value
	Coefficients:						173.03	183.03	0.2888
	X5.L**	-8.67	0.33	-25.92	<0.0001	0.0002			
	X5.Q***	7.44	0.38	19.44	<0.0001	1710.4			
	X5.C****	-3.23	0.36	-8.89	<0.0001	0.0397			
	Intercepts:								
Y1~X5	Not very likely Somewhat likely	-5.39	0.32	-17.01	<0.0001				
	Somewhat likely Very likely	-3.79	0.24	-15.57	<0.0001				
	Coefficients:						167.21	173.21	0.0019
	X7Yes	1.35	0.46	2.95	0.0040	3.8647			
	Intercepts:								
Y1~X7	Not very likely Somewhat likely	-1.53	0.33	-4.63	<0.0001				
	Somewhat likely Very likely	0.15	0.26	0.55	0.5833*				
	Coefficients:						155.62	161.62	<0.0001
	X8Yes	3.22	1.05	3.07	0.0028	24.925			
	Intercepts:								
Y1~X8	Not very likely Somewhat likely	-1.62	0.32	-5.13	<0.0001				
	Somewhat likely Very likely	0.12	0.24	0.49	0.6227*				
	Coefficients:						101.77	107.77	0.0393
Y2~X1	X1Female	1.17	0.56	2.08	0.0400	3.2249			
	Intercepts:								
	No Not sure	-2.19	0.54	-4.01	0.0001				
	Not sure Yes	-0.85	0.42	-2.02	0.0459				
	Coefficients:						104.70	114.70	0.7261
Y2~X5	X5.L	-9.00	0.39	-22.73	<0.0001	0.0001			
	X5.Q	6.05	0.46	13.28	<0.0001	425.05			
	X5.C	-2.90	0.55	-5.32	<0.0001	0.0549			
	Intercepts:								
	No Not sure	-6.11	0.46	-13.39	<0.0001				
	Not sure Yes	-4.80	0.31	-15.63	<0.0001				
	Coefficients:						97.51	109.51	0.0747
Y2~X6	X6Worsen	-16.60	0.88	-18.96	<0.0001	<0.0001			
	X6No impact	-15.59	0.64	-24.28	<0.0001	<0.0001			
	X6Moderately improve	-14.06	0.47	-30.14	<0.0001	<0.0001			
	X6Significantly Improve	-13.99	0.49	-28.58	<0.0001	<0.0001			
	Intercepts:								
	No Not sure	-17.31	0.39	-43.44	<0.0001				
	Not sure Yes	-15.89	0.33	-48.58	<0.0001				

*The significance of coefficients relative to intercepts can vary based on the model's objective. Given that the primary interest in this research lies in assessing how particular predictors influence the outcome variable, the significance of these coefficients is deemed more crucial than that of the intercepts; ** "L" stands for "Linear"; *** "Q" stands for "Quadratic"; **** "C" stands for "Cubic"

We excluded the examination of multicollinearity in this context because each model exclusively included a single predictor. Nevertheless, frequency distribution analysis verified the requirement for predictor variability, ensuring that the predictor did not assume a single value across the dataset. Critical to the models' validity, the proportional odds assumption was validated for each model, as indicated by the p-values (>0.05) derived from the Brant test outcomes (see Table 3). The verification results showed a consistent correlation between the predictors and the log-odds of achieving a higher or lower outcome category across all outcome categories.

Table 3. Brant test results

Outcome	Predictor	Omnibus Test χ^2	df	Omnibus Probability	Specific Test for Predictors	Specific Predictor χ^2	Specific Predictor Probability
Y1	X5	0.8	3	0.85	X5.L, X5.Q, X5.C	0, 0, 0	1, 1, 1
	X7	0	1	0.99	X7Yes	0	0.99
	X8	0	1	0.99	X8Yes	0	0.99
	X1	0.56	1	0.46	X1Female	0.56	0.46
Y2	X5	0.03	3	1	X5.L, X5.Q, X5.C	0, 0, 0	1, 1, 1
	X6	5.32	4	0.26	X6Worsen, X6No impact, X6Moderately improve, X6Significantly improve	0, 0, 0, 0	1, 1, 1, 1

The models were assessed by examining them for outliers and influential data points and comparing model fits using AIC values. Table 4 presents the AIC values for each model, detailing the number of detected outliers and influential points. Interestingly, we identified no outliers in any model, as all counts were zero. However, we noted the presence of influential points for each model. When comparing the AIC values of the original models, those without non-existent outliers, and those without influential points, it became clear that removing influential points reduced the AIC values.

Table 4. Comparison of AIC values across models with and without influential observations and outliers

Model description	Y1 ~ X5	Y1 ~ X7	Y1 ~ X8	Y2 ~ X1	Y2 ~ X5	Y2 ~ X6
Original model	183.03	173.21	161.62	107.77	114.70	109.51
Number of outliers	0	0	0	0	0	0
Number of influential points	5	4	4	5	5	5
Model excluding outliers	183.03	173.21	161.62	107.77	114.70	109.51
Model excluding influential observations	159.59	157.74	152.99	68.41	89.89	93.31

Significance of Model Coefficients and Performance Metrics

The examination of POLR models, targeting the predictors X5 (technological proficiency), X7 (past use of AI educational tools), and X8 (interest in AI educational tools development), provided thorough insights into their impact on Y1 (educational AI tools adoption likelihood). For X5, the presence of significant p-values (<0.0001) underscored a strong statistical relationship with Y1. The extreme odds ratios, particularly 1710.4 for the quadratic term, suggested that different levels of technological proficiency had a significant effect on Y1. However, the likelihood ratio test, yielding a p-value of 0.2888, implying that technological proficiency by itself did not significantly improve the model's capacity to explain Y1 compared to a baseline model without any predictors.

In the case of X7, its coefficient, which showed a significant p-value (<0.0001), confirmed its important association with Y1. The odds ratio of 3.8647 for X7Yes underscores that past use of AI educational tools is a strong predictor of their continued use. This conclusion is strongly supported by a likelihood ratio test with a p-value of 0.0019. This results highlights the critical role of prior experience with AI tools in predicting future usage.

For X8, the coefficient's significance (p<0.0001) directly tied the interest in AI educational tools development to educational AI tools adoption likelihood. An odds ratio of 24.925 for X8Yes underscored the impact of this interest on educational AI tools adoption likelihood. Additionally, a marked improvement in the model's fit was observed, as indicated by the likelihood ratio test p-value (<0.0001). Based on the analyses that evaluated the influence of X1 (gender), X5, and X6 (perceptions of AI's role in education) on Y2 (interest in attending AI professional development opportunities), the findings are as follows:

Gender (X1Female) significantly influenced Y2, as indicated by the p-value of 0.0400 and odds ratio of 3.2249; this suggested that females were more inclined than males to attend AI professional development opportunities. This discovery was further supported by the likelihood ratio test ($p = 0.03928$).

For X5, highly significant coefficients and substantial effect sizes, as demonstrated by an odds ratio of 425.053 for X5.Q, indicated that Y2 varied significantly with technological proficiency levels. Yet, the likelihood ratio test ($p=0.7261$) suggested that X5, by itself, did not significantly boost the model’s explanatory capability beyond a baseline model without predictors.

Regarding X6, significant p-values (<0.0001) highlighted its strong impact on interest in attending AI professional development opportunities. Extremely low odds ratios for all categories revealed the significant impediment effect of negative perceptions. However, a likelihood ratio test resulting in a p-value of 0.07472 pointed to only a slight, non-significant model fit enhancement when considering perceptions. This fact underscores the nuanced role of perceptions in influencing interest in attending AI professional development opportunities.

Table 5. Cross-validation method, with 10-fold and performance metrics

Outcome	Cross-validation			Selected Method	Performance metrics		
	Predictor	Accuracy	Kappa		$R^2_{McFadden}$	$R^2_{Cox\&Snell}$	$R^2_{Nagelkerke}$
Y1	X5	0.589	0	cauchit	0.0213	0.0388	0.0459
	X7	0.590	0	cloglog	0.0541	0.0959	0.1135
	X8	0.590	0	cloglog	0.1197	0.1997	0.2365
Y2	X1	0.835	0	cauchit	0.0401	0.0437	0.0650
	X5	0.829	0	cloglog	0.0124	0.0137	0.0204
	X6	0.813	-0.0118 to - 0.025	cloglog	0.0802	0.0856	0.1274

Model Evaluation

Table 5 introduces the cross-validation analysis that evaluated the predictive performance of various models using separate predictors X5, X7, X8 for the outcome Y1, and X1, X5, X6 for Y2. For the outcome Y1, the models achieved moderate accuracy levels around 0.59. However, the zero Kappa statistic suggested that the accuracy might not significantly deviate from chance, indicating limited predictive effectiveness. Predictor X8 seemed to have the greatest predictive power, as shown by its gradually rising pseudo-R-squared values (0.1197, 0.1997, and 0.2365), which means it fits the model better than X5 and X7.

In contrast, the models predicting outcome Y2 displayed higher accuracy, especially the model with predictor X1, which achieved an accuracy of 0.835. Despite this high accuracy, negative Kappa values for predictor X6 warned of potential overfitting or non-generalizability, underscoring the importance of careful interpretation of these metrics. The high pseudo-R-squared values for predictor X1 suggested that it had a lot of explanatory power, which could be a sign of how well it captured important changes in the data.

Discussion

The statistical analysis indicated that predictors—technological proficiency, past use of AI educational tools, and interest in AI educational tools development—all significantly affected the educational AI tools adoption likelihood. Interest in AI educational tools development emerged as the most influential, as evidenced by the highest odds ratio and a significant p-value from the likelihood ratio test, underscoring a strong connection with educational AI tools adoption likelihood. These findings imply that although technological skills and past use of AI educational tools are relevant, a strong interest in AI educational tools development plays a central role in forecasting educational AI tools adoption likelihood. The low accuracy of the predictions and the pseudo-R-squared values found across these models show how hard it is to accurately model educational behaviors.

Moreover, gender emerged as a positive factor for interest in attending AI professional development opportunities, contrasting with the potential impediment effect of negative perceptions of AI’s role in education. Although technological proficiency was important, its isolated impact did not significantly improve model accuracy, revealing the challenges in accurately forecasting interest in attending AI professional development

opportunities. These findings suggest that a more complex approach, such as using multiple predictors or interaction between them, might make likelihood of AI tools adoption and interest in attending AI professional development opportunities, more predictable.

Reflecting on our statistical analysis, which identified technological proficiency, past use of AI educational tools, and especially interest in AI educational tools development as crucial predictors for educational AI tools adoption likelihood, and comparing these with broader research, we reveal similarities and divergences. An evident similarity with a cross-sectional study (Ahmad et al., 2024) lies in the critical gap in AI awareness and its impact on perceptions within higher education, underscoring the universal challenge of cultivating interest in AI. However, while our study highlighted the overall importance of fostering a specific interest in AI educational tools development, further research (McGrath et al., 2023; Chou et al., 2023) dives into the nuanced discrepancies in AI knowledge among educators, influenced by gender and educational settings. These studies suggest that while interest in AI is important, the factors that affect it—such as gender, institution, and learning environment—are also very important. This nuanced view complements our findings by illustrating the varied nature of AI adoption challenges, indicating that efforts to build up AI integration in education must address not only the broad interest and proficiency but also the detailed landscape of educators' experiences and perceptions.

These findings have several practical implications for educational policymakers, curriculum designers, and AI tool developers. Firstly, the essential role of interest in educational AI tools development suggests that educational programs should include components that stimulate and develop this interest, such as project-based learning and real-world problem-solving activities involving AI. Secondly, the positive influence of gender on interest in attending AI professional development opportunities highlights the opportunity to tailor marketing strategies to encourage greater female participation in AI-related education and careers. Lastly, addressing negative perceptions of AI's role in education requires clear communication of AI's benefits and ethical considerations, along with the development of privacy-preserving and inclusive AI tools.

The present study acknowledges some limitations in its investigation. Specifically, the reliance on convenience sampling and the concentration on a single academic university may limit our findings' broader applicability. The structured nature of the primary quantitative approach may not fully capture academic staff's nuanced perspectives on AI integration. Moreover, the exponential progression of AI technologies poses a difficulty in ensuring that our conclusions remain current and pertinent over time.

Conclusion

This research investigated the influence of various factors on the likelihood of academic staff at the University of Vlora "Ismail Qemali" adopting AI tools in future pedagogical endeavors and their interest in professional development related to AI. The study identified significant predictors of educational AI tools adoption likelihood and interest in attending AI professional development opportunities. Here are included: technological proficiency, past use of AI educational tools, interest in AI educational tools development, gender, and perceptions of AI's role in education.

Among these, interest in AI educational tools development emerged as a particularly strong predictor, underscoring the importance of fostering a specific interest in educational AI tools adoption. We found that gender positively influences interest in attending AI professional development opportunities, underscoring the potential to encourage female participation in AI-related education and careers. Conversely, negative perceptions of AI were shown to potentially diminish interest in attending AI professional development opportunities, suggesting a need for clear communication of AI's benefits and ethical considerations.

Emphasizing the critical role of fostering interest in AI educational tools development and addressing gender disparities and negative perceptions, this research informs the development of targeted interventions, training programs, and policies aimed at enhancing educators' skills and readiness for AI integration. Finally, the research underscores the multifaceted nature of academic staff's readiness and interest in AI technologies within academic settings. It reveals the importance of addressing both broad and nuanced factors influencing AI adoption, from technological proficiency to personal attitudes towards AI. By providing a deeper understanding of these dynamics, the study offers a foundation for more effective AI integration strategies in education, fostering an ecosystem that nurtures innovation, inclusivity, and preparedness for the AI-driven future of teaching and learning.

Recommendations

Further research should be conducted to increase the variety of samples and incorporate comparative studies that span different educational contexts in order to increase the generalizability of the findings. The integration of qualitative methods may provide more profound insights into educators' perspectives and encounters with AI. It is advisable to conduct longitudinal studies to track the development of AI technologies and their potential impact on the field of education. We could discern optimal strategies for integrating AI by investigating the efficacy of particular AI interventions implemented in educational environments. To guarantee that technology deployment fosters fairness, safeguards privacy, and enhances educational environments, conducting an in-depth examination of the ethical considerations and inclusiveness of AI tools is essential.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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Enhancing ESL Students' Writing Skills through Natural Language Processing Model Chat GPT

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Abstract: This research paper describes an experimental study to determine the effectiveness of using Chat GPT based natural language processing (NLP) model to improve the writing proficiency of ESL students. The study shows how such approach can be integrated into the teaching process to improve the quality of writing skills. The paper provides an overview of methods of teaching writing according to certain criteria for assessing writing skills. The effectiveness of the model is assessed in comparison with traditional teaching methods. Recommendations are given for optimizing the learning process using NLP technologies. The conclusion highlights the significance of the technology used in improving writing skills and discusses the prospects for using the Chat GPT model to optimize these skills in ESL students.

Keywords: Chat GPT technologies, Methods of teaching writing, ESL students

Introduction

When teaching a foreign language, as it is known, it is necessary to develop four skills simultaneously: listening, reading, speaking and writing. In the contemporary digital age, efficient writing skills undeniably play an integral role in daily communication and are considered the key to success (Graham & Harris, 2023). Their development is necessary for students to communicate in remote settings, starting with social platforms and networks. Competent written communication helps to avoid misunderstandings in both personal and business contexts, which can generally have a positive impact on the future of students.

Moreover, regular writing practice significantly improves oral speech skills, forcing to think about spelling, grammatical phenomena, sentence structure and overall textual coherence. For ESL students the refinement of writing skills tends to trail behind as this skill requires extended vocabulary and involves stylistic flair when necessary to compose a letter or write an essay or article. If speaking skills are possible to develop within the time frame of classes, then writing skills, as a rule, require more time outside the allocated class time as they involve meticulous review of the work, accompanied by comments, analyzing shortcomings and errors, and finally, the assessment in accordance with certain criteria.

The Review of Existing Technologies and Methods of Teaching Writing

High information technologies are a consequence of the inevitable processes of globalization. Modern didactics have long used various innovative forms of teaching such as role-playing game, project method, ICT, critical thinking techniques, etc. Previously, methods for enhancing writing skills included creative writing, project-based learning, problem-based learning method, theory of project learning, discussion methods, in particular, brainwriting as a written form of brainstorming. All *innovative teaching methods* involve interactive and

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computer technologies. *Interactive technologies* encompass scientific, social, professional, integrative and other forms of classes, as well as seminars structured around brainstorming sessions and educational discussions. Computer-assisted learning technologies involve the selection, processing, storage and transmission of information to students. Chat GPT, an artificial intelligence model based on generative pre-trained transformers, which represents one of the pioneering products developed by Open AI artificial intelligence research laboratory established in 2015.

The integration of advanced language models like Chat GPT versions GPT-3.5, GPT-4 and others (Generative Pre-trained Transformer) into language education, contributes to modernizing pedagogical transformations and opens up new technological opportunities in language education. Numerous researchers (Alexander et al., 2023; Baskara & Mukarto, 2023; George et al., 2023; Perkins, 2023.) highlight the benefits associated with the utilization of Chat GPT. Ongoing research endeavors are focused on exploring practical implementation of Chat GPT in the context of foreign language teaching (Kukulska-Hulme, Bossu et al., 2023; Luckin, Cukurova et al., 2022). The positive impact of Chat GPT on language learning lies in its capacity to enhance various aspects of the learning experience, such as improving speaking skills, reading, writing, grammar and pronunciation accuracy (Kohnke et al., 2023).

One of the key focal points in the integration of Chat GPT within language education revolves around to the potential for enhancing students' writing skills through using Chat GPT (Ahmed, 2023). Concurrently, the author highlights a higher level of satisfaction among EFL students with the outcomes achieved through teacher-mediated instruction as opposed to writing assistance provided by Chat GPT. Researchers Y. Xiao and Y. Zhi have reported improved writing quality and language competence using Chat GPT (Xiao & Zhi, 2023). In a separate study D. Yang conducted a study showcasing the extensive application of Chat GPT across various educational tasks, in particular text editing, in which students took help from Chat GPT regarding the structural and content aspects of their essays. Furthermore, Chat GPT has proven useful in providing examples and ideas for strengthening argumentation in written compositions. This feature proves particularly beneficial in large groups, where the number of students constrains personalized attention from the teacher. By offering personalized feedback and suggestions, Chat GPT thereby improves students' learning efficiency, fosters comprehension of linguistic subtleties, and boosts students' capacity to construct coherent and complex texts (Yan, 2023). This tailored approach holds particular significance in language learning, given students' diverse needs and varying learning paces. Notwithstanding the manifold advantages that Chat GPT offers in language learning, a number of challenges have arisen. As pointed out in various studies, despite its advanced capabilities, Chat GPT also does not consistently cater to the different language levels of students (Liu, 2024).

Scientists unanimously still consider Chat GPT as an assistant and a valuable source of learning that can help in the analysis of written work (Marzuki et al., 2023). As a result, it has been argued that the combination of artificial intelligence and human interaction represents a promising approach to improving language teaching learning experiences (Li et al., 2023). It is commonly recognized that conducting a comprehensive analysis of every written work presents a challenge in a sizable group of students. The GPT chat emerges as a viable solution to this issue, given its capability to offer a detailed assessment of all aspects of the written work of each student within the group. Hence, **the objective** of our study is to describe the integration of Chat GPT and its instructional application in learning process aimed at enhancing writing proficiency. The areas of application of Chat GPT for developing writing skills may encompass such activities as vocabulary enrichment, grammar refinement, analyzing written work, writing texts of various styles, fostering independent student work for self-assessment and skill development and, finally, facilitating spelling and grammar checks by teachers of students' essays.

Methodology

Participants

Two groups of undergraduate intermediate level students at the Tourism Department were selected randomly: a controlled group and an experimental group. Each group consisted of ten individuals studying English General Course. Randomization was employed to ensure unbiased presentation. We hypothesized that students who participated in experimental group showcase a greater increase in improvement of their writing skills in terms of formulating their thoughts and structuring texts, creativity and diversity in their written work.

Methods of Learning Using Chat GPT

The teaching method involved feedback from the Chat GPT model, learning through examples using Chat GPT, as well as generating ideas for written text and correcting errors with Chat GPT. The description of the methods includes students learning to analyze and interact with text examples created by the Chat GPT.

Results and Discussion

Evaluating the level of writing among English as a Second Language (ESL) students has been conducted using a diverse set of criteria. The devised general criteria serve to assess the level of writing skills of ESL students aiding in pinpointing areas requiring improvement, and enabling the educator to objectively evaluate students' work. The experiment was conducted with 20 second-year Tourism Department intermediate (B1 level) ESL students, during which the group was divided into control and experimental groups. The experiment took place over the course of two weeks. We used the following criteria to assess students' works.

Grammar and spelling: grammar, accuracy and spelling proficiency encompasses the correct application of verb tenses, subject-predicate agreement, and the appropriate use of articles, prepositions, and other linguistic elements.

Vocabulary: Evaluating vocabulary entails the use of a range of lexical items and precision of word usage. Students have to demonstrate the ability to use a variety of words and expressions to articulate their thoughts and ideas effectively.

Text organization of the text: Assessment of the ability to structure a text and express thoughts cohesively and logically. This criterion includes the use of paragraphs and connecting words and phrases to ensure a coherent flow of ideas throughout the text.

Clarity and accuracy of thought expression: Assessment how accurately and clearly a student expresses his or her thoughts and ideas. This requires clear language and reasoning.

Punctuation: Assessment for proper punctuation usage in the written work.

While studying English grammar and developing grammar proficiency in writing, the students were given the following types of tasks generated by Chat GPT:



Here are some grammar exercises focusing on the passive voice related to the topic of social media impact on society:

Exercise 1:
Rewrite the following sentences using the passive voice:

1. Social media influencers shape consumer behavior.
2. Users share news articles on social media platforms.
3. Companies use social media for marketing their products.
4. Researchers have studied the impact of social media on mental health.
5. People often discuss important issues on social media.

Exercise 2:
Fill in the blanks with the correct passive voice form of the verbs:

1. Many online campaigns _____ (organize) by social media users.
2. The new social media policy _____ (implement) by the company last month.
3. Important information about the event _____ (share) on various social media platforms.
4. Studies on social media trends _____ (conduct) by researchers every year.
5. The impact of fake news on society _____ (discuss) in many online forums.

Figure1. Grammar exercises generated by Chat GPT

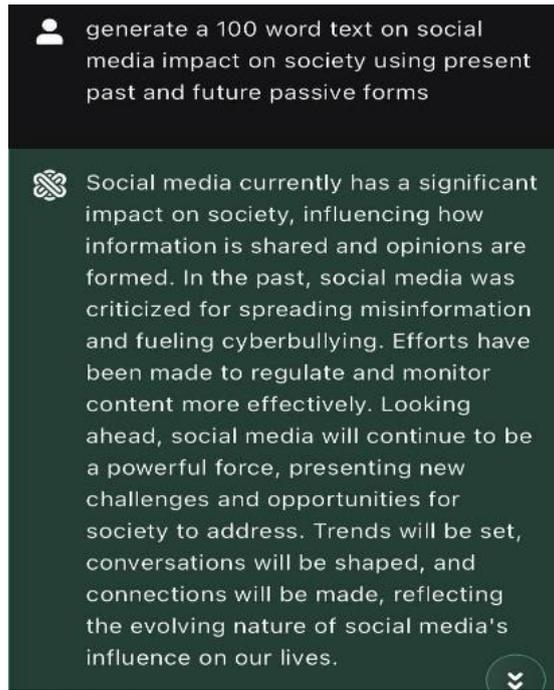


Figure 2. Grammar-based text generated by chat gpt

Provided exercises (Fig.1) aimed at reinforcing passive voice structures. The answers were generated later for the self-test purposes. In comparison to practicing certain grammar structures within sentences, Chat GPT - generated English texts (Fig.2) were also used to allow students to observe their application in a broader context.

In the process of working with **vocabulary**, we compiled a list of words based on the previously given text to practice contextual learning relevant to the topic. Subsequently, exercises (Fig.3) with missing words in the sentences were generated.

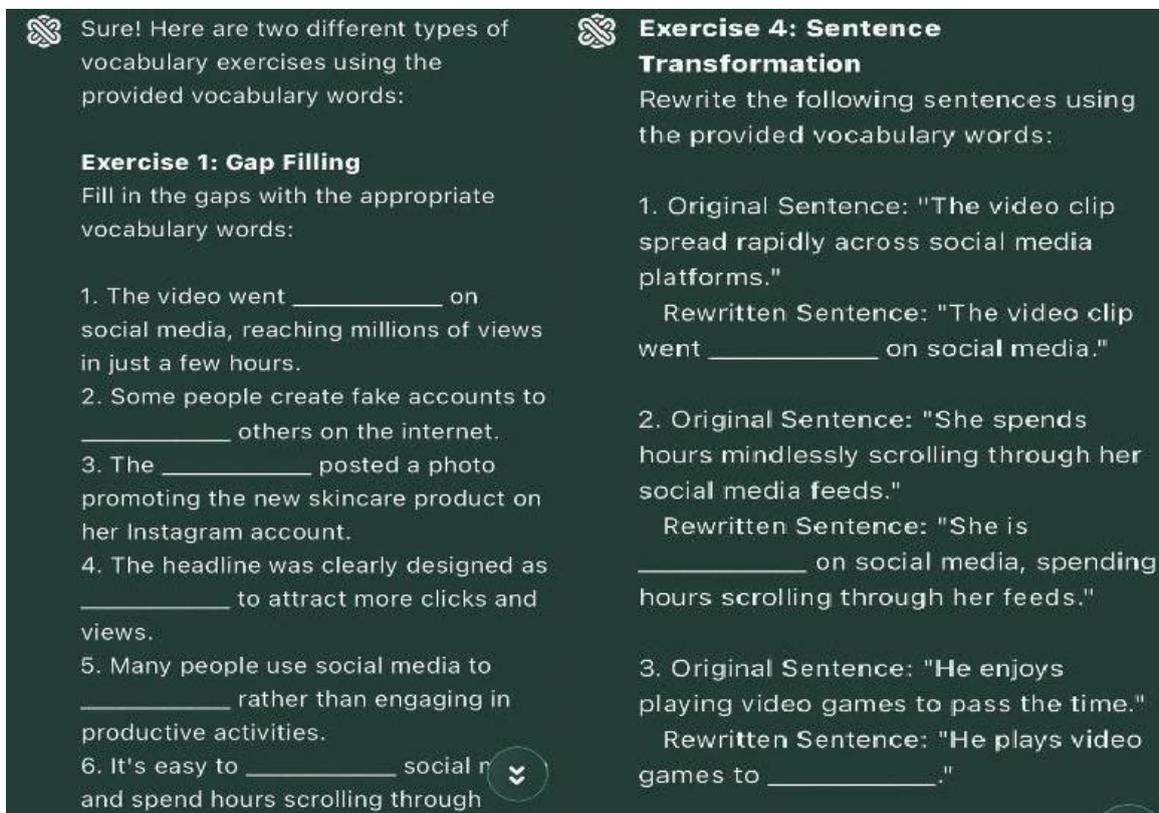
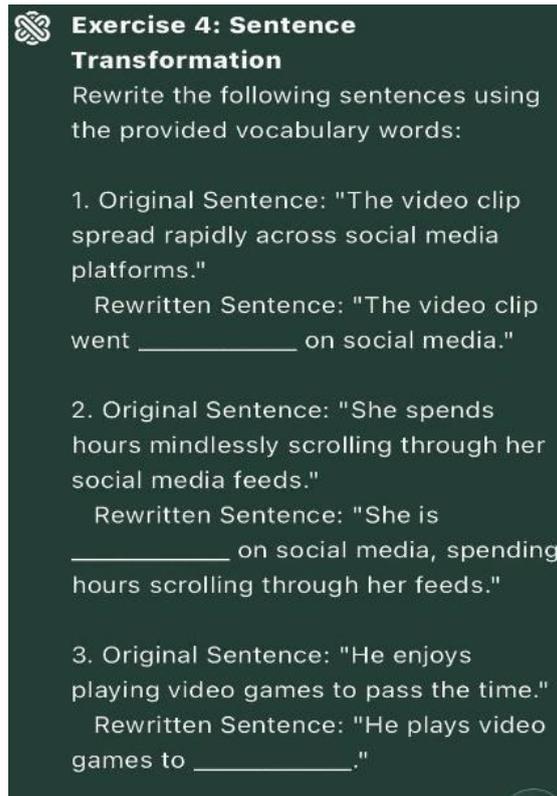


Figure 3. Vocabulary exercises generated by Chat GPT



Exercise 4: Sentence Transformation
Rewrite the following sentences using the provided vocabulary words:

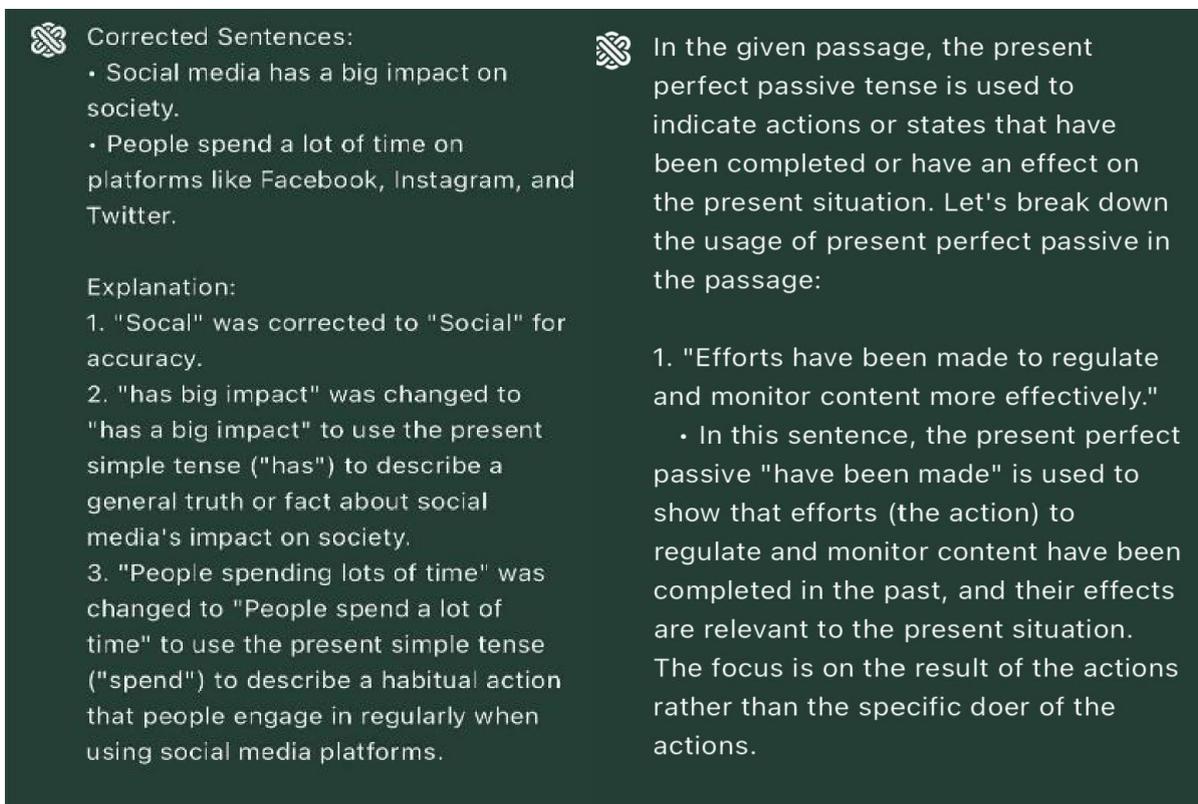
1. Original Sentence: "The video clip spread rapidly across social media platforms."
Rewritten Sentence: "The video clip went _____ on social media."

2. Original Sentence: "She spends hours mindlessly scrolling through her social media feeds."
Rewritten Sentence: "She is _____ on social media, spending hours scrolling through her feeds."

3. Original Sentence: "He enjoys playing video games to pass the time."
Rewritten Sentence: "He plays video games to _____."

Figure 4. Sentence transformation exercises generated by Chat GPT

Using the GPT chat, students were able not only to check their sentences for errors but also to receive the corrected versions along with a brief explanation (Fig.5). In addition, GPT addressed challenges (Fig.6) encountered when using various grammatical structures.



Corrected Sentences:

- Social media has a big impact on society.
- People spend a lot of time on platforms like Facebook, Instagram, and Twitter.

Explanation:

1. "Socal" was corrected to "Social" for accuracy.
2. "has big impact" was changed to "has a big impact" to use the present simple tense ("has") to describe a general truth or fact about social media's impact on society.
3. "People spending lots of time" was changed to "People spend a lot of time" to use the present simple tense ("spend") to describe a habitual action that people engage in regularly when using social media platforms.

In the given passage, the present perfect passive tense is used to indicate actions or states that have been completed or have an effect on the present situation. Let's break down the usage of present perfect passive in the passage:

1. "Efforts have been made to regulate and monitor content more effectively."
 - In this sentence, the present perfect passive "have been made" is used to show that efforts (the action) to regulate and monitor content have been completed in the past, and their effects are relevant to the present situation. The focus is on the result of the actions rather than the specific doer of the actions.

Figure 5,6. Chat GPT corrections along with the explanations.

An additional task was assigned to ESL students of the tourism department aimed at enhancing their writing skills through chat GPT. The task involved composing an essay on the topic of “The Impact of Social Media on Society” students exploring the ways of how social media facilitates the formation of public opinion. Subsequently students had to submit their essays to the chat GPT for error identification, analysis and correction. Following this process, students were to collaboratively analyze and discuss their errors within groups and share the corrected versions with their peers accompanied by reflections on their errors.

Before conducting the main experiment, we collected average data from the control and experimental groups and identified the average outcome of both groups. The works were evaluated based on the following aspects: grammar, vocabulary, text organization, spelling, clarity, and punctuation. The visualization of the prior-experiment's results using a graph allows for the comparison of the writing skill outcomes in both groups before the experiment. Each aspect was assessed on a scale of up to 10 points, following which the group's average statistical data was collected. The final results indicate an average score of 38% (Fig.7) for the control group and 39% for the experimental group (Fig. 8), reflecting the aggregated performance achieved by students in each group across various aspects of written work.

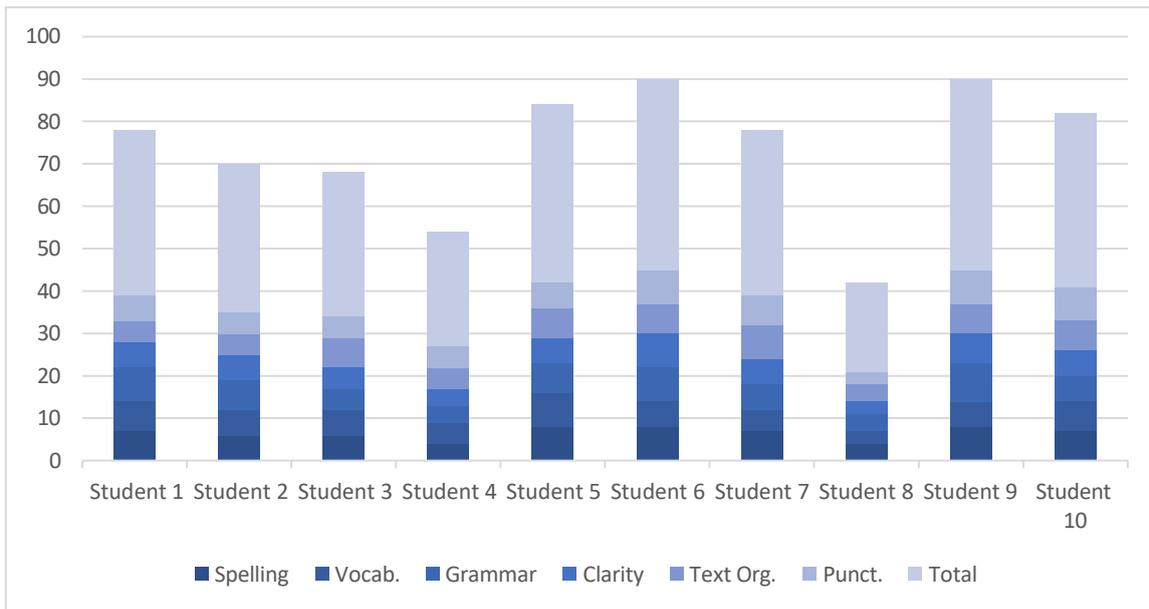


Figure 7. Controlled group pre-experiment data

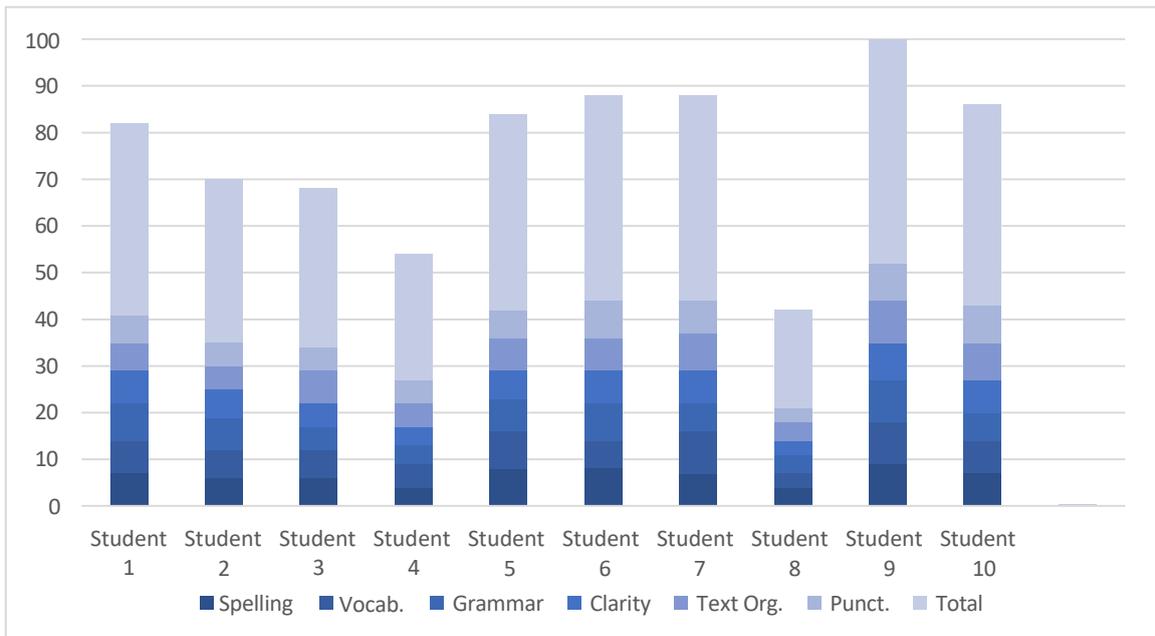


Figure 8. Experiment group pre-experiment data

The comparison of the results of the experimental group's works before and after the experiment, allows us to conclude that the use of the Chat GPT natural language processing model is capable of effectively influencing the development of written language skills across all specified aspects, particularly in the areas of grammar and vocabulary enrichment. After using a textbook and summarizing the work using traditional methods, the data shows 3% result which is less effective than the results of the experimental group.

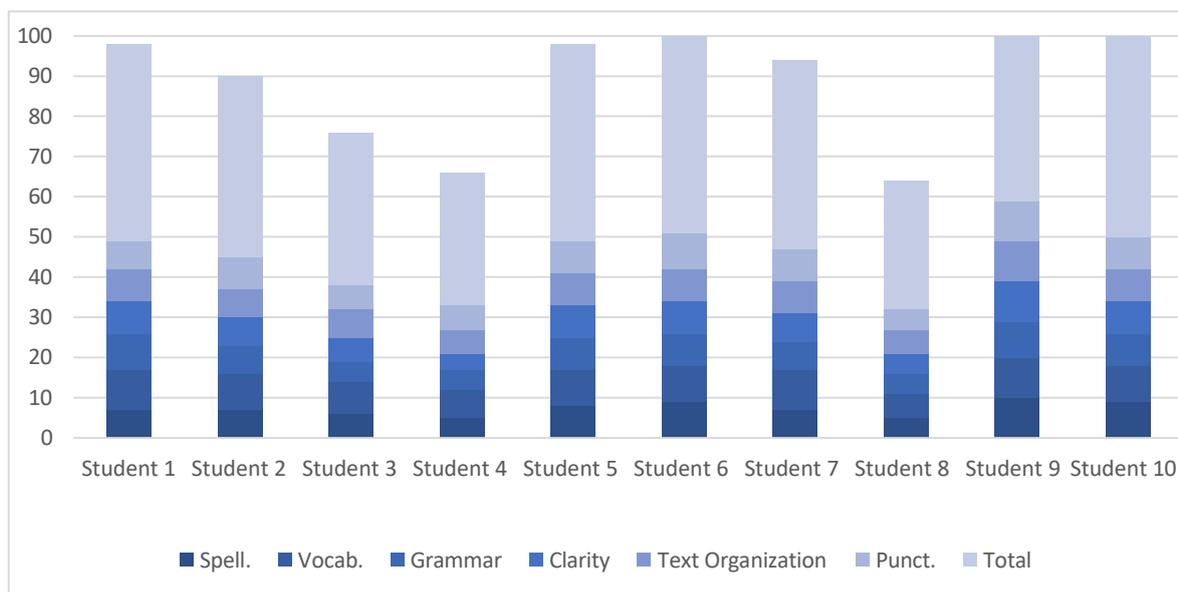


Figure 9. Experiment group post-experiment data

The initial indicator in the control group was 38%, while it was 41% in the average group scores in the same group after the experiment. In the experimental group, before applying Chat GPT, the initial results were 39%, which increased to 45% after the Chat GPT application. This represents a significant increase of 6% in comparison with 3% respectively in the controlled group, indicating the effectiveness of using Chat GPT. The improvement in the performance can be attributed to the heightened motivation and interest of students when engaging with artificial intelligence technology. During the experiment, students had the opportunity to analyze and interact with text examples generated by the model. This interactive learning experience helped them enhance their skills in formulating thoughts and structuring texts, thereby fostering creativity and diversity in their written work. The quality of students' written assignments improved notably, thanks to the prompt feedback and personalized learning provided by the AI technology. Overall, the results demonstrate that integrating artificial intelligence tools like Chat GPT into the learning process can lead to substantial improvements in students' academic performance and skills development.

The difficulties encountered during work can be grouped as follows: adapting to new technologies for some students required some time to adjust. In the context of utilizing chat GPT models, the quality of feedback provided to students plays a pivotal role in their learning outcomes. Ensuring that the feedback generated by the model is accurate, relevant, and clear is crucial for students to make meaningful improvements in their writing skills. Inaccuracies in feedback may arise at times, potentially due to unclear or imprecise instructions given to the model, highlighting the importance of providing detailed and precise input to the system. Moreover, interpreting the feedback generated by chat GPT models can sometimes pose challenges for students. Understanding and applying the feedback effectively require critical thinking and analytical skills. It is essential to address these challenges and provide necessary guidance to students. Ethical considerations also come into play when integrating technology into education. Fairness in evaluating students' work, ensuring data privacy and security, and promoting digital literacy are important aspects to consider when using advanced technologies like chat GPT in educational settings.

Technical issues, such as software malfunctions or limitations in the model's operation, can hinder the learning process and impact students' results. Therefore, proactive measures should be in place to monitor and address technical issues promptly to minimize disruptions and ensure a seamless learning experience for students. To ensure the successful implementation of technology in education, educators should provide comprehensive training and support to students, establish clear guidelines for using the technology, monitor progress regularly, and be ready to adapt strategies based on feedback and outcomes. By addressing these aspects thoughtfully and

proactively, educators can maximize the benefits of integrating technologies like chat GPT into the learning environment

Conclusion

Thus, Chat GPT is a new phenomenon, and yet, despite the emerging novelty of this teaching tool, it is already finding more and more active use in teaching foreign languages. As the experiment has shown, the use of Chat GPT in the practice of teaching writing brings positive results. The potential of an artificial intelligence model in education requires an empirical study of all its capabilities. At the same time, we note that Chat GPT should be considered only as a modern high-tech tool for learning English, which cannot completely replace the interaction with a real teacher.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

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How Leadership and Behavior Impacts and Improves the Decision-Making in Organizations

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Abstract: The purpose of this research article is to analyze the influence of leadership style and behavior on decision-making. In more detail, the impact of leadership style and decision-making skills and competencies on decision-making, respectively on decision-making effectiveness. For the purpose of research, both, quantitative and qualitative methods are applied in the paper. As tool for primary data collection the questionnaire was used and all the data collected were analyzed through SPSS software tool. The research sample consisted from eighty-two (82) respondents-leaders of various businesses in Kosovo. The collected data were analyzed through Statistical Package for the Social Sciences software, respectively through linear regression analysis and other necessary complementary analysis. The findings from the conducted research show that the different leadership styles applied by business leaders have a positive impact on decision-making, namely on the effectiveness of decision-making. According to results obtained, both supportive behaviors and directive behaviors of leaders towards their employees, influence positively the decision-making, depending on the situation with which they face during their work. Meanwhile leaders who possess skills related to decision-making, such as: identifying and analyzing problems, gathering the information necessary to solve problems, generating possible alternatives/solutions, making decisions, the implementation and evaluation of the decisions made, have a higher tendency to be involved in effective decision-making and foster the effectiveness of organizations in general.

Keywords: Leadership, Behavior, Decision making, Competencies

Introduction

Environmental dynamism means rapid and continuous change in demand, competition and technology (Eisenhardt & Bourgeois, 1988; Sputtek, 2012) constitutes the most important context variable that investigates the relationship between the personality of leaders and their behavior, because it directly limits the behavior of leaders (i.e. the degree of inclusiveness they can pursue under time and other constraints arising from environmental dynamism) as well as the degree to which those personal characteristics manifest in their behavior. In more uncertain or dynamic environments, personal characteristics are likely to emerge more than in less dynamic environments (Finkelstein & Hambrick, 1996; Sputtek, 2012).

Massive world changes such as social media, globalization, mobile commerce, geopolitical wars, renewable technologies and smart cars, offshoring, climate change and resource scarcity, telecommuting and virtual teams, cybercrime, redistribution of economic power and others have made today's leaders face challenges they could not even imagine just a few years ago (Daft, 2015) and time is showing that people are the most important

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business resource. Human capital is the greatest competitive potential nowadays and to function as such, conditions must be created so that each individual can use personal characteristics to give the maximum (Kasimati & Manjhari, 2005). The changing nature of organizations involves moving away from an emphasis on command and control of the workforce and toward an environment of training, support, and empowerment of teamwork. This gives an ever-increasing importance to the function of leadership. The leader-follower relationship is reciprocal and effective leadership is a two-way process that affects individual and organizational performance. Leadership is related to motivation and interpersonal behavior (Mullins & Christy, 2016).

Managing people would be very easy if all people were the same, but they differ among themselves because of their abilities, skills, intelligence, personality, preparation and culture (the environment in which they were raised) (Armstrong, 2001). There are also other important differences, such as the needs and demands of individuals, which they distinguish between themselves and which in these people cause reactions in terms of motivation to realize these needs and demands (Havolli, 2014). In this sense, organizational behavior studies the behavior of people in an organization and how this behavior affects the operation of the organization. Since organizational behavior is directly related to employment environments (not voluntary unions, etc.), it studies work-related behavior, absenteeism, job design and change, turnover, productivity, human activity, and management (Kasimati & Manjhari, 2005). The best leaders, at all levels, are those who are genuinely interested in other people and find ways to bring out the best in them. Successful organizations pay attention to developing leaders in the soft skills needed to effectively lead technical people in a changing environment (Daft, 2015). The purpose of this thesis is to elaborate on the topic "How Leadership Style and Behavior Influence Decision-Making and Improve Decision-Making Ability?". More broadly, it talks about the function of leadership and its role for businesses, shows the importance of authority, power and integrity for the function of leadership, talks about organizational behavior as an important discipline for businesses to recognize and devote to special importance. The explanation of leadership styles is based on the situational leadership approach, where two types of behaviors and four types of styles applied by business leaders are presented through the model of this approach. It is also about problem solving and decision-making and decision-making skills that lead to organizational effectiveness.

Research questions:

1. What is the impact of leadership style on effective decision-making in the organization?
2. How does the behavior of leaders affect work results and adequate decisions?
3. How is the relationship between leadership style, behavior and decision-making explained in terms of improving the decision-making skills of leaders?

Literature Review

Defening Leadership

Leadership is the process by which managers motivate subordinates, direct the work of individuals or teams, choose the most effective communication channel, or resolve behavioral issues (Robbins et al., 2014). Leadership is the third basic managerial function. Some people consider leadership to be the most important and challenging function of all other managerial activities. "Leadership is the set of processes used to get organizational members to work together to advance the interests of the organization."

The key point about leadership is that it does not necessarily occur within the hierarchical structure of the organization. It can happen at different levels and manifest in different ways. Many people act as leaders without clearly defining their role (Mullins & Christy, 2016). For example, Belbin (1997) suggests that: there is a clear implication that leadership is not part of the job, but a quality that can be brought to a job... The work that leadership entails in the context is clearly not assigned, but comes to spontaneous way (Belbin, 1997). Radcliff (2010) asserts that leadership is not mysterious, it is completely natural. The guidance is clear and simple. The only qualification to be a leader is the desire to grow. It absolutely does not matter where you are in an organization (Krasniqi & Elezaj, 2023). Leadership is a natural, human activity that is part of all people. There is no need for a certain IQ or job title to be a leader. There are only three aspects to leadership: Future, commitment and delivery.

- First, leadership always starts in the future.
- Second, if the leader wants the help of others to create that future, he must engage them.
- Third, in delivery, the leader makes things happen (Radcliffe, 2010).

Leadership, Authority and Power

To truly understand leadership, we must understand the concept of power and authority. Authority is the right to perform or command, that is, authority comes with the formal job/position in the organization. In contrast, power is the degree to which a person is able to influence others so that they respond to requests. People who pursue personalized power, power directed at helping themselves, as a way to further their own selfish ends, can give the word power a bad name. However, there is another type of power, which is socialized power, the power directed at helping others (Sturm & Antonakis, 2015). Within organizations there are usually five sources of power that can be relied upon by leaders, they are:

- Legitimate power,
- Rewarding power,
- Coercive power,
- Expert power and
- Referent power (Kinicki & Williams, 2020).

Legitimate Power: Influence of Behavior due to One's Formal Position

Legitimate power, which all managers have, is the power that results from managers' formal positions within the organization. All managers have legitimate power over their employees, stemming from their position, whether it is a construction manager, advertising account supervisor, sales manager, or CEO. This power can be exercised both positively and negatively, as praise or as criticism (Kinicki & Williams, 2020).

Rewarding Power: Influencing Behavior by Promising or Giving Rewards

Reward power, which all managers have, is the power that results from managers' authority to reward their subordinates. Rewards can range from praise to pay raises, or even recognition to promotions. Example: Top-performing employees at Home Mortgage Alliance, a Denver-based mortgage lender, are rewarded with a vacation trip each year. Recent destinations have included Hawaii and Mexico (McGhee, 2018).

Coercive Power: Influencing Behavior by Threatening or Punishing

Coercive power, which all managers have, results from managers' authority to punish their subordinates. Punishment can range from verbal or written reprimand to demotion or even termination of employment. Fines and suspensions may be used in some lines of work. Coercive power should be used judiciously, of course, as a manager who is seen as consistently negative will produce a lot of dissatisfaction among employees (George, 2016).

Expert Power: Influence of Behavior due to One's Expertise

Expert power is the power that results from one's specialized information or expertise. Special expertise or knowledge may be common, such as knowing the work schedule and duties of the people who report to you. Or it can be sophisticated, such as have computer or medical knowledge. Administrative assistants may have expert power because, since they have skills and abilities that don't share among other group members (Kinicki & Williams, 2020).

Referent Power: Influence of Behavior due to One's Personal Attractiveness

Referent power is the power derived from one's personal attraction. This type of power characterizes strong, visionary leaders who are able to persuade their followers through their charisma. Referent power can be associated with managers, but it is more likely to be characteristic of leaders (Kinicki & Williams, 2020). It is useful to view referent power as something that can be developed and maintained through good interpersonal relationships, ones that encourage the admiration and respect of others. Simply put, a leader finds it much easier to get people to do what he wants when the leader likes them than when they don't (Schermerhorn, 2013).

Leadership and Integrity

Whether it's called ethical leadership or moral leadership, the lesson is the same: Respect flows to leaders who behave with integrity. If the leader has integrity, he will be honest, trustworthy and consistent in everything he does (Schermerhorn, 2013). CEO coach Kenny Moore says that our personal character is "revealed by how we treat those without power." Take a close look at how people in leadership positions treat everyday workers - for example waiters, technicians, janitors and clerks. Moore says that the ways we deal with people who are powerless "reveal our real tendencies" (Schermerhorn, 2013).

The "line of integrity" in the figure marks the difference between where a leader should and should not be. Below the line are leaders who lie, blame others for personal mistakes, want others to fail, and take credit for others' ideas. They are conceited and they are also selfish. Above the line of integrity are honest, consistent, humble and selfless leaders. Some call such leaders "servants" of the organization and its members (Craig & Gustafson, 1998; Schermerhorn, 2013).

Problem Solving and Decision Making?

"Decision-making is about analyzing and defining the situation or problem, identifying possible courses of action, weighing them, and determining a course of action" (Armstrong, 2012, p. 290). Managers' ability to solve problems and make decisions rationally has long been assumed to be one of the valuable products of work experience. But close observation of their actual practices has shown that even experienced managers are likely to be very unsystematic when dealing with problems and decisions. And their hit-or-miss methods often produce decisions based on wrong conclusions, which means that the decisions must also be wrong (Stryker, 2001). Armstrong (2012) presented and explained the twelve (12) steps of problem solving, which are:

1. Defining the situation - determining what has gone wrong or what will go wrong.
2. Setting objectives - determining what needs to be achieved now or in the future to deal with a current or potential problem or a change in circumstances.
3. Development of hypotheses - hypotheses are developed about what caused the problem.
4. Fact-finding - finding out what actually happened and comparing this with an estimate of what should have happened. This is easier said than done. Insidious political factors may have contributed to the problem and may be difficult to identify and address. The facts may not be clear. They can be obscured by a mass of contradictory materials. There may be many opinions but few verifiable facts.
5. Analyzing the facts - determining what is important and what is unimportant, diagnosing the cause or possible causes of the problem, testing any assumptions, distinguishing opinions and facts, and digging out what lies behind the problem.
6. Identifying possible courses of action - showing what each involves.
7. Evaluation of alternative courses of action - evaluate the extent to which they can achieve the objectives, the cost of implementation, any practical difficulties that may arise and the possible reactions of interested parties.
8. Weighing and deciding - determining which alternative is likely to result in the most practical and acceptable solution to the problem. This is often a balanced judgement.
9. Setting the objectives - the goals for the implementation of the decision are defined.
10. Adopt a "means-ends" approach where appropriate - in complicated situations with long-term implications it can be useful to identify the steps required and select an action at each step that will bring the process closer to the goal .
11. Implementation of the plan - a time plan is prepared and the required resources are identified and collected.
12. Implementation - monitor progress and evaluate success.

Effective leaders don't make too many decisions. They focus on what is important and try to make some important decisions at the highest level of conceptual understanding. They try to find the constants in a situation, to think about what is strategic and generic instead of "solving problems" (Drucker, 2001). People don't all think the same way. Understanding one's own thinking style and the styles of others around him will give the leader some valuable leadership tools. The term "thinking style" does not refer to a person's IQ, but to the way they process information (Osborne, 2015). We can broadly distinguish three styles of thinking, which are:

- Tactical thinking style,
- Style of operational thinking and

- Strategic thinking style (Osborne, 2015).

Table 1. Definition of thinking styles

Styles	Characteristics	Questions made
Tactical	Accepts direction Focuses on how to achieve a goal Plans and thinks every action logically	How can we achieve the best result in the shortest time? How can we organize the actions in a clear plan? What are the most important things to do or coordinate?
Operacional	See opportunities for action and improvement Focuses on practical actions and application in complex situations	What action can we take? What should be done? When can we start?
Strategic	Thinks every problem from first principles Redefines problems and confidently challenges issues upwards	What if...? Why have we excluded these other courses of action? Why not do this instead? Who else should be involved?

Most people tend to get stuck using only one of the thinking styles. But by recognizing his own thinking style, the leader begins to ask different questions and think about problems in new and exciting ways. By doing this, he works more effectively with his team because I can understand how they think and communicate and can speak to people in their “language” (Osborne, 2015).

Research Methodology

The methodology of this paper is based on the theoretical part, which summarizes an analysis of the existing literature that deals with the topic related to the influence of leadership styles and behavior on adequate decision-making and improving the skills of leaders for effective decision-making. Also, to achieve the goal of the paper, a study was conducted with the leaders of eighty (80) businesses in Kosovo. The conducted study has enabled the analyzed theory to be supported with concrete and practical results. Quantitative and qualitative methods in scientific research are applied in the paper. The questionnaire was used as a research instrument. The questionnaire contains 21 questions, including questions related to the demographic information of the respondents, as well as questions related to the analyzed issues. To collect the primary data, about two hundred and forty (240) questionnaires were distributed, so this number includes the population, while we received answers in eighty-two (82) of them. So, the sample of the research was the eighty-two (82) leaders of different businesses in Kosovo, through whose survey we managed to collect the primary data for this study. With the collected data, a database was created in the SPSS (Statistical Package for the Social Sciences) software. Data analysis was performed in this software. In order to analyze the influence of leadership style and behavior in decision-making, the following hypotheses have been raised:

- Hypothesis 1: Leadership styles applied by business leaders positively affect decision-making, namely the effectiveness of decision-making.
- Hypothesis 2: Leaders' supportive behaviors make employees participate more in the decision-making process, which positively affects decision-making.
- Hypothesis 3: Leaders' directive behaviors towards their employees reduce the effectiveness of decision-making.
- Hypothesis 4: Leaders who possess skills related to decision-making, such as: identification and analysis of problems, collection of information necessary to solve problems, generation of alternatives/possible solutions, decision-making, implementation and evaluation of decisions made, have a higher tendency to be involved in effective decision making.

To prove the raised hypotheses, a research model was built and through linear regression analysis, the relationship between the variables included in the model was seen.

Thus, the research model has the form: $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$

Where:

- Y - Decision making (dependent variable)
- X₁ - Leadership style (independent variable)

- X_2 - Supportive behaviors (independent variable)
- X_3 - Directive behaviors (independent variable)
- X_4 - Decision-making skills (independent variable)
- β_0 - is a constant coefficient that shows what the value of Y will be when X_1, X_2, X_3 and $X_4 = 0$.
- β_1 - is the coefficient of the research model that shows what the value of Y will be when X_1 changes by 1 unit, keeping the variables X_2, X_3 and X_4 constant.
- β_2 - is the coefficient of the research model that shows what the value of Y will be when X_2 changes by 1 unit, keeping the variables X_1, X_3 and X_4 constant.
- β_3 - is the coefficient of the research model that shows what the value of Y will be when X_3 changes by 1 unit, keeping the variables $X_1, X_2,$ and X_4 constant.
- β_4 - is the coefficient of the research model that shows what the value of Y will be when X_4 changes by 1 unit, keeping the variables X_1, X_2 and X_3 constant.
- ε - is the error term that sums up all other factors that may have an impact on Y, but which were not taken into account in the research model.

After explaining the variables, the research model takes the form:

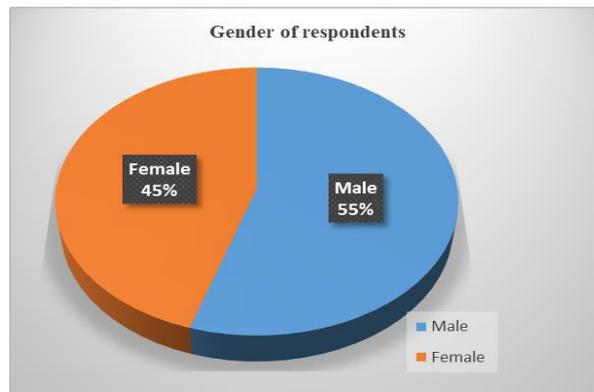
$$\text{Decision Making} = \beta_0 + \beta_1 \text{ Leadership Style} + \beta_2 \text{ Supportive Behaviors} + \beta_3 \text{ Directive Behaviors} + \beta_4 \text{ Decision Making Skills} + \varepsilon$$

Results and Discussion

At the beginning, the demographic data of the respondents are presented, which are followed by graphical, tabular presentations and by the interpretation of the analyzed aspects and issues, as well as by the results of the research model, which make clear the influence of the leadership style and behavior of leaders in decision-making, namely in making effective decisions.

Table 2. Gender of respondents

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
	45	54.9	54.9	54.9
F	37	45.1	45.1	100.0
Total	82	100.0	100.0	

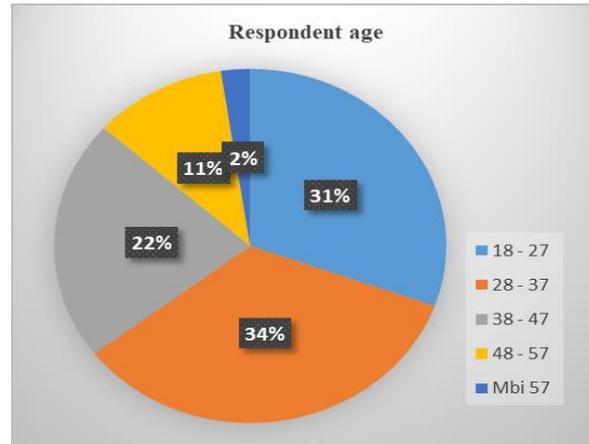


Graph 1. Gender of respondents

Table 2 and Graph 1 show the results for the gender of the respondents, from which it can be seen that out of a total of 82 business leaders surveyed, 54.9% were male and 45.1% were female.

Table 3. Respondent age

Age	Frequency	Percentage	Valid Percentage	Cumulative Percentage
18 - 27	25	30.5	30.5	30.5
28 - 37	28	34.1	34.1	64.6
38 - 47	18	22.0	22.0	86.6
48 - 57	9	11.0	11.0	97.6
Mbi 57	2	2.4	2.4	100.0
Total	82	100.0	100.0	

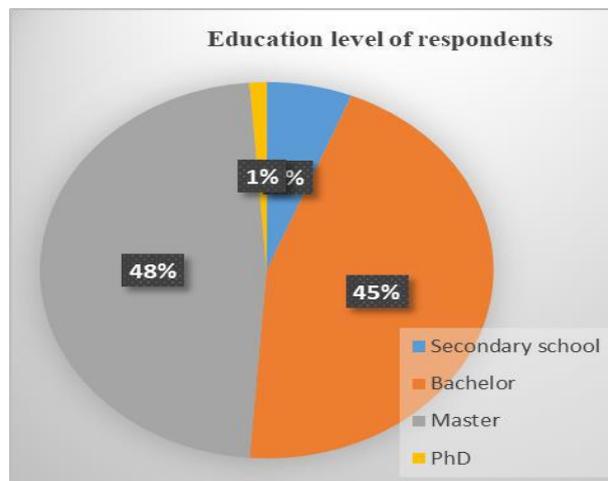


Graph 2. Respondent age

Table 3 and graph 2 show the results related to the age of the respondents. According to the results, out of 82 respondents, 30.5% of the respondents were aged 18 - 27 years old, 34.1% were aged 28 - 37 years old, 22.0% were aged 38 - 47 years old, 11.0% were aged 48 - 57 years old. and 2.4% of them were aged over 57 years.

Table 4. Education level of respondents

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Sec'school	5	6.1	6.1	6.1
Bachelor	37	45.1	45.1	51.2
Master	39	47.6	47.6	98.8
PhD	1	1.2	1.2	100.0
Total	82	100.0	100.0	

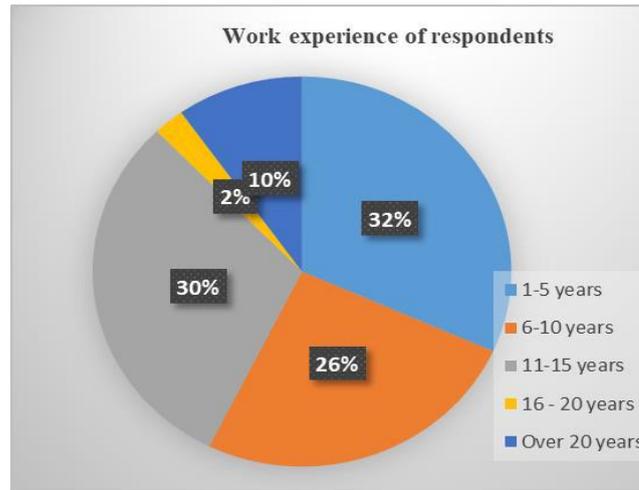


Graph 3. Education level of respondents

As for the level of education of the respondents, from the results of table 4 and graph 3, it can be observed that 6.1% of the respondents have secondary education, 45.1% of them have completed bachelor's studies, 47.6% have completed master's studies and 1.2% have completed doctoral studies.

Table 5. Work experience of respondents

Years of work	Frequency	Percentage	Valid percentage	Cumulative percentage
1 - 5	26	31.7	31.7	31.7
6 - 10	21	25.6	25.6	57.3
11 - 15	25	30.5	30.5	87.8
16 - 20	2	2.4	2.4	90.2
Over 20	8	9.8	9.8	100.0
Total	82	100.0	100.0	

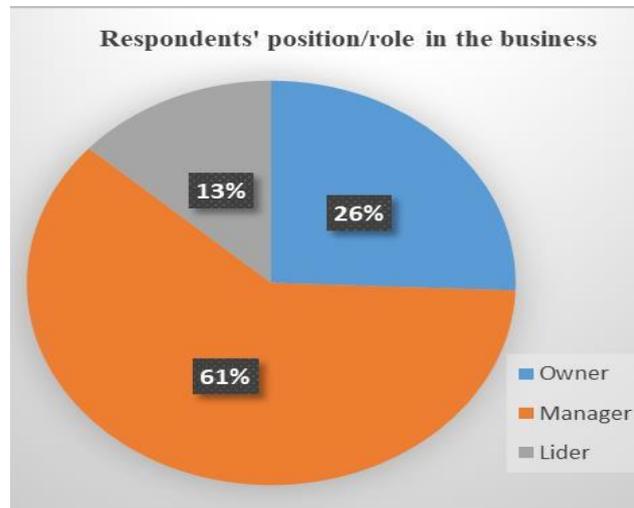


Graph 4. Work experience of respondents

Regarding the work experience of the respondents, we see the results of table 5 and graph 4 and we say that 31.7% of the respondents have 1 - 5 years of work experience, 25.6% of them have 6 - 10 years of work experience, 30.5% have 11 - 15 years of work experience, 2.4% have 16 - 20 years of work experience and 9.8% of them have over 20 years of work experience.

Table 6. Position/role of respondents in business

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Owner	21	25.6	25.6	25.6
Manager	50	61.0	61.0	86.6
Lider	11	13.4	13.4	100.0
Total	82	100.0	100.0	

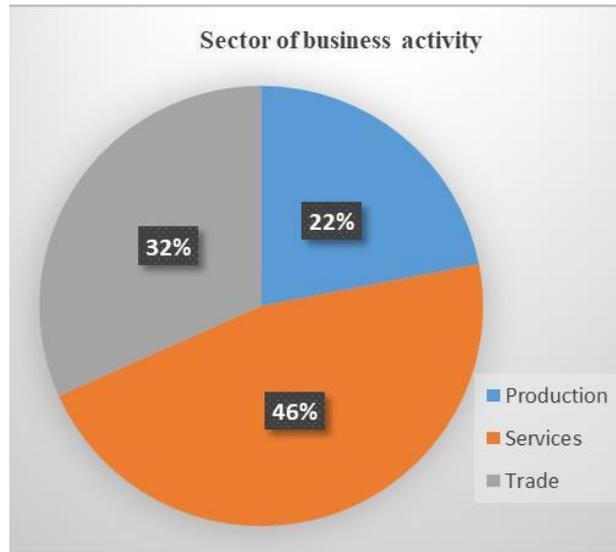


Graph 5. Respondents' position/role in the business

The respondents were asked what is the position or role they have in the business and it turned out that 25.6% of them exercised the role of business owner, 61.0% were business managers and 13.4% had the role of leader in the business (see table 6 and graph 5)

Table 7. Sector of business activity

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Production	18	22.0	22.0	22.0
Services	38	46.3	46.3	68.3
Trade	26	31.7	31.7	100.0
Total	82	100.0	100.0	

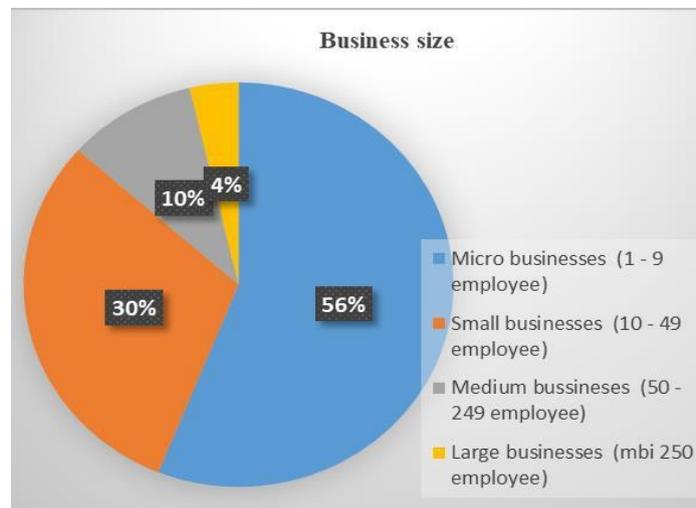


Graph 6. Sector of business activity

Table 7 and graph 6 show the results for the activity sector of the surveyed businesses. From here we see that 22.0% of the businesses developed their activity in the manufacturing sector, 46.3% of them developed their activity in the service sector and 31.7% developed their activity in the commercial sector.

Table 8. Business size

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Micro businesses (1 - 9 employee)	46	56.1	56.1	56.1
Small businesses (10 - 49 employee)	25	30.5	30.5	86.6
Medium bussineses (50 - 249 employee)	8	9.8	9.8	96.3
Large businesses (mbi 250 employee)	3	3.7	3.7	100.0
Total	82	100.0	100.0	



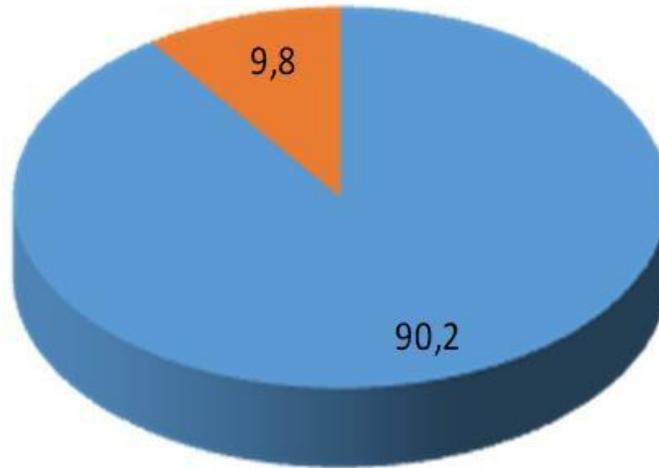
Graph 7. Business size

Table 9. Leadership, the most important function

Of the four (4) functions of the management process, which are: planning, organizing, leading and controlling, do you think that leading is the most important function?

	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Yes	74	90.2	90.2	90.2
No	8	9.8	9.8	100.0
Totali	82	100.0	100.0	

The size of the businesses surveyed varied. Thus, from table 9 and graph 7 we see that 56.1% of surveyed businesses were micro businesses with 1 - 9 employees, 30.5% were small businesses with 10 - 49 employees, 9.8% were medium businesses with 50 - 249 employees. employed and 3.7% were large businesses with over 250 employees.

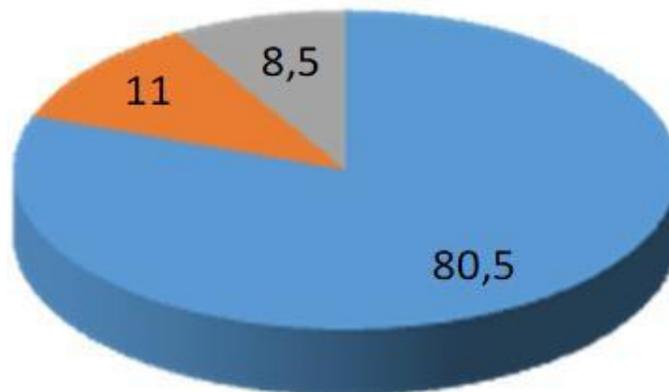


Graph 8. Leadership, the most important function

For the statement "Of the four (4) functions of the management process, which are: planning, organizing, leading and controlling, do you think that leading is the most important function?" it resulted that 90.2% of the leaders surveyed answered "Yes" and 9.8% of them answered "No" (see table 10 and graph 8), that is, most of them agree that leadership is a very important function of management process as it deals with people within businesses.

Table 10. The effective leader must have

To influence others, an effective leader must have:				
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Autority	66	80.5	80.5	80.5
Pover	9	11.0	11.0	91.5
Position	7	8.5	8.5	100.0
Total	82	100.0	100.0	



Graph 9. The effective leader must have..

To influence others, an effective leader must have: authority, power or power. Regarding this, the respondents gave their opinion and it turned out that 80.5% of the leaders surveyed thought that in order to influence others, an effective leader should have authority over his employees, 11.0% of them thought that the leader should have or exercise power over employees and 8.5% thought that the leader should have power (see table 10 graph 9).

Table 11 gives the results of the correlation analysis of the variables included in the research model. From these results it emerged that:

- There is a very weak positive correlation of 0.002 between "Decision making" and "Leadership style". This statement is not correct because the significance value is 0.493, i.e. higher than the standard p-value of 0.05.
- There is a medium positive correlation of 0.530 between "Decision Making" and "Supportive Behaviors". This statement is correct because the significance value is 0.000.

Table 11. Correlation analysis

		Decision making	Leadership style	Supportive behaviour	Directive behaviour	Decision making skills
Pearson Correlation	Decision making	1.000	.002	.530	-.051	.595
	Leadership style	.002	1.000	.029	-.431	.007
	Supportive behaviour	.530	.029	1.000	.001	.454
	Directive behaviour	-.051	-.431	.001	1.000	-.045
	Decision making skills	.595	.007	.454	-.045	1.000
Sig. (1-tailed)	Decision making	.	.493	.000	.324	.000
	Leadership style	.493	.	.398	.000	.475
	Supportive behaviour	.000	.398	.	.497	.000
	Directive behaviour	.324	.000	.497	.	.346
	Decision making skills	.000	.475	.000	.346	.
N	Decision making	82	82	82	82	82
	Leadership style	82	82	82	82	82
	Supportive behaviour	82	82	82	82	82
	Directive behaviour	82	82	82	82	82
	Decision making skills	82	82	82	82	82

- There is a very weak negative correlation of -0.051 between "Decision Making" and "Directive Behaviors". This statement is not correct as the significance value of 0.324 is higher than the standard p-value of 0.05.
- There is a medium positive correlation in the value of 0.595 between "Decision making" and "Decision making skills" and this statement is correct because the significance value is 0.000.
- There is a very weak positive correlation of 0.029 between "Leadership Style" and "Supportive Behaviors" and such statement is not correct because the significance value is found to be 0.398.
- There is a weak negative correlation of -0.431 between "Leadership Style" and "Directive Behaviors", this statement is correct based on the significance value which is 0.000.
- There is a very weak positive correlation in the value of 0.007 between "Leadership style" and "Decision-making skills", but this statement is not correct because the significance value was found to be 0.475.
- There is a very weak positive correlation of 0.001 between "Supportive Behaviors" and "Directive Behaviors". This statement is not correct since the significance value in this case is 0.497.
- There is a medium positive correlation of 0.454 between "Supportive Behaviors" and "Decision-Making Skills". This statement is accepted since the significance value is 0.000.
- There is a very weak negative correlation of -0.045 between "Directive Behaviors" and "Decision Making Skills". This statement is incorrect because the significance value is 0.346.

Table below shows the model summary of data and variabls included in the reserach.

Table 12. Model summary

Model Summary ^b										
Change Statistics										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. Change	F Durbin-Watson
1	.664 ^a	.441	.412	.631	.441	15.177	4	77	.000	2.064

a. Predictors: (Constant), Decision making, Leadership style, Supportive behaviour, Directive behaviour, Decision making skills

b. Dependent Variable: Decision making

Table 12 shows important results such as: the correlation coefficient (R), the determination coefficient (R²), the significance of the research model and the Durbin-Watson coefficient. Based on the obtained results we say that:

- Correlation coefficient (R = 0.664) - shows that all variables included in the model have a correlation of 66.4%.
- Coefficient of determination (R² = 0.441) - shows that "Leadership style", "Supportive behaviors", "Directive behaviors" and "Decision-making skills", as independent variables, explain "Decision-making",

as a dependent variable, at a level of 44.1%. The remaining percentage of 55.9% summarizes in the error term (ϵ) all other variables that can influence "Decision making", but which are not taken into account in the model.

- Significance of the research model (Sig. F Change = 0.000) - indicates that for a significance level of 5%, the research model is statistically reliable and acceptable.
- The Durbin-Watson coefficient (Durbin-Watson = 2.064) - shows that in the research model there is no autocorrelation or interdependence between independent variables since the resulting value is within the range 1.5 - 2.5, respectively 2.064.

Table 13. Anova Test

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.150	4	6.037	15.177	.000 ^b
	Residual	30.631	77	.398		
	Total	54.780	81			

a. Dependent Variable: Vendimmarja

b. Predictors: (Constant), Decision making, Leadership style, Supportive behaviour, Directive behaviour, Decision making skills

In table 13 we focus on the Sig value. = 0.000 and we fully prove that the research model is significant at the 5% confidence level.

Table 14. Coefficients of the research model

Model		Unstandardized Coefficients		Standardized Coefficients		95.0% Confidence Interval for B		Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	.921	.658		1.400	.165	-.389	2.232		
	Leadership style	-.062	.195	-.030	-.319	.751	-.450	.326	.813	1.230
	Supportiv behaviour	.306	.089	.329	3.438	.001	.129	.483	.792	1.263
	Directive behaviour	-.097	.206	-.045	-.473	.637	-.506	.312	.811	1.233
	Decision making skills	.487	.105	.444	4.632	.000	.277	.696	.791	1.264

a. Dependent Variable: Decision making

Table 14 shows the results of the coefficients of the research model and their significance. From the obtained results we say that:

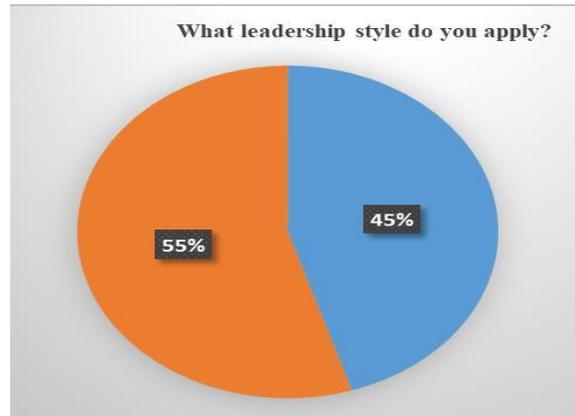
- β_0 - is a constant coefficient which does not have any logical meaning and is not important for research.
- β_1 - shows that "Leadership style" negatively affects "Decision-making", keeping constant or unchanged the other three variables, namely "Supportive behaviors", "Directive behaviors" and "Decision-making skills". However, it turned out that the significance of this coefficient has a value of 0.751. This value is higher than the standard value $p = 0.05$ and we say that in this case the opposite is true, i.e. "Leadership style" positively affects "Decision-making".

Since the leadership styles in this paper were analyzed based on the situational leadership approach model, namely the SLII® model (Situational Leadership® II - Situational Leadership II), then the focus here was to see what leadership style business leaders apply by was based on this model, as well as which element of the situational leadership model characterizes their leadership style more.

Table 15. Leadership style

What leadership style do you apply?				
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Dirtecrive style	16	19.5	19.5	19.5
Suportive style	66	80.5	80.5	100.0
Total	82	100.0	100.0	

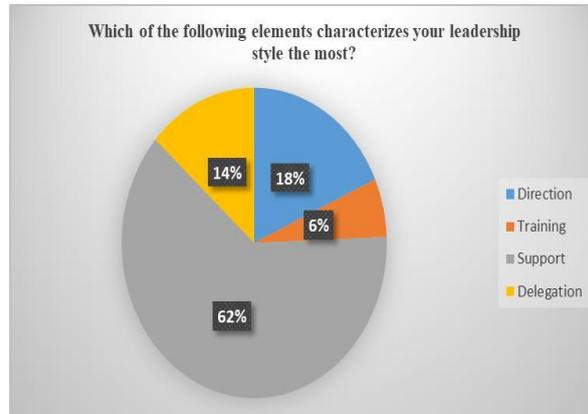
According to the results presented in Table 15 and Graph 10, we say that out of 82 surveyed leaders, 19.5% exercised a directive leadership style and 80.5% of them exercised a supportive leadership style.



Graph 10. What leadership style do you apply?

Table 16. Characteristics of leadership style

Which of the following elements characterizes your leadership style the most?				
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Direction	15	18.3	18.3	18.3
Training	5	6.1	6.1	24.4
Support	51	62.2	62.2	86.6
Delegation	11	13.4	13.4	100.0
Total	82	100.0	100.0	



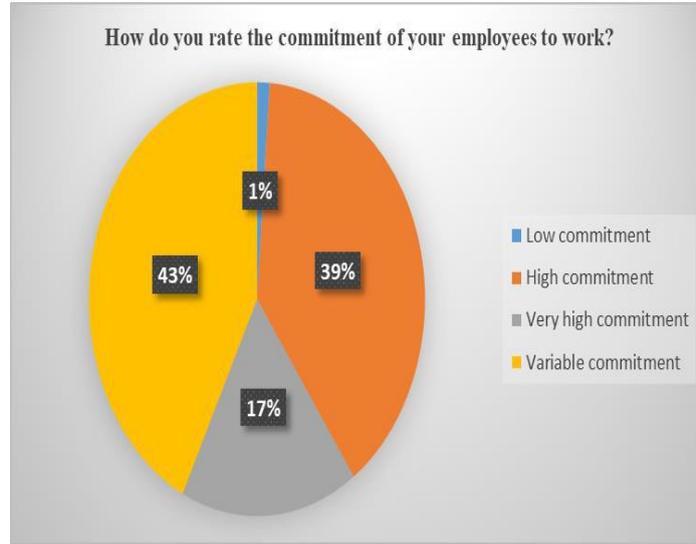
Graph 11. Leadership style characteristics

After declaring the leadership style, the surveyed leaders were asked which element characterized their leadership style the most, and it turned out that the leadership style of 18.3% of leaders was characterized by direction, the leadership style of 6.1% of leaders was characterized by training, the leadership style of 62.2% of leaders was characterized by support and the leadership style of 13.4% of leaders was characterized by delegation (see Table 16 and Graph 11).

Table 17. Employee commitment

How do you rate the commitment of your employees to work?				
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Low commitment	1	1.2	1.2	1.2
High commitment	32	39.0	39.0	40.2
Very high commitment	14	17.1	17.1	57.3
Variable commitment	35	42.7	42.7	100.0
Total	82	100.0	100.0	

For the analysis of these elements of the leadership style, we have based the SLII® model (Situational Leadership® II - Situational Leadership II). In order to fulfill this model, we also obtained information about the commitment of employees to their work (see Table 17 and Graph 12).



Graph 12. How do you rate the commitment of your employees to work?

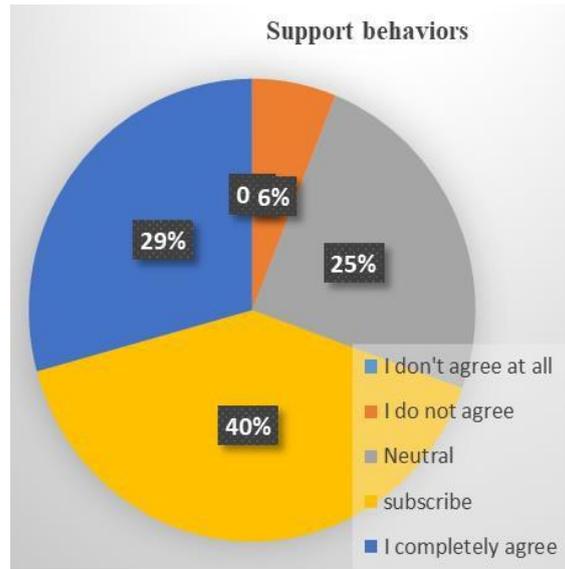
From the above results, it has emerged that in 1.2% of cases, leaders rate their employees' dedication to work as low, in 39.0% of cases they rate it as high, in 17.1% they rate it as very high and in 42.7% they rate it as variable commitment. Based on the above findings, we have drawn up the following figure (figure 7) where the distribution of leaders' styles and behaviors in the quadrants of the SLII® model, as well as the commitment of employees, can be clearly seen. This figure was drawn up and summarized based on the results of Table 16, Graph 11, Table 17, Graph 11, Table 18 and Graph 12. Figuratively here we can see placed in the corresponding squares of the SLII® model the resulting percentages related to leadership styles and behaviors of surveyed business leaders in Kosovo. As we mentioned above, the majority of Kosovar leaders exercise a supportive style towards their employees (80.5%), their leadership style in most cases is characterized by the element of supporting their employees (62.2%), rich in leadership (18.3%), delegation (13.4%) and training (6.1%). Also, in the lower part of the figure, we presented the assessment made by the leaders regarding the commitment of their employees to work, and we saw that it resulted that in most cases the employees showed variable commitment to work (in 42.7% of cases), rich in high commitment (in 39.0% of cases), very high commitment (in 17.1% of cases) and low commitment (in 1.2% of cases) (see figure 7 in summary).

Based on the result of the β_1 coefficient and the above elaboration of the aspect of leadership styles applied by business leaders, we say that Hypothesis 1 is accepted: The leadership styles applied by business leaders have a positive effect on decision-making, namely on the effectiveness of decision-making.

- β_2 - shows that "Supportive Behaviors" positively affect "Decision-Making", keeping the other three variables constant, namely "Leadership Style", "Directive Behaviors" and "Decision-Making Skills". This statement is accepted because the significance of this coefficient is 0.001.

Table 18. Supportive behaviors

Leaders' behaviors that allow a close and friendly relationship with their employees, i.e. through which they provide support, make employees participate more and more effectively in the decision-making process.				
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
I don't agree at all	0	0.0	0.0	0.0
I do not agree	5	6.1	6.1	6.1
Neutral	20	24.4	24.4	30.5
subscribe	33	40.2	40.2	70.7
I completely agree	24	29.3	29.3	100.0
Total	82	100.0	100.0	



Graph 13. Support behaviors

According to the result of table 18 and graph 13 regarding the statement that: "The behaviors of leaders that allow a close and friendly relationship with their employees, i.e. through which they provide support, make employees participate more and more effectively in the decision-making process ", it turned out that 0.0% of the surveyed leaders "do not agree at all", 6.1% "disagree", 24.4% are "neutral" for this statement, 40.2% "agree" and 29.3% "completely agree". From here we prove that Hypothesis 2 is predicted: The supportive behaviors of leaders make employees participate more in the decision-making process, which positively affects decision-making.

- β_3 - shows that "Directive behaviors" negatively affect "Decision-making", keeping other variables constant, namely "Leadership style", "Supportive behaviors" and "Decision-making skills". However, it turned out that the significance of this coefficient is 0.637 and even in this case the opposite is true, i.e. "Directive behaviors" positively affect "Decision making".

Table 19. Directive behaviors

Do you think that the leader's directive behaviors increase employee dissatisfaction because the latter may feel forced to perform defined work tasks?				
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Yess	68	82.9	82.9	82.9
No	14	17.1	17.1	100.0
Total	82	100.0	100.0	



Graph 13. Directive behaviors

It was found that 83.9% of the leaders surveyed agree that the directive behaviors of the leader increase the dissatisfaction of the employees because the latter may feel forced to perform the defined work tasks and 17.1% of them disagree with such a thing (see table 19 and graph 14). The above result shows that Hypothesis 3 is rejected: The directive behaviors of leaders towards their employees affect the reduction of decision-making effectiveness. This is argued by the fact that even those leaders who behaved in a directive manner towards their employees knew exactly in what situations to exercise such behavior, i.e. when work and activities had to be carried out under pressure of time or factors others that have forced leaders to give stricter orders to their employees and, as can be seen, such a thing has resulted in effective decision-making.

Table 20. Leader behavior and employee performance

The behavior of the leader is directly reflected in the performance of the employees.				
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
I don't agree at all	2	2.4	2.4	2.4
I do not agree	1	1.2	1.2	3.7
Neutral	14	17.1	17.1	20.7
Subscribe	29	35.4	35.4	56.1
I completely agree	36	43.9	43.9	100.0
Total	82	100.0	100.0	

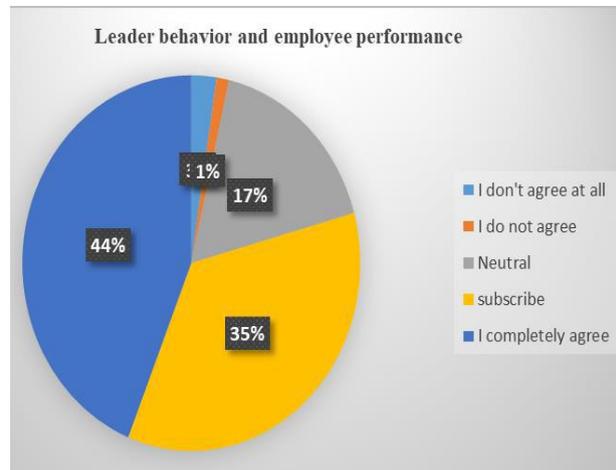


Chart 15. Leader behavior and employee performance

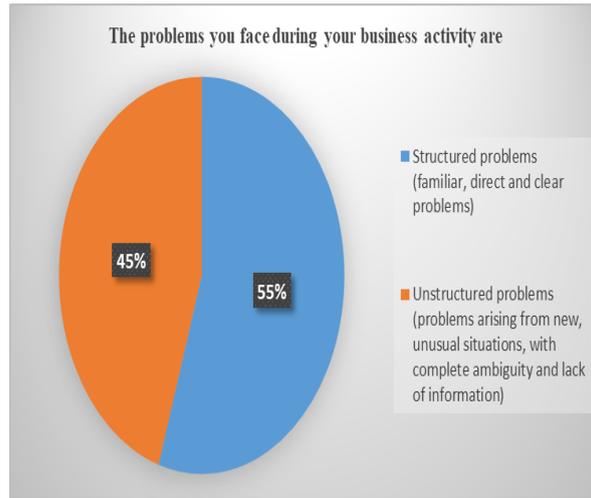
Table 20 and graph 15 show the results related to the statement that: "The leader's behavior is directly reflected in the performance of the employees", As we can see, it resulted that: 2.4% of the surveyed leaders answered with the option "I do not agree at all" , 1.2% answered with the "disagree" option, 17.1% answered with "neutral", 35.4% with "agree" and 43.9% with "completely agree".

- β_4 - shows that "Decision-making skills" positively affect "Decision-making", keeping the other variables constant, namely "Leadership style", "Supportive behaviours" and "Directive behaviours". This statement is accepted because the significance of this coefficient is 0.000.

Table 21. Types of problems

The problems you face during your business activity are:				
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Structured problems (familiar, direct and clear problems)	45	54.9	54.9	54.9
Unstructured problems (problems arising from new, unusual situations, with complete ambiguity and lack of information)	37	45.1	45.1	100.0
Total	82	100.0	100.0	

In every business, decisions are made because during the daily activity of businesses, different problems are presented and to solve these problems, different types of decisions must be made.

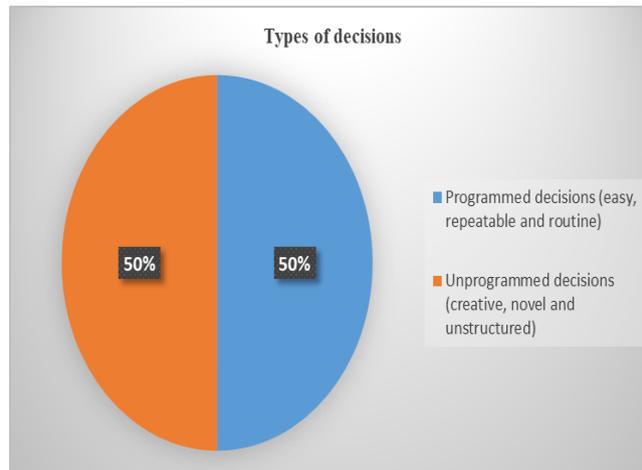


Graph 16. Types of problems

Based on the results of table 22 and graph 16, we say that in the surveyed businesses, leaders in 54.9% of cases faced structured problems which are known, direct and clear problems, as well as in 45.1% of known, direct and clear cases they were faced with unstructured problems which are problems arising from new, unusual situations, with complete ambiguity and lack of information.

Table 22. Types of decisions

According to your leadership style and behavior as a leader, for solving problems you tend to get more:					
	Frequency	Percentage	Valid Percent.	Cumulative Percent.	
Programmed decisions (easy, repeatable and routine)	41	50.0	50.0	50.0	
Unprogrammed decisions (creative, novel and unstructured)	41	50.0	50.0	100.0	
Total	82	100.0	100.0		



Graph 17. Types of decisions

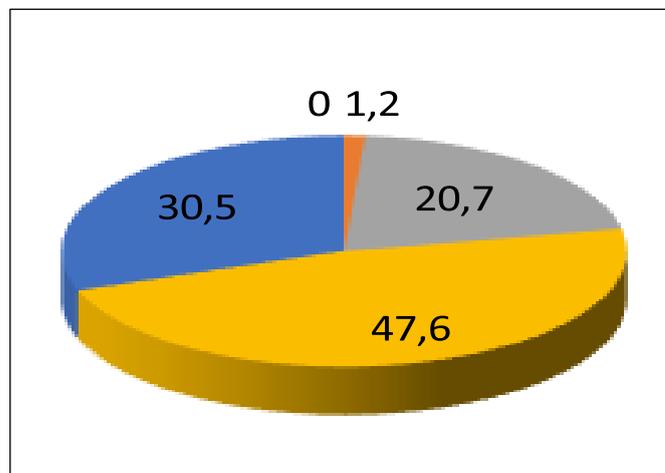
In relation to their leadership style and their behavior as a leader towards employees, when leaders were asked what decisions they tend to make most to solve the problems they face, they stated that 50.0% of the time they make programmed decisions which are easy, repeatable and routine decisions, and in 50.0% of other cases they make unprogrammed decisions which are creative, new and unstructured decisions (see table 22 and graph 17).

In support of the leadership style that leaders exercise towards their employees, it has been found that the type of decision-making they apply, in 30.5% of cases is individual decision-making and in 69.5% of cases is group decision-making (see table 24 and chart 18).

In the table below are analysed skills related to decision-making, such as: identifying and analyzing problems, gathering the information needed to solve problems, generating alternatives/possible solutions, making the decision/s, implementing and evaluating the decisions made, improve over time

Table 23. Decision-making skills

Skills related to decision-making, such as: identifying and analyzing problems, gathering the information needed to solve problems, generating alternatives/possible solutions, making the decision/s, implementing and evaluating the decisions made, improve over time. time while working as a leader.				
	Frequency	Percentage	Valid Percentage	Cumulative Percentage
I don't agree at all	0	0.0	0.0	0.0
I do not agree	1	1.2	1.2	1.2
Neutral	17	20.7	20.7	22.0
subscribe	39	47.6	47.6	69.5
I completely agree	25	30.5	30.5	100.0
Total	82	100.0	100.0	



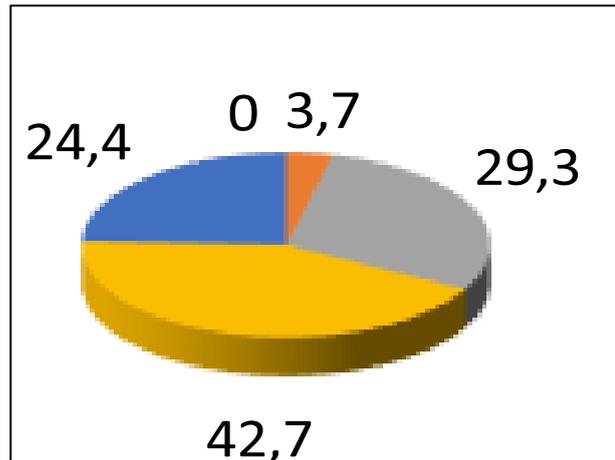
Graph 14. Decision-making skills

Regarding the statement that: "Skills related to decision-making, such as: identification and analysis of problems, collection of information necessary to solve problems, generation of alternatives/possible solutions, decision-making, implementation and evaluation of decisions obtained, improve over time while working as a leader", it was found that:

- 0.0% of respondents "do not agree at all",
- 1.2% of respondents "disagree",
- 20.7% of them expressed a "neutral" attitude towards this issue,
- 47.6% "agree" with such a statement, and
- 30.5% of them "completely agree" (see table 25 and graph 19).

Table 24. Effective decision making

The applied leadership style and behavior towards employees result in effective decision-making, thus ensuring effective solutions to the problems faced by the business.				
	Frequency	Percentage	Valid Percentage	Cumul. Percentage
I don't agree at all	0	0.0	0.0	0.0
I do not agree	3	3.7	3.7	3.7
Neutral	24	29.3	29.3	32.9
Subscribe	35	42.7	42.7	75.6
I completely agree	20	24.4	24.4	100.0
Total	82	100.0	100.0	



Graph 20. Effective decision-making

From the results of table 26 and graph 20 we see that, for the statement "the applied style of leadership and the behavior towards employees result in effective decision-making, thus providing effective solutions to the problems with which the business is attacked", 0.0% of the leaders said "I do not agree not at all", 3.7% said "disagree", 29.3% expressed a "neutral" attitude, 42.7% answered "agree" and 24.4% answered "completely agree". Also, from the above analysis related to decision-making skills, it has been proven that Hypothesis 4 is correct: Leaders who possess skills related to decision-making, such as: identification and analysis of problems, collection of information necessary to solve problems, generating possible alternatives/solutions, making the decision/s, implementing and evaluating the decisions made, have a higher tendency to be involved in effective decision-making.

At the end, the leaders were asked: "What results in decision-making do the style and behavior that they applied to their employees bring?", and in this regard we received different opinions which were analyzed and a summary of them was made as follows. In general, it has been found that the style and behavior of leaders influence:

- Increasing productivity and profitability, as well as easier decision-making;
- Bringing good results and suitable climate in the work environment;
- The performance and satisfaction that employees receive at work;
- Work with positive results and higher commitment;
- Good behavior on the part of employees;
- Treating employees with dignity and correctness, bringing the intended result and success;
- Mutual support and cooperation;
- Finding alternative easy, reliable and creative methods in motivating employees, so that they have a clear, understandable and easy implementation of the tasks given to them;
- Fair leadership through which the leader earns respect or authority without imposing on employees;
- Having a simple and understandable approach to a problem or challenge at work;
- Efficiency and performance of work in the best possible way, as well as in great successes;
- Clarity of tasks that are required to be performed by employees;
- In the well-being of the employees so that they feel better and more influential in the business;
- In employee satisfaction as they too can be promoted and involved in experiences that lead to excellent results;
- Creating close/friendly relationships or not with employees, depending on what style the respective leaders apply;
- Making the right decisions that lead to effective decision-making that brings success to all business staff;
- In ensuring the continuous success of the business, which affects the extension of the life cycle of the business and the like.

Conclusion

In this concluding part, we summarize the main points of this paper, namely we draw conclusions through which the most important aspects analyzed and discussed are clearly shown. Undoubtedly, leadership style,

organizational behavior, decision-making and decision-making skills are matters of high importance and require deep knowledge and detailed analysis so that leaders are prepared for unplanned situations and unstructured problems which can at any time attack the activity of their businesses. Thus, they need to adapt their leadership style and their behavior towards employees in order to overcome whatever situation they are faced with and make effective decisions.

Regarding these aspects, it has been found that the leaders of enterprises in Kosovo in most cases exercise a supportive style of leadership, while some of them exercise a directive (commanding) style. The style of leadership that they exercise or apply has proven to have a positive impact on decision-making, that is, it has brought appropriate decisions and effective decision-making.

In addition to leadership style, the behavior of leaders towards their employees also has an impact on decision-making and organizational success. Based on the situational leadership model, which includes supportive behaviors and directive behaviors that characterize the style and behavior of leaders, the study has shown that both supportive and directive behaviors have resulted in effective decision-making behaviors and organizational success. Supportive behaviors have influenced employees' greater freedom while performing their tasks, which has led to increased job satisfaction, higher motivation, higher commitment to work, and to employees it has brought a sense of belonging valid for business. On the other hand, the effectiveness brought by directive (mandatory) behaviors is justified by the fact that business leaders are faced with unforeseen and unplanned situations that required immediate response and flexibility, situations during which time was limited, short and did not allow enough space for cooperation with employees and other parties. In this way and in such situations, a more directive or commanding approach on the part of leaders has resulted in success and performance of tasks in the right way. As for the elements that characterize the style and behavior of the leaders, we say that the style of the majority of the surveyed leaders was characterized by the element of support, followed by direction, delegation and training.

Based on the style and behavior exercised by leaders towards their employees, we have come to the conclusion that the commitment of employees has different levels. In most cases, it has been found that the commitment of employees to work is variable depending on the work that needs to be done, another large part of the leaders have stated that their employees have high commitment to work. These were followed by a lower part of those who declared a very high commitment of employees and a very low part who declared a low level of commitment of employees to their work. For an individual in the role of leader to make effective decisions, he must possess decision-making skills. Within these skills, we include skills such as: identifying and analyzing problems, gathering the information needed to solve problems, generating alternatives/possible solutions, making decisions, implementing and evaluating the decisions made. These skills are necessary for effective decision-making and are improved over time as leaders face different and challenging situations during their leadership. The more experience as a leader the more the decision-making skills improve. It is worth noting that even when decision-making in some cases does not result in effectiveness, the least that can happen in these cases is that lessons can be learned from these situations and from these lessons decision-making can be improved in future situations.

Recommendations

Leadership and behavior play a crucial role in decision-making within organizations. Based on research findings there are some recommendations on how leadership and behavior can impact and improve decision-making:

Empower Others: Leaders should empower everyone in their organization to make sound and ethical decisions¹. This involves creating an environment where people feel comfortable making decisions and where their input is valued.

Ethical Considerations: Leaders should consider the ethical implications of their decisions. Decisions should be evaluated not just on their immediate impact, but also on their wider consequences¹.

Shared Accountability: Effective leadership decision-making creates shared accountability. This means that everyone in the organization has a role to play in decision-making and shares responsibility for the outcomes.

Organizational Culture and Structure: The culture and structure of an organization can greatly influence decision-making³. For example, in a culture that values collaboration, decisions may be made through a more democratic process involving input from multiple team members.

Leadership Style: The leadership style within an organization can have a significant impact on decision-making³. Different leadership styles can lead to different decision-making processes.

Delegation: Organizations should determine what decisions to delegate and push them as low as possible⁴. This empowers people to make decisions without approval and can lead to more efficient decision-making.

Remember, the goal of leadership is not just to make decisions, but to foster an environment where everyone feels empowered to contribute to decision-making. This can lead to better decisions and a more successful organization.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

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Irony, Analysis and Text Interpretation

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Abstract: Stylistic devices create special atmosphere giving additional hues to the reading. Writers use different stylistic devices to express the idea and lead the reader to the answer. The style that writers use varies from author to author that makes reading enjoyable and exciting. While analyzing the text, readers think about the hidden meaning, implied idea, thus trying to read between the lines. The topic of our discussion is irony. Irony is an implied discrepancy between what is said and what is meant. There are different types of irony: verbal irony, irony of situation, dramatic irony and tragic irony, each having their value and importance. Irony can be used by the writer in a variety of forms for a variety of purposes. It finds its expression in the use of words conveying the opposite of their literal meaning. Using irony by the writer may create different effects on the reader. To begin with, it can be used to show folly in an amusing way. On the other hand, it can take the form of wounding criticism causing anger and hatred. Finally, it can be used to depict the situation showing all tragedy and sadness it involves. Thus, effects created by irony make the reader see through the surface meaning to the true purpose of writing.

Key words: Interpretation, Irony, Types, Implied meaning, Literature

Introduction

Writers use different stylistic devices to express the idea and lead the reader to the answer. The style that writers use varies from author to author that makes reading enjoyable and exciting. While analyzing the text, readers think about the hidden meaning, implied idea, thus trying to read between the lines. In order to make a story appealing to the reader, authors have to apply to the techniques drawing their attention. The story with predictable events and characters, with the expected end might sound like the most boring story ever. Literature needs unexpected. Stylistic devices tend to spice up the texts and their role is of great value. Some stylistic devices appear when inanimate objects are provided with human qualities or when things are compared, others for exaggeration to create an effect or when there is a conflict between the reality and appearance. In fact, the latest one mentioned is the topic of our discussion, i.e. irony. Irony can be used by the writer in a variety of forms for a variety of purposes. It finds its expression in the use of words conveying the opposite of their literal meaning. Irony is an implied discrepancy between what is said and what is meant.

There are different types of irony: verbal irony, irony of situation, dramatic irony and tragic irony, each having their value and importance. Using irony by the writer may create different effects on the reader. To begin with, it can be used to show folly in an amusing way. On the other hand, it can take the form of wounding criticism causing anger and hatred. Finally, it can be used to depict the situation showing all tragedy and sadness it involves. Thus, effects created by irony make the reader see through the surface meaning to the true purpose of writing.

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Methods, Results and Discussion

A method used in this research is mainly descriptive and analytical. The Analysis are based on the examples used in the article and mainly on two basic stories: “The Story of an Hour” by Kate Chopin and “The Lamb to the Slaughter” by Roald Dahl. The stories contain different types of irony that emphasize the situation and add more vivid hues to the comprehension and analysis, filling the readers with the emotions and suspense. This stylistic device is used a variety of purposes by the author and as the reader understands the implied meaning created by the irony, it can be said that the author’s goal is achieved.

There are different reasons for using irony in literary texts as it is a tool that may be used for many different purposes. This stylistic device may create specific relationship between the reader and the speaker, between the characters in the story or just between us and the reality around us. The communicative roles of the irony vary from slight criticism to humour, from folly to anger. On the other hand, irony may serve as a tool of implication in the text. The utterance containing the ironic expression may draw the world indirectly, giving implicit assertions about the reality, thus teaching something to the reader. Irony is the device authors use to create excitement and interest. Irony is a figure of speech in which words are used in such a way that their intended meaning is different from the actual meaning of the words; it may also depict the situation ending up in a way that was not expected at all. Irony is showing a discrepancy between the reality and what appears to be true.

There are different types of irony: verbal irony, irony of situation, dramatic and tragic irony. The mentioned types have their specific purposes and are used by authors to create intended atmosphere thus reaching the goal of impressing and influencing the reader.

Verbal Irony

To begin with, to identify **verbal irony**, it must be said that this type of irony occurs when a person says one thing but means another. Jane Austen opens “Pride and Prejudice” with this ironic sentence:

“It is a truth universally acknowledged, that a single man in possession of a good fortune, must be in want of a wife.” (Burns, 1995).

The mothers of unmarried daughters would like to think that this is “a truth universally acknowledged”, but in fact it is not true at all – particularly from the point of view of the “single man in possession of a good fortune”. Austen presents this idea only to entertain us with the enormity of the misconception. Verbal irony sometimes takes the form of overstatement or understatement rather than of statement of the true opposite of what is meant. In “Pride and Prejudice” Jane Austen describes Mr. and Mrs. Bennet:

“Mr. Bennet was so odd a mixture of quick parts... that the experience of three and twenty years had been insufficient to make his wife understand his character. Her mind was less difficult to develop.”

Since Mrs. Bennet’s foolish character is quite easily understood, Austen’s irony is established through understatement. (Burns, 1995).

Irony of Situation

The type of irony in which the difference is between what one might expect or what would seem appropriate, and what actually happens is called **irony of situation**. In Chopin’s “The story of an hour”, the following situation is described:

“When she abandoned herself a little whispered word escaped her slightly parted lips. She said it over and over under her breath: “free, free, free!” the vacant stare and the look of terror that had followed it went from her eyes. They stayed keen and bright. Her pulses beat fast, and the coursing blood warmed and relaxed every inch of her body”.

So, this happens after Mrs. Mallard is told the news about the death of her husband, Brently Mallard. In the beginning of the story the reader witnesses how other characters, Richard and Josephine try to take care of Luis and deliver that sad news as gently as possible. The reader supposes that the death of a beloved person might be very painful and devastating. The development of the story leads the reader to this supposition. But what do these lines imply? Mrs. Mallard appears happy to lose her husband as she finds herself free, free from all the pressure and burden she suffered from during the years of marriage. Irony of situation surprises the reader but makes the scene vivid and comprehensible. And another paragraph: "But she saw beyond that bitter moment a long procession of years to come that would belong to her absolutely. And she opened and spread her arms out to them in welcome". This is another example of situational irony, making the reader realize that married life was a symbol of prison for Luise and her husband's death was the end of her sentence. She could not believe that was happening to her, and wanted to drink the whole elixir of this happiness. Readers' expectations are violated, instead of the wife weeping because of that great loss we get the woman enjoying freedom. It is worth noting that the situational irony that appears at the end of this story is really shocking both for the reader and the characters.

"Someone was opening the front door with a latchkey. It was Brently Mallard who entered, a little travel-stained, composedly carrying his grip-sack and umbrella. He had been far from the scene of the accident, and did not even know there had been one. He stood amazed at Josephine's piercing cry; at Richard's quick motion to screen him from the view of his wife."

The picture that the reader faces in this part of the story is startling as it was less predicted and really unexpected. No one would expect the person who was announced dead in the very beginning of the story to come back home in the end. The effect influences the reader and leaves him speechless. So, Chopin's art of using irony involves the reader making him think about something more complicated.

In Coleridge's "The Rime of the Ancient Mariner" there was:

"Water, water, everywhere,
And all the boards did shrink;
Water, water, everywhere,
Nor any drop to drink."

Ironically, there is water everywhere but they do not have a single drop of drinkable water (Burns, 1995).

Dramatic Irony

As for **dramatic irony**, it appears when a character in a literary or dramatic work perceives a situation in a limited way while the reader or audience is aware of a greater significance. So, dramatic irony occurs when the audience knows something that the characters do not.

To continue with Kate Chopin's "The Story of an Hour", it can be said that there are some interesting examples of dramatic irony. When Luis got the news of her husband's death she locked herself in her room, refusing to see anyone. In the examples of situational irony the reader sees that she is not suffering a lot, on the contrary, she enjoys her freedom. But her sister, Josephine, who is not aware of the whole situation is depicted in the following way: "Josephine was kneeling before the closed door with her lips to the keyhole, imploring for admission. "Luis, open the door! I beg; open the door – you will make yourself ill. What are you doing, Luise? For heaven's sake open the door". Josephine does not know that the news came as a relief for Mrs. Mallard and it is shown in the following sentence: "Go, away. I am not making myself ill." No. she was drinking in a very elixir of life through the open window." Josephine lacks the information that the reader is aware of thus leading her to misunderstanding of the situation. With the help of dramatic irony the author made everything comprehensible for us covering all in mystery for Luise's sister.

The way the author finishes the story is very interesting. The reader literally gasps at the last lines of the story as they contain tragic side of a person's life. The end of the story can be connected with both, dramatic and tragic irony as the reality breaks the main character's dreams and hopes and besides the reader understands that the doctor's were very much mistaken in announcing the reason of Mrs. Mallard's death.

“When the doctors came they said she had died of heart disease – of the joy that kills.”

Stylistic devices are the magic elixir that attract readers’ attention, create suspense and interest. Dramatic irony is an effective tool making the reader think deeply, analyse and explain the characters’ actions and lead to the unknown, hidden or mysterious, thus giving them the chance to see what is there behind the scenes. Since dramatic irony depicts the situation perceived by the audience with the characters who are not aware of episodes that unfold, it generates curiosity. Dramatic irony encourages readers to anticipate, hope, and fear the moment when a character would learn the truth behind events and situations of the story.

Interesting examples of dramatic irony are found in Roald Dahl’s story “The Lamb to the Slaughter”. The excitement and curiosity are kept to the end with the author’s interesting writing style. The moment in the story when the policemen are searching for the weapon is an example of a dramatic irony.

“Sometimes Jack Noonan spoke at her gently as he passed by. Her husband, he told her, had been killed by a blow on the back of the head administered with a heavy blunt instrument, almost certainly a large piece of metal. They were looking for the weapon. The murderer may have taken it with him, but on the other hand he may have thrown it away or hidden it somewhere on the premises.”

The reader knows what happened, the reader witnessed the fact of a murder and knows who the murderer is. The policemen, who are looking for the weapon, inform Mrs. Maloney about the development of the investigation having no idea that in fact, she is the one who committed the crime.

The story unfolds and the reader is experiencing the mixture of feelings struggling to make a decision between right and wrong, lots of questions appear but the answers are not easy to find. In the following example, Mary Maloney who killed her husband is inviting the policemen to have dinner, to eat up the lamb that was in the oven. The question is, what are the policemen eating, a lamb or a weapon they are looking for?

“Well,” she said. “Here you are, and good friends of dear Patrick’s too, and helping to catch the man who killed him. You must be terribly hungry by now because it’s long past your suppertime, and I know Patrick would never forgive me, God bless his soul, if I allowed you to remain in his house without offering you decent hospitality. Why don’t you eat up that lamb that’s in the oven? It’ll be cooked just right by now.”

A kind of mock feeling is derived from what the reader witnesses in the story and the effect of dramatic irony is crucial. It is striking to realize how ridiculous the end of the story is! While having dinner and discussing the idea of the weapon one of the policemen says:

“- Personally, I think it’s right here on the premises.
- Probably right under our very noses. What do you think, Jack?”
And in the other room Mary Maloney began to giggle.”

The scene of the policemen in the kitchen creates the effect of dark humour. The policemen speculating about the murder weapon unwittingly devour it. The most ridiculous part is that they help to destroy the murder weapon themselves.

Tragic Irony

Another interesting type of irony, so called **tragic irony**, presents the basic discrepancy between man’s hopes and dreams and what a man can realistically accomplish. Most of this irony comes from the idea that while we are young we never accept that we must grow and die. Man is doomed to failure and must live with frustration and death while longing for success and immortality.

Hamlet uses tragic irony by reminding us that even great man return to dust:

“Alexander died, Alexander was buried, Alexander returneth into dust;”
“Imperious Caesar, dead and turned to clay,
Might stop a hole to turn the wind away.”

Conclusions

So, effects and uses of irony vary from author to author making the reader think about the author's purpose. The following main effects may be singled out: First: it can be used to show up pretence and folly in an amusing way. Second: it can take the form of fierce or wounding criticism. Third: it can be used to show the tragedy or sadness of a situation (all forms of irony may do this, not just the type referred to as tragic irony) (Burns, 1995). Irony in all its forms provides extra dimensions of meaning. It suggests meaning without stating them, and thus promotes reader involvement. Readers should have it in mind that irony should not be read only on the surface level that may create misunderstanding and misinterpretation. Reading between the lines, ability to see through the surface meaning may lead the reader to the true purpose of the writing. Like all other figures of speech, irony brings about some added meanings to a situation. Ironic statements and situations in literature develop readers' interest. It makes a work of literature more intriguing, and forces the readers to use their imaginations to comprehend the underlying meanings of the texts. Moreover, real life is full of ironical expressions and situations. Therefore, the use of irony brings a work of literature to the life.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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The Use of Compliments in English by Kyrgyz Learners

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Abstract: People always deal with a certain speech act concerning on the purpose and reasons of communicating. Here when we are concentrated on speech acts, there is a need to have knowledge of different language means from phonemes to the whole text. Within different types of speech acts there is an issue of giving compliments to another one and at the same time responding to this or that compliment which takes one of the most crucial discussions and investigations throughout different languages considering their cultural backgrounds as well. These pre-study observations cause the relevance of this research. Therefore, the main aim of the article is to identify the ways and roles of using compliments in EFL classroom in Kyrgyzstan. The study reveals the fact that complimenting lessons sound more natural and live during different learning sessions and circumstances. The results of the study may be helpful and beneficial for English language instructors and learners as obtaining pragmatic ability and getting ready for further cross-cultural communication stages.

Key words: Compliments, Speech act, Pragmatics, EFL Classroom

Introduction

Nowadays, English is considered the main language of correspondence in global relations. Although English is taught in schools and colleges in Kyrgyzstan, Kyrgyz speakers are not well prepared to communicate properly in English. Numerous studies have highlighted the need for proper learning of English by Kyrgyz students in educational institutions of Kyrgyzstan. Research shows that teachers' attitudes influence classroom climate and student achievement.

When communicating between each other people deal with pragmatic competence in socio-cultural perspective. Pragmatics investigates the relationship between contexts and conversational conventions that speakers follow in order to cooperate and be socially acceptable to each other (Cutting, 2002). Pragmatic competence is defined as the ability to communicate effectively and involves linguistic knowledge beyond grammar (Thomas, 1983). There is variability across cultures regarding linguistic and social behavior. This is evident in the way a person uses speech acts such as apologizing, requesting effusing, thanking and complimenting. The linguistic and social

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variability depends on linguistic, social, and cultural conventions. However, if the underlying linguistic and social norms differ, cross-cultural misunderstanding or miscommunication can occur.

The ability of learners to use speech acts in socially appropriate ways is part of a speaker's knowledge of the target language (Kasper, 1989). Holmes states that a compliment is a speech act which explicitly or implicitly attributes credit to someone other than the speaker, usually the person addressed, for some "good" possession, characteristics, skill, etc., which is valued by the speaker and the hearer (Holmes, 1986).

E.g.: - *You did a good job!* – *You really handled that situation well!* – *Nice game!* – *You have such beautiful hair!*

Different cultures have their own system in giving compliments, not only the formulation utilized but also their frequency of occurrence, the context where they were expected to be appropriate, the responses from the addressee, how the utterance is recognized as a compliment and the function of the speech act performed (Garcia, 2018).

Responding to Compliments Samples

1. A: That's a nice shirt you are wearing!
B: *Well, I just got it. It was pretty cheap.*
2. A: You did an excellent job yesterday, Jim! I really enjoyed your presentation.
B: *Do you really think so?*
A: Oh, yeah, it was fabulous!
3. A: I love your clock. It looks great in your living room!
B: *Thanks. A friend of mine brought it to me from Oregon.*
4. A: You're looking well!
B: *Thanks. So you are!*

In general, compliments are presented as positive politeness strategies, because they indicate that the complimenter notice or attends to the addressee's face desires. The formula of compliments was found and it gives learners the possibility to enhance and use them according to the following nine syntactic formulas:

1. NP is/ looks (really) ADJ – Your hair looks fantastic!
2. I (really) like/ love NP – I really like your hair!
3. PRO is (really) a ADJ NP – This was really a great dinner!
4. You V a really ADJ NP – You have a wonderful idea!
5. You V (NP) really ADV – You really handled that situation well!
6. You have a really ADJ NP – You have such beautiful hair!
7. What a ADJ NP – What a lovely baby you have!
8. ADJ NP – Nice game!
9. Isn't NP ADJ – Isn't your bag beautiful! (Wolfson and Manes, 1980)

Methodology

The Observatory of Student Life regularly publishes data reported in the media who report psychosocial aspects of student life. It showed how students are gradually gaining autonomy vis-à-vis their family friendly environment and adopt a new lifestyle and a new network of relationships. Here are probably many reasons and perhaps, admittedly, a kind of wisdom in skepticism and resistance from teachers to fully chambered their ways and adopt, without resistance, approaches educational fashion. These deviate indeed much of the classical education model, which comes significantly change the role of teachers, their knowledge, their skills and attitudes. If we address the educational problems in another way rather than seeking to implement at all costs-called educational models as "ideal", like little or not at all applied by the vast majority of teachers, we can try the most effective practices not simply to identify, from research undertaken in regular classrooms. Our intention is not to examine the most innovative approaches that only a minority of teachers favor but rather to identify what works well in those which are the lot of the vast majority of them. Data analysis was done by quantitative research method even the nature of data collected was qualitative, so quantitative research design was used for the present research study.

This study involved 32 third-year students of English Philology Department of Osh State University in academic year 2023-2024. The participants were asked to fill the written task from Google Form online testing system. The aim of the method was to analyze the English compliment responds of Kyrgyz speakers and highlight the possible differences or similarities of the compliment and respond occurrence between English and Kyrgyz cultures. Participants were expected to read the written situation in each item and complete the blank with their own responses.

Results and Discussion

Items Containing English Compliment Situations and Responses

There were conducted 4 situational items.

Item 1

Situation: Your invited friend compliments your cooking after dinner. He says: "Your food is so delicious. You're a fantastic cook!"

Your response

The participants' response examples included the following answers:

Acceptance: "Yeah, I know. Thanks."

Positive Elaboration: "Thanks. I can give you the recipe if you like."

Neutral Elaboration: "Really?"

Negative Elaboration: Thanks, but I didn't do much, anyone could do it."

Denial: no occurred.

Item 2

Situation: You had project work presentation. Your report was complimented by one of the members of your company. He says: "Your report was very thorough. Great job you did!"

Your response

Acceptance: "Thanks for noticing it."

Positive Elaboration: "Thank you! I'm glad you found it informative and engaging."

Neutral Elaboration: "Thanks. I wanted to make sure we covered all aspects."

Negative Elaboration: "I appreciate your words. I couldn't have done it without the support of our team."

Denial: no occurred.

Item 3

Situation: You have started a new job. Your new colleague says: "You adapted to the changes so well."

Your response

Acceptance: "Yeah, I know. Thanks."

Positive Elaboration: "Thanks. Being adaptable and flexible is crucial in our fast-paced environment."

Neutral Elaboration: "Do you think so?"

Negative Elaboration: Thanks, but it's the same that I handled in my previous job."

Denial: no occurred.

Item 4

Situation: In a party of your friend you have new acquaintances. They say: "You're a great communicator!"

Your response

Acceptance: "I really appreciate your words."

Positive Elaboration: "Thank you so much! Clear communication is something I really strive for. You are the best communicator too!"

Neutral Elaboration: "I'm glad to meet your expectations."

Negative Elaboration: Thanks, but I'm the ordinary-skilled communicator."

Denial: no occurred.

Results of this study indicate pragmatic transfer from Kyrgyz into English because there was no significant difference between the compliment responses given in English. But the variability of compliment responding means which are obviously used by native English speakers was not used properly by Kyrgyz learners. The compliment responses were analyzed by categorizing them into followings:

- Acceptance
- Positive Elaboration
- Neutral Elaboration
- Negative Elaboration
- Denial

The means and Standard Deviations (SD) for the five categories can be seen in Table 1. In Table 1 Acceptance is the category with the highest SD, Positive Elaboration is the second highest category, whereas Neutral elaboration is the medium degree category. Negative Elaboration is the lowest category, and category of Denial responses has not occurred.

Table 1. Frequencies of items' categories

Item	Acceptance	Positive Elaboration	Neutral Elaboration	Negative Elaboration	Denial
1-item	16	12	2	2	0
2-item	8	14	4	6	0
3-item	11	15	5	1	0
4-item	18	6	6	2	0
All responses	53	47	17	11	0

The data in Table 1 suggests that the Kyrgyz learners accept the compliment with positive elaboration more frequently, and neutral elaboration has also a significant place in complimenting pragmatics. But with comparison between previous research works on compliment responses by the other native and non-native English speakers in Kyrgyz culture the responses on denial category were not occurred as it shows 0 SD.

Conclusion

Since the group of Kyrgyz informants were students as a second language at the Osh State University, their proficiency might have been above the national average, and consequently this group may not be representative of the Kyrgyz population as a whole. However, this does not imply that the informants had a higher level of pragmatic competence, and it is assumed that pragmatic transfer most probably has occurred.

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From Tradition to Action: The Potential of Community Empowerment Through Local Wisdom for Sustainable Environmental Protection Practices

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Abstract: Local wisdom is the values, norms, and traditions that are passed down from generation to generation in a community group. This research aims to explore the potential for community empowerment through local wisdom values in the context of protection environmental practices in the community of Lawang Agung Village, South Sumatra, Indonesia. This research uses a qualitative approach with case study analysis techniques. Data collection was carried out by conducting systematic observations and in-depth interviews with participants and supported by documentary data to strengthen the results of research analysis. The informants in this study totalled 8 people consisting of 2 community leaders, 2 traditional leaders, and 4 people who play an active role in various cultural activities in the research locus area and have participated in cultural and environmental communities for more than 5 years. All research data were collected and reduced within the research boundaries so that the research results could be presented in accordance with the research objectives. The research analysis will be interpreted to develop a deeper understanding of the phenomenon under study. The research results show several things including: (1) Lawang Agung Village has a long history of practicing local wisdom and using natural resources wisely. (2) The spirit of *gotong royong* (mutual cooperation) and community cohesiveness is starting to fade due to the impact of individualism and modernization, shifting collective priorities to achieve personal gain. (3) The potential for empowerment for environmental conservation

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practices can be optimized with the stages of identifying empowerment potential, planning and organizing, implementing, and disseminating results/experiences. (4) Integration of spiritual values is also an important step in strengthening the transformation of local wisdom values into concrete actions in sustainable environmental conservation practices. The implication of the findings of this research is the exploration of various potentials of local wisdom values to strengthen environmentally wise behavior by integrating them in people's daily lives. This research also contributes to the strengthening of the theory and practice of environmental empowerment that prioritizes the local wisdom of the community.

Keywords: Local wisdom, Community, Social interaction, Social life

Introduction

The environment plays a vital role in sustaining the life of creatures, plants and humans. Environmental problems faced today cover a wide range of issues, from climate change, habitat destruction, biodiversity loss, to air and water pollution. All of these problems affect the balance of the ecosystem and have the potential to have a serious impact on human life and other creatures on this planet (Al-Khateeb et al., 2017; Herman Susila, 2017; Pratama, et al., 2018). Environmental problems are complex and difficult to overcome if there is no cooperation between governments, communities, and environmentalists (Alwaeli, 2015; Anatona et al., 2023). However, to mobilize people so that they have a shared concern for protecting the environment, various approaches and ways are needed so that people voluntarily contribute to protecting their environment from damage (Herman Susila, 2017; Reniwati & Noviatrri, 2019). One way to address these environmental issues is by empowering communities through the utilization of local wisdom for sustainable environmental practices. Local wisdom refers to knowledge, skills and values that have existed in a community for many years, which have often been tested and proven effective in adapting to the local environment (Abdullah & Wahid, 2022; Azis et al., 2019; Reniwati & Noviatrri, 2019).

Indonesia is a region that has a variety of cultures, local wisdom, and a multicultural society. Each region has its own style and distinctiveness and varies according to its geographical location. Local wisdom has a very important role in shaping and maintaining unity in society. Behind the diverse cultures, traditions, and beliefs of each community, there are local wisdom values that are inherent and become the basis for living together (Jumriani et al., 2021; Karim, 2020). Local wisdom not only includes practical knowledge related to agriculture, the environment, or social values but also reflects the resilience of communities in the face of change and conflict (Siswanto, 2017; Sulaiman et al., 2022). In the context of community unity, local wisdom serves as the glue that connects individuals within the community.

Values such as gotong royong, consensus, and mutual respect become the foundation of relationships between community members. Local wisdom also teaches the importance of understanding differences and celebrating diversity as a commonwealth (Adinugraha & Sartika, 2022; Ambarwati & Wilujeng, 2023; Andriani et al., 2023). Local wisdom as cultural heritage also creates a sense of pride and belonging to the origins and cultural roots of the community. Thus, local wisdom is not a barrier to unity but rather a force in achieving sustainable unity (Saputra et al., 2021; Silo & Ismail, 2022). Thus, maintaining and respecting local wisdom is an important step in building a harmonious and strong society in facing the challenges of the times. Local wisdom plays a central role in community education, becoming a strong foundation for building the character and identity of each individual. In essence, local wisdom reflects the values, norms, and traditions that develop in a particular society (Kurniawan, 2020; Radetić-Paić & Černe, 2020). Its presence in education provides many invaluable benefits, creating a connection between the past, present, and future.

By empowering communities through local wisdom, it will be possible to create solutions that suit local conditions and needs. For example, in the face of climate change, communities can use their traditional knowledge of local weather patterns and appropriate growing seasons to improve food security. Communities can also develop sustainable agricultural systems, such as the use of local crop varieties that are resistant to extreme weather and organic farming practices. In addition, community empowerment through local wisdom can help in the conservation of natural habitats and biodiversity. Local communities often have in-depth knowledge of the local flora and fauna and the ecosystems they inhabit. By utilizing this knowledge, they can be involved in efforts to conserve forests, conserve wetlands, and replant native vegetation. Thus, through the utilization of local wisdom and community empowerment, we can develop environmental practices that are sustainable and adaptive to today's complex environmental challenges. This is not just about preserving the environment for future generations but also about improving the overall well-being and resilience of local communities. Observing a tradition can also be useful to find out the functions, meanings, and cultural values

contained in the customs practiced by a community group (Sunjata, 2008). Local wisdom is also a legacy of our ancestors in the value system of life that is integrated in the form of religion, culture, and customs. In its development, the community adapts to its environment by developing wisdom in the form of knowledge or ideas and tools, combined with customary norms, cultural values, and activities to manage the environment in order to meet its needs (Suhartini, 2009).

On the other hand, the lives of people in Indonesia cannot be separated from their interactions with their natural environment. Environmental conditions in Indonesia produce a diversity of ecosystems and natural resources, giving birth to Indonesian people who are closely related to natural conditions in carrying out various activities to uphold their survival. Indonesian people respond to nature as a teacher who guides the lifestyle of the community, which is born in the form of natural habits that are poured into life customs oriented to the attitude of nature developed into a teacher (Salim, 2006). Traditional knowledge or traditional wisdom is a system of knowledge and cultural heritage that originates from a long process of experience in the past, adopted, and passed on to the next generation through an evolutionary process (Zulfadrim, 2008; Lampe, 2006). Local wisdom generally contains teachings to maintain and utilize natural resources (forests, land and water) in a sustainable manner. In terms of the environment, the existence of traditional wisdom is very beneficial because it directly or indirectly helps in maintaining the environment and preventing environmental damage. Local wisdom is social capital from the perspective of environmentally sound sustainable development, so it is very important to explore, study, and develop in order to lead to better management of natural resources and the environment (Siswadi, 2011).

Local wisdom itself refers to knowledge derived from people's experiences and the accumulation of local knowledge and local wisdom found in society, communities, and individuals (Phongphit & Nantasuwana, 2002). The interaction of indigenous people with their environment produces wisdom and knowledge in managing their natural environment. The attitudes and behaviors of indigenous people will refer to the ecological values prevailing in their communities. Local ecological knowledge refers to the local expertise of people who are different from indigenous peoples, may not have a long-term relationship (i.e., hundreds or thousands of years) with the local environment, but still have local wisdom, experiences, and practices adapted to the local ecosystem. Therefore, local wisdom is important to be studied and preserved in a society in order to maintain a balance with its environment and at the same time preserve its environment. Local wisdom becomes cultural wealth that then grows and develops in the community and is able to strengthen the social cohesion of community members and empirically able to prevent environmental damage. However, over time these traditions have begun to fade as a result of the penetration of modern culture that is difficult to avoid (Permana, 2010).

People's lives cannot be separated from their interactions with the surrounding natural environment. Interaction with the surrounding environment needs to be preserved for the next generation. Environmental conservation is an effort to create natural environmental conditions that are sufficient in quantity and quality for future generations by involving many parties including indigenous peoples who have existed since long ago and have unique attitudes and cultures. The various parties involved basically have the goal of achieving economic, social, and ecological balance. The way of managing natural resources and the environment by indigenous peoples has been proven to enrich the diversity of natural resources and sustainability. Indigenous peoples are the largest element in the structure of the Indonesian state and play a major role in sustainable development (Martayadi & Supriyadi, 2024; Syamsudin, 2023). Local wisdom does not only stop at ethics but also reaches norms actions and behaviors, so that local wisdom can be like a religion that dominates humans in their attitudes and actions, both in the context of daily life and determining further human civilization (Suhartini, 2009).

A disturbed and damaged natural environment will have an impact on the lives of the surrounding community. Environmental problems will arise as damage is not immediately overcome. For this reason, environmental problems need to be studied further, especially since environmental damage is already alarming. Environmental conservation efforts can be carried out through the values of local wisdom in the community that are inherited and maintained from generation to generation. On the other hand, the existence of a consumptive lifestyle can erode the norms of local wisdom in society. To avoid this, the norms that have been applied in a society that is hereditary and closely related to the preservation of the environment need to be preserved, namely local wisdom. The people of Lawang Agung village are unique in their efforts to protect their environment. Some people of Lawang Agung Village have beliefs and myths to preserve nature because there is a "*puyang*" which is an entity in the form of a tiger that is the guardian of the natural forest of Lawang Agung Village. In addition, the kinship system of the community in the Rupit Subdistrict is very close, so people still often do mutual cooperation to carry out various activities, including cleaning the environment. However, along with the times, this local wisdom is starting to fade because individualistic traits and ignorance of the environment are getting

stronger. Some people feel that keeping the environment clean is not their job, so they do not actively contribute to caring for the environment.

Local wisdom will survive and thrive if there is a process of instilling noble values in every member of the community, from children to parents. Planting these values is done as an effort to make every member of the community realize that the value of local wisdom is very important for human life, which is always side by side with the natural environment. For this reason, environmental issues need to be studied further, especially since environmental damage is already worrying. Environmental conservation efforts can be carried out through local wisdom values in the community that are passed down and maintained from generation to generation. The potential for community empowerment through local wisdom to realize sustainable environmental preservation is an element that must be analyzed so that it can be implemented in community life. Based on environmental problems and the potential of local wisdom in Lawang Agung Village, researchers are interested in researching and analyzing elements of tradition and local wisdom that have long been part of community life so that they can be transformed into community action in protecting the environment.

Method

This research was conducted using a qualitative approach with case study analysis. The qualitative approach research method with case studies is an in-depth research approach to understanding a particular phenomenon through in-depth analysis of one or several cases studied. The qualitative approach emphasizes understanding the context, interpretation, and meaning of a phenomenon so as to provide a rich and in-depth picture (Miles, M. B., & Huberman, A. M., 1994). The locus of this research was Lawang Agung Village, Rupit Sub-district, North Musi Rawas, South Sumatra Province. The sampling technique was carried out by purposive sampling with several criteria, including (1) the informant is the village head because he is an official community leader (*Tokoh Masyarakat*), (2) the informant is a village traditional leader who is respected and respected by the community (*Tokoh Adat*), (3) the informant is a community member who plays an active role in various cultural activities in the research locus and has participated in cultural and environmental communities for more than 5 years (*Masyarakat*). The total number of informants in this study was 8 informants with the following explanation:

Table 1. Research informant data

Initials	Gender	Number	Criteria	Codificaton
RY	M	1	Tokoh Masyarakat (TM)	M-TM-1
GA	M	2	Tokoh Masyarakat (TM)	M-TM-2
RN	M	3	Tokoh adat (TA)	M-TA-3
RF	M	4	Tokoh adat (TA)	M-TA-4
KW	F	5	Masyarakat (M)	F-M-5
SP	F	6	Masyarakat (M)	F-M-6
RA	M	7	Masyarakat (M)	L-M-7
TE	F	8	Masyarakat (M)	F-M-8

Source: Research data, processed in 2023.

Data collection is done through various techniques, such as in-depth interviews, participatory observation, and document analysis. Primary data will be collected from direct participants in the case study, while secondary data can come from relevant sources, such as related literature or documents. Data analysis techniques are carried out in several stages such as data collection with research boundaries that have been determined by the researcher, then data reduction is carried out so that data presentation can be done properly and finally conclusions are drawn to answer research questions. The collected data will be organized systematically to facilitate analysis. This includes transcribing interviews, coding data, and grouping findings based on emerging themes or patterns. The results of the analysis will be interpreted to develop a deeper understanding of the phenomenon under study. Conclusions are drawn based on key findings and implications for theory, practice and future research.

Results and Discussion

Empirical Condition of Lawang Agung Village

Half or 50% (fifty percent) of the total area in North Musi Rawas Regency is a forest area consisting of natural reserve forests, protected forests, and management forests, while the other half (307,260 ha) is used for settlements and industry. One of the villages in North Musi Rawas Regency is Lawang Agung village. Lawang Agung village has a geographical condition of mostly swamp areas, and is included in the lowlands. Lawang Agung village is one of the 16 villages in the Rupit sub-district, North Musi Rawas Regency, South Sumatra Province. However, in recent years, the social landscape in this village has undergone worrying changes. Individualism has begun to erode the cohesiveness and solidarity that have been the main pillars of community life. The people of Lawang Agung Village are traditionally known for their high spirit of *gotong royong* (mutual cooperation). They help each other in every activity, from the construction of public places to building houses. Cooperation is at the core of daily life, where each individual feels a responsibility to help others. However, in recent decades and with the times, slowly but surely, this spirit of mutual cooperation has started to fade. The individualistic nature of the community has changed the social dynamics of Lawang Agung Village. The drive to achieve personal gain and individual interests has begun to shift collective priorities. The *gotong royong* (mutual cooperation) programs that used to be a moment to strengthen relationships between residents are now being abandoned, replaced by indifference and solitude. Community leaders in Lawang Agung village also feel that people are now only concerned with their own interests, as expressed by M-TM-2

"...The community in Lawang Agung Village is not like it used to be, when I was young, about 20 years ago, the people of Lawang Agung Village were very enthusiastic when there were joint events such as cleaning the river, cleaning the roads, even cleaning public places such as places of worship and latrines (places to wash and bathe in the river)."

Furthermore, M-TM-1 also expressed a similar statement that the people of Lawang Agung Village have experienced a decline in their concern and participation in protecting the environment, as revealed in the following interview:

" In fact, many people in Lawang Agung Village still care about their environment, especially people who feel uncomfortable with the many branches of wood and garbage that fill the river, but that concern only comes from a few individuals, so there are only a few who still play an active role in cleaning the banks of the river that have accumulated due to drifting wood and garbage."

Lawang Agung Village is a village whose territory is drained by the Rawas River, which is a branch of the Musi River, the longest river in South Sumatra province. Through cultural influences and the large number of people who work as planters and fishers in the river, for decades the people of Lawang Agung village have lived around the watershed. The people of Lawang Agung Village also have good social interactions with each other so that they will help each other to keep the environment clean. However, as time goes by, social interaction between communities is decreasing because community members are busy with their own affairs. One of the local wisdoms of the Lawang Agung village community and even most of the people of North Musi Rawas Regency is "*ngejago warisan puyang*". This local wisdom is to maintain ancestral heritage to use nature and rivers wisely so that the community remains concerned with environmental sustainability. This has been passed down from generation to generation, but at present the values contained in local wisdom are rarely implemented in the daily lives of the people of Lawang Agung village. This problem was also expressed by the traditional leader of the Lawang Agung village community, M-TA-3, as shown in the following transcript:

"...Ngejago warisan puyang is the local wisdom of the Lawang Agung village community which is very loaded with values in environmental sustainability, but now the community is not too concerned about the values of this local wisdom, the community is now massively opening oil palm plantations so that many wild animals such as tigers, bears, and birds have lost their natural habitat, besides that illegal gold mining has damaged the quality of river water and polluted river biota, it is exacerbated by the lack of public awareness not to throw garbage in the river."

The statement expressed by M-TA-3 was also reinforced by one of the informants who is a member of the Lawang Agung village river care community organization, F-M-5, who revealed that illegal logging in the upper reaches of the river causes the river to overflow very quickly and can cause flooding if the rain intensity is very high.

" We have tried to continue to protect the forest and river environment throughout North Musi Rawas Regency so that it continues to be sustainable and becomes a blessing for the community itself, but a handful of unscrupulous people damage the river by carrying out illegal logging so that there is no more water absorption

when it rains. Of course, this problem will have an impact on the overflow of river water which will trigger flooding."

Another local wisdom is "*Bekarang iwak*" this tradition is one of the traditional wisdom of the community in Lawang Agung Village with the aim that the community will not look for fish by concentrating, poisoning or damaging. This tradition is also carried out to build community understanding to preserve the river and not catch fish using chemicals or gentrification, because if the community violates the customary leaders will punish the perpetrators. In addition to *bekarang iwak*, there is another local wisdom of the Lawang Agung Village community in catching fish, namely "*Nakul*". This tradition is used to catch fish with a special box-shaped tool with bamboo as a handle. This local wisdom still survives today although not as much as it used to. This was revealed by P-M-7, who is a cultural actor of the Lawang Agung village community

"...For Nakul, the people of Lawang Agung Village still do it quite a lot, especially when it is fish season, the people of Lawang Agung Village, especially mothers, will gather together to nakul and collect their catches to be sold or made into processed foods such as pempek or tekwan."

Another local wisdom of the Lawang Agung village community is "*sedekah maling*" which means almsgiving in secret. Usually people who do this will give their garden products in the form of fruits or food in general at the mosque when people are praying.

Aspects of Local Wisdom Potential for Environmental Sustainability Practices

One of the main elements in a community's local wisdom values is social interaction. Social interaction plays a crucial role in supporting and strengthening sustainable environmental practices. Sustainable environmental stewardship practices based on local wisdom not only cover the physical aspects of environmental preservation, but also take into account the social and cultural factors involved in the process. In this context, social interactions within the community are important as they play a major role in shaping and sustaining such practices. Social interactions within the community enable the exchange of knowledge and (Agusta, 2021; Asril & Yoserizal, 2019; Pratama et al., 2021) experiences related to local wisdom in environmental management. Through conversations, discussions and cooperation between individuals and groups, traditional knowledge and practices that have proven effective in protecting the environment can be acquired, maintained and enriched. Social interaction plays an important role in shaping a strong community identity that embraces the values of local wisdom in environmental management. Through the formation of social bonds and a sense of attachment to their environment, community members tend to feel a responsibility to maintain and preserve the environment in which they live.

Social interactions also provide important emotional support in carrying out environmental stewardship practices. Through mutual encouragement and support among community members, individuals are better able to persevere and remain motivated to engage in sustainable environmental conservation efforts. In addition, the formation of cooperation networks and collaboration between individuals, groups and organizations that have the same goals in environmental care practices. Through cross-sector cooperation and partnerships, efforts to implement sustainable practices based on local wisdom can be strengthened and expanded (Aflisia et al., 2019; Pratama et al., 2021). Based on this, in the context of local wisdom-based sustainable environmental care practices, social interactions play a very important role in supporting, strengthening and expanding environmental conservation efforts. Therefore, it is important to recognize and understand the role that social interactions play in this context, as well as to promote the formation of broader networks and collaborations in support of such sustainable practices.

Through the local wisdom of the Lawang Agung Village community, there are several aspects that can be optimized in increasing the potential of local wisdom that has survived for a long time but has begun to not be implemented in everyday life. The first aspect is of course education, Educating the community about the importance of environmental sustainability and local wisdom values is an important step. With increased awareness, people will be more inclined to practice local wisdom in their daily lives. The education in question is applying the principles of adult learning in the learning process. As expressed by M-TA-4 that environmental education is basic and important for the people of Lawang Agung village.

"...As a traditional leader, I really hope that environmental education that prioritizes adult learning will be presented in Lawang Agung Village. The people of Lawang Agung Village need additional knowledge and

insight so that the local wisdom that has been passed down by the ancestors can be increased in potential so that the community can again apply it in their daily lives but still adapted to the times."

If environmental education is implemented, it can be a way to encourage active community participation in environmental decision-making, which will increase the recognition and application of local wisdom. Inclusive consultation and dialogue processes can ensure that local knowledge is valued and integrated in environmental policies and programs. In addition, another important aspect in increasing the potential of local wisdom is by empowering the local economy. This empowerment is carried out to encourage the development of a sustainable local economy based on local wisdom so as to increase community motivation to protect the environment. Recognizing and protecting the community's traditional rights to natural resources will strengthen their position in preserving the environment. This includes land, forest and water rights, which are the basis for local wisdom practices (A.A.K.J, 2020; Andari et al., 2022; Bu'ulolo, 2020).

Another important aspect is that combining modern technology with local wisdom can increase the effectiveness of environmental sustainability practices. An example is using geographic information systems (GIS) for participatory mapping of natural resources based on local knowledge. This aspect is considered effective when applied to the natural resource mapping of Lawang Agung village as stated by F-M-8 that the integration of technology in natural resource mapping will help optimize the potential implementation of local wisdom values. This aspect should also be supported by increasing the capacity of local communities in terms of skills, knowledge, and access to resources will strengthen their potential in practicing local wisdom. This capacity building can be done through training, formal and non-formal education, and exchange of experiences between communities.

"...As a person who cares about the environment, I believe that by mapping the potential natural resources of Lawang Agung village, the local wisdom that has begun to disappear from people's lives will be applied again optimally if this local wisdom is properly categorized according to its potential to protect natural resources and accompanied by increasing the capacity of local communities."

Local wisdom has an important function in relation to the conservation and preservation of natural resources, as well as advice, beliefs, and taboos. Preserving the natural environment and natural resources is something that really needs to be done because of its sustainability for the next generation. Local wisdom in this case has a function for this. Restoring the potential of local wisdom to preserve the environment that has faded due to the lack of community spirit involves a series of steps that focus on strengthening social ties and collective values in the community. One approach that can be taken is through revitalizing local culture and strengthening community identity. Revitalizing local culture can start with collecting and documenting traditional knowledge related to the environment and natural resources. This includes traditional methods in agriculture, forest management, waste management, and other practices that have proven sustainable over the centuries. With a holistic and sustainable approach, it is hoped that the potential of local wisdom can be reactivated and become a major force in maintaining environmental sustainability, even amidst the ongoing challenges and changes in modern society.

Integration of Spiritual Values for Environmental Conservation Practices

The implementation of spiritual values in local wisdom reflects the integration between the spiritual dimension and the local wisdom of a society or culture. It involves understanding and applying spiritual values in daily life, which are often reflected in local norms, customs and traditions. In this context, spiritual values are not only considered as religious practices, but also as a foundation for behavior and actions that reflect balance, harmony and meaning in life. It is important to note that local wisdom is a cultural heritage that develops over generations, encompassing ways of seeing and values that are unique to a particular community. While spiritual values, by their nature, encompass a deeper dimension of life, involving a connection with a greater power or transcendent existence. The integration of spiritual values in local wisdom has a profound impact on the mindset, behavior and social relationships of the community concerned.

Within this framework, it is important to highlight that the implementation of spiritual values in local wisdom is not always uniform in every society or culture. Each community group may have a different interpretation of spiritual values and how to apply them in daily life. In this framework, it is important to highlight that the implementation of spiritual values in local wisdom is not always uniform in every society or culture. Spiritual values emphasize the importance of achieving balance between humans, the environment and spiritual forces. Local wisdom can reflect efforts to live in harmony with nature and achieve harmony in social relations. With

well-maintained local wisdom values, communities remain united in the bond of unity. Balance and harmony are deep concepts and involve various aspects of human life. In the context of the local wisdom of the Lawang Agung village community, this concept becomes the basis for the community to achieve a balanced, harmonious and sustainable life. The implementation of balance and harmony in local wisdom covers various dimensions, such as human relationships with nature, between individuals, between generations, as well as in spiritual and economic aspects. In addition, balance between individuals and in social relations is also a major focus of local wisdom. Traditional communities often have norms that promote mutual respect, fairness and cooperation. These value systems create a social environment that favors balance and harmony between individuals, avoiding conflicts that are detrimental to communal life. Principles such as *gotong royong*, deliberation and social justice form the foundation for daily life practices.

Balance and harmony in local wisdom also involve an intergenerational dimension. Understanding and respecting the knowledge passed down from generation to generation is an important aspect. Traditional societies often value the role of parents and ancestors and regard them as a source of wisdom and experience. Therefore, the implementation of intergenerational balance involves the transfer of knowledge, values and skills from the older generation to the younger generation, creating continuity and maintenance of local identity (Diab et.al, 2022; Farhan & Anwar, 2016; Sandoval-Rivera, 2020, Yuliana, et.al 2017). This theory is also supported by one of the community cultural actors of Lawang Agung village, F-M-6, who revealed that spiritual values are still closely held by most of the people of Lawang Agung village so that it has the opportunity to be integrated with local wisdom for sustainable environmental conservation practices.

"...Although the implementation of local wisdom has begun to fade, the people of Lawang Agung village are mostly religious adherents who practice their worship so that it will be an opportunity if stakeholders strive to integrate local wisdom values in various spiritual activities such as environmentally friendly practices in worship with good waste management and not polluting the river"

Furthermore, the use of symbols of nature in spiritual practices is also an example of the integration of local wisdom values. For example, in many cultures, trees are considered symbols of life and the power of nature. In spiritual practices (Abeyewickreme et al., 2013; Adamson & Bromiley, 2013; Cox, 2014; Coy et al., 2021). trees are often considered sacred and revered, and respectful treatment of trees becomes part of religious practices. In addition, many spiritual practices also teach values such as simplicity, balance and respect for all forms of life. This is in line with local wisdom values that emphasize harmony between humans and nature and the importance of maintaining ecological balance. Such integration of local wisdom values with spiritual activities can provide a strong foundation for sustainable environmental conservation practices (Blair, 1985; Chowdhury et al., 2020; Tuçaltan, 2020). This is because it combines spiritual beliefs with concrete actions in preserving and protecting nature, thus creating a deep and sustainable commitment to caring for the earth as a common home for all living beings. (Adelman, 1993; Gortmaker, 1999; Mahfud et al., 2021).

From Tradition to Action and Future Research Directions

Based on the research findings and discussion of the potential for community empowerment through local wisdom for sustainable environmental sustainability practices, stages can be identified that can be carried out so that the process of converting knowledge values and local wisdom practices into real actions. This stage begins with an understanding of local wisdom. This stage involves an in-depth understanding of the local wisdom that exists in the Lawang Agung village community. It requires a study of the traditional knowledge, cultural practices and values that have accumulated over the years in interacting with the environment such as *bekarang iwak*, *nakul*, *sedekah maling*, and *ngejago warisan puyang* that can be synthesized into action in environmental conservation inherent in the attitudes of the people of Lawang Agung village.

The next step is to identify the potential for community empowerment contained in the local wisdom. This stage can be in the form of certain skills, knowledge or practices that can be used to strengthen the community's role in preserving the environment. In the case of the Lawang Agung village community, participatory approaches are needed that prioritize a "sense of belonging" to local wisdom and environmental conservation practices that are starting to fade. The results show that most people know the local wisdom in Lawang Agung village but it is still limited to the level of knowledge without practice. Therefore, a powerful strategy is needed that prioritizes real actions in supporting sustainable environmental practices. The government plays an important role in facilitating, providing budgets, and optimizing efforts to convert local wisdom values into concrete actions to preserve the environment.

Once the potential for community empowerment is identified, the next step is to plan and organize efforts to integrate local wisdom into sustainable environmental practices. This involves forming working groups, developing strategies, and setting clear goals that the community will easily understand. Then the next stage is implementation, which involves applying sustainable practices based on local wisdom. While implementation is taking place, it is also important to evaluate and adjust. It is important to continuously evaluate the practices and make adjustments if necessary. This ensures that the practices are effective in achieving the goal of sustainable environmental sustainability and remain in line with existing local values and wisdom. The final step in transforming local wisdom values into concrete actions for sustainable environmental practices is the dissemination of results and experiences. This step is done by sharing the results and experiences of local wisdom practices with other communities or related parties. In addition, this method can also inspire others to adopt the same practices and expand their positive impact in maintaining environmental sustainability (Pratama, et.al, 2021).

The potential of local wisdom of the Lawang Agung village community such as *nakul*, *bekarang iwak*, *sedekah maling*, and *ngejago warisan puyang* is local wisdom that has tremendous potential for sustainable environmental conservation practices. Empowering the community and increasing collective awareness will transform the values of local wisdom into real action in protecting forests, rivers and everything in them. Based on the results of the study, future research directions can explore the concepts of community empowerment and local wisdom through the lens of diverse disciplines, such as anthropology, sociology, ecology, and economics. The integration of these various approaches can provide a more holistic understanding of how traditions and local wisdom can be used for environmental sustainability practices. Research can also focus on analyzing policies that support or hinder community empowerment and local wisdom-based environmental sustainability practices. This involves exploring existing policies, identifying gaps or challenges in their implementation, and recommendations for improvements or the development of new policies that are more inclusive and sustainable. In addition, it explores how technological innovations can be used to strengthen local wisdom-based environmental behavior. Researchers suggest that the development and implementation of technologies that are appropriate to the local cultural and environmental context and pay attention to the needs and knowledge of local communities will help in optimizing the conversion of local wisdom/tradition values into concrete actions of sustainable environmental conservation practices.

Conclusion

Lawang Agung Village, located in North Musi Rawas Regency, has a long history of practicing local wisdom that reflects a harmonious relationship between humans and nature. However, in recent years, worrying social changes have taken place in the village. The spirit of gotong royong and community cohesiveness has begun to fade due to the impact of individualism and modernization, shifting collective priorities to achieve personal gain. However, while local wisdom values such as "nakul" and "bekarang iwak" have survived, their practice has begun to regress. Communities need to be actively involved in protecting the environment, which is an important part of local wisdom. Social interaction plays a crucial role in shaping and maintaining sustainable environmental conservation practices. Through the formation of social bonds and a sense of attachment to their environment, community members are likely to feel responsible for maintaining and preserving the environment in which they live. The proposed strategy based on the research findings to strengthen local wisdom practices and maintain environmental sustainability involves various stages, from in-depth understanding of local wisdom, identification of community empowerment potential, to implementation and evaluation of sustainable practices. Governments, community organizations and individuals need to work together to support these efforts. Through combining modern technology with local wisdom values, as well as strengthening community education and participation, we can optimize sustainable environmental conservation practices. The integration of spiritual values is also an important step in strengthening the collective commitment to maintaining the balance between humans, nature and spiritual forces.

Recommendations

Based on this research on the potential of community empowerment through local wisdom for sustainable environmental sustainability practices, it can be recommended that future research can further explore how to strengthen local wisdom practices and promote community participation in maintaining environmental sustainability. This involves more in-depth policy analysis, development of sustainable technologies, as well as integration of spiritual values in people's daily practices. With these measures, we can safeguard cultural and natural heritage for generations to come.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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Human Resources Management and Lean Management Tolls

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Abstract: For more than two decades, Algeria has been seeking to diversify its economy through optimal exploitation of available resources and not relying on energy resources. Therefore, the human resources sector has recently received great attention in Algerian economic policies. This research paper aims to research and show the relationship between human resources management and lean management, by studying a sample of workers in the Aïn Témouchent- Algeria Telecom - that is active in the field of services. Lean management refers to a technology that has been developed with the aim of reducing waste from the production process and maximizing the value of the product or service to the customer, without sacrificing quality, Formulated by Toyota's production system, it is part of the distinct thinking, We used the questionnaire as a main tool for this study, as it was distributed to a random sample of 40 workers in the institution under study. At the conclusion of this study, we concluded that there is a positive and statistically significant relationship between training, motivation and lean management, while there is less statistically significant relationship between evaluation, leasing and lean management.

Keywords: Motivation, Training, Evaluation, Leasing, Lean management.

Introduction

Human resources management has become one of the most important functional departments in modern organizations, so that its efforts are focused on improving the performance of its human resources in carrying out their tasks in order to achieve the goals of the organization with the highest levels of efficiency and effectiveness, and among the modern administrative concepts, which has become the lion's luck in economics is the concept of agile management, as the philosophy of agile management originated in Japan by TOYOTA In the fifties of the 19th century. Then the model was generalized to the automotive industry, after this concept spread after the study carried out by the Institute (MIT) on the automotive industry, and agile management has arisen based on some of the ideologies that preceded it, including total quality management Production on time, these ideas represented the starting spark for the basic components of agile thinking, that is, the production of high-quality products at the lowest cost and only when needed, we will try through this scientific research to take note of some of the theoretical aspects of each of the management of Human resources and agile management, as well as an attempt to link the interaction between them through a field study at the operational institution of Algeria Telecom, Ain Timouchent branch,

Previous Studies

We mention the following studies : Study Sparrow and Otaye (2014) entitled "Agile management and the capacity of the human resources function": The role of human resources engineering and the location of intellectual capital : the objective of the study is to study the relationship between agile thinking and the role of human resources in achieving agile sustainability, which may lead to changes in intellectual capital surrounding agile thinking and new core experiences. Relying on the case study method to reach results, the study concluded that the organization's human resources must be engineered for the successful implementation of agile management

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through changes in human resources skills, behaviors and competencies as well as changes in human resources practices.

Study Jassem and Al-Zubaidi (2016) entitled: "The reflection of the agile management approach on human resource management practices: field research in telecommunications companies in Iraq (Zain - Asiacell)" This study aimed to test the extent to which the lean management approach is reflected in two of the most important telecommunications companies operating in Iraq, namely (Zain, Asiacell) and determine the extent to which the agile management approach is adopted by the two companies surveyed in a way that improves resource management practices The research problem was that there were deficiencies in some aspects of the application of the agile management approach in the two companies Research sample This deficiency was reflected in human resource management practices, and the questionnaire was used as a major tool for obtaining data and information, as it was distributed to a random sample of 90 individuals working in the departments of human resources and customer service in the two companies surveyed, and the statistical program SPSS was used For data analysis, the researchers have reached a set of results, perhaps the most important of which is that the statistical results of all correlation and influence between agile management tools and human resource management practices were positive and moral, and there are no significant differences between the two companies in the field of application of agile management tools and human resources practices.

Study bin Warith and Jaba (2016) entitled : "The role of productive institutions in the application of the agile management method : A field study on Algerian pharmaceutical institutions" This study aims to shed light on one of the most important modern methods of production management, which is the agile management method, and reviews the various forms of waste that the institution may face during the production process. Through the descriptive and analytical approach on which the study relied, the theoretical aspect of the effective role played by the agile management method in eliminating waste in the institution was demonstrated, through a set of mechanisms and tools on which this philosophy is based, with the need to provide a set of basic requirements necessary for the correct application of the method.

Through the applied study on a sample of Algerian pharmaceutical institutions and using the questionnaire tool, the extent to which the method of agile management can be applied has been measured, and it has been concluded that these institutions, represented by the senior management, are largely committed to providing all the necessary capabilities for the application of this method, and the training policy adopted in them is in line to some extent with the basic requirements of it, but the prevailing culture in these institutions, especially the absence of a spirit of cooperation between management and workers, remains. The great obstacle to the application of this management philosophy.

Study Rakaj and Al-Abadla (2017) entitled : The availability of the requirements of agile management and its role in human resource development in the Ministry of Education and Higher Education in Gaza: This research is based on studying the availability of the requirements for achieving agile management of work organization, continuous improvement, standard work, multifunctional worker in the Ministry of Education and higher education in Gaza, and their role in achieving human development in the ministry through the indicators of recruitment and training. It was completed based on a random sample selected through 430 forms out of 4119 employees in the ministry and its directorates spread in five regions across the main building of the ministry and seven sub-directorates. The researchers concluded that the concentration and spread of the Ministry of Education and Higher Education in Gaza with its directorates in the governorates, and the method of work followed based on the continuous improvement of work by adopting standard standards and job rotation achieves the requirements of agile management, and therefore there are no significant differences of statistical significance when testing its hypotheses at the level of significance 5%

The researchers also found the need to motivate workers to develop their capabilities and develop them through standard work standards and the rest of the determinants of agile management and that the variation of the correlation between polarization and the paragraph of organizing the work site, and the existence of this relationship between the rest of the paragraphs of the study supports this positive ability to the extent achieved from the requirements of agile management in human resource development. This was confirmed by the statistical tests of the correlation coefficients and their significance at the level of significance

Study Brahim et al. (2018). entitled: The role of agile soft management in achieving total quality (Examples of some agile institutions) This study aimed to illustrate the impact of the use of agile management techniques in improving the quality of products or services based on a set of tools used to achieve this. The business environment in which contemporary institutions are active is characterized by instability and continuous developments as a result of being affected by globalization and technical and technological changes, in addition to the intensity of competition, all of which encouraged organizations to adopt the concept of agile management in order to reach the quality provided to customers, which allows them to excel in the market to ensure their survival.

The study reviewed the theoretical framework of agile management with reference to a package of its tools used: such as workplace organization (5S), Appropriate Time (JIT), Continuous Improvement (Kaizen), Kanban, and Comprehensive Maintenance (TPM). The comprehensive framework for the concept of quality management and the most important principles that it seeks to achieve was clarified, and as the last part of the study, a set of models for agile European institutions (*MARSY- DIETAL-Nummi – Safran-TOKHEIM*), which has achieved positive results in the quality of its products and services

Human Resources Management

Human resources management has known great development and great interest by modern organizations, after it was marginalized and had no impact on the organization's policy, but environmental changes and transformations forced organizations to reconsider again the concept of human resources management appropriate to the organization's general strategies.

Definition of Human Resources

The first definition: it is the only real resource and Peter Drucker confirms this as he says that the organization has one real resource, which is the human being)Al-Huwaili , 2002(The second definition: It is also the most important elements of work and production, although all financial resources are important, but human resources are considered the most important, because they are the process of creativity and innovation and they design the product and supervise its manufacture and quality control and are the ones who market it, without effective human resources these things cannot be performed efficiently and no organization will be able to achieve its goals and missi)Al-Hiti, 2018(

Definition of hrm drfnd by glueck. w: It is that function in the organization that is concerned with the supply of the necessary human resources, including planning, searching, operating and dispensing with manpower needs) Abdel-Baqi, 1999 (Chruden and Sherman defined it : Human resource management includes basic processes that must be performed and rules that must be followed, and the main task of the people manager is to help managers in the organization and provide them with the opinion and advice they need to enable them to manage their subordinates more effectively) Kani, 2014 (and he knew it as Smith .G&Grant. J: It is the responsibility of all managers in the organization and a reign for what is done by human resources specialists in people management) Abdel-Baqi, 2001(We conclude from the previous definitions that the Human Resources Department is the department that provides what the facility needs from manpower, maintains, trains and develops it, and works on its stability and raise its morale, and this department also follows up the application of regulations, instructions and laws that participated in the formulation and adoption of the administration from time to time in line with the interest of the public.

The emergence and development of human resources management: Human resources management in its modern form is not the result of the hour, but is the result of a number of developments dating back to the beginning of the industrial revolution, those developments that contributed to showing the need for a specialized human resources department that takes care of human resources affairs in the facility, there are many reasons that explain the increasing interest in human resources management as a specialized function and as a branch of management, and among these reasons) Al-Huwaili,2002(

Industrial expansion and development in the modern era, helped the emergence of organized labor organizations, where problems began between management and human resources, which led to the need for a specialized department that takes care of and solves the problems of human resources in the enterprise. The great expansion in education and cultural opportunities for workers, which led to increased awareness as a result of their high level of culture and education, which led to the need for specialists in human resources management and modern means to deal with this modern type of resources.

Increased government intervention in relations between workers and employers by issuing labor laws and legislation, which led to the need for a specialized department that maintains the application of laws to avoid the enterprise falling into trouble with the government; the emergence of trade unions and labor organizations that defend human resources and the need to pay attention to the relations of management with labor organizations, which led to the importance of having a specialized department to create cooperation between management and labor organizations.

The most important historical stages that human resources management went through from the middle of the 19th century until now are: the first stage (Salmi, 2001):Industrial life developed after the industrial revolution before

that, industries were confined to the system of specialized sects, where such as industrialists practiced their handicrafts in homes with simple tools, and in terms of human resource management, the industrial revolution was the beginning of many human problems. The second stage : The emergence of the scientific management movement: One of the developments that contributed to the emergence of the importance of human resources management is the spread of the scientific management movement led by Taylor, who reached the four foundations of management, namely:(Al-Hiti, 2005) Real development in management: Taylor means to replace the experimental method or the method of right and wrong in management with the scientific method

Attention to the development and education of human resources : Taylor asserts that the worker will not produce the energy required of him until he has the willingness to work, and appropriate training on the job, which is essential to reach the required level of work; real cooperation between management and human resources: Taylor asserts that it is possible to reconcile in the public interest. Taylor has emphasized labor standards and focused on his demand for workers to perform production rates on the pay-per-wage principle.the third stage : The growth of workers' organizations in the beginning of the twentieth century Labor organizations grew and strengthened in countries, especially in transportation and heavy materials, and the movement of scientific management that tried to exploit the worker, is a direct cause of the emergence of unions. the fourth stage: The beginning of the First World War: Where the first World War showed the need to use new methods of selecting employees before hiring them, such as (alpha and beta) and successfully applied to work to avoid the reasons for their failure after their employment, and with the development of scientific management and industrial psychology, some specialists in human resource management began to appear in facilities to help in recruitment, training, health care and industrial security. the fifth stage: between the First and Second World Wars: The end of the twenties and the beginning of the thirties of this century witnessed developments in the field of human relations, where the Hawthorne experiments were conducted by Elton Mayo, and convinced many of the importance of satisfying workers about their work and providing appropriate conditions for work. sixth stage: after World War II until now: At this stage, the scope of work carried out by human resources management has expanded, as it included training and development of workers and the development of programs to motivate them and rationalize human relations and not only save human resources files and control their attendance and departure routinely, and modern trends in human resources management still focus on human relations and benefit from the results of research for psychology and anthropology.

Human resources management functions : Human Resources Management is interested in achieving efficiency and organizing employees in institutions, this interest is considered the most important entrance capable of ensuring the quality of performance and to achieve this efficiency, the department undertakes a set of functions, the most important of which are : Training function : What is the concept of the training function ? There are many concepts used to express training as a process, there are those who consider it an attempt to improve the current and future performance of workers by increasing their abilities to accomplish their jobs, or administrative and organizational efforts aimed at improving the ability of the individual worker to perform a specific job, or to play a specific role) Deiri & Al-Kiswati,2009(Incentive function: It has been defined as: "A force external to the person, which may be material, moral or in the form of factors present in the environment surrounding the individual, pushing him or below him to raise the level of his human performance to a higher level in order to obtain new advantages"(Deiri, 2009) ,there are several divisions of incentives and each division is based on a specific basis or aims to highlight a specific aspect.types of incentives according to their trends: Under this division, incentives are divided into two types: positive incentives and negative incentives. Positive incentives : Those incentives that aim to improve the level of performance of individuals through the entrance of encouragement and excitement.

Negative incentives : It is a set of influences that seek to influence the behavior of individuals through the entrance of punishment and deterrence. Types of incentives according to their nature, According to this basis, incentives are material and non-material incentives moral (Abbas,2011(Material incentives : These material incentives mean satisfying human material or physiological needs such as food and clothing. Non-material incentives (moral): they are those aspects that provide the social or self-needs of individuals.

Performance appraisal function: It is a process whereby the efforts of employees are fairly and fairly estimated to be rewarded for what they work and what they produce, based on elements and rates on the basis of which their performance is compared to determine their level of efficiency in the work they work)Abdel Ghaffar, 1993(rental Function: the concept of wage differs in capitalist economic theories from that in socialist economic theories and the reason for this difference is due to their view of work, in capitalist economic theories work is seen as a commodity sold and bought and has a price and that this price is the wage, which is defined in the said system as "the price that the worker gets for the physical or mental efforts he makes in the production process") Al-Maghribi, 2007(.

Lean Management

What is lean management : The Philosophy of agile management originated in japan by toyota in the fifties of the 19th century. The model was then generalized to the automotive industry, after the concept spread after the study carried out by the MIT Institute on the automotive industry) Monden , 2012(.

Lean management was built on some of the ideologies that preceded it, including TQM production on time) Arnhieter & Maleyeff, 2005(These ideas represented the starting point for the basic components of agile thinking, including focusing on producing high-quality products at the lowest cost and only when needed (Didia, 2017) as for the definition of agile management, there is no agreement on a single definition, but there are many definitions of this concept and we present them: Sparrow & Otaye points out that agile management "aims to produce products and services at the lowest cost and as quickly as possible, focuses on efficiency, minimizing waste and eliminating value-added activities, to improve and increase productivity.)Sparrow& Otaye,2014)

It is also "a philosophy that the organization aims to maximize value for its customers by minimizing waste (Nicholas, 2011). Through the above definitions, it is clear that agile management is based on: Creating value based on the needs of the customer, by eliminating all forms of waste, including on-time production, and direct delivery to the customer, with the continuous development of the value creation process through all its stages until the service or product reaches the final consumer, taking into account the high level of quality.

Principles of lean management: According to Womack and Jones , there are 5 basic principles of agile management:

Value determination: Value is always determined by customers' need for a specific product.

Value flow planning: Define all the steps for each type of product, omitting those that do not create value. All actions are defined within any path through which the product or service travels. This path can be in design, production, human resources, management, distribution, or customer service. The method here is to draw a plan for the flow and flow of materials, and products, through each process, and the goal is to identify every step that does not provide value, and from here find a way to get rid of these Missed steps.

Flow creation : After removing the damaged from the value creation path, this step is followed by verifying and ensuring that the remaining steps are proceeding smoothly without interruptions, delays, or congestions." Implementing steps in a tight sequence, which makes the product or service flow smoothly towards the customer") Didia,2017(this requires moving from a mentality of condescension and silo, to work between jobs that includes all interests, which represents the biggest challenges in the face of management programs.

Establishment of clouds: With improved flow, towards the market or customer can improve significantly. Which improves the way products are distributed, which is done according to need only, this means that the customer can attract products from the institution according to his need, that is, the actual demand is what creates production and then sales, and as a result, the products do not need to be manufactured by or stored, a process that arises from expenses for managing these stores, and we can also dispense with them and therefore the This process will reduce costs for both the factory and the customer.

Mastery and perfection: If we define the value, and the value paths and streams are set, the wasted steps are deleted, and we enter the flow and attraction, the process must be started again and continued until we reach a state of perfection and mastery, where value is created completely without waste. Agile management is not a fixed system, it requires constant and constant efforts and vigilance to master.

Requirements for the application of agile management: In order for agile management to succeed on the ground for the organization, the latter must meet some conditions or requirements, which are as follows:

supporting senior management: This is natural as senior management is the one who provides the capabilities and requirements needed by this method, and therefore its conviction is a cornerstone in the success of the application of this method.

Participatory management ensures that all employee suggestions are used, whether in finding solutions to problems or developing new work patterns that allow the organization to continuously improve its performance, and find optimal formulas for production without waste) Wilson,2010). Training : Training aims to change the behavior and convictions of individuals from those that existed before the formation process. Agile management requires highly qualified workers to identify, detect and avoid errors, and this is only possible with rigorous training designed to spread the culture of eradication of heather. In addition to providing workers with skills in line with the principles of agile management.

Culture : Every change in the organization must be preceded by a flexible culture that enables and paves the way for this change to be well received by the workers, if we want it to continue and succeed. If we go back to the

emergence of agile management in its infancy, Toyota in Japan, we find that one of the foundations of its success is the culture that characterizes the Japanese worker, which is characterized by strong belonging to the institution in which he works, and stems from his sense of belonging and loyalty to his country.

Agile management tools : There are many tools that fall under the agile management methodology, which enables obtaining the highest results by getting rid of waste and waste and thus increasing the efficiency of institutions. The following are the authors' most frequent and service-related tools:

Organization of the work site: There is no doubt about the importance of arranging and cleanliness of the workplace, and their role in increasing the productivity of workers so that the elimination of clutter can access things easily and quickly, and the tool of (5s) is the starting point to achieve this (Glover & Jackson, 2010). It improves the surroundings of workers by adhering to five principles: 5 words starting with "S".

Continuous improvement: It is a Japanese method that depends on the inclusion of small and continuous improvements, on each of the products, services, or processes, these improvements lead to reducing waste and waste, and continuous improvement is a comprehensive concept for all aspects of the organization, where all employees in the organization are engaged in the improvement process, regardless of their administrative levels, and their job positions from the top of the administrative pyramid to the front lines (Glover & Jackson, 2010).

Standard work: refers to the standardization of executive procedures at the workplace, where it shows and answers: what?, where?, when? Who?, and how? Tasks should be done to ensure the best results. In this way, customer satisfaction is achieved, and the continuity of the improvement process is ensured, by reaching the best possible way to perform the work (Michalaska & Szewiecz, 2010).

Multifunctional workers : This concept focuses on the presence of skilled workers and at the same time possessing multiple skills, undergoing specialized training in order to enable them to have high capabilities to solve problems related to each activity, and to develop it for the better, and this method is a tool to train workers to deal with more than one task within the organization) Glover & Jackson, 2010.

Six sigma: A strategic systematic approach to improving the process and new services, using scientific and statistical methods to raise the level of customer satisfaction with the services provided to them.

The Reality of Lean Management in the Ain Temouchent - Algeria Telecom –

In support of what we have presented in the theoretical aspect, and in view of the nature of the topic that requires trying to project theoretical concepts on practical reality and know the extent of their application in the Algerian institution, and in order to answer the problem posed and related to the extent of the role of human resources management in adopting agile management tools in the institution, we chose Algeria Telecom due to its advantages over other institutions at the national level, and it is also recently seeking to develop its services Under fierce competition.

Algeria Telecom

Algeria telecom is a public institution with shares of a commercial nature in the field of services, especially in the field of telecommunications, and it is active at the national level, its opening capital is estimated at 100 million algerian dinars until 2005 and then raised to 50 billion algerian dinars, and registered in the commercial register No. 02B0018083 and its social headquarters in algiers, on the national road no. 5 of the five homes of Mohammedia 16211 Algeria, and the age of the institution is legally defined by ninety-nine years, and the number of its workers is about 23 thousand workers, including 45% technicians, The turnover during the year 2010 amounted to 60 billion dinars, about 40%, of which is the duration of the fixed telephone horse. adsl , 15% Internet the directorate general of algeria is divided into regional regional commissions, the latter divided into state directorates and directorates into commercial agencies.

The role of training in adopting agile management tools within the algeria telecom: There are several types of training , internal training : It is within the institution with internal efficiency and currently its duration is between a week and three methods as needed in order to enable employees to practice their work in good conditions, which earns the institution a profit for time and money.

External training : It is of two types of short-term, i.e. from one month to three months, and it is with a contractor and is also subject to the low price up to fifty thousand dinars, but if it is above fifty dinars, the institution must contract with two or three, while long-term, i.e. three months up to six months, it is for groups that work in the

technical field. The role of motivation in adopting agile management tools in the Algeria telecom: which in turn is material and moral, financial incentives : there are social activities health services excursions the Foundation also conducts a lottery for workers to go to Umrah every year, and whoever wins the Hajj lottery costs the Foundation.

Moral incentives : The institution has moral incentives aimed at providing an appropriate climate for the worker in conditioning and achieving belonging to it, and according to the same social agreement dated 13/07/2003 grants the worker the right to these moral incentives.

Negative incentives: However, just as there are positive incentives for the institution, on the other hand, there are negative incentives, and according to what is stated in the internal organization of the institution in Article 118 based on what is authorized by Article 72 of the Social Agreement Code contained on 13/07/2003, it is classified as penalties applied to it according to professional errors, and public discipline.

The role of evaluation in adopting agile management tools in the Algeria Telecom : The Department of Human Resources Management distributes cards to evaluate the performance of workers to the heads of work teams in order to evaluate employees for a grant of points that are according to discipline, performance, biography, the number of interventions made by the worker in order to solve customer problems and the number of sales that he makes and be an addition to him in the base wage he obtains, the evaluation process in the institution in general is subject to the productivity of each worker in his field in the institution.

The role of leasing in adopting agile management tools within Algeria Telecom: The wage is an effective tool in stimulating the human resource and improving its standard of living, which helps in attracting and attracting highly efficient people, the wages in the operational directorate of Algeria Telecom are improved for the rest of the public institutions, where the lowest wage ranges from three thousand Algerian dinars, an institution that attracts highly qualified employees.

Field Study Methodology (Data Analysis and Hypothesis Testing)

We will learn about the methodological framework of the study, then present and analyze the results of the study, then test the hypotheses to come up with hypotheses

Field study methodology: In this study, we relied on the descriptive analytical approach in order to identify the phenomenon under study, and the program of the statistical package for the social sciences (SPSS.V.20) was used in order to process the data obtained through the field study of the surveyed sample.

Determine the population and sample of the study all the employees of Algeria Telecom, Ain Temouchent branch, including executives, technicians and executive workers, numbered 200 workers in 2018, where we distributed 40 questionnaires and retrieved 33 questionnaires.

Study tools and sources of information: To achieve the objective of the study of knowing the role of human resources management in adopting the principles of agile management in Algeria Telecom, then using the questionnaire as a tool to collect data as: the independent variable: human resources management with its various functions (motivation, training, evaluation, leasing), the dependent variable: agile management (work organization, continuous improvement, standard work, multifunctional workers, six sigma).

Stability of the study tool: It means the stability of the results obtained using the measurement tool several times, where the stability coefficient was used depending on the internal consistency factor Cronbach's alpha, as the closer the value of the stability coefficient to one, the higher the stability and the closer it is to zero, the low stability.

Table 1. Stability coefficient for allstatistique de fiabilité mesures

Alpha Crowe Laboratories	Number of ferries
0.96	33

Source: Prepared by researchers based on SPSS V.20 outputs

From the chart, we conclude that the total statements of the study variables have satisfactory credibility and satisfactory stability, as the value of Alvacronbach is 0.96, which is an acceptable and strong stability coefficient of 96%.

Main hypothesis test: There is a positive and statistically significant relationship between human resources management and agile management tools in the Algeria Telecom to find out the impact of human resources management on the adoption of agile management tools in the operational directorate of Ain Temouchent, we

used a simple linear regression model. As HRM is an independent variable and agile management tools are a dependent variable at a moral level of 5%. Thus we write the following equation:

$$y = a_0 + a_1x_1 + e \quad \epsilon \text{ (y = dependent variable x= independent variable, } a_0 = \text{constant, } a_1 = \text{ regression coefficient, } e \epsilon = \text{ uncertainty coefficient remainders)}$$

Table 1. Linear correlation and level of significance for human resources management

Constant a_0	Significance Level	Degree of Freedom	Factor Regression a_1	t Calculated	Determination Coefficient	Correlation Coefficient
0.198	0.009	1 31 32	0.939	5.320	0.477	0.691

*Researcher's result based on SPSS outputs

The source is prepared by researchers based on the outputs of SPSS. V.20. Through the table, the level of significance is equal to 0.00, which is less than the level of significance 0.05, and therefore it can be said that there is a statistically significant relationship between the two variables, and this is confirmed by the correlation coefficient estimated at 0.691, which indicates a strong positive relationship between them and from the coefficient of determination, we find that human resources management affects and controls the adoption of agile management tools by 47.7%, accordingly, there is a positive and statistically significant relationship between human resources management and agile management tools in the institution, and the following equation shows the relationship between two variables $y = 0.198 + 0.939x + e\epsilon$ at a significant level of 5%.

We note through the model presented between human resources management and the adoption of agile management tools that the higher the percentage of human resources management by one unit, the more agile management rises by 0.939 units at a level of 5%.

Testing the first sub-hypothesis : There is a positive and statistically significant relationship between motivation and lean management tools in the operational directorate of algeria telecom Ain Timouchent branch To test the first hypothesis, we used a simple linear regression model. Motivation is an independent variable and agile management tools are a dependent variable

Table 2. Linear correlation and significance level of motivation

Constant a_0	Significance Level	Degree of Freedom	Factor Regression a_1	t Calculated	Determination Coefficient	Correlation Coefficient
1.299	0.000	1 31 32	0.636	5.320	0.477	0.691

*Researcher's result based on SPSS outputs

Through the table, the level of significance is equal to 0.00, which is less than the level of morality.0.05 Thus, it can be said that there is a statistically significant relationship between motivation for human resources and the adoption of agile management tools, this is confirmed by the correlation coefficient estimated at 0.633, which indicates a strong positive relationship between them, and from the coefficient of determination, we find that motivation affects and controls the adoption of agile management tools by 40.1%, and therefore we confirm the validity of the hypothesis that there is a positive and significant relationship Statistical significance between motivation and agile management tools in Algeria Telecom in Ain Temouchent at a moral level of 5%

The following equation shows the relationship between motivation and the variable of adopting agile management.

$$y = 1.299 + 0.636x_1 + e \quad \epsilon$$

We note through the presented model: the greater the value of motivation by one unit, the more agile management rises by 0.636 units.

Testing the second sub-hypothesis: There is a positive and statistically significant relationship between training and lean management tools in the Algeria Telecom Ain Timouchent branch to test this hypothesis we used a simple linear regression model. Training is an independent variable and agile management tools are a dependent variable at a moral level of 5%.

Table 3. Linear correlation and level of significance for training

Constant a_0	Significance Level	Degree of Freedom	Factor Regression a_1	t Calculated	Determination Coefficient	Correlation Coefficient
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0.249	0.000	1	0.831	5.209	0.467	0.683
		31				
		32				

*Researcher’s result based on SPSS outputs

From the table, the significance level is 0.00 and is less than Morale level 0.05 Thus, it can be said that there is a statistically significant relationship between HR training and the adoption of Tools Agile management This is confirmed by the correlation coefficient of the estimated by: 0.683, which indicates a strong positive relationship between them, and from the coefficient of determination, we find that human resources training affects and controls the adoption of agile management by: 46.7% ‘ Therefore, we confirm the validity of the hypothesis that That there is a positive and significant relationship Statistics Between training and Tools Agile management in the operational directorate Algeria Telecom Ain Temouchent Branch at a moral level of 05%. The following linear equation shows the relationship between two variables: $y = 0.249 + 0.831 x_2 + e\epsilon$

We note through the model provided that the higher the value of training in one unit, the higher the value of agile management by: 0.831 unitS. Testing the third sub-hypothesis there is a positive and statistically significant relationship between evaluation and lean management tools in the Algeria Telecom Ain Timouchent branch

Table 4. Linear correlation and significance level of evaluation

Constant a ₀	Significance Level	Degree of Freedom	Factor Regression a ₁	t Calculated	Determination Coefficient	Correlation Coefficient
2.013	0.013	1	0.418	2.648	0.184	0.429
		31				
		32				

*Researcher’s result based on SPSS outputs

Through the table, the level of significance is equal to 0.013, which is less than the level of morality 0.05, and therefore it can be said that there is a statistically significant relationship between the evaluation of human resources and the adoption of agile management, while the correlation coefficient estimated at 0.429, which shows that there is a low positive relationship between evaluation and agile management, and the coefficient of determination shows that the evaluation of human resources affects by 18.4% on the adoption of agile management tools, and therefore we confirm the validity of the hypothesis that There is a positive and statistically significant relationship between the evaluation of human resources and lean management tools in the operational directorate of Algeria Telecom, Ain Temouchent branch, at a significant level of 05%. And the following equation shows the relationship between the two variables: $y = 2.013 + 0.418 x_2 + e\epsilon$

We note through the model presented between evaluation and agile management tools, where the higher the value of evaluation by one value, the adoption of agile management principles rises by 0.418 units at a moral level of 05%

Hypothesis test IV: There is a positive and statistically significant relationship between leasing and lean management tools in the Algeria Telecom Ain Timouchent branch

Table 5. Linear correlation and level of significance for leasing

Constant a ₀	Significance Level	Degree of Freedom	Factor Regression a ₁	t Calculated	Determinatio n Coefficient	Correlation Coefficient
1.726	0.016	1	0.431	2.543	0.173	0.416
		31				
		32				

*Researcher’s result based on SPSS outputs

From the above table, the significance level is equal to 0.016, which is less than the moral level of 0.05, and therefore it can be said that there is a statistically significant relationship between leasing and the adoption of agile management. This is confirmed by the correlation coefficient estimated at 0.416, which shows that there is a low positive relationship between leasing and the adoption of agile management tools and the coefficient of determination, which explains that human resources leasing affects agile management tools by 17.3%, and therefore we confirm the validity of the hypothesis. According to the statement that there is a positive and statistically significant relationship between therental and lean management tools of the Algeria Telecom, Ain Temouchent branch, at a significant level of 05%. The following linear equation shows the relationship between $y = 1.726 + 0.431 x_4 + e\epsilon$

We can see through the model, the higher the leasing value by one unit, the more agile management tools rise by 0.431 units.

Conclusion

The results obtained from the analysis of the questionnaire were as follows: Motivation and training have a statistically significant impact on the adoption of lean management tools in the operational directorate of Algeria Telecom in Ain Timouchent, and this confirms that the directorate gives great attention to the motivation and training functions of its employees, which improves their performance and the quality of their services, through these results it can be said that workers show high approval as evidence of the good performance of human resources management.

The evaluation and leasing have a statistically significant impact, which reflects positively on the adoption of the principles of lean management, which in turn affects the friendly return of the directorate, but there is a disparity in the functions as the evaluation and leasing functions are still incomplete compared to the rest of the jobs.

Recommendation

Based on the results of the study, we offer a number of recommendations, the most important of which are : Increased attention and wider use of agile management tools by the Algeria Telecom in ain Temouchent it is important to spread the culture of reducing waste among employees through continuous improvement activities of the company's activities even if there are no problems so as to significantly improve the value of products and services provided to customers.

The function of human resources management has an effective role and it positively affects the adoption of the principles of lean management in the operational directorate of Algeria Telecom in Ain Temouchent, but the functions of evaluation and leasing require increased attention to them and activation by the administration, because of their important role in consolidating agile management tools whose objectives are in line with the objectives set for the facility.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

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Effects of Exercise Training on EEG Activity Patterns during Cognitive Tasks

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Abstract: To explore the effective method to detect the effect of exercise training on EEG activity, this paper compared the distinguishability of EEG changes relevant to exercise training in different cognitive states. EEG signals of college students who have undergone long-term exercise training (exercise training group) and college students who have not undergone such training (control group) were collected under specific cognitive tasks (Motor imagination tasks). Then the power characteristics of alpha wave and beta wave were obtained by wavelet transform method. The machine learning method was used to distinguish the difference of brain electrical activity between the exercise-trained subjects and the control group during the exercise-related cognitive tasks. Results showed that EEG patterns between two groups were not distinguished in rest status (the accuracy is lower than 59%), but they were separable in the completion of the motor cognitive tasks. The accuracy was over 85%. The pattern of brain electrical activity during cognitive tasks can better reflect the effect of exercise training.

Keywords: Exercise training, Machine learning, Brain development.

Introduction

Cognitive neuroscience research shows that learning and training have an important impact on brain development, which is the embodiment of brain plasticity. Exercise ability is not only related to the physiology of organs such as muscles, bones, heart and lung but also related to the brain's exercise information processing ability. The ability of the central nervous system to acquire, recognize and make decisions about movement information is an important part of movement ability. It can be improved too through exercise. The acquisition of motor skills will be accompanied by a certain degree of plasticity changes in brain structure and function with the development of modern imaging technologies such as EEG (electroencephalogram), fMRI (functional magnetic resonance imaging) and PET (positron emission tomography) etc., many researchers have paid attention to the influence of exercise on brain structure and function. On this basis, further research was conducted to explore the effects of professional sports training on EEG activity under specific cognitive tasks. These researches can provide physiology basis for evaluation of the training effect and development of motor ability.

Motor ability is one of the basic functions of human brain, and specific training can improve motor ability and affect the physiological structure of the brain. Brain image studies such as fMRI and PET showed that there are specific divisions of brain regions involved in different movements and there are the

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cooperation and interaction of among various motor areas. People with professional sports training showed significant changes in the frontal, occipital and parietal lobes of brain compared with people without sports training group. For example, Wei Gaoxia et al conducted an fMRI study on divers in 2009, and found that the gray matter density in the bilateral thalamus and the left premotor area of elite athletes was significantly higher than that of ordinary people. EEG studies have also shown training-related changes in brain electrical activity corresponding to motor function regions. Del Percio et al., (2009) found that the activity of brain regions of air gun athletes in the preparation stage was lower than that of non-athletes. It was found that elite karate athletes had significantly higher amplitudes of rhythm alpha 1 in the top and occipital regions at rest state than non-athletes and amateur athletes. However, these studies were limited in 1) static regional comparisons and didn't compare brain activity patterns during cognitive tasks; 2) The comparison of a single region or parameter fails to analyze the cooperative working mode of multiple regions. The effect of exercise training on brain activity patterns during cognitive tasks remains to be further studied.

In this paper, we will discuss the EEG pattern difference under sport imagine tasks. We compared the EEG activities between the groups of long-term professional sports training and without sports training under exercise-related cognitive tasks. The college students with long-term professional sports training constituted the experimental group and college students without professional sports training constituted the control group. The EEG electrical signals of the participants were collected during the rest status and the process of performing the motor imagination tasks. Classifiers in machine learning method were used to distinguish the difference of brain electrical activities between the two groups.

Experimental Design

Selection of Experimental Subjects

The subjects of this study were 8 university students in Nanjing with an average age of 23. After the detailed explanation of the experiment purpose and process, the consent form was signed with the subjects on a voluntary basis. In the study, the subjects were divided into professional sports training group and non-professional sports training group according to whether they had received professional sports training. The professional sports training group consists of 4 college students who have received more than three years of professional sports training and carry out more than 5 hours professional training every day. The non-professional sports training group consisted of 4 college students who did not have any amateur or professional sports training. All subjects were in good health and had no mental disorders and no known brain or systemic organic diseases.

Design of Motor Imagery Cognitive Tasks

The cognitive task of motor imagery includes two items. 1) Imaging oneself doing the mental task of sports of high jump. 2) Imagining oneself doing mental task of the swimming action.

Data Acquisition Method

The EEG signal was collected during the mental imagination tasks. The EEG acquisition system produced by Nanjing VISH Company was used to collect EEG signals. The experimental data were collected via 19-lead electrode cap. The brain electrode was placed using international standard 10/20 system in the order of Fp1, Fp2, F3, F4, C3, C4, P3, P4, O1, O2, F7, F8, T3, T4, T5, T6, Cz, Fz and Pz, referring to the left and right ear electrodes interconnected by electrodes (A1+A2). The arrangement is shown in Figure 1. The EEG data is bandpass filtered from 0.5Hz to 40Hz, and the sampling frequency is 512HZ. In the experiment, it is required to keep the environment quiet and no disturbing noise. The subjects completed the motor imagination tasks in turn under the instruction of the experimental operator:

- 1) Resting status: Subjects are required to close their eyes and relax without doing any imagination for two minutes.
- 2) Motor imagination task: The subjects were asked to imagine themselves doing the high jump with their eyes closed and repeat the imagination for one minute. When you're done, stop imagining, open your eyes, relax, and self-regulate for one minute.

3) The subjects were asked to imagine themselves swimming with their eyes closed and repeat the imagination for one minute. When you're done, stop imagining, open your eyes, relax, and self-regulate for one minute.

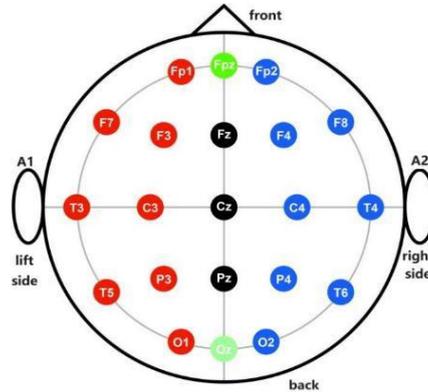


Figure 1. International 10-20 System 19-lead placement

Data Analysis

EEG Feature Parameters Extraction

Data Preprocessing

- 1) In this experiment, the signal is preprocessed by denoising. Noise was removed for obvious eye movement, body movement or other disturbing manually through the software function.
- 2) Data segmentation: EEG data of every lead under every task were divided into with a data segment with 512 sample points. 160 data segments were taken per lead for each subject in the resting state. And 160 data segments were obtained for per lead of each subject under the movement imagine tasks.

Feature Extraction

The sampling frequency of EEG experiment data was 512Hz. Considering the frequency range of δ , θ , α and β waves of EEG rhythm, db4 wavelet basis was first used to decompose each original EEG signal in 7 layers. The frequency range of each component after decomposition was corresponding to the frequency band of the four EEG rhythm signals. δ waves mainly appear on A7, θ waves on D7, α and β waves on D6 and D5, respectively. The signal energy coefficients of 4 corresponding bands were calculated. The four signal energy coefficients were normalized to region (Lisberger, 1988). After the pretreatment of EEG experimental data, 4 rhythm energy characteristic parameters were extracted from each data segment after wavelet transformation, and the 19-lead experimental sample was a two-dimensional matrix of 19×4 .

Data Pattern Classification Algorithm

In order to determine whether professional sports training has an impact on cognitive brain electrical activity, this study first used the classification algorithm in machine learning to classify the brain electrical activity patterns of the experimental group and the control group to detect whether they are separable. Due to the large number of data features and small amount of data in this study, two classical classification algorithms, SVM (Support Vector Machine) and BP (Back Propagation) neural network algorithms, were employed. SVM is based on statistical learning theory and structural risk minimization principle, which shows many unique advantages in solving small sample, nonlinear and high-dimensional pattern recognition. BP neural network algorithm has strong learning ability, self-organization and adaptability, and can automatically form a decision region that meets the requirements through its own learning mechanism. It has showed the impressive classification performances in the problems without the empirical knowledge and discriminant function about the pattern in advance. So it becomes a classic algorithm in machine learning.

Results and Discussion

Classification Results

In the study, 8 experimental subjects formed $8 \times 160 = 1280$ data samples in rest states and under movement imagine tasks respectively. In each experiment, 70% was used as training data and 30% as test data. The final classification accuracy result was obtained by 10-fold cross-validation.

Experiment 1: Classification of EEG in Rest State

There were 1280 samples with the label of two classes from 4 subjects with long-term professional sport training and 4 subjects non-professional-sport training in rest state. The accuracy was obtained by 10-fold cross-validation. The classification results of experimental group and control group in resting state are shown in Table 1.

Table 1. Classification results of two groups in resting status

Classifier	Accuracy (10-fold)
SVM	58.17%
BP neuronet	53.88%

As it can be seen from the classification results in Table 1, the accuracy of the classification of college students in the professional and non-professional sports training groups was lower than 58.17% under the closed eyes resting task, indicating that the two types of samples were almost inseparable. The results showed that there was almost no difference between the professional training group and the non-professional training group.

This conclusion is similar to that of Coenen (2004). Shishuo et al. where they conducted an exercise imagination experiment on elite male short-distance track cyclists and second-level athletes, and found that there was no significant difference in the total EEG power of the left and right brain regions of second-level athletes compared with elite athletes under quiet state. Denghui studied the EEG of 20 young tennis players (including 4 elite players, 10 elite players and 6 unranked players), and found that the brain wave rate and amplitude of the elite group were not significantly different from those of the elite group and the non-ranked group, which indirectly indicated that the activity degree and tension of the higher nervous activities of the athletes with different training levels were roughly similar when they were quiet. At the same time, Shishuo et al. also believe that the characteristics of EEG at rest are not related to the level of training.

However Zhaoqi and Xuegong (2007) studied the amplitude changes of EEG rhythm in elite karate athletes, amateur karate athletes and non-athletes under the closed eye resting state, and found that the amplitude of δ and $\alpha 1$ rhythm in the parietal region, occipital region and occipital region in elite karate athletes was significantly higher than that in non-athletes and amateur karate athletes. The specific EEG rhythm amplitude of subjects with different training level showed obvious difference. These researches show that there are completely different results on the effects of exercise training on the EEG in the resting state. The inconsistent phenomenon can be explained that EEG in the resting status is unreliable or insufficient to identify the changes in the brain activity of exercise training.

Experiment 2: Classification of EEG Under Motor Imagery Tasks

There were 1280 samples with the label of two classes from 4 subjects with long-term professional sport training and 4 subjects non-professional-sport training under motor imagery tasks. The accuracy was obtained by 10-fold cross-validation. The classification results of experimental group and control group under motor imagery tasks are shown in Table 2.

The classification accuracy of college students in the professional sports training group and the non-professional sports training group was more than 85% under the motor imagination task, and the two types of samples were distinguishable. The results showed that there were significant differences between the professional exercise training group and the non-professional exercise training group. After long-term

professional exercise training, the electrical activity of the brain of the college students changed to some extent.

Table 2. Classification results of two groups under motor imagery tasks

Classifier	Accuracy (10-fold)
SVM	87.55%
BP	85.88%

After long-term training, a series of changes have taken place in the structure and function of the system in the higher parts of the brain, and Functional Reorganization is realized to achieve the function reshaping, that is, the plasticity of the brain. The results of experiment 2 showed that this change can be detected explicitly in the cognitive tasks. The change of EEG under cognitive tasks is more distinguishable and relevant to effect of exercise training than the EEG in rest status.

Conclusion

The present study showed that EEG in the long-term exercise professional experimental group and those without professional exercise training was not distinguishable in the resting state. However, there was a significant difference in the pattern of EEG activity in the execution of cognitive tasks, which indicates that the EEG activity in the cognitive task can better reflect the change of motor ability. This result may provide a more accurate perspective for the study of brain plasticity. It also provides a physiological way to evaluate the training effect on brain function. Finally, the change in EEG activity pattern was not only manifested in the band but also in the region. The internal mechanism of this pattern change needs further study.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

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Investigation of Physical Education Teacher Candidates' Perspectives towards the Field of Physical Education

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Abstract: Education is a process that starts from the birth of an individual and continues until the end of his/her life. It is all of the planned and programmed activities that serve to provide some improvements in the behaviors of individuals according to predetermined goals. For this reason, teachers' love for their profession and their perspectives on their profession are very important for the education and training process to be effective. The aim of this study is to examine the perspectives of prospective physical education teachers towards the field of physical education. In the study, it was tried to determine the views of prospective physical education teachers about their field. As a data collection tool, an open-ended question developed by the researcher was presented to prospective physical education teachers. Using the interview method, which is one of the qualitative research methods in the research, the data obtained from 10 participants studying at Gaziantep University Faculty of Sport Sciences were analyzed by content analysis method. As a result, prospective physical education teachers stated that their field is an important and necessary profession. In addition, it was determined that physical education as a field is effective in terms of education and training and contributes to society in many ways. However, while the participants stated that the society did not attach importance to the field of physical education and approached it with prejudice, it was concluded that the importance of the field should be emphasized.

Keywords: Physical education, Prospective teacher, Field.

Introduction

In the historical process, people have used different ways of transferring their experiences to future generations, in other words, different ways of teaching. These teaching methods or activities have changed and developed according to the structure of societies, lifestyles, production and consumption styles and economic activities, and have reached today. While in the past, the educational needs of individuals were met by natural educators or teachers with whom they interacted, today this process is mostly carried out by teachers, each of whom is an expert in their field (Akkus, 2013). Advanced societies that consider education important are composed of individuals who are trained in various fields and have qualified manpower. The education system of countries plays an important role in providing qualified manpower. Teachers, who are perhaps the most important part of the education system, are very effective in the progress of society. In this respect, in order for prospective teachers to be more effective and successful in their professions, they should be trained as individuals with pedagogical formation and positive attitudes towards their profession (Durmusoglu et al., 2009). Because the qualifications of teachers, who are the locomotive of the education system in terms of teaching, significantly affect the success rate in education (Arastaman, 2013).

In the 21st century, even if the best school buildings are built, the most up-to-date curricula, materials, technologies and activities are developed to raise the expected individuals, the desired result will not be achieved unless the teacher is adequately equipped (Güven & Keleşoğlu, 2018). For this reason, the quality of new generations is identical to the quality of the teachers who raise them. Considering that teachers are artisans who shape human personality (Celikten et al., 2005), their attitude towards the teaching profession gains importance in order to be qualified or to reflect their qualifications to students.

The extent to which prospective teachers have competencies related to their profession and their attitudes towards the teaching profession is an important issue in terms of their qualifications (Capri & Celikkaleli, 2008). Teacher self-efficacy is of great importance among the factors required for a qualified education and affecting quality, in parallel with the responsibilities of always striving for self-improvement (Kafkas et al., 2010). For this reason, the perceptions of pre-service teachers about the teaching profession reveal how they will become teachers in the future and their aspirations for this (Akça-Berk et al., 2015).

Since teachers have the power to affect their students positively or negatively with their behaviors, it is thought that the attitudes of prospective teachers towards the teaching profession are very important. Pre-service teachers' attitudes towards their profession are closely related to their reasons for choosing their profession and how they see their profession (Kartal & Afacan, 2012). The aim of this study is to examine the views of prospective physical education teachers towards the field of physical education.

Method

Qualitative research is defined as research in which qualitative data collection methods such as observation, interview and document analysis are used and a qualitative process is followed to reveal perceptions and events in a realistic and holistic manner in a natural environment (Yıldırım & Şimşek, 2013:46). In the research, the interview method was used because it would be effective in obtaining more detailed and detailed information about the examination of the physical education teacher candidates' views on the field of physical education, their approaches and their comments on the definition (Yıldırım & Şimşek, 2013).

Research Group

In the study, the views of prospective physical education teachers towards the field of physical education were examined. For this purpose, the study group of the research consists of students studying at Gaziantep University Faculty of Sport Sciences.

Preparation and Implementation of the Open-Ended Questionnaire

In the study, a semi-structured interview form consisting of 1 item was used to collect qualitative data. Through the interview technique, which is frequently used in qualitative research, the researcher tries to understand unobservable situations such as attitudes, experiences, intentions, thoughts, mental perceptions, interpretations and reactions (Yıldırım & Simsek, 2013). In order to develop the interview form, a comprehensive literature review was conducted and an interview form was prepared. While preparing the semi-structured interview form used as a data collection tool, the researcher first conducted a literature review and created a semi-structured interview form question pool with questions that could be asked to prospective teachers about the subject. Then, the questions were examined by three experts and the semi-structured interview form was finalized. None of the participants included in the study were forced to participate in the research, and the principle of confidentiality was carefully observed during the application and collection of the questionnaires. The interviews were recorded with a voice recorder and then these recordings were transcribed.

Data Analysis

The data obtained from the interview form used in the research were recorded with a voice recorder. The frequently used content analysis technique was used to analyze the data obtained from the questions in the interview form (Yıldırım & Simşek, 2013, p.259).

The steps followed are as follows;

- Collection of research data
- Coding of data
- Creation of themes
- Organizing the data according to codes and themes
- Interpretation of findings

Findings and Interpretation

Table 1. Distribution of physical education teacher candidates' views on their perspectives towards the field of physical education.

Themes	n	%
A sacred profession	10	18.3
A necessary and important area	10	18.3
An effective and efficient space	9	16.3

An area that contributes to society	9	16.3
An area to be valued	9	16.3
A field approached with prejudice	8	14.5
Total	55	100

In Table 2, when the perspectives of the prospective physical education teachers participating in the research on the field of physical education are examined, 18.3% of them stated that it is a sacred profession as well as a necessary and important field. In addition, 16.3% of the majority of the prospective teachers stated that it is an effective and productive field and a field that contributes to society. At the same time, 16.3% of the prospective physical education teachers stated that it is a field that should be valued and 14.5% stated that it is a field that is approached with prejudice.

Results and Discussion

In this part of the study, the results obtained based on the findings obtained with the aim of examining the views of prospective physical education teachers towards the field of physical education are given.

When we examined the perspectives of the pre-service physical education teachers participating in the research, it came to the fore that physical education is a sacred profession as well as a necessary and important field. In addition, it was stated that physical education is an effective and productive field and a field that contributes to society. At the same time, pre-service physical education teachers stated that it is a field that should be valued and a field that is approached with prejudice. From this point of view, we can say that physical education is a necessary and important field. It can be said that the field of physical education should be valued a little more in society and people should not approach the field with prejudice.

Recepoglu and Ibret (2019) identified issues such as job security, the value of the profession, social status and having a career as factors that reduce the motivation of pre-service social studies teachers. Here, the negative perspective of teachers due to the negativities in the value and social status of the profession is similar to the result of the study. Karatekin et al. (2015) concluded that pre-service social studies teachers' view that teaching is a socially valuable profession is effective.

As a result, prospective physical education teachers stated that their field is an important and necessary profession. In addition, it was determined that physical education as a field is effective in terms of education and training and contributes to society in many ways. However, while the participants stated that the society did not attach importance to the field of physical education and approached it with prejudice, it was concluded that the importance of the field should be emphasized.

Conclusion

As a result, prospective physical education teachers stated that their field is an important and necessary profession. In addition, it was determined that physical education as a field is effective in terms of education and training and contributes to society in many ways. However, while the participants stated that the society did not attach importance to the field of physical education and approached it with prejudice, it was concluded that the importance of the field should be emphasized.

Recommendations

In order to eliminate the factors that negatively affect the motivation of prospective physical education teachers, it can be suggested to carry out studies organized by faculty members working in the field of physical education. In addition, in the universities where pre-service teachers study before service, environments can be created where they can express their views on their fields, talk about their problems easily, and strengthen their sense of belonging to their branches.

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Preschool Teachers' Views on Play Education in Preschool Investigation of Opinions

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Abstract: Play activities are an important need for children. In this sense, the child expresses himself/herself effectively through play activities. In our country, physical education and play related courses are given at all levels of education. Therefore, all kinds of gains given to the child should be given through play. Especially in the learning-teaching process and we can say that children receive some gains through play. The aim of this study is to examine the views of preschool teachers on play education in preschool. The research is a qualitative study. The research group consists of 10 preschool teachers and this study group was determined by maximum diversity sampling method. In the research, face-to-face interview technique was used in accordance with the principle of volunteerism with preschool teachers working within Gaziantep Provincial Directorate of National Education. In the research, the interview method, which is one of the qualitative research methods, was used and the data obtained were analyzed by content analysis method. As a result of the research, preschool teachers stated that play is a part of self-knowledge, fun and life for children. It was also stated that it is effective in socializing children, recognizing their cultural characteristics and obeying the rules. In addition, based on the opinions of preschool teachers, it was concluded that play develops the characteristics of sharing, cooperation, tolerance and acting together.

Keywords: Preschool, Teacher, Game

Introduction

In the preschool period, which covers the 3-6 age period, also known as the play age, children use objects or has the ability to represent something they imagine. This imagination can lead to future life, to people, it shapes the way they view events and themselves. At the same time, play is a way for the child to interact with the environment. (Maden, 2010) and to be aware of the events around them (Sevinc, 2004). The game includes cultural exchange takes place between children who encounter different cultures. This situation leads to it allows him/her to see the experiences. Tolerance between children, respect for different experiences hearing develops (Hazar, 1996). Piaget says that children's games are extremely social, play as a form of social behavior for children and as a way of gaining social skills environment (Pehlivan, 2012). Preschool years are the years when the child's development begins to increase. Research has shown that childhood the behaviors acquired during the years of life form the personality structure, attitudes, habits, beliefs and values of the individual in adulthood judgments (Karaomerlioğlu, 2010; Tanrıverdi, 2012).

Children's future the formation of social and moral values, which will determine the future, begins in the first years of life. Social preschool education is the basic structure for ensuring the continuity of values and transferring them to future generations is the cornerstone. There are many ways to get to know children and share their world. Play is one of the most in addition, during the game, many known social, social and cultural in addition to behaviors, different behaviors can be acquired. During the game, the child can learn about and to use his/her own tools and equipment with care, to protect them, not to disturb the order, to be frugal to show behaviors, to be useful to the environment and society, and to use their time efficiently awareness can be gained. Similarly, during the game, it is possible to raise awareness of the environment to which the individual belongs or lives moral and conscientious values can also be taught. All the child's actions and aspirations are social the idea that expectations should also be taken into consideration can be gained through play (Sevinc, 2004). The importance of games played during childhood in the development of children, from the past

The contributions of children's games to their mental, physical, social and psychological development have attracted the attention of educators and opinions on the use of children's games in education have emerged. In line with these views, today, especially in many kindergartens and institutions at the first stage of education, children's games are effectively used as a kind of teaching method. In other words, while children's games played in the past supported children's development in an informal sense, they are now used more formally and consciously. In the past, children's games were mostly played outside and in groups (Artar & Demir, 1998; Toren, 2011), whereas today, children's games are generally played indoors, through technological toys and

individually. In this study, it was aimed to examine the views of preschool teachers on play education in preschool.

Method

Qualitative research is defined as research in which qualitative data collection methods such as observation, interview and document analysis are used and a qualitative process is followed to reveal perceptions and events in a realistic and holistic manner in a natural environment (Yıldırım & Simsek, 2013). In the study, the interview method was used because it would be effective in obtaining more detailed and detailed information about preschool teachers' views on preschool play education, their approaches and their comments on recognition (Yıldırım & Simsek, 2013).

Research Group

In the study, the views of preschool teachers on play education in preschool were examined. For this purpose, the study group of the research consists of preschool teachers working in Gaziantep Provincial Directorate of National Education.

Preparation and Implementation of the Open-Ended Questionnaire

In the study, a semi-structured interview form consisting of 1 item was used to collect qualitative data. With the interview technique, which is frequently used in qualitative research, the researcher tries to understand unobservable situations such as attitudes, experiences, intentions, thoughts, mental perceptions, interpretations and reactions (Yıldırım & Simsek, 2013). A comprehensive literature review was conducted to develop the interview form and an interview form was prepared. While preparing the semi-structured interview form used as a data collection tool, the researcher first conducted a literature review and created a semi-structured interview form question pool that included questions that could be asked to preschool teachers on the subject. The questions were then examined by three experts and the semi-structured interview form was finalized. None of the participants were forced to participate in the study, and the principle of confidentiality was carefully respected during the implementation and collection of the questionnaires. Interviews were recorded with a voice recorder and then transcribed.

Data Analysis

The data obtained from the interview form used in the research were recorded with a voice recorder. The frequently used content analysis technique was used to analyze the data obtained from the questions in the interview form (Yıldırım & Simsek, 2013, p.259).

The steps followed are as follows;

- Collection of research data
- Coding of data
- Creation of themes
- Organizing the data according to codes and themes
- Interpretation of findings

Findings and Interpretation

Table 1. Distribution of the data related to the examination of preschool teachers' views on preschool play education.

Themes	n	%
Self-recognition	9	15.1
Enjoyment	9	15.1
Sharing and helping	8	13.3
Part of life	8	13.3
Socialization	7	11.6

Tolerance	7	11.6
Recognition of cultural characteristics	6	10
Following the rules	6	10
Total	60	100

In Table 1, when the views of the preschool teachers participating in the study on play education in preschool are examined, the majority of them, 15.1%, stated that it was self-recognition and fun. In addition, 13.3% of the preschool teachers who participated in the study stated that play education is about sharing and cooperation and that it is a part of life, while 11.6% stated that it is about socialization and tolerance. In addition, 10% of the preschool teachers stated that it was about recognizing cultural characteristics and obeying the rules.

Results and Discussion

In this part of the study, the results obtained based on the findings obtained with the aim of evaluating the views of preschool teachers on play education are presented.

When we look at the opinions of the preschool teachers participating in the study regarding play education in preschool, it was determined that the majority of them saw play as self-recognition and entertainment. In addition, it has come to the fore that the preschool teachers who participated in the study stated that play education is about sharing and cooperation, and that it is a part of life. In addition, preschool teachers stated that play is socialization and tolerance. In addition, it was seen that they stated that play is the recognition of cultural characteristics and obeying the rules.

The child who plays with his/her friends during the game "learns cooperation and the rules necessary for collective life. The child, who is socialized through play and becomes aware of the concepts of self and others, grasps his/her social roles through play (Ozdemir, 2006). Children who learn the rules through play adopt these rules over time and learn to be in harmony with their friends and to respect each other during play. Thus, in addition to obeying the rules, the child learns to respect others values class begins to form by comprehending respect for rights (Uzer et al., 2006). In play, children also establish relationships with friends from different cultures and different environments. In this way, they learn to tolerate each other and learn about each other's cultures. They respect their values. Because the continuity of the game depends on this (Hazar, 2006).

In the study conducted by Artar (2004) to determine the views of kindergarten teachers on children's games, it was determined that the games played by children support their development in different dimensions. In Kayar's (2008) thesis study, findings were obtained that children's games support children's development and results were obtained to support this study.

Conclusion

As a result of the research, preschool teachers stated that play is a part of self-knowledge, fun and life for children. It was also stated that it is effective in socializing children, recognizing their cultural characteristics and obeying the rules. In addition, based on the opinions of preschool teachers, it was concluded that play develops the characteristics of sharing, cooperation, tolerance and acting together.

Recommendations

It is suggested that it is necessary to increase studies on the reflection of children's games to education in our country by considering them more scientifically. Informative seminars should be organized for teachers working in schools, especially in the first step of education, about teaching techniques with games.

Acknowledgements or Notes

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Analyzing the Types of Games Used by Classroom Teachers in Lessons

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Abstract: Play is an activity that encompasses the child's life and living. The child gets to know himself, nature, his environment and other people through play. At the same time, the child also learns to learn while playing. In early childhood education institutions, the most important way of teaching children is through play. Play is used in communicating with children, accessing information and gaining new skills. There are definitely play activities in every environment where there are children. Children can comprehend life better through play. After love, the most important need for children is play. The aim of this study is to examine the types of games used by classroom teachers in lessons. The research group consists of 20 classroom teachers and this study group was determined by maximum diversity sampling method. In the research, face-to-face interview technique was used in accordance with the principle of volunteerism with 20 classroom teachers working in schools affiliated to Iğdır Provincial Directorate of National Education. The interview method, which is one of the qualitative research methods, was used in the research and the data obtained were analyzed by content analysis method. As a result of the research, classroom teachers stated that they used traditional games, in-class games, drama and role plays in the lesson. At the same time, the classroom teachers participating in the research stated that they played rhythmic counting games, picture and card games, and games related to the subject. In addition to educational and entertaining games, it was also found that they used word games and games with songs.

Keywords: Classroom teacher, Lesson, Game types.

Introduction

Play not only prepares the individual for life but is also an effective method of expressing the inner world. The child expresses his/her inner world through play. The child tries to understand the world with the roles he/she acquires during the game, communicates and in this way his/her personality is formed and developed. The information acquired during the game becomes permanent and effective. Play is the child's way of thinking through experimentation. He learns the knowledge, skills and experiences he needs for his life while playing games. Therefore, play is the most important way in the education of children. Games are very effective in the learning process because they make children constantly active (MEB, 2009).

Play is one of the indispensable basic resources for the child to be happy. Through play, we can determine what the child likes and dislikes (Ogulmus, 2009). The child acquires and learns everything in education through play by doing and experiencing. Through play, the child uses all his/her senses. In this way, a permanent and natural learning process is realized. When we consider that children always play and love to play, it is also important to use the concept of play effectively in the educational process. While play is effective in entertainment and education, it also plays a very effective role in the physical development of the individual. When we compare children who play games with children who do not play games, it has been observed that those who play games are healthier, fitter and develop more quickly than others (MEB, 2009). Through play, children communicate better with their environment, get to know them better and incorporate what they learn into their play (Ucer, 1985).

According to educational science, play is recognized as an effective and important educational tool. It is especially effective in transferring the skills acquired in the pre-school period and school years, which is the first period of education for children, to the next ones. Thanks to the gains obtained through the game, positive features are reinforced and positive developments are provided on individuals. Learning through play can be called learning by direct experience (Aral, 2000). Poyraz and Dere (2003) stated that play is the most natural learning environment in the process of child development. We can develop the imagination of individuals by teaching them some information through play. Because play develops self-expression, freedom and thinking power of individuals (Gonen & Dalkılıç, 1998). Play activities are an indispensable need for children's development. The child becomes aware of his/her own ability by recognizing himself/herself through play and

ensures that the information he/she obtains becomes permanent through play (Alıncak, 2016). Therefore, all kinds of gains given to the child should be given through play (Sel, 1974). According to psychoanalytic theory, play activities are an effective tool for coping with negative events in the environment (Barnett, 2013). Play is an effective element that makes individuals ready and suitable for life, directs their development and helps them display correct behaviors in daily life (Alıncak & Tuzcuogulları, 2016). This study aims to examine the types of games used by classroom teachers in lessons.

Method

Interview method, which is one of the qualitative research methods, was used in the study. Qualitative research is a method that offers the researcher more flexibility than quantitative research and offers different approaches to data collection method, analysis and research design. Qualitative research is defined as research in which qualitative data collection methods such as observation, interview and document analysis are used and a qualitative process is followed to reveal perceptions and events in a realistic and holistic way in a natural environment. Qualitative research is an approach that emphasizes investigating and understanding social phenomena within their environment with an understanding based on theorizing (Yıldırım & Simsek, 2013). The interview method is prepared to obtain the same type of information from different people by focusing on similar topics (Patton, 1987; Yıldırım & Simsek, 2013).

Research Group

This study aims to examine the types of games used by classroom teachers in lessons. For this purpose, the study group of the research consists of classroom teachers working in schools affiliated to Iğdır Provincial Directorate of National Education.

Preparation and Implementation of the Open-Ended Questionnaire

In the study, the types of games used by classroom teachers in lessons were examined. For this purpose, the study group of the research consists of classroom teachers working in Iğdır Provincial Directorate of National Education. In the selection of the study group, maximum diversity sampling, one of the purposeful sampling methods, was used. According to Yıldırım and Şimşek (2013), the aim is to create a relatively small sample and to reflect the diversity of individuals who may be parties to the problem being studied in this sample to the maximum extent. The number of classroom teachers in the sample group in this study was determined as 20.

Data Analysis

The data obtained from the interview form used in the study were recorded with a voice recorder. After the application, the qualitative data in the audio recordings, including the answers of the classroom teachers, were transferred to the computer environment by the researcher. Qualitative data were then analyzed by content analysis method. The frequently used content analysis technique was used to analyze the data obtained from the questions in the interview form. The aim is to reach concepts that can explain the collected data (Yıldırım & Simsek, 2013).

Findings and Interpretation

Table 1. The distribution of classroom teachers' views on the types they use in lessons.

Themes	n	%
Traditional games	17	17.7
Classroom games	15	15.5
Drama and role plays	14	14.5
Rhythmic counting games	11	11.3
Picture and card games	11	11.3

Educational and entertaining games	11	11.3
Word games	9	9.2
Games with songs	9	9.2
Total	97	100

When the types of games used by the classroom teachers participating in the study are analyzed in Table 1, 17.7% of them stated that they used traditional games. In addition, 15.7% of the classroom teachers who participated in the study stated that they used in-class games and 14.5% stated that they used drama and role plays. In addition, 11.3% of the classroom teachers stated that they used rhythmic counting games, drawing and card games, educational and entertaining games in the lessons. At the same time, 9.2% of the classroom teachers stated that they preferred word games and games with songs.

Results and Discussion

In this section of the study, the conclusions reached based on the findings obtained in order to examine the types of games used by classroom teachers in lessons are given.

When the types of games used by the classroom teachers participating in the study were analyzed, it was seen that the majority of them used traditional games. In addition, the themes that the classroom teachers participating in the study used in-class games, drama and role plays in the lessons came to the fore. In addition, it was stated that classroom teachers used rhythmic counting games, drawing and card games, educational and entertaining games in the lessons. It was observed that some classroom teachers preferred word games and games with songs. From this point of view, we can say that the participants mostly used traditional games in the lessons and preferred different games in order to make the lesson effective together with in-class games. stated. Ayan and Dundar (2009), in their research, stated that the child introduces himself/herself more comfortably during the game and that he/she is free and creative while playing games, and that students' creativity develops in the learning process. Kaytez and Durualp (2014) concluded in their study that teaching with games is beneficial for the development of children and should be used in special education.

Conclusion

As a result of the research, classroom teachers stated that they used traditional games, in-class games, drama and role plays in the lesson. At the same time, the classroom teachers participating in the research stated that they played rhythmic counting games, picture and card games, and games related to the subject. In addition to educational and entertaining games, it was also found that they used word games and games with songs.

Recommendations

Classroom teachers can be given training seminars about teaching with games. Different types of games can be practiced in the lessons in terms of students' development. Likewise, the use of traditional games in lessons can be encouraged.

Acknowledgements or Notes

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The Effects of Play on Learning According to Classroom Teachers

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Abstract: Play has a great importance on the development of individuals. Children direct their lives by applying all the knowledge and skills they learn through play in their daily lives. The child recognizes his/her environment through play and continues his/her relations with his/her peers in this way. Thus, they fulfill some of their needs through play. The aim of this study is to reveal the effects of play on learning according to classroom teachers. The research group consists of 20 classroom teachers and this study group was determined by maximum diversity sampling method. In the research, face-to-face interview technique was used in accordance with the principle of volunteerism with 20 classroom teachers working in schools affiliated to Iğdır Provincial Directorate of National Education. The interview method, which is one of the qualitative research methods, was used in the study and the data obtained were analyzed by content analysis method. As a result of the research, it was seen that classroom teachers stated that the game was effective on learning and that learning was easier and faster as well as being permanent and effective. In addition, the classroom teachers participating in the study stated that learning is fun and that students are more interested and willing to learn. In addition, it was concluded that attention and motivation improved with the game and students had positive thinking skills.

Keywords: Classroom teacher, Play, Learning.

Introduction

Play is not only a phenomenon that provides children with fun and happiness, but also provides a socialization environment between individuals as it provides interaction during play. In this way, students' characteristics such as working together, friendship, acting together, self-confidence and taking responsibility can be developed, as well as providing support in the formation of their personalities (Aykutlu & Şen, 2004).

Play activities are a need of the child. The child expresses himself/herself more comfortably through play. Everything obtained in the game process provides permanence. Therefore, all kinds of gains given to the child should be given through play (Sel, 1974). Educational games develop some motoric features and psychological and social behaviors inherent in the nature of the game (Ayan et al., 2015).

Asking children in the first stage of primary education to remain inactive for a whole class period is contrary to their developmental characteristics (Aykaç, 2005). Play activities are an activity process that provides satisfaction in line with the child's needs (Lindon, 2001). The fact that play is spontaneous, arouses curiosity in individuals and recalls some forgotten elements in people's consciousness makes it educationally valuable (Mead, 2007).

Considering the age and developmental characteristics of children in the growth process, it comes to the fore that teaching with play is the most appropriate method for children to learn in terms of educational purposes and to transfer these skills to their attitudes and behaviors. When we consider the data of educational science, it indicates that learning by experiencing facilitates the learning process and gaining positive behaviors (Maden, 2007). Ellialtıođlu (2005) sees play as an indispensable way of life and the most effective way of learning in terms of individual development. Giving education through play is an important issue that needs to be emphasized in terms of learning the rules of the society in which the individual lives, on the other hand, offering some advantages to educators and providing the opportunity to get to know the child through play (Sađlam, 1997).

Play activities are an indispensable need for children's development. The child becomes aware of his/her own ability by recognizing himself/herself through play and ensures that the information he/she obtains becomes permanent through play (Alıncak, 2016). Therefore, all kinds of gains given to the child should be given through play (Sel, 1974). According to psychoanalytic theory, play activities are an effective tool for coping with negative events in the environment (Barnett, 2013). Play is an effective element that makes individuals ready

and suitable for life, directs their development and helps them display correct behaviors in daily life (Alıncak & Tuzcuoğulları, 2016).

Play is an important concept in educational science. Some experts consider play as an "art of learning". In addition, it is thought to be a way in which children expel their excess energy while playing games, prevent them from misbehaving and provide children with the need to imitate (Biriktir, 2008). The effect of play on children and its instructive nature cannot be discussed without any doubt. In general, the concept of play is not a learning tool for the child, and the child does not play to learn, but learns while playing; this is achieved through life experiences (Yavaşoğlu, 2005). From this point of view, the aim of this study is to reveal the effects of play on learning according to classroom teachers.

Method

Interview method, which is one of the qualitative research methods, was used in the study. Qualitative research is a method that offers the researcher more flexibility than quantitative research and offers different approaches to data collection method, analysis and research design. Qualitative research is defined as research in which qualitative data collection methods such as observation, interview and document analysis are used and a qualitative process is followed to reveal perceptions and events in a realistic and holistic way in a natural environment. Qualitative research is an approach that emphasizes investigating and understanding social phenomena within their environment with an understanding based on theorizing (Yıldırım & Şimşek, 2013). The interview method is prepared to obtain the same type of information from different people by focusing on similar topics (Patton, 1987; Yıldırım & Simsek, 2013).

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Preparation and Implementation of the Open-Ended Questionnaire

In the study, the effects of games on learning according to classroom teachers were examined. For this purpose, the study group of the research consists of classroom teachers working in Iğdır Provincial Directorate of National Education. Maximum diversity sampling, one of the purposeful sampling methods, was used in the selection of the study group. According to Yıldırım and Şimşek (2013), the aim is to create a relatively small sample and to reflect the diversity of individuals who may be parties to the problem being studied in this sample to the maximum extent. In this study, the number of classroom teachers in the sample group was determined as 20.

Data Analysis

The data obtained from the interview form used in the study were recorded with a voice recorder. After the application, the qualitative data in the audio recordings, including the answers of the classroom teachers, were transferred to the computer environment by the researcher. Qualitative data were then analyzed by content analysis method. The frequently used content analysis technique was used to analyze the data obtained from the questions in the interview form. The aim is to reach concepts that can explain the collected data (Yıldırım & Simsek, 2013).

Findings and Interpretation

Table 1. Distribution of classroom teachers' views on the effects of play on learning.

Themes	n	%
Impact on learning	18	16.4
Learning becomes permanent	18	16.4
Learning is easy and fast	16	14.6

Being fun	15	13.6
Students are interested and enthusiastic	15	13.6
Increased attention and motivation	14	12.7
Provides positive thinking skills	14	12.7
Total	110	100

When the opinions of classroom teachers on the effects of games on learning are analyzed in Table 1, almost all of the teachers participating in the study, 16.4%, stated that games are effective on learning and learning is permanent. Regarding the effects of the game on learning, 14.6% of the classroom teachers participating in the study stated that learning was easy and fast, and 13.6% of them stated that the lesson was fun with the game and the students were more willing and interested. At the same time, 12.7% of the classroom teachers observed that the game increased attention and motivation and provided positive thinking skills.

Results and Discussion

In this section of the study, the conclusions reached based on the findings obtained in order to examine the effects of classroom teachers' play on learning are given.

When we look at the opinions of the classroom teachers who participated in the study about the effects of games on learning, it was seen that almost all of the teachers participating in the study stated that the game was effective on learning and that learning was permanent. In addition, the classroom teachers who participated in the study stated that learning was easy and fast, the lesson was fun with the game, and the students were more willing and interested.

It was also observed that the game increased attention and motivation and provided positive thinking skills. Based on the opinions expressed by the classroom teachers, we can say that the game is effective on learning and contributes to students in many ways. Savaş and Gülüm (2014) found that the game teaching method increased the rate of recall in the lessons. Ayan and Dündar (2009) state that children express themselves more easily during play and that children have a freer and more creative personality in a play environment, therefore the use of play in educational environments to develop creativity skills in students is an indispensable need.

Firat (2007) stated that in education with games in foreign language teaching, they constantly put students at the forefront, try to ensure that they are active, learn by doing and practicing, ensure that every student participates in the lesson willingly with this method, enable students to learn words easily, keep them in their minds without forgetting them and say them without any difficulty when asked. Er (2008) stated that the use of games in foreign language teaching as an in-class activity has a positive effect on student motivation, supports participatory and active learning, and makes a significant contribution to creating a real communication environment and using real language.

Conclusion

As a result of the research, it was seen that classroom teachers stated that the game was effective on learning and that learning was easier and faster as well as being permanent and effective. In addition, the classroom teachers participating in the study stated that learning is fun and that students are more interested and willing to learn. In addition, it was concluded that attention and motivation improved with the game and students had positive thinking skills.

Recommendations

Classroom teachers can be given training seminars about teaching with games. Different types of games can be practiced in the lessons in terms of students' development. Likewise, the use of traditional games in lessons can be encouraged.

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Examination of Physical Education Teachers' Views on the Benefits of Reading Books

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Abstract: As a profession, teaching is one of the most important professions that play a role in the development and improvement of society. In this process, the attitudes and behaviors of prospective teachers towards the teaching profession are of great importance. In today's conditions, developments in both technology and science increase the number of information sources and the importance of reading. The aim of this study is to examine the views of physical education teachers on the benefits of reading books. The research group consists of 15 physical education teachers and this study group was determined by maximum diversity sampling method. In the research, face-to-face interview technique was used with 15 physical education teachers working in schools affiliated to Iğdır Provincial Directorate of National Education on the basis of volunteerism. The interview method, which is one of the qualitative research methods, was used in the research and the data obtained were analyzed by content analysis method. As a result of the research, physical education teachers stated that reading books gives a positive perspective and rests the soul. They also stated that their theological knowledge improved with reading books and they were happier. In addition, physical education teachers stated that reading books improved their communication skills and provided them with the ability to think differently.

Keywords: Physical education, Teacher, Book, Reading

Introduction

The education system is based on three important components. These components are the education program, teachers and students. In order to achieve success in education and to reach the goals, these elements must be coordinated with each other. When one of the elements is unhealthy, the system is badly affected (Katkat & Mızrak, 2003). Schools, which are instrumental in the blending and functionality of these elements in the education process, play a major role in terms of gaining and developing reading habits (Konan, 2013; Batur et al., 2010).

Reading enables people to develop their vocabulary, form concepts, make generalizations, draw conclusions and evaluate events from different perspectives. Reading fulfills emotional and spiritual needs. Individuals who do not read are always worried that their deficiencies may be noticed by others. Therefore, people who stay away from reading have difficulty in establishing relationships with society and other people and cannot become active (Arıcan, 2010). Konan (2013) emphasized the rapid increase in knowledge and mentioned that the most important way of obtaining this knowledge is the increasing importance of reading and stated that it is one of the important principles of individual and social development. Gunes (1997) revealed that an individual living in a civilized society has one hundred times more knowledge than a person living in a developing society and that approximately sixty percent of this knowledge is gained through reading. Sever (2004) also stated that reading has a great effect on people's access to information and a healthy view of events.

Orhan (2017) defines habit as a behavior that exists continuously in human life, affects and determines human life, and forms personality and character by directing his/her mental and social attitudes. Looking at these definitions, it is seen that the definition of habit emphasizes the continuity of the work done or the existing situation. Reading habit is defined as: "As a result of the individual's perception of reading as a need and a source of pleasure, the act of reading is performed continuously and regularly throughout life and with a critical/examining quality" (Yılmaz, 1993). According to Odabas et al. (2008), reading habit is: "It is a skill that strengthens and increases the knowledge, skills and understandings that individuals acquire throughout their lives and at the same time enables the adaptation of these values to individual and social life" (p. 435).

According to Tanju (2010), reading habit is an important skill that enables individuals to perform the act of reading with pleasure after learning to read. This habit can also be defined as considering the act of reading as a need and ensuring continuity throughout life. Dokmen (1990) states that when defining a reader's reading habit, what, when, where and how they read and how they acquire what they read are meant.

The main goal of countries in their struggle for existence is to develop, modernize and to protect and glorify the existence of their citizens by competing with other countries. However, people can live a happy and peaceful life by standing against ignorance. Therefore, it is necessary to be aware of the developments in the world and not to fall behind the society. There should be active continuity in change and development. Knowledge should be given the necessary importance and should be developed by using it effectively (Onal, 2010). In this study, it was aimed to examine the views of prospective physical education teachers on the benefits of reading.

Method

Qualitative research is defined as research in which qualitative data collection methods such as observation, interview and document analysis are used and a qualitative process is followed to reveal perceptions and events in a realistic and holistic manner in a natural environment (Yıldırım & Simsek, 2013). The research design is the phenomenology design, one of the qualitative research designs. The phenomenology design focuses on phenomena that we are aware of but do not have an in-depth and detailed understanding. In the study, the interview method was used because it would be effective in obtaining more detailed and detailed information about physical education teachers' views on the benefits of reading books, their approaches and their comments on the definition (Yıldırım & Simsek, 2013).

Research Group

In the study, the views of physical education teachers on the benefits of reading books were examined. For this purpose, the study group of the research consists of 15 physical education teachers working in schools affiliated to Iğdır Provincial Directorate of National Education. In the selection of the study group, maximum diversity sampling, one of the purposeful sampling methods, was used.

Preparation and Implementation of the Open-Ended Questionnaire

In the study, a semi-structured interview form consisting of 1 item was used to collect qualitative data. Through the interview technique, which is frequently used in qualitative research, the researcher tries to understand unobservable situations such as attitudes, experiences, intentions, thoughts, mental perceptions, interpretations and reactions (Yıldırım & Simsek, 2013). In order to develop the interview form, a comprehensive literature review was conducted and an interview form was prepared. While preparing the semi-structured interview form used as a data collection tool, the researcher first conducted a literature review and created a semi-structured interview form question pool with questions that could be asked to physical education teachers about the subject. Then, the questions were examined by three experts and the semi-structured interview form was finalized. None of the participants included in the study were forced to participate in the research, and the principle of confidentiality was carefully observed during the implementation and collection of the questionnaires. The interviews were recorded with a voice recorder and then these recordings were transcribed.

Analysis of Data

The data obtained from the interview form used in the research were recorded with a voice recorder. Qualitative data were then analyzed by content analysis method. The frequently used content analysis technique was used to analyze the data obtained from the questions in the interview form (Yıldırım & Şimşek, 2013).

Results and Discussion

Table 1. Distribution of teachers' views on the benefits of reading books.

Themes	n	%
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Gaining a positive perspective	13	18.4
Ensuring happiness	13	18.4
Resting our souls	12	17
Our technological knowledge is improving	11	15.4
Improving our communication skills	11	15.4
Gaining the ability to think differently	11	15.4
Total	71	100

When the opinions of the teachers participating in the study on the benefits of reading books are analyzed in Table 1, it is seen that 18.4% of them expressed the opinion that it provides a positive perspective and happiness. In addition, 17% of the physical education teachers who participated in the study stated that their souls rested regarding the benefits of reading books. In addition, 15.4% of the teachers who participated in the study stated that their technological knowledge improved, their communication skills improved and they gained different thinking skills with reading books.

Conclusion

When the opinions of the teachers participating in the study on the benefits of reading books were analyzed, it was seen that the majority of them expressed the opinion that it provides a positive perspective and happiness. In addition, the physical education teachers who participated in the study stated that they rested their souls regarding the benefits of reading books. In addition, the teachers who participated in the study stated that their technological knowledge improved, their communication skills improved and they gained different thinking skills with reading books. From this point of view, it can be said that reading books contributes to teachers in many ways. Kus and Turkyılmaz (2010) found that the participants in their study generally acquired new knowledge. They stated that they read in order to learn. Yılmaz (2008) in his research that students read in order to gain more knowledge and to get away from people they stated that they sometimes read for the purpose of reading. Gecgel and Burgul (2009), on the other hand in the research, students wanted to obtain some information among the reasons for reading in the direction of the "no-one can be a victim of the terrorist organization".

As a result of the research, physical education teachers stated that reading books gives a positive perspective and rests the soul. They also stated that their theological knowledge improved with reading books and they were happier. In addition, physical education teachers stated that reading books improved their communication skills and provided them with the ability to think differently.

Recommendations

Teachers should be encouraged to read books. Considering that teachers shape society, we can say that they can shape society.

Acknowledgements or Notes

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Examination of Physical Education Teachers' Views on the Benefits of Reading Books

Gozde YIKILMAZ
IğdırUniversity

Ahmet YIKILMAZ
IğdırUniversity

Fikret ALINCAK
Gaziantep University

Abstract: As a profession, teaching is one of the most important professions that play a role in the development and improvement of society. In this process, the attitudes and behaviors of prospective teachers towards the teaching profession are of great importance. In today's conditions, developments in both technology and science increase the number of information sources and the importance of reading. The aim of this study is to examine the views of physical education teachers on the benefits of reading books. The research group consists of 15 physical education teachers and this study group was determined by maximum diversity sampling method. In the research, face-to-face interview technique was used with 15 physical education teachers working in schools affiliated to Iğdır Provincial Directorate of National Education on the basis of volunteerism. The interview method, which is one of the qualitative research methods, was used in the research and the data obtained were analyzed by content analysis method. As a result of the research, physical education teachers stated that reading books gives a positive perspective and rests the soul. They also stated that their theological knowledge improved with reading books and they were happier. In addition, physical education teachers stated that reading books improved their communication skills and provided them with the ability to think differently.

Keywords: Physical education, Teacher, Book, Reading

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