Mathematical Knowledge in the Acquisition of Skills in Data Analysis, Catering, and Fashion Designing

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Mathematical Knowledge

Mathematical knowledge is the study of how society can effectively make use of the vast and growing literature on mathematics. Its studies approach such as databases of mathematical knowledge, automated processing of formulae and the use of semantic information and artificial intelligence. Mathematics is particularly suited to a systematic study of automated knowledge processing due to the high degree of interconnectedness between different areas of mathematics. New forms of mathematical knowledge are growing in importance for mathematics and education, including tacit knowledge; knowledge of particulars, language and rhetoric in mathematics. These developments also include recognition of the philosophical import of the social context of mathematics and are part of the diminished domination of the field by absolutist philosophies. From an epistemological perspective, all knowledge must have a warrant and it is argued in the paper that tacit knowledge is validated by public performance and demonstration. This enables a parallel to be drawn between the justification of knowledge, and the assessment of learning. An important factor in the warranting of knowledge is the means of communicating it convincingly in written form, i.e., the rhetoric of mathematics (Moore, 2017).

Importance of Mathematical Knowledge in Skills Acquisition

According to Speelman (2015), a skill is seen as the ability to do something well, usually gained through training or experience. Skill is often acquired after a training session or after a practical. Skill acquisition is the ability to learn or acquire skills. It involves the development of a new practice of a way of doing things usually gained through or experience. Akpama, Esang, Asor, & Osang (2011), observed that the acquisition of vocational skills leads to a significant reduction of poverty among young adults who participated in skills acquisition programmes. Entrepreneurial studies are inter-disciplinary training that focuses on the tools needed to start a new business or vocation. As Nigeria is fast becoming a predominantly youthful society with a high rate of unemployment, it requires educating the youth in entrepreneurship skills in technical and vocational education and training to tackle unemployment which has reached daunt proportions. Similarly, Amadi & Abdullah (2012), reported from their study that a greater percentage of the sampled youth reported high and moderate levels of their capacity building: implying that the vocational skills acquisition and development was a

successful scheme. They, however, recommended that the constraints that impede the success of the scheme should be addressed by policymakers to make the outcome of the skills training more successful.

Mathematical knowledge in Skill Acquisition is enshrined in entrepreneurship which in the context of this study, refers to an individual's knowledge and ability to perform specific tasks successfully. Hence, Anerua & Obiazi (2009), posit that entrepreneurship is the process of perceiving business opportunities, mobilizing both human and material resources and initiating actions under an enterprise that is characterized by risk-taking, innovation, and creativity to meet individual, group or societal needs. Entrepreneurship skills, therefore, are business skills that one acquires to function effectively in the turbulent business environment as an independent or self-employed person to improve one's economic status and the society at large. The importance of entrepreneurship skills acquisition cannot be overstressed since appropriate skills acquisition by means of entrepreneurship will help to make young school leavers be self-reliant and boost their economic status. Mathematical knowledge in entrepreneurship skills acquisition opens one's eyes to forecast business opportunities using appropriate entrepreneurship skills.

Similarly, Adebayo (2013), advocated that the importance of mathematical knowledge in skill acquisition is better achieved through Entrepreneurship Education. He found that entrepreneurial education is best received in the school's settings and that learning by doing is seen as the best approach or method to teach entrepreneurial education. While, Ezeji and Okorie (2019), emphasising the importance of mathematical knowledge in skills acquisition in national growth, emphatically contended that "Nigeria's social and economic problems will be drastically reduced if people are given adequate vocational training in skills, raw materials, types of machinery and equipment". It is only with skilled men that materials can be harnessed, manipulated and transformed into products (ibid., 2019).

Importance of Mathematical knowledge in Data Analysis

An analysis is breaking down a whole into its separate components for individual examination. Data analysis is a process for obtaining raw data and converting it into information useful for decision-making by a user (Schutt and O'Neil, 2013). Also, Data analysis skill can be referred to as the ability to collect and organize data such that it is translated into meaningful information. It is the ability to use one's analytical and logical reasoning to evaluate the collected data (Clever, 2019). Studies have shown that these skills require gathering data from various sources, reviewing it, as well as analysing it to discover certain findings, conclusions or useful information to support decision-making. Of recent, every single organization makes attempts to gather data, for instance, by monitoring its competitors' performance, sales figures and buying trends, etc. to be

more competitive (ibid., 2019).

Mathematical knowledge in data analysis is a necessity for making well-informed and efficient decisions most especially in helping an organization to ascertain their positions in the market relative to competitors, identify the potential risk that need to be avoided, and the opportunities that must be grabbed in order for the organization to grow. Data are gathered from a variety of sources and the data analyst process, organize, and communicates requirements of the data to the custodians of the data. Data analyst may apply Mathematical formulas or models called algorithms to the data to identify relationships among the variables, such as correlation or causation (Clever, 2019).

Similarly, Mathematics serves as the bedrock of any contemporary discipline of science as almost all the techniques of modern data science, including machine learning, have a deep mathematical underpinning. Mathematics and Statistics are two of the most important concepts of Data Science. Research have also shown that Data Science revolves around these two fields and draws their concepts to operate on the data. Statistics, on the other hand, is the study of the collection, analysis, visualization, and interpretation of the data. Statistics deal with raw data and helps the industries to take careful data-driven decisions (Dataflair, 2019). Meanwhile, a Data Scientist, specializing in Data Science uses various statistics and machine learning algorithms not only to analyse the data but also to predict future occurrences of an event. Data Science as a field which deals with data processing, analysis, and extraction of insights from the data using various statistical methods and computer algorithms, is a multidisciplinary field that combines mathematics, statistics, and computer science (ibid., 2019).

Mathematical knowledge in data analysis will enable a student to draw conclusions or inferences from the data. Mathematical knowledge in data analysis helps business organisations, marketers or merchandise to use Data to analyse their marketing strategies and create better advertisements. Many a time, businesses spend an astronomical amount on marketing their products which, most of the times may not yield expected results. Therefore, by studying and analysing customer feedback, companies can create better advertisements. The companies do so by carefully analysing customer behaviour online. Also, keeping a check on customer trends helps the company to get better market insights. Therefore, businesses need Data Scientists to assist them in making strong decisions regarding marketing campaigns and advertisements. Likewise, Data Scientists help companies to acquire customers by analysing their needs with the help of mathematical knowledge. This in a way allows the companies to modify products best suited for the requirements of their potential customers.

Similarly, research have shown that Mathematical skill in data holds the key for companies to understand their clients. With the help of mathematical skills Data

Scientists enables companies to recognize clients and help them deliver the needs of their customers. Beyond using statistical techniques to conclude, a data Scientist's goal is to communicate his results with the company. Hence, a Data Scientist needs not only to be proficient in number-crunching but should also capable of translating the mathematical jargon for taking proper business decisions (Dataflair, 2019).

For example, consider a Data Scientist analysing monthly sales of the company, he uses several statistical tools and Mathematical skills to analyse and draw conclusions from the data. In the end, he obtains results that he needs to share with the company. Hence, Data Scientist needs Mathematical knowledge to know how to communicate results in a very concise and simple manner. In the same vein, technical results and processes may not be understood by the people managing sales and distribution, therefore, the Data Scientist must be able to story tell. The storytelling of data will allow the Data Scientist to transfer his knowledge across to the management team without any hassle (Dataflair, 2019).

Mathematical Knowledge and Catering Skills Acquisition

Catering is the business of making available food service at a remote site or a site such as a hotel, hospital, pub, aircraft, cruise ship, park, filming site or studio, entertainment site, or event venue. The foremost priority of catering skills is the preparation of young people for the catering occupation. For this, they need to acquire mathematical knowledge to be able to communicate the knowledge and skills (Moore, 2017).

Besides, accounting and bookkeeping skills are necessary to understand the financial aspects of managing a catering business as the ability to prepare and interpret financial statements is essential. It is also crucial to understand the legal aspects of catering. Hence, a caterer, like any other businessperson, must have some human resource skills. Similarly, knowing how to recruit, train, motivate, and manage personnel is critical and necessarily dependent on Mathematical related skills and knowledge (Manfred & John, 2014). Caterers' knowledgeability in Mathematical skills is a necessity to develop and implement a marketing Plan, Organize, Execute, and Control the business which is the four basic functions of management in catering. However, Catering is a very risky business that depends on Mathematical knowledge and catering skill as it the caterers to know when the risk outweighs the gain (ibid., 2014).

Creativity is the standard of all outstanding caterers. Management and other personnel with Mathematical knowledge and skill will have a greater impact and a level of success in the workplace than their counterparts with weak mathematical knowledge and skill. Personnel with Mathematical knowledge and skill can turn the client's vision into reality by creating the suitable look, feel, menu, service, and environment. In essence, Mathematical knowledge in catering skills helps the caterer to know that the needs of

the client must always come first. Success in the catering business comes from identifying these needs and satisfying them. Therefore, Caterers that are not Mathematics experts are those who get lost in trying to satisfy their own needs for money, equipment, and greater self-esteem. They forget that the primary goal is to serve the needs of the client. When a client's needs are met, the caterer's needs for revenues, profits, and positive feedback will be met automatically. The success of the business depends on the caterer's Mathematical knowledge (Jefferson, 2017).

Likewise, strategic planning is a roadmap to help a caterer determine the direction in which he/she wishes to go, and the specific goals he/she will need to accomplish to get there. Mathematics provides a strategic plan with a statement of core values, which may include things like client satisfaction; ethical business practices; staff satisfaction, training, and motivation; community service; and operating an environmentally conscious business. Mathematics also plays a core value, by helping caterers to develop a vision and mission statements. The mission statement is a succinct sentence that sums up the business mission. For example: "To meet the catering needs of the corporate community, providing high levels of service and food quality that result in repeat business and vital growth." While the vision statement is a concise summary of where you want to be in the future (Manfred & John, 2014).

In the same way, Mathematical knowledge in catering skill help caterers to make decisions that keep their operations running smoothly. With the help of Mathematical knowledge, caterers realize that that there is no perfect solution to every problem, some decisions will be better than others, and that the best decision-making goal is to find the best possible solution with the least number of drawbacks. Additionally, Mathematical knowledge in catering skills helps caterers to choose the best alternative; make decisions that help achieve the business objectives, allow quality time for planning and decision making, realize that no one will ever please everyone and put decision making in perspective (Mike, 2012).

One more important thing that requires mathematical knowledge in catering skills is Time Management. Studies have equally shown that Mathematics experts in catering have realized that if they can accomplish more meaningful production in less time, they will have more time for things other than work. They also realize that working smarter, not harder, through the effective use of time will produce greater results (Manfred & John, 2014). Hence, a key to effective time management is the ability to set goals for a day, week, month, a year, several years and lifetime. Mathematics experts use some of the tips for putting smart goals in writing, not just for "big picture" goals, but as part of their daily business. Without written goals, caterers cannot effectively manage their time. Since time management involves choosing how to spend time, a caterer can't make proper choices without knowing his/her desired goals (ibid., 2014).

Mathematical Knowledge and Fashion Designing Skills Acquisition

In the fashion industry, after the designer has finalized to make available a new fashion product in large quantity on demand by consumers, it involves a multitude of process such as fashion making, marketing, and (Buttle, 2013). Beginning from the designing to the manufacturing process for the global market and onward to vendors, retailers, and consumers, the merchandising/marketing workforce is increasingly dependent on mathematics-related skills and knowledge (Garrett, 2008). In most instances, these skills are simple computations and applications of mathematics that are addressed early in one's education. Personnel with mathematics expertise will have a greater impact and level of success in the workplace than their counterparts with weak mathematics capabilities (Breiner, Harkness, Johnson, & Koehler, 2012).

Producers and retailers in the fashion industries are faced with the challenge of doing more with less. Fashion marketers and merchandisers need to possess a requisite understanding of the construction of manufactured items and manufacturing processes to determine the types of suitable materials along with the estimation of material costs and how best to package and deliver items once produced (Baker, 2004; Borin & Metcalf, 2010). Again, Mathematics in the fields of marketing and merchandising (FMM) is an essential skill. Therefore, curricula in FMM programs need to integrate key mathematics concepts within the marketing and merchandising acumen (Hines and Bruce, 2007). Emphasis on FMM is to make certain the right product is delivered to the customer at the right time, at the right price, in the right place, and the right quantity (Jackson & Shaw, 2000). Similarly, Mathematics is a tool that helps one accomplish all of these factors as the fashion businesses often outsource much of their apparel manufacturing operations overseas. As a result of such practices, employees must have an expert understanding of cross-cultural complexities including import/export rates and tariffs/taxes (Sen, 2008).

With the increasing globalization and innovations in technology, industries' needs require the integration of additional Mathematics skills and knowledge (Sen, 2008; Kincade, 2010). Familiarity with Mathematics skills and applications enhances students and future merchants with understandings that are critical for problem-solving and decision-making in a globalized world of manufacturing and retail (Community Report, 2012). Furthermore, Globalization brings changes in resources as well as fashion trends. Hence, the International Textiles and Apparel Association (ITAA) defines globalization as the interaction of the design, product development, and merchandising processes in a global marketplace (Ko & Megehee, 2012). Designers focus on introducing a finely blended amalgamation of eastern and western trends. This increase in cross-cultural sources, as well as changing the pattern of fashion trends, requires exceptional decision-making skills of the fashion merchandiser/marketer to make appropriate evaluations

regarding the selection of the materials, manufacturing, packaging, and distribution to meet customers' demands of cost-effective business plan of actions.

Forecast of future business trends in fashion requires business mathematics acumen to be able to understand past losses and challenges as well as the ability to predict future expenditures and earnings (Behrman and Levin, 2014). This has made the clothing and textile industries to employing individuals with expertise in manufacturing, distribution, and marketing. Even though it may appear that Mathematics or Science, Technology, Engineering, and Mathematics (STEM) coursework is not critical to fashion, it should be stressed that in fashion industry-related programs, STEM concepts, particularly mathematical concepts, are necessary (Shirley & Kohler, 2012). For example, in the production of cotton, which is one of the most widely produced fibres used in the fashion industry, mathematics plays an instrumental role. Evaluating the process of manufacturing cotton fabric to produce apparel like jeans requires students to conceptualize mathematics (Cohen, 2016).

Many may not be aware that it takes roughly 24 ounces of cotton fibre to create a pair of jeans, which may be important to note from a cost analysis perspective. The interpretation of such costs entails mathematic skills and allows marketers and merchandisers to analyse components involved in the big picture of product development and sales. Mathematics also plays a critical role when it comes to the distribution phase of the fashion industry. Finished products are disseminated across retail stores, online websites, and wholesale locations worldwide. This requires graduates of FMM programs to be well-versed in the use of technology operations and concepts, which requires knowledge and application of mathematics (Shirley & Kohler, 2012).

Also, marketers/merchandise should be of the know on how to understand the environmental effects of their fashion products from the beginning design process through its final delivery. Possessing the knowledge and ability to apply mathematical principles to calculate specific metrics of energy consumption, emissions, water use, and sustainability of the fashion product is vital to a company's success (Sproles, 2011; Shirley and Kohler, 2012). Some industries require taking a suitability test, which has a range of different questions where most are mathematically oriented, to establish the best placement of employees. Numeracy skills are needed for many of these entrance exams (Zevenbergen, 2011). In one case, job seekers aiming for work producing foam textile products in the aerospace industry must take and pass a mathematics test before being eligible to complete an application. Whereas, potential applicants must complete this eighteen-problem test within thirty minutes with no calculator. The test includes problems where one must convert inches to feet, read a tape measure, and find the density of a block of foam (mass divided by volume). Mathematics knowledge empowers students with an insight to operate successfully in a globalized world of

manufacturing and retail (Yu and Jin, 2005; Schoof, 2013).

Conclusion

Mathematical knowledge is a study approaches such as databases of mathematical knowledge, automated processing of formulae and the use of semantic information and artificial intelligence. It is observed that the acquisition of vocational skills leads to a significant reduction of poverty among young adults who took part in skills acquisition programmes. Entrepreneurial studies are inter-disciplinary training that centers on the tools needed to start a new business or vocation. Mathematical knowledge in acquisition opens one's eyes to forecast business opportunities using appropriate entrepreneurship skills. The importance of mathematical knowledge in skill acquisition is better achieved through Entrepreneurship Education. Mathematical knowledge in data analysis is a necessity for making well-informed and efficient decisions. It is what helps us identify the potential risk that needs to be avoided and the opportunities that must be grabbed to grow. From the design process to manufacturing for the global market, and onward to vendors, retailers, and consumers, the merchandising/marketing workforce is increasingly dependent on mathematics-related skills and knowledge.

Recommendations

1. Students' knowledge in Mathematics is not to be based on cognitive knowledge only.
2. Student's knowledge in Mathematics should be constructivism.
3. Teachers of Mathematics should have vast knowledge not only in their field of study.
4. Curriculum planners should design the Mathematics curriculum by incorporating skill acquisition.
5. Seminar should be organized for Mathematics teachers to acquire skills for them to impact those skills to students while teaching in the classroom.

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