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Mathematics Plays Multi- Dimensional Role In Science And Technology Through Teachers' Positive Attitude

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ABSTRACT
For a secondary school student to be termed successful in his WASSCE or NECO, he/she should have had at least a credit in the subject mathematics. The mathematics achievement score of students in Nigeria in recent years has been very poor due to negative attitude of most teachers in mathematics class. This paper discussed the need for teachers' positive attitude in our mathematics class for us to develop scientifically and technologically sound. The paper discussed mathematics, science and technology, attitude and finally teachers' attitude. The paper recommended with much emphasis that mathematics should be taught only by teachers trained in that field for effective teaching and learning to take place.
Keywords: Mathematics, Science and Technology, Attitude, Teachers Attitude

INTRODUCTION

Mathematics in the world over plays a pivotal role in student lives, it is a bridge to science, technology and other subjects offered in any formal educational system. Mathematical knowledge and skills are crucial for the scientific and technological development and economic success of societies, for world countries (Russo 2020). This is because mathematics skills are very widely essential in understanding other disciplines including social sciences, engineering, sciences, arts, and outspread to all areas of science, technology as well as business enterprises and hence mathematics has been became a key in all sciences (Rogers 2017) . Poor mathematical skills in students depressed them from a large number of professions because mathematical background knowledge is the pre requisite for entrance in any profession (Hwang 2021). Those with low mathematics abilities are likely to have a more negative attitude towards mathematics and will not have the tendency to amend their mathematics skill. Researches indicated that poor attitudes towards mathematics are related to lower levels of achievement in the subject (Rikhotso 2015) .

The main cause of the animosity towards mathematics especially in developing nations are attitudes of the learners, uninteresting lessons and low motivation of teachers attitude, confidence of learners, lack of teaching experiences, economic conditions, parents' educational level, teacher competency in math education, teacher's personality, intellectual factor, communication, stress, the pressure to perform well, lack of appropriate teaching methods, many numbers of student in the class over demanding tasks (Roggers 2017). Even though, decreasing numbers of students choosing to study mathematics and natural science have been major issue, mathematics has been as a fundamental forerunner to success in worldwide modern society (Berger 2020).

Science (from Latin *scientia* 'knowledge') is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe. Modern science is commonly divided into three major branches: natural science, social science, and formal

science. Each of these branches comprises various specialized yet overlapping scientific disciplines that often possess their own nomenclature and expertise. Both natural and social sciences are empirical sciences, as their knowledge is based on empirical observations and is capable of being tested for its validity by other researchers working under the same conditions. There are also closely related disciplines that use science, such as engineering and medicine, which are sometimes described as applied sciences.

Natural Science: is the study of the physical world. It can be divided into two main branches: life science (or biological science) and physical science. These two branches may be further divided into more specialized disciplines. For example, physical science can be subdivided into physics, chemistry, astronomy, and earth science.

Social Science: is the study of human behavior and functioning of societies. It has many disciplines that include, but are not limited to anthropology, economics, history, human geography, political science, psychology, and sociology. In the social sciences, there are many competing theoretical perspectives, many of which are extended through competing research programs such as the functionalists, conflict theorists, and inter actionists in sociology

Applied Science: is the use of the scientific method and knowledge to attain practical goals which includes a broad range of disciplines such as engineering and medicine. Engineering is the use of scientific principles to design and build machines, structures, and other items, including bridges, tunnels, roads, vehicles, and buildings. Engineering itself encompasses a range of more specialized fields of engineering, each with a more specific emphasis on particular areas of applied mathematics, science, and types of application.

Since Mathematics deals with logical reasoning and quantitative calculations (John, 2013), Sadiq (2011) opined that a visible knowledge of Mathematics is a necessity for social and economic transformation of any nation. This is because developed countries have utilized the opportunities offered by the current phenomenal increase in science technology and mathematics especially information and communications technology, applied science whose main engine force is mathematics. Dambatta (2013) puts it more succinctly when he opined that the knowledge of mathematics allows scientists to communicate ideas using universally accepted technology since it is truly the language of sciences.

Concept of Attitude

In the scientific literature, there are different definitions of attitude. Han and Carpenter (2014) establish that attitude is an affective, cognitive, and behavioral reaction to an environment or object, while for Rodríguez et al. (2020) attitude toward mathematics refers to beliefs about the effectiveness and interest of students in performing mathematical tasks in academic and everyday situations. In this study, the attitude toward mathematics is the disposition of a person toward a mathematical task resulting from his/her way of thinking, feeling, or acting. According to Di Martino and Zan (2015), attitudes act as a bridge between beliefs and emotions, and include both beliefs (about oneself and about mathematics) and emotions.

The world has changed and the previous curriculums do not fit. The problem of what factors influence students' and teachers' attitudes and beliefs towards mathematics teaching and learning opened some new spheres for investigations. Attitude refers to a learned tendency of a person to respond positively or negatively towards an object, situation, a concept, or a person. It is also regarded as a belief held by individuals that reflects their opinions and feelings and can be sometimes manifested in behaviour (Joseph, 2013). In accordance with Syyeda (2016), attitude is multidimensional. It takes into account three components: affect, cognition, and behaviour. Attitude encompasses a teacher's level of enthusiasm, resourcefulness, willingness to help and knowledge of the content. It's important to maintain a positive attitude, however, because doing so improves your ability to help children learn and understand new material.

Mathematics Teachers' Attitude

Attitude of teachers towards mathematics denotes interest or feeling towards the teaching of mathematics. It is the teacher's disposition towards ―like‖ or ―dislike‖ of teaching mathematics class. Definition of attitude, according to Azwar (2015) is a form of evaluation or feeling. Attitude is

also defined as a way of viewing something (Muellerleile, 2005). Attitude toward an object is a feeling of receiving and supporting (favorable) or a feeling of rejected, not supportive and not impartial. Moreover, as an individual, all the actions of the teachers will be imitated by their students, so that the figure of a teacher must be good and positive.

The teacher is very important factor in education and learning (Ulug et al., 2011). Therefore, teachers indirectly affect the learning outcomes of their students. One of the influences of teachers to students is the attitude of the teacher. The attitude of teachers who are full of warmth and acceptance is desired by each student. The student will feel comfortable and calm in their learning process when the relationship with the teacher is good, but if the students have a bad relationship with the teacher, usually they will be lazy or even have low motivation to learn.

No nation can develop without teaching profession because every other profession, in one way or the other, will pass through teaching process before they can be certified as professional in their various fields. Teaching profession is like a yolk that is being surrounded by other profession. In the light of this, this paper sees teaching as an engine room of other profession. Because of this, motivation of teachers cannot be overlooked most especially mathematics teachers. Teacher failure to provide explanations for the mathematical concepts being taught is part of teachers' negative attitude. Even though mathematics is generally regarded as important, many people have a disposition towards the subject, either positive or negative. Attitudes form a central part of a person's identity. It is quite normal to love, hate, like, dislike, favour, oppose, agree, disagree, argue and persuade. All these are evaluative responses.

The attitude of teachers correlated positively and significantly with students' academic performance (Ekperi, Onwuka, &Nyejerime, 2019). The teacher is the most important factor in education and learning (Ulug et al., 2011). Therefore, teachers indirectly affect the learning outcomes of their students. One of the influences of teachers to students is the attitude of the teacher. The attitude of teachers who are full of warmth and acceptance is desired by each student more especially in mathematics class. The student will feel comfortable and calm in their learning process when the relationship with the teacher is good, but if the students have a bad relationship with the teacher, usually they will be lazy or even have low motivation to learn. The attitude of a good teacher can also improve the spirit and motivation of students in learning. High motivation will give a good learning outcome (Ulug et al., 2011).

Teachers also understand the characteristic of their students so that they can understand and accepting what students get in class. It could be the experience of the teacher that makes them to be more understanding and can follow up the learning outcome with intervention, such as advising students to attend tutoring outside the school. This is in line with Marlina (2017) who suggests that teachers'with teaching experiences are related to their attitudes. Attitude is not only one of the significant factors that characterize human uniqueness but a factor that influences achievement. Gerrie Jacobs & Erica Spangenberg (2014) link up Several studies indicate that mathematics teachers' attitudes have a vital influence on their learners' achievement. Kibrislioglu (2016) defines attitude towards mathematics as liking or disliking of the subject; a tendency to engage in or avoid mathematical activities; a belief that one is good or bad at mathematics; and a belief that mathematics is useful or useless. Attitude can be a positive or negative emotional disposition towards mathematics. Several studies have demonstrated that attitudes towards mathematics are directly and significantly associated with students' performance.

Among the students' factors, attitude is regarded by many researchers as a key contributor to higher or lower performance in mathematics (Mohamed & Waheed, 2011; Mata, Monteiro & Peixoto, 2012; Ngussa & Mbuti, 2017). Attitude refers to a learned tendency of a person to respond positively or negatively towards an object, situation, concept or another person. Attitudes can change and develop with time (Syyeda, 2016), and once a positive attitude is formed, it can improve students' learning. On the other hand, the effect of attitude on students' performance in mathematics might be positive or negative depending on the individual student.

Towards achieving scientific and technological advancement, we need nothing but good performance in mathematics at all levels of education. The negative performance of students towards an educational aims and objectives could be associated to the low motivation of teachers most especially in the area of mathematics. The general state of affairs of education in the country is despite academic

achievement of students as well as get students interested in studying mathematics, there are still concerns that students 'interest in mathematics is diminishing and their academic achievement is generally poor as such mathematics teachers should develop positive attitude for students to develop scientifically and technologically to cope with the changing world.

RECOMMENDATIONS

- Teachers should ensure overall attitude towards learning mathematics that involves three main components : Affective, Behavioural and Cognitive
- It is hereby recommended with great emphasis that Mathematics should be taught by only teachers deeply trained in mathematics to ensure positive attitude in the teaching learning process for the students to emulate.
- As teachers' negative attitude hinders effective learning and consequently affects the learning outcome henceforth they should be well motivated.

CONCLUSION

The learning of mathematics depends on the way it is presented to the learner, the way the learner actively interacts with the learning experiences presented to him and the environment within which the learning takes place. With the current increase in scientific knowledge the world over, much demand is placed and emphasis is laid on the teacher, the learner and the environment in the whole process of teaching and learning of mathematics. Teachers' attitude towards the teaching of mathematics plays a significant role in shaping the attitude of students towards the learning of mathematics. Teachers' attitude towards science is a significant predictor of pupils' science achievement as well as their attitude towards science. Students' positive attitude towards science could be enhanced by teachers' enthusiasms, resourcefulness and helpful behaviour, teachers' thorough knowledge of the subject matter and their making science quite interesting. All these factors could also be applicable to mathematics learning since mathematics is regarded as the language of science. It is on this premise that the attitude of the teacher, his (her) disposition to the subject, students, classroom environment could make or unmake the attitude of the students towards the learning of mathematics. The attitude of the mathematics teacher can mold the attitude of the students to want to learn or not. Hence the mathematics teacher should be psychologically prepared to teach the subject given that every other requirement is met.

REFERENCES

Aiken LR (1970) Attitudes toward Mathematics. Rev Educ Res 40(4):551–596

Azwar, S. (2015).Sikap ManusiaTeori Dan Penerapannya. Yogyakarta: Pustaka Pelajar.

Berger, N., Mackenzie, E. & Holmes, K. Positive attitudes towards mathematics and science are mutually beneficial for student achievement: A latent profile analysis of TIMSS 2015. *Aust. Educ. Res.* **47**(3), 409–444 (2020).

Dambatta, B.U. (2013). Transforming Nigeria for vision 20:2020: implication for mathematics and mathematics education. Abacus. *Journal of Mathematics Association of Nigeria* 38(1), 137 145.

Di Martino, P., & Zan, R. (2015). *The construct of attitude in mathematics education.* In B. Pepin & B. Roesken-Winter (Eds.), From beliefs to dynamic affect systems in mathematics education: Exploring a mosaic of relationships and interactions (pp. 51–72). New York: Springer

Ekperi, P., Onwuka, U., & Nyejirime, W. (2019). *Teachers' Attitude as a Correlate of Students' Academic Performance.* International Journal of Research and Innovation in Social Science (IJRISS), 3(1), 205-209.

Han, S. Y., and Carpenter, D. (2014). Construct validation of student attitude toward science, technology, engineering and mathematics project-based learning: the case of Korean middle grade students. *Middle Grades Res. J.* 9, 27–41.

Hwang, S. & Son, T. Students' attitude toward mathematics and its relationship with mathematics achievement. *J. Educ. e-Learn. Res.* **8**(3), 272–280 (2021).

John, L.B. (2013). *Encyclopedia, Britannia* http://www.britainnia.com/ Search? Query = mathematics.

Joseph, G. (2013). A Study on School Factors Influencing Students' Attitude Towards Learning Mathematics in the Community Secondary Schools in Tanzania: The case of Bukoba Municipal Council in Kagera Region. (Masters dissertation).

Kempa RF, McGough JM (1977) A study of attitudes towards mathematics in relation to selected student characteristics. Br J Educ Psychol 47(3):296– 304.

Marlina.(2017). Teacher's Attitude and Peer Acceptance to Children with Special Needs in Inclusive Primary Schools. In Proceedings of the 9th International Conference for Science Educators and Teachers (ICSET), 245–252.

Muellerleile,J.(2005). Attitude vs aptitude. Retrieved from http://www.4vqp.com/images/062305_ Attitude_vs_Aptitude.pdf.

Ngussa, B. M., & Mbuti, E. E. (2017). *The Influence of Humour on Learners' Attitude and Mathematics Achievement:* A Case of Secondary Schools in Arusha City, Tanzania. Journal of Educational Research, 2(3), 170 -181.

Rikhotso S. B. Primary school learners' attitudes on Mathematics learning in Mathematics. PhD diss., 2015.

Rodríguez, S., Regueiro, B., Piñeiro, I., Estévez, I., and Valle, A. (2020). Gender differences in mathematics motivation: differential effects on performance in primary education. *Front. Psychol*. 10:3050. doi: 10.3389/fpsyg.2019.03050

Rogers, G."i'm Not Good at Math": Mathematical illiteracy and in-numeracy in the United States (2017).

Russo, J. *et al*. Exploring the relationship between teacher enjoyment of mathematics, their attitudes towards student struggle and instructional time amongst early years primary teachers. *Teach. Teacher Educ.* **88**, 102983 (2020).

Sadiq, J.O. (2011). A keynote Address presentation at the 2011 National Conference of school of social sciences Federal college of Education Katsina, on innovative methods of teaching and learning science, Technology and mathematics for Quality Education.

Syyeda, F. (2016). *Understanding Attitudes Towards Mathematics (ATM) using a Multimodal modal Model*: An Exploratory Case Study with Secondary School Children in England. Cambridge Open-Review Educational Research e-Journal, 3, 32-62.

Ulug, M., Ozden, M. S., & Eryilmaz, A. (2011).The effects of teachers' attitudes on students' personality and performance. Procedia-Social and Behavioral Sciences, 30, 738-742.