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## Promoting Undergraduates' Interest in Mathematics as a Discipline of Study in Tertiary Institutions: An Exploration of Pragmatic Strategies for Policy Decision

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**ABSTRACT:** *The waning interest of students in pursuing mathematics as a discipline at the tertiary level contributes to the shortage of mathematics teachers in Nigeria. It is disheartening to observe the declining trend in students opting for mathematics at the undergraduate level, especially given the significant contributions of mathematics in achieving the objectives of tertiary education in Nigeria. This paper explored pragmatic strategies for policy decisions aimed at enhancing undergraduates' interest in mathematics as a discipline of study. Key strategies include innovative teaching methods, collaborative learning environments, mentorship programmes, and digital transformation. The paper recommends policy measures such as competitive salaries, ongoing professional development, and incentives to attract and retain qualified mathematics educators. Additionally, it advocates for the establishment of structures to embed technology into mathematics classrooms, including securing funding, teacher training, and maximizing digital tools for improved understanding.*

**KEYWORDS:** mathematics, undergraduates, tertiary institutions, policy measures, pragmatic strategies

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### INTRODUCTION

Tertiary education is the level of education that produces graduates from various fields of academic learning after four to seven years of academic programme. Students that are gainfully admitted

into the higher institutions to study and obtain their first degrees in tertiary institutions referred to as undergraduates. There is barely any higher institution of learning in Nigeria without the department of mathematics, and this underscores the fact that mathematics education is indispensable to achieving the goals of tertiary education in Nigeria.

Mathematics is seen as a universal language for expressing and solving complex problems, making informed decisions, and nurturing critical thinking skills. It is a discipline that play a crucial part in various fields such as science, technology, engineering, and social science. The discipline is regarded as important cornerstone of our modern world, technological, engineering improvements, and largely in today's increasingly data-driven world. It can also be regarded as the bedrock of scientific and technological advancements that sustain myriad of innovations and findings (Mazana, Montero & Casmir, 2019).

In contemporary education, the pursuit of mathematics as a discipline in tertiary institutions faces challenges stemming from a decline in students' interest. Recognizing the paramount importance of mathematics in fostering critical thinking, problem-solving skills, and its pivotal role in various academic and professional fields, there is a pressing need to address this diminishing enthusiasm. Previous studies revealed that there was low interest of students applying for mathematics as a field of study in the tertiary institutions globally (Fielding & Makar, 2008; Mensah, Okyere & Kuranchie, 2013; Wonu & Salmon, 2019; George, Salman & Okafor, 2020). As laudable and as important this discipline is, many undergraduates exhibit lack of interest in it, and this unwholesome development could be attributed to many factors.

As released by the admission office of the Ekiti State University in Affiliation with Emmanuel Alayande College of Education, Oyo, the enrolment for mathematics as a course of study in the university showed that 20 students were offered admissions in 2019\2020; 14 students admitted in 2020\2021; 9 students in 2021\2022; 13 students in 2022\2023 (Admission Record, 2023). Corroborating this development, Akinsola (2023) affirm that the number of students gaining admission yearly into the mathematics department at the University of Ibadan is grossly inadequate. This admissions status reflects low enrolment for mathematics as a discipline. Many factors according to literatures have been noticed as reasons why undergraduates don't like to choose mathematics as their discipline in tertiary institutions, and among these factors are: students' factor, teachers' factor, mathematics anxiety, government factor, lack of mathematics teachers, infrastructural facilities, among others (Okonkwo, 1998; Anigbo & Okene, 2015; Eze & Ikpe, 2023).

In the opinion of Aguilar (2021), one of the main reasons for students' reluctance toward choosing mathematics as a course of study is lack of understanding and self-perception of low content knowledge. Davadas and Lay, (2017) stressed that students' experiences through their academic life affect their views, belief and opinions towards mathematics. In a study carried out by Abosalem

(2015) on students' attitude toward Mathematics concluded that students who show positive attitude to doing Mathematics consequently perform well in Mathematics.

Another reason why the students show disinterest in studying mathematics at the tertiary institutions is due to the instructional strategies adopted by the teacher's taking mathematics (Mahmoud & Salim, 2014). There is no doubt about the fact that when a teacher has a conceptual understanding of mathematics, the classroom instruction is affected in a positive manner. However, when a teacher does not understand, reverse is the case. In a study carried out by Osborne (2021), findings revealed that the association between teachers' instructional practices and students' mathematics proficiency levels varies across school-level variables such as location, available resources, socio-economic, racial-ethnic compositions of the student body, experience levels of the teacher.

Anxiety is another factor creating disinterest for students in studying mathematics at the tertiary level. Mathematics is a discipline that students often link with distinct emotion. Akinsola (2023) stressed that anxiety is not a merely a psychological problem that hinder the ability of students to solve mathematical problems, individuals who suffer from mathematical anxiety may witness a physical reaction to mathematics and this can result to pain.

Adigun (2018) stressed that students' loss of interest is another major reason why undergraduates dislike choosing mathematics as their field of study. He noted that students become more interested in things which are original for which they can perceive practical values, involve puzzle elements. Kulbir (2012) reiterated that elements of newness, usefulness and sheer intellectual curiosity are the primary incentives for the developing of students' interest. Adigun (2018) found out that that the major factors that could influence students' interest in studying Mathematics are parents' encouragement, friends and classmates, career prospects and job opportunities among others.

Poor classroom management is one of the causes that also lead to poor participation of students in studying mathematics. In the scientific investigation carried out by Akinsola (2002) on verbal and non-verbal instructional methods employ by mathematics teacher during instruction. The result of the study indicated that majority of the mathematics teachers are verbal authoritarian. The issue of students not showing interest in studying mathematics as a field of interest might not be unconnected with the teacher's verbal method of instructional presentation.

Several studies had been done in the area of mathematics, especially within the context of teacher perception of the impact of social factors on teaching and learning of mathematics (Sangoniya, Aasa, Salaudeen, 2022), motivation and students' achievement in mathematics (Salaudeen, Farayola & Sangoniya, 2022) while little research is available in the literature on the focus of this study. Therefore, this study examined promoting undergraduates' interest in mathematics as a discipline of study: An exploration of pragmatics strategies for policy decision.

### **Theoretical Framework**

This study is hinged on Bertalanffy's System Theory. The central concern of this paper is to explore ways of enhancing undergraduates' interest in studying mathematics in tertiary institutions. Bertalanffy's Theory is appropriate for this study as it explicate the relationship between the various inputs (innovative teaching methods, collaborative learning environments, mentorship programs, and technology integration), the process of implementation; and this entails how teachers are able to explore the aforementioned inputs which will determine the resultant output (enhancing undergraduates' interest in studying mathematics as a discipline of study in tertiary institutions). Nwanko (2014) reiterated that input-output function is a continual and cyclical. The enthusiasm exhibited by undergraduates in pursuing mathematics as a course of study is intricately linked to the degree to which tertiary institutions recognize and process the inputs aforementioned.

### **Mathematics as an Academic Pursuit**

The origin of the word "mathematics" is in Greek word which means tendencies to learn. Abd Algani (2022) sees role of mathematics as extends from shaping our daily decisions to advancing our understanding of the natural world and the universe. Mathematics is seen as the foundation of knowledge and an essential tool to foster creativity that helps with finding innovative solutions to complicated problems (Hamdi, 2023). Mathematics holds multifaceted significance in our daily lives, not merely about counting, but it underpins countless aspects of our existence.

Choosing mathematics as a field of study opens the door to a diverse range of opportunities and intellectual pursuits. This discipline involves the exploration with the use of abstract concepts, logical reasoning, problem-solving, and quantitative analysis. Individuals who opt for mathematics as a choice of study often develop strong analytical and critical thinking skills. According to Akinsola (2023), the functions of mathematics include: helps to clarify the operations, helps to gain perspective, it enhances the speed of intuition, helps to improve the child's intellectual development, it reveals hidden patterns that help us to understand world around us, among others.

### **Towards Enhancing Students' Interest in Studying Mathematics as a Discipline of Study in the Tertiary Institutions**

Mathematics plays a crucial and complex role in society, influencing various parts of our daily lives, technological advancements, scientific discoveries, and economic developments. The knowledge gained from studying Mathematics is one of the skills that is used in every aspect of human endeavour and this becomes even more important and policy makers should take cognizance of the fact that achieving the goals of tertiary institutions in Nigeria lies on the mathematics.

Teachers are central to classroom instruction in mathematics. In order to encourage students' enthusiasm of studying mathematics as a course of study, it is imperative for the mathematics teachers to take cognizance of the characteristics of effective mathematics teaching and adopt

different instructional strategies. Akinsola (2009) assumed that if mathematics is well taught, students will be learning and the fear associated with mathematical understanding will be automatically reduced. Additionally, teacher should take cognizance of the fact that every student is unique, and as such discover the strategies that resonate best with the particular group of students. Teachers should be patient and understand individual learning styles in school and this can contribute significantly to fostering an enthusiasm toward mathematics. Remember that every student is unique, so it may take some experimentation to discover the strategies that resonate best with your particular learners.

Integration of technology into the teaching of mathematics is another way of encouraging students to learn mathematics as a discipline of study. The importance of technological application in teaching mathematics in recent times is well known, for instance, application of graphic calculators, computer and other devices contribute meaningfully in the teaching learning. Hamdi (2023) reiterated that technological tools such as use of computers in education is the most actual interactive platform that can create new approaches that facilitate understanding. Momani (2023) stresses that application of technological devices in mathematics learning and teaching enables teachers to improve classroom instruction, facilitate communication and collaboration among learners thereby present mathematical concepts enthusiastically. Summarily, through integration of technology into the teaching of mathematics, educators can create a more engaging and student-centered learning environment, and sustaining interest in the study of mathematics. The interactive and dynamic nature of technology to match with the preferences of many modern learners, making mathematics more accessible and enjoyable to learners.

Collaborative instructional strategy should be recognized by the teachers. Collaborative teaching is regarded as the most real way of teaching mathematics courses as compared to the individual way of teaching and learning style. Collaborative learning agrees with the philosophy of contemporary perspectives on learning and teaching aiming to promote higher achievement, more positive interpersonal relationships and greater psychological health, resulting in graduates being cooperative, caring, reflective, critical and creative (Haftamu, 2017). Powell and Kalina (2009) described that through collaborative learning, students have regular opportunities to communicate and interact socially and intellectually. Nkrumah (2021) investigated effects of collaborative learning and mathematics achievement on gender groupings of colleges of education in Ghana and found out that students undertaking collaborative learning scored significantly better than working alone. Conclusively, collaborative teaching in mathematics creates a more inclusive, engaging, and effective learning experience and it enhances the overall quality of mathematics education.

Mentorship programme should also be seen as a mechanism that stimulates students' interest in studying mathematics as a course of discipline. Application of mentorship is now embraced in a range of situations and institutions to teach, guide, teach, counsel and advise on issues that affect the life of mentee. Arnesson & Albinsson (2017) opine that mentorship has capacity to close the gap between theory and practice when used as pedagogic tool. Mentorship plays significant role

in influencing students' interest as it provides a supportive and individualized learning strategy, addressing specific needs and challenges that students may encounter. Mentorship provides guidance that fosters a deeper understanding of mathematical concepts and helps students develop the skills and confidence necessary for success in their studies.

## CONCLUSION

In conclusion, the pursuit of enhancing students' interest in studying mathematics as a discipline in tertiary institutions is an imperative mission with far-reaching implications for both individual academic success and the broader advancement of society at large. The pragmatic strategies for policy decision discussed ranging from innovative teaching methods, real-world applications, collaborative learning environment, mentorship programmes, technological integration collectively form a comprehensive approach to transform the often-perceived challenges of mathematics into opportunities for intellectual growth and engagement.

### Suggestion for Policy Implication

Arising from the aforementioned, the underlisted are suggested for the policy makers as panacea for promoting undergraduates' interest in studying mathematics as a discipline of study in tertiary institutions.

- Policy makers should endorse policies aimed at attracting and retaining highly qualified mathematics educators which involves offering competitive salaries, providing avenues for professional development, and implementing incentives for teachers who are proficient in mathematics education.
- Establish mentorship initiatives linking undergraduates studying mathematics with professionals, and through these programs, mentors offer guidance, share insights from their experiences, and assist students in envisioning potential career paths within the field.
- Create guidelines and support systems to facilitate the incorporation of technology in mathematics classrooms, and this can be achieved through provisions for funding educational technology resources, offering teacher training programs, and implementing strategies to effectively utilize digital resources in enhancing students' understanding of mathematics.
- Promote policies that foster collaboration among mathematics teachers by establishing professional learning networks that allow teachers to exchange effective strategies, share valuable resources, and discuss success stories.

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