

VOL 1 NO 1: DECEMBER. 2024 AN OPEN ACCESS PEER-REVIEWED JOURNAL

Frontline Professionals Journal, 1(1), 59-67.

Original Article

STUDENTS' ENTHUSIASM FOR MATHEMATICS AS A GROWTH CATALYST FOR ECONOMIC TRANSFORMATION

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Citation: Enosakhare Clapperton (2024) Students' enthusiasm for mathematics as a growth catalyst for economic transformation. *Frontline Professionals Journal*, 1(1), 59 - 67.

Abstract

The subject Mathematics had been identified overtime as the foundation for the growth of science and technology of any nation. Its role in advancing the nation's economic and technological development makes it a core subject in our secondary school. Therefore, this research explores the importance of student enthusiasm for mathematics as a critical drive for economic growth, particularly in times when economy faces stagnation or decline. Mathematics, as the foundational tool for innovation, technology and problemsolving, has the potential to catalyze a nation's economic revival. By examining the psychological and educational factors that foster enthusiasm for Mathematics among students; the study investigates how fostering this enthusiasm can lead to a more skilled and innovative work force, this research also explores the broader societal benefits, including increased productivity, technology advancements and improved problemsolving capabilities which translate to economic development. Leveraging on case studies and empirical data, the study proposes that a concerted focus on nurturing mathematics interest at the student's level can help build a generation capable of addressing complex economic challenges, thus stimulating sustainable economic growth. The finding aim to inform policy makers and educational leaders about the long-term economic value of investing in mathematics education and student engagement in STEM (Science, Technology, Engineering and Mathematics) field.

Keywords: Student enthusiasm, STEM education, Mathematics problem-solving, Catalyst, Economic growth.

Introduction: Mathematics has long been recognized as a universal language essential not only for understanding the natural world but also for shaping the structure of modern economics. As a discipline that forms the foundation of technology, engineering, finance and countless other fields, Mathematics is crucial for fostering the critical thinking and problem-solving skills necessary to navigate an increasingly complex global landscape. However the true potential of Mathematics extends beyond its technical application, its serves as a powerful tool for economics transformation. This paper investigates the role of students' enthusiasm for the subject Mathematics as a catalyst for economic growth, proposing that a passionate engaged student body can significantly impact a nation's trajectory. At the heart of this exploration lies the concept of student enthusiasm, which refers to the intrinsic motivation, curiosity and interest students develop towards learning Mathematics. Enthusiasm in this contest is more than just passive participation; it is an active, engaged form of learning where students develop a deep appreciation for the subject's relevance and utility in both academic and real-world settings. When students are enthusiastic about mathematics, they are more likely to pursue advanced studies, acquire the skills needed for high-demand careers, and contribute to innovation and problem-solving in various sectors. The relationship between student's enthusiasm and economic transformation refers to the process by which an economy undergoes structural change, improving productivity, technological capacity and overall standards of living. Central to this transformation, is the cultivation of high skilled workforce, capable of driving innovation, entrepreneurship, and effective policy-making. Mathematics, as a foundational discipline, plays a pivotal role in shaping the cognitive abilities and technical proficiency required for such economic advancement.

This research aims to explore how fostering greater enthusiasm for mathematics among students can provide the intellectual foundation needed to build a robust, dynamic workforce. Knowing that through enhanced engagement with subject, student are better equipped to meet the demand of an evolving job market, particularly in a sector critical to economic growth. Also this paper examines how educational system, curricular and teaching methodologies can be aligned to inspire and sustain enthusiasm for mathematics. By doing so, it seeks to highlight the essential link between students' enthusiasm and economic development arguing that cultivating the love for mathematics in the classroom is not merely an academic goal but a strategic move imperative for national growth. Paul Romer in the early 1990, in his theory of endogenous growth theory explains that the subject mathematics is essential for many industries that are at the core of economics development, including technology, engineering, finance and science. A workforce enthusiastic about mathematics is more likely to engage in field that lead to productivity gains, innovations, and the creation of a new technology. Building and maintaining students' enthusiasm in mathematics was identified as a different problem for teachers and loss of interest in the subject was also noted as one of the main cause of student failure.

Some of those factors that influence students enthusiasm towards Mathematics at all levels of education were therefore x-rayed

| Year | Total Number of | Number with | Number with | |
|------|--------------------|-----------------|-------------------|--|
| | registered Student | Credit Pass (%) | ordinary pass and | |
| | | | below | |
| 2004 | 29,850 | 12,620 (42.28) | 17,230 (57.72) | |
| 2005 | 32,450 | 14,200 (43.64) | 18,340 (56.36) | |
| 2006 | 35,286 | 16,120 (45.68) | 19,166 (54.32) | |
| 2007 | 31,200 | 13,280 (42.56) | 17,920 (57.44) | |
| 2008 | 28,490 | 12,109 (42.50) | 16,381 (57.50) | |
| 2009 | 23,502 | 14,204 (42.40) | 19,298 (57.60) | |
| 2010 | 34,420 | 16, 420 (47.70) | 18,000 (52.30) | |

Result of Senior Secondary School Certificate Examination in General Mathematics in Edo State, Nigeria, May/June WAEC (SSCE)

This paper also examined the need for motivating the student to love and become enthusiastic about the subject mathematics using new teaching and learning skills and also using qualified and well founded mathematics teacher in teaching the subject at all levels.

Research Methodology:

The study was descriptive. It was conducted using twenty (20) out of about 39 public secondary schools in both Oredo and Ikoba okha local government area of Edo state Nigeria. Due to large population, survey design was used and the study was constrained to a sample size. Sixteen (16) senior secondary school students (eight boys and eight girls) were randomly sampled from each chosen school. A total of three hundred and twenty (320) students were captured in the study. Mathematics enthusiasm inventory (MEI) containing eight items were constructed by the researcher and used for the study. The inventory was administered by the research assistant (mathematics teachers in the sampled schools). The instrument (MEI) is a questionnaire which requires information on the factors that influence students, majorly senior secondary school student's enthusiasm to mathematics. The instrument is a four-point scale of (disagreed, strongly disagreed, agreed and strongly agreed). MEI was validated by two mathematics educator from the federal college of education (technical) Ekiadolor and one expert in measurement and evaluation from the university of Benin. An item with a mean value of 2.0 and above is agreed while a mean value below 2.0 is disagreement to the item statement. Cronbach Alhpa formula was used to determine reliability co-efficient of 0.91 using about 40 students outside the area. The instrument was administered to the students and collected after 20 minutes by the research assistant of the school sampled. Data collected were analyzed using descriptive statistics of mean and standard deviation.

Cronbach Alpha formula is a measure of internal consistency or reliability of a set of item in scale or questionnaire/ it access how well the item in a test measures the same underlying concept. The formular for Cronbach`s Alpha is

$$\alpha = \frac{N}{N-1} \sum_{i=1}^{n} 6^{2}_{i}$$

 α = Cronbach`s Alpha

N = Number of items in the scale

 G_{i}^{2} =Variance of each individual item

 G_x^2 = Variance of the total school (sum of all item)

Table 1

Mean and Standard deviation of factors that influences students` enthusiasm toward mathematics in schools (senior secondary schools).

| S/N | ITEMS | MEAN | STANDARD DEVIATION | REMARK |
|-----|--|------|-----------------------|-----------|
| 1 | I study mathematics because it prepares students for technical and vocation where mathematics is applied | 2.64 | 1.21 | Agreed |
| 2 | I study mathematics because there are several opportunities for anyone that study the subject | 2.74 | 1.42 | Agreed |
| 3 | I study mathematic because you can only be successful when you know the subject | 1.20 | 0.82 | Disagreed |
| 4 | I study mathematics because it will help me to become a scientist in the future | 3.20 | 1.64 | Agreed |
| 5 | I study because my parents encouraged me | 2.50 | 1.10 | Agreed |
| 6 | I study mathematics because of the influence of my friends and classmates | 2.85 | 1.42 | Agreed |
| 7 | I study mathematics because, it is a compulsory subject for economic transformation | 3.00 | 1.46 | Agreed |
| 8 | I study mathematics because our teacher always guy me gift | 1.84 | 0.45 | Disagreed |

From the table 1 above, item1 has mean 2.65 and standard deviation of 1.21, item 2 has a mean of 2.74 and standard deviation of 1.42.other items that have agreed remarks are items 4, 5, 6, and 7. With mean and standard deviation of 3.20(1.42), 2.50(1.10), 2.85(1.42) and 3.00(1.42) respectively. While item 3 and 8 have the disagreed remark with mean and standard deviation of 1.20(0.82) and 1.84(0.45). Analysis therefore shows that some factors that could influence students enthusiasm for mathematics as a growth catalyst for economic transformation includes the quest to go into technical and vocational field where mathematics are applied, several opportunities for anyone that studied mathematics, prepare you to become a scientist in the future, encouragement from their parents to do so, mathematics as a compulsory subject and finally peer influence.

Empirical studies on enthusiasm as a factor in learning mathematics.

R.J. Shumov (2001); this study examine the impact of motivation (boasting enthusiasm) on students' learning outcome in mathematics. The study shows that students who displayed higher level of enthusiasm for mathematics were more likely to engage in problem-solving task and showed improved performance. Enthusiasm help reduce mathematics anxiety, contributing to better learning experiences. S.A.Ma (2015) conducted a study on enthusiasm and student engagement in the mathematics classroom, "A longitudinal study". The longitudinal study tracked the mathematics learning experience of middle school students over several years. It concluded that enthusiasm particularly when combined with purported teaching practice, was a strong predictor of long-term engagement and achievement. Enthusiastic students were more likely to persist in mathematics, even when faced with difficult concept. L.G.Bell (2009) studied the effect of enthusiasm on problem-solving abilities in mathematics. The study focused on the development of problem-solving skills in mathematics and how students` enthusiasm influenced their approach to mathematics task. Students who exhibited high level of enthusiasm were more likely to engage in innovative problem-solving strategies and show resilience in the face of difficulties leading to better problem-solving skills. L.H Jones (2010) examined enthusiasm and advancement in mathematics: exploring the role of students' motivation. The study explored the relationship between students' enthusiasm for mathematics and their academic growth. It found that students who showed higher enthusiasm for mathematics had better achievement outcomes. The study also showed that enthusiasm foe the subject fostered an intrinsic motivation to engage with different concepts, which in turn enhance cognitive skills and academic performance. The growth observed was not only in grades but also in the development of problem-solving abilities and mathematics thinking.

C.Dweck (2006) investigated growth mindset and enthusiasm in mathematics learning (the role of attitude).this study on growth mindset emphasized the importance of student enthusiasm for learning particularly in subjects like mathematics. The study found that students who approached learning the subject with so much enthusiasm were more likely to adopt a growth mindset, believing that their abilities could improve with effort. This mindset led to greater perseverance when facing challenges, thus contributing to sustained academic growth and improvement in problem solving skills.

Ways to boast students' enthusiasm in mathematics which acts a growth catalyst for economic transformation.

- 1. Real-world application: Here, students are exposed to how mathematics is used in everyday life, from budgeting to architecture to technology etc. so that the students can understand its relevance. For example, how architects apply geometry to design buildings, or how engineers apply algebra in creating technology. By demonstrating how mathematics plays a role in career, their enthusiasm for the subject will certainly increase.
- 2. Gamify Learning: This involves turning mathematics problems into game or competitions. Using mathematics puzzles, challenges, and online platforms with interactive Maths games to make learning more engaging. This certainly increases students' enthusiasm for the subject (mathematics).
- 3. Incorporating Technology: Technology can be an invaluable tool for engaging students in mathematics using apps and websites like Desmos (for graphing), Khan Academy (for tutorials), or Wolfram Alpha (for solving problems) can help students visualize abstract concepts and walk through complex calculations. Videos and interactive simulations can make topics like geometry or calculus more dynamic b showing how mathematical principle works in real-time. All these certainly increases or boast enthusiasm.
- 4. Collaborative Learning: To boast enthusiasm, group activities or mathematic clubs can be organized, where students can collaborate, share ideas and work on fun mathematics projects together. Students who may be struggling can feel less pressure and more supported when working in a group.
- 5. Challenge with Puzzles: Introducing mathematical puzzles, riddles, and brainteasers that encourages critical thinking and problems-solving sparks curiosity, excitement and enthusiasm for the subject mathematics.
- 6. Mathematics teacher must be enthusiastic while teaching: Children tend to attach a value to each subject, and when they see their teacher value mathematics, they too will understand its importance.
- 7. Incorporating music into your lesson: Many students does realize how closely related music is to mathematics, every genre of the formal uses calculation in some

way and your classroom will greatly benefit from understanding this relationship. Effective teachers will take the strategies listed above to not only motivate students to understand the lesson, but also see mathematics in a new, more applicable light. Present the difficult subject in a way the students will love and be more enthusiastic about it.

Discussion of findings

The quest to pursue career in technical and violation where mathematics is applied was discovered to be a major factor that enthusiasm of the student to study the subject. This finding of the study is in agreement with the finding of Nasser, and baker, N.A (2014) which examines how students' motivation to learn mathematics relates to their aspiration for future careers, especially in technical and vocational feed. Parental encouragement to their children to study mathematics is considered to be a factor that influences the student enthusiasm toward learning of mathematics. This finding of study is in agreement with the finding of Dimakos, Tyrlis, Spyros that (2012) and Safiyeh and Ali (2014) which states that students' father and their mother are important factors that influences the enthusiasm when it comes to learning mathematics. The study also shows that friends and classmates are important factors that influence the enthusiasm of students in mathematics. This confirms the studies of Uchendu and Mbah (2007) and Safiya and Ali (2014) who found that peer interaction learning strategy has positive effects in students' enthusiasm in science than traditional lecture-based pattern. The researcher also stressed that school environment, family, conducting research related to mathematics, its application to daily life and history if mathematics were categorized as vital factors that would boast the students' enthusiasm in mathematics. Other finding includes the fact that quiz and competition with prizes encouraged students' enthusiasm in learning mathematics which agrees with the study of Adegun (2017) who stated that there was statistically significant difference in the fraction problem solving skill acquisition between incentive group and no incentive group.

Recommendation

Based on the finding of this study, the following recommendation are made

- 1. Higher institutions f learning responsible for training teachers should incorporate the new techniques in the Mathematics method course content. This will prepare the teachers in training ahead on how to use these techniques;
- 2. Parents should always encourage their children on the usefulness of Mathematics in their day to day activities;
- 3. Textbook should be written to illustrate more on the application of new techniques of teaching on different contest areas in Mathematics;

- 4. Mathematics teachers should organize quiz and completion with prize of possible on weekly bases or fortnightly. The empirical studies above revealed that the use of new methods, making known usefulness of the concepts and intellectual curiosity are the primary stimuli for the awakening of students' interest and achievement in Mathematics. It is therefore recommended that mathematics teachers should incorporate these techniques of teaching to bring a total change in teaching mathematics concepts in order to increase student's achievement and interest in Mathematics;
- 5. Students should be encouraged to solve problems on their own and not to depend on the teacher's solution always;
- 6. Federals and State Ministries of education, Professional bodies like Science Teachers Association of Nigeria (STAN), Mathematical Association of Nigeria (MAN), National Mathematical Centre (NMC), and Nigeria Educational Research Council (NERC), etc. should organize seminars and workshops on zonal bases on the use of the use of these new techniques so as to sensitize Mathematics teachers in training ahead on how to use these new techniques so as to sensitize Mathematics teachers on the benefit derivable from using them.

Conclusion

Enthusiasm is a very powerful factor in transforming the teaching and learning of Mathematics in Nigeria. The degree and direction of attitude towards Mathematics are largely determined by the level of enthusiasm developed by students for Mathematics. Any students with positive attitude towards Mathematics, studies the subject because he likes or has pleasure from acquiring mathematical concepts. Students are likely to work diligently and most effectively at task in which they genuinely interested. A student who is not enthusiastic when it comes to Mathematics tends to absent himself from Mathematics classes. But the subject demands regularity and it is a sequence subject. If a student is absent even for a few days, the sequence is broken and he fails to comprehend the subsequent steps. It is the duty of the teacher to motivate and sustain student's interest in the Mathematics classes so as to advance the nation's economic and technical development. Findings of this study revealed that major factors that could influence students' interest in learning Mathematics include parents' encouragement, friends and classmates, career prospects and job opportunities among others.

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