ASSESSING THE INFLUENCE OF TECHNOLOGY AND CULTURE ON SECONDARY SCHOOL STUDENTS INTEREST IN MATHEMATICS

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A RESEARCH WORK SUBMITTED TO THE DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY, FACULTY OF EDUCATION, UNIVERSITY OF BENIN, BENINCITY, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE EDUCATION (B.Sc. Ed) DEGREE IN MATHEMATICS EDUCATION.

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CERTIFICATION

We the undersigned hereby certify that this project work was carried out by Uzeh Juliana Ekomiare's, a student of the department of Curriculum and Instructional Technology that it is adequate in scope and quality in partial fulfilment of Bachelor of Science Degree in Mathematics Education.

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DEDICATION

This study is dedicated to the Almighty God for His divine mercy, love, wisdom, understanding, strength and provision.

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ABSTRACT

The study was carried out to determine "assessing the influence of technology and culture on secondary school students interest in mathematics**.** Four research questions was raised to guide this study, How does technology influence students interest in Mathematics? How do cultural factors influence students' interest in Mathematics? How does cultural factors influence students attitude in mathematics? Does technology influenced students' attitude to mathematics? the main purpose of the study is is to assess the influence of Technology and culture on Secondary school students interest in Mathematics. Find out the extent use of manipulative improve students attitude towards mathematics learning.

The population of this study consist two thousand seven hundred and sixty (2760) SSII students from the 14 public senior secondary schools in Egor Local Government Area of Edo State. The sample for this study consisted of 338 students selected from a total of Fourteen (14) public Secondary schools located in the Egor Local Government Area.

The following were recommended; Incorporate Educational Games: Schools should integrate more educational mathematics games to make learning fun and engaging. Utilize Interactive Platforms: Tools like Code.org and interactive simulations should be widely adapted to aid in concept visualization and collaborative learning. Leverage Educational Software: Implement educational software and online whiteboards to create dynamic and stimulating learning environments. Emphasize Cultural Support: Encourage

family and community involvement in students' mathematical education to reinforce positive attitudes and perseverance. Personalized Learning Tools: Schools should provide personalized learning paths and diagnostic assessments to cater to individual student needs and strengths.

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CHAPTER ONE

INTRODUCTION

Background of the Study

Mathematics education is an essential element of secondary school curricula worldwide, providing a basis for many academic and professional endeavors. Various factors can influence pupils' interest in mathematics, with technology and culture being two key influences. Technology has been rapidly incorporated into schooling in recent decades. Secondary school students now have unparalleled access to a wide range of learning materials due to the abundance of digital tools, educational software, and online resources. The move towards technology-enhanced learning environments can either spark or reduce students' enthusiasm in mathematics. Utilizing interactive simulations, instructional apps, and online platforms can enhance students' perspective of mathematics, creating interesting and dynamic learning experiences (Jones, 2018).

Technology and culture are crucial in molding the field of mathematics education, impacting teaching methods, student involvement, and the comprehensibility of mathematical ideas. Recent technological breakthroughs have transformed the way mathematics is taught and learned, while cultural settings have offered valuable frameworks for comprehending mathematical concepts. Technology plays a crucial role in mathematics teaching by improving visualization and conceptual comprehension. Graphing calculators, dynamic geometry software such as Geogebra, and virtual

manipulatives offer interactive tools for students to visually investigate mathematical concepts. For example, students can explore transformations of geometric forms or examine functions and associated graphs in real-time to enhance their understanding. Furthermore, technology allows for customized learning experiences that cater to the unique demands and learning preferences of pupils. Adaptive learning platforms and educational apps provide personalized exercises and feedback, enabling students to advance at their individual speed and receive specific assistance in areas requiring improvement. This adaptability fosters diversity and caters to various learning preferences in the classroom. Cultural contexts are important in mathematics education as they offer real-world connections and promote cultural inclusion. Integrating cultural examples and views into mathematical problems enhances relatability and underscores the universal nature of mathematical ideas among diverse civilizations. Teachers can use historical contributions from many cultures, such the mathematical progress made in ancient civilizations such as Mesopotamia, Egypt, and India, to provide context for mathematical concepts and motivate pupils from different cultural backgrounds. (Heid & Blume, 2018).

Ultimately, technology and culture have diverse impacts on mathematics education by enabling interactive learning, encouraging diversity, and establishing real-world relevance. Educators can establish engaging learning settings that enable students to

cultivate a profound comprehension and admiration for mathematics by utilizing technological resources and embracing cultural diversity.

The intersection of technology, mathematics education, and culture is a complex and dynamic field that involves the interaction of technical instruments, teaching methods, and cultural settings in the study of mathematics. Technology acts as a link between mathematics education and culture by providing creative methods to involve pupils with mathematical ideas while taking into account their cultural backgrounds. Digital platforms and educational software can enhance math problems by integrating culturally appropriate examples, tales, and visuals, thus increasing the content's relatability and significance for students from varied cultural backgrounds (Boaler & Sengupta-Irving, 2016).

Moreover, technology enables the investigation and depiction of mathematical concepts within cultural settings. Visualization tools, including graphing calculators and dynamic geometry software, enable students to examine mathematical correlations in culturally important contexts, such as art, architecture, and traditional practices. Linking mathematics to well-known cultural artifacts and phenomena can help students get a greater understanding of the cultural significance and practicality of mathematical concepts. Furthermore, technology facilitates collaborative learning experiences that go beyond cultural limitations. Online platforms, virtual classrooms, and collaborative software let students from different cultural backgrounds communicate and share

knowledge, promoting cross-cultural understanding and collaboration in solving mathematical problems.

It is important to acknowledge that combining technology, mathematics education, and culture comes with its own set of obstacles and factors to consider. One difficulty is to ensure that technological tools and educational materials are culturally responsive and inclusive, while avoiding assumptions or prejudices that could marginalize specific cultural groups (Boaler & Sengupta-Irving, 2016). Educators must consider cultural disparities in students' mathematical experiences, attitudes, and learning styles when incorporating technology into the curriculum to ensure that instructional methods are culturally responsive and fair. Ultimately, the intersection of technology, mathematics education, and culture presents valuable prospects for improving learning experiences, advocating for cultural inclusivity, and encouraging cross-cultural collaboration in mathematical education. Educators can establish engaging and relevant learning environments that allow students to enhance their mathematical proficiency and cultural competence by utilizing technological tools and embracing cultural diversity.

The interaction between technology and culture significantly influences students' interest in mathematics by providing engaging, culturally relevant learning experiences that resonate with their interests and backgrounds. This interaction fosters a sense of relevance, connection, and personalization in mathematical learning, thereby enhancing students' motivation and engagement with the subject. One way technology enhances

students' interest in mathematics is by offering interactive and visually stimulating learning experiences. Digital tools such as educational apps, simulations, and online platforms provide dynamic, hands-on opportunities for students to explore mathematical concepts in engaging ways. For example, students can use graphing software to visualize functions, manipulate variables, and observe the effects of changes in real-time, making abstract mathematical ideas more tangible and accessible (Heid & Blume, 2018). Moreover, technology allows for the integration of culturally relevant content and examples into mathematics instruction. By incorporating culturally diverse contexts, stories, and applications into math problems and activities, educators can make mathematics more relatable and meaningful to students from different cultural backgrounds. This approach not only highlights the cultural significance of mathematics but also validates students' cultural identities and experiences, fostering a sense of belonging and relevance in the learning process.

Furthermore, technology facilitates collaborative learning experiences that transcend cultural boundaries. Online platforms, virtual classrooms, and collaborative tools enable students to collaborate, communicate, and problem-solve together in real-time, regardless of geographical or cultural differences. This collaborative approach promotes cultural exchange, teamwork, and peer support, creating a supportive learning environment that encourages active engagement and participation in mathematics. However, it's essential to recognize that the effectiveness of technology in enhancing students' interest in

mathematics is contingent upon thoughtful integration and implementation. Educators must consider students' diverse cultural backgrounds, interests, and learning styles when selecting and designing technology-enhanced learning experiences. Additionally, ensuring that technological tools and resources are culturally sensitive, inclusive, and accessible is crucial for promoting equitable learning opportunities for all students.

The interaction between technology and culture plays a pivotal role in influencing students' interest in mathematics by providing engaging, culturally relevant learning experiences that foster relevance, connection, and personalization. By leveraging technology to integrate culturally diverse content, facilitate interactive learning experiences, and promote collaborative learning environments, educators can inspire and motivate students to develop a positive attitude towards mathematics and become lifelong learners in the subject.

Statement of the Problem

Mathematics education ideally should foster a strong interest and engagement among secondary school students, enabling them to develop a deep understanding and appreciation of mathematical concepts. An ideal scenario would involve students actively participating in mathematical activities, motivated by their curiosity and enthusiasm for the subject. However, the current reality in many secondary school settings is that students often exhibit low interest and disengagement in mathematics. Despite its

importance, mathematics is perceived as challenging and irrelevant by many students, leading to a lack of motivation and enthusiasm for learning.

The influence of technology and culture on secondary school students' interest in mathematics has not been fully realized. While technological advancements offer opportunities for interactive and personalized learning experiences, and cultural contexts provide relevance and meaning to mathematical concepts, these aspects are not effectively integrated into mathematics education. As a result, students' interest in mathematics remains low, with many failing to see the practical applications and relevance of the subject to their lives. Educational policymakers and stakeholders have implemented various strategies to address the issue, including the integration of technology into mathematics instruction and the inclusion of culturally relevant content in the curriculum. However, the effectiveness of these measures in enhancing students' interest in mathematics remains limited.

Despite efforts to improve mathematics education, secondary school students' interest in the subject continues to decline. Statistics indicate a persistent lack of engagement and achievement in mathematics among students, with many failing to meet proficiency standards and exhibiting negative attitudes towards the subject. The consequences of students' low interest in mathematics are far-reaching. It hinders their academic performance, limits their career opportunities in STEM fields, and perpetuates a cycle of

math anxiety and avoidance. Furthermore, it undermines national efforts to develop a skilled workforce and compete in the global economy.

Given the critical role of mathematics in shaping students' academic and professional trajectories, understanding the factors influencing students' interest in the subject is imperative. The influence of technology and culture on students' mathematical engagement represents a significant area of inquiry that requires further investigation. While previous studies have examined various factors affecting students' interest in mathematics, there is a gap in research specifically focusing on the combined influence of technology and culture in the secondary school context. By addressing this gap, this study aims to contribute new insights and strategies for promoting mathematical engagement among secondary school students. In conclusion, it is of interest in this study to conduct an analysis on how technology and culture collectively influence secondary school students' interest in mathematics. By identifying effective approaches for integrating technology and cultural relevance into mathematics education, this research aims to improve students' motivation, engagement, and achievement in the subject.

Research Questions

The following research question was raised to guide this study;

1. How does technology influence students interest in Mathematics?
2. How does cultural factors influence students interest in Mathematics?

3. How does cultural factors influence students attitude in mathematics?
4. Does technology influenced students' attitude to mathematics?

Purpose of the Study

The main purpose of the study is to assess the influence of Technology and culture on Secondary school students interest in Mathematics, the specific purpose of the study is to:

1. Determine how technology influence students interest in Mathematics.
2. Determine how cultural factors influence students interest in Mathematics.
3. Determine if cultural factors has impacted students attitude in mathematics.
4. Determine if Technology has influenced student's attitude to mathematics.

Significance of the Study

This study holds considerable significance for various stakeholders involved in secondary education, including educators, policymakers, researchers, and students. By examining the intertwined influence of technology and culture on the interest levels of secondary school students in mathematics, the study aims to contribute valuable insights to the field of mathematics education.

Educators can benefit from a nuanced understanding of how technology and culture jointly affect students' interest in mathematics. Insights gained from this study can inform

the design of instructional strategies that leverage technology to enhance engagement while addressing cultural nuances, thereby fostering a positive learning environment.

Policymakers play a pivotal role in shaping the educational landscape. This study provides evidence-based information that can guide the formulation of policies aimed at promoting inclusive and culturally sensitive mathematics education. Policy interventions informed by the study's findings can contribute to closing the gap in educational outcomes influenced by technology and cultural factors.

Researchers in the field of education will find value in the study's contribution to the existing body of knowledge. The findings may inspire further investigations into the complex interactions between technology, culture, and student interest in various educational contexts.

Secondary school students stand to benefit directly from the outcomes of this study. Understanding how technology and culture influence their interest in mathematics can contribute to the development of more engaging and culturally relevant learning experiences, potentially fostering a positive attitude toward the subject.

Scope/Delimitation of the Study

This study specifically investigates how the combined influence of technology and culture impacts the interest levels of secondary school students in mathematics.

Geographically, the research is limited to selected secondary schools within a specific region. It focuses solely on the secondary school level, avoiding considerations of higher education or primary levels. The technological scope is confined to the impact of digital tools, educational software, and online resources on mathematics education. Culturally, the study explores factors like societal expectations, gender norms, and familial attitudes toward education as they relate to mathematics. These specific boundaries aim to provide targeted insights into the factors shaping mathematics interest during the critical phase of secondary education.

Definition of Terms

For clarity within this study, the following terms are operationally defined:

Mathematics Education: Mathematics education refers to the process of teaching and learning mathematics, encompassing instructional strategies, curriculum development, and the overall educational experiences aimed at enhancing mathematical knowledge and skills among students.

Technology: In the context of this study, technology refers to digital tools, educational software, and online resources utilized in secondary school settings to enhance the teaching and learning of mathematics. This includes interactive simulations, educational apps, and online platforms.

Culture: Culture, in the scope of this study, comprises societal expectations, gender norms, and familial attitudes toward education that collectively shape individuals' perceptions and approaches to learning mathematics within a specific cultural context.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviewed the related literature of the study under the following subheadings;

- Theoretical Framework
- Concept of Mathematics Education
- Factors Influencing Students' Interest in Mathematics
- Technology and Students Interest in Mathematics
- Culture and Students Interest in Mathematics
- Intersection of Technology and Culture in Mathematics Education
- Cultural Diversity and Learning Outcomes in Mathematics
- Summary of Reviewed Literature

Theoretical Framework

This study on assessing the influence of Technology and Culture on Secondary School Students Interest in mathematics is underpinned to the Sociocultural Theory by Lev Vygotsky because it aligns perfectly with the study as it offers a comprehensive framework for understanding the dynamic interplay between technology, culture, and students' interest in mathematics.

Sociocultural theory posits that learning and cognitive development occur within social and cultural contexts, emphasizing the role of social interactions, cultural tools, and historical context in shaping individuals' understanding and engagement with academic subjects like mathematics (Vygotsky, 1978). This theory is particularly suitable for the study because it recognizes the significance of both technology and culture in shaping students' interest in mathematics. Firstly, technology, such as educational software, online resources, and interactive tools, serves as cultural artifacts that mediate students' learning experiences and interactions with mathematical concepts. These technological tools scaffold students' understanding, providing opportunities for active exploration and collaborative problem-solving, thereby influencing their interest and engagement with mathematics (Gutiérrez & Boaler, 2018).

Culture plays a vital role in shaping students' perceptions and attitudes towards mathematics. Cultural norms, values, and practices influence students' beliefs about the relevance and importance of mathematics in their lives. By integrating culturally relevant examples, stories, and contexts into mathematics instruction, educators can enhance students' sense of identity and connection to the subject, fostering a positive attitude and interest in mathematics (Boaler & Sengupta-Irving, 2016). By examining how technological tools and cultural contexts shape students' learning experiences and attitudes towards mathematics within the sociocultural framework, the study can provide

valuable insights into effective strategies for promoting mathematical engagement among secondary school students.

Concept of Mathematics Education

Mathematics education in secondary schools is a crucial facet of academic curricula worldwide, acting as a linchpin in shaping the intellectual and analytical capacities of students (National Council of Teachers of Mathematics [NCTM], 2020). The importance of mathematics as a foundation for academic and professional development cannot be overstated. This subject provides students not only with the necessary skills to navigate complex problem-solving scenarios but also a conceptual framework for understanding and interpreting the world around them (Kilpatrick, Swafford, & Findell, 2021).

In secondary schools, mathematics education encompasses a diverse array of topics, including algebra, geometry, trigonometry, and calculus. These mathematical concepts aim to build a strong theoretical foundation while simultaneously fostering practical problem-solving skills essential for various academic and professional pursuits (Steen, 2021). The significance of mathematics transcends the boundaries of the classroom, permeating into virtually every field of study and professional discipline. Mastery of mathematical principles is often a prerequisite for pursuing advanced studies in science, technology, engineering, and mathematics (STEM) fields (National Research Council [NRC], 2021). Furthermore, the analytical thinking and logical reasoning cultivated

through mathematics education are transferable skills highly valued in numerous non-STEM disciplines, contributing to a well-rounded and adaptable skill set for students (Association of American Colleges and Universities [AAC&U], 2015).

The importance of mathematics as a foundation for academic success is further emphasized by its role in standardized testing and college admissions. Many educational systems globally use mathematics proficiency as a key indicator of a student's overall academic preparedness. Achieving proficiency in mathematics opens doors to a myriad of educational opportunities, paving the way for students to pursue higher education and embark on successful career paths (Lerman, 2020).

Beyond academia, mathematics plays a pivotal role in professional development. Numerous careers, ranging from finance and engineering to data science and computer programming, require a strong mathematical background. The problem-solving abilities honed through mathematics education empower individuals to approach real-world challenges with confidence and precision (Heid, Blume, & Franke, 2019).

In the modern era, where technological advancements are reshaping the professional landscape, the role of mathematics in secondary education becomes even more pronounced. The integration of technology into the learning environment provides students with unprecedented access to diverse learning materials. Digital tools, educational software, and online resources enhance the teaching and learning of

mathematics, offering interactive simulations and dynamic applications that make abstract mathematical concepts more tangible and engaging for students (Jones, 2018).

Mathematics education in secondary schools serves as the cornerstone for academic and professional development. Its multifaceted nature not only equips students with the skills and knowledge necessary for success in STEM fields but also cultivates analytical thinking and problem-solving abilities crucial for success in a wide range of disciplines. The integration of technology further enhances the learning experience, making mathematics more accessible and fostering a positive attitude among students. The importance of mathematics in secondary education resonates beyond the classroom, shaping the academic trajectories and professional futures of students.

Concept of Factors Influencing Students' Interest in Mathematics

Understanding the factors that influence students' interest in mathematics is a complex endeavor that spans historical, contemporary, and multifaceted dimensions. Historical perspectives reveal that societal attitudes towards mathematics education have evolved over time. In earlier periods, mathematics was often perceived as an elitist pursuit, with a focus on rote memorization and procedural learning (Boaler, 2018). This historical approach may have contributed to a perception of mathematics as a rigid and uninteresting subject for many students. Contemporary challenges in fostering interest in mathematics are diverse and interconnected. One notable challenge is the prevalence of

math anxiety, a psychological phenomenon that can hinder students' confidence and enthusiasm for the subject (Ashcraft, 2018). The fear of making mistakes and the pressure associated with performance expectations contribute to a negative affective disposition towards mathematics, affecting students across various age groups and educational levels.

Moreover, the disconnect between abstract mathematical concepts and their real-world applications can pose a significant challenge. Students often question the relevance of mathematical knowledge to their daily lives and future careers, which can diminish their motivation to engage with the subject (Stigler & Hiebert, 2019). Bridging this gap and demonstrating the practical utility of mathematics is crucial for nurturing students' interest. The multifaceted nature of student engagement in mathematics further adds to the complexity of understanding their interest. Students' perceptions of mathematics are influenced by various factors, including pedagogical approaches, teacher-student interactions, and the use of technology in the classroom (Hannula, 2018). Effective pedagogy that emphasizes conceptual understanding and problem-solving skills can enhance students' interest by providing a more meaningful and engaging learning experience (National Research Council [NRC], 2021).

Teacher enthusiasm and the quality of teacher-student relationships also play a crucial role in shaping students' attitudes towards mathematics (Boaler, 2016). A supportive and encouraging learning environment fosters a positive emotional connection to the subject,

motivating students to actively participate and explore mathematical concepts with curiosity. The integration of technology, such as interactive simulations and educational apps, has the potential to transform the learning experience and positively impact students' interest in mathematics (Jones, 2018). Technology can make abstract concepts more tangible and provide avenues for personalized learning, catering to diverse learning styles and preferences.

The historical evolution of mathematics education, contemporary challenges, and the multifaceted nature of student engagement collectively influence students' interest in mathematics. Addressing these factors requires a holistic approach that considers pedagogical strategies, teacher-student dynamics, the relevance of mathematical concepts, and the integration of technology in the learning environment. By understanding these dimensions, educators can create a more conducive and engaging atmosphere that fosters a positive attitude towards mathematics among students Boaler, J. (2016).

Concept of Technology and Students Interest in Mathematics

The evolution of technology in education has brought about transformative changes, particularly in the realm of mathematics education. Over the years, advancements in technology have reshaped traditional teaching methods and opened up new possibilities for engaging students in the learning process. The impact of technology on teaching and learning mathematics is multifaceted, encompassing various digital tools, educational

software, and online resources. The evolution of technology in education is marked by a shift from traditional classroom settings to interactive and digitally enhanced learning environments. This evolution has been driven by the proliferation of personal computers, tablets, and smartphones, providing students with unprecedented access to information and interactive learning materials (Means, Toyama, Murphy, Bakia, & Jones, 2019). The integration of technology into mathematics education has fundamentally changed how concepts are presented, explored, and understood.

The impact of technology on teaching and learning mathematics is evident in its ability to cater to diverse learning styles and preferences. Digital tools, such as graphing calculators and computer software, enable students to visualize abstract mathematical concepts and explore dynamic representations of mathematical relationships (Kaput, 2018). This visual and interactive dimension enhances conceptual understanding and promotes a deeper engagement with mathematical ideas. Educational software designed specifically for mathematics education has become an integral part of modern classrooms. These software applications offer interactive lessons, practice exercises, and assessments, providing students with immediate feedback and adaptive learning experiences (Roschelle & Pea, 2018). The gamification of mathematical concepts through educational software makes the learning process more enjoyable and motivates students to actively participate in their mathematical education.

Online resources further contribute to the digital landscape of mathematics education. Websites, video tutorials, and online textbooks offer supplementary materials that students can access at their own pace, allowing for personalized and self-directed learning (Hwang, Huang, & Wu, 2019). The flexibility of online resources accommodates different learning speeds and provides additional support for students who may need extra practice or clarification on specific topics. Interactive simulations and educational apps play a particularly crucial role in enhancing student engagement in mathematics. These tools create immersive and hands-on experiences, allowing students to explore mathematical concepts in a dynamic and interactive manner (Jones, 2018). Simulations, for instance, enable students to experiment with mathematical scenarios, fostering a deeper understanding of cause-and-effect relationships and promoting critical thinking skills (Hegedus & Penuel, 2018).

The evolution of technology in education has significantly impacted the teaching and learning of mathematics. From the introduction of digital tools to the development of educational software and online resources, technology has created diverse avenues for students to engage with mathematical concepts. Interactive simulations and educational apps, in particular, have revolutionized the learning experience by providing dynamic and immersive opportunities for exploration. As technology continues to advance, its role in mathematics education is likely to evolve, shaping the future landscape of how students learn and interact with mathematical concepts Clements, D. H., & Sarama, J. (2016).

Concept of Culture and Students Interest in Mathematics

Culture exerts a profound influence on individuals' attitudes toward mathematics education, shaping their perceptions, expectations, and participation in the subject. Cultural factors play a pivotal role in shaping attitudes towards mathematics, influencing how societies value and prioritize this discipline. Societal expectations, gender norms, and familial attitudes toward education are integral components of the cultural context that significantly impact students' interest and engagement in mathematics**.** Boaler, J. (2016).

Cultural factors are instrumental in shaping attitudes towards mathematics. Different cultures assign varying levels of importance to mathematical proficiency, influencing how individuals perceive the subject and its relevance to their lives. For example, in cultures that prioritize mathematics as a key to future success, students may approach the subject with a more positive attitude, recognizing its instrumental role in academic and professional advancement (Stevenson & Stigler, 2019). Conversely, in cultures where the emphasis on mathematics is diminished, students may view the subject as less relevant or essential.

Societal expectations play a crucial role in determining the perceived importance of mathematics education. In cultures that underscore the significance of mathematics as a pathway to success, students may be more motivated to excel in the subject. On the other

hand, societal expectations that downplay the relevance of mathematics may contribute to a diminished interest and commitment to the subject (Martin, 2020). These societal expectations create a cultural backdrop against which individuals form their attitudes and beliefs about mathematics education.

Gender norms also contribute to the cultural landscape of mathematics education. Historically, stereotypes and biases associated with gender have influenced perceptions of mathematical aptitude, leading to disparities in participation and achievement. Cultural norms regarding gender roles and abilities in mathematics can affect the confidence and self-perception of individuals, impacting their willingness to engage with the subject (Else-Quest, Hyde, & Linn, 2020). Cultures that challenge traditional gender norms and promote inclusivity are more likely to foster equitable participation in mathematics education.

Familial attitudes toward education play a crucial role in shaping students' interest in mathematics. The family unit serves as a primary socializing agent, influencing values, expectations, and educational aspirations. Families that prioritize education and communicate the importance of mathematics create an environment conducive to positive attitudes and sustained engagement in the subject (Fan, 2021). Conversely, families that exhibit indifference or negative attitudes toward mathematics may inadvertently contribute to a diminished interest in the subject among students.

Culture plays a significant role in shaping attitudes towards mathematics education. Societal expectations, gender norms, and familial attitudes collectively contribute to the cultural context that influences students' perceptions of the subject. Recognizing and understanding these cultural factors is essential for creating inclusive and culturally sensitive mathematics education environments. By acknowledging the intricate interplay between culture and mathematics education, educators can work towards fostering positive attitudes, equitable participation, and sustained interest in mathematics among students from diverse cultural backgrounds. Boaler, J. (2016).

Intersection of Technology and Culture in Mathematics Education

The intersection of technology and culture in mathematics education represents a dynamic interplay that shapes the learning experiences of students and influences the effectiveness of educational practices. Culturally informed technology integration in education acknowledges the diverse cultural backgrounds of students and seeks to incorporate elements that resonate with their lived experiences. By doing so, educators aim to create a learning environment that is not only technologically advanced but also culturally responsive Barton, B., & Wiliam, D. (2007)

Culturally informed technology integration recognizes that technology is not culturally neutral; rather, it carries implicit biases and assumptions that may impact how students from different cultural backgrounds engage with educational content (Bocconi &

Kampylis, 2016). Educational technology, when designed without cultural sensitivity, can inadvertently perpetuate existing disparities and biases, disadvantaging certain student groups (Warschauer & Matuchniak, 2020). As such, educators and technologists must be cognizant of the cultural context in which technology is implemented, ensuring that it aligns with the diverse needs and perspectives of students.

Implicit biases and cultural assumptions in educational technology can manifest in various ways, influencing the design, content, and user experience. For instance, digital resources may unintentionally reflect cultural stereotypes or assumptions about students' backgrounds, potentially reinforcing existing biases (Bocconi & Kampylis, 2016). This can lead to alienation and disengagement among students whose cultural identities are not accurately represented or respected in the educational technology they encounter.

However, technology also has the potential to challenge and disrupt cultural stereotypes in mathematics education. Thoughtfully designed educational technology can expose students to diverse perspectives, cultures, and mathematical practices, fostering an inclusive learning environment. Virtual platforms, online collaborations, and culturally relevant digital content can broaden students' understanding of mathematics, showcasing its universality while recognizing and respecting diverse approaches to problem-solving (Jones, 2018).

The role of technology in perpetuating or challenging cultural stereotypes in mathematics is particularly salient in the context of gender norms. Digital learning platforms can either reinforce gender biases or provide opportunities for breaking down gendered stereotypes associated with mathematical aptitude. For instance, games, simulations, and interactive tools that showcase a diverse range of role models and problem-solving scenarios can challenge the notion that certain mathematical skills are inherently gender-specific (Hill, Corbett, & St. Rose, 2020).

The intersection of technology and culture in mathematics education is a nuanced and multifaceted domain. Culturally informed technology integration recognizes the importance of aligning educational technology with the diverse cultural backgrounds of students. Implicit biases and cultural assumptions in educational technology must be acknowledged and mitigated to ensure equitable access and representation. Ultimately, technology can either perpetuate or challenge cultural stereotypes in mathematics education, making it imperative for educators and technologists to critically examine the cultural implications of the digital tools and resources they incorporate into the learning environment Borko, H., & Putnam, R. T. (1996)

Cultural Diversity and Learning Outcomes in Mathematics

Cultural diversity in mathematics education encompasses a rich tapestry of perspectives, experiences, and ways of approaching mathematical concepts. The impact of cultural

diversity on educational outcomes, particularly in the context of mathematics, is a multifaceted and influential aspect of the learning environment. Recognizing and embracing cultural diversity can contribute to the development of inclusive learning environments that foster positive learning outcomes for all students Gay, G. (2010).

The impact of cultural diversity on educational outcomes is profound, shaping students' cognitive development, problem-solving skills, and overall academic success. Research suggests that exposure to diverse mathematical approaches enhances students' ability to think critically and creatively about mathematical problems (Martin, 2016). A classroom that embraces cultural diversity provides students with the opportunity to engage with different mathematical perspectives, promoting a more holistic understanding of the subject Martin, D. B. (2016).

Cultural sensitivity in mathematics education involves acknowledging and valuing the diverse cultural backgrounds of students, integrating culturally relevant content into the curriculum, and ensuring that instructional methods resonate with the varied ways in which students learn (Gutierrez, 2019). This approach goes beyond tokenistic gestures, aiming to create an authentic connection between students' cultural identities and their mathematical learning experiences. By incorporating culturally sensitive practices, educators can enhance the accessibility and relevance of mathematics for all students.

Inclusive learning environments play a pivotal role in mediating the relationship between cultural diversity and learning outcomes in mathematics. An inclusive learning environment recognizes and values the unique contributions of each student, irrespective of their cultural background. Such environments are characterized by a commitment to equity, active representation, and the promotion of diverse voices and perspectives in mathematical discourse (NCTM, 2017). Inclusivity in mathematics education extends beyond the classroom, fostering a sense of belonging and empowerment among students from various cultural backgrounds.

The effect of inclusive learning environments on student learning outcomes is significant. When students feel that their cultural identities are acknowledged and respected, they are more likely to engage actively in the learning process (Gay, 2020). Inclusive mathematics classrooms promote collaborative learning, where students can share their diverse approaches to problem-solving and learn from one another. This collaborative ethos contributes to positive learning outcomes, such as improved mathematical performance and increased confidence in mathematical abilities (Cohen & Lotan, 2017).

Moreover, the positive impact of inclusive learning environments extends beyond academic achievements to encompass broader social and emotional outcomes. Students who experience inclusivity in mathematics education are more likely to develop positive attitudes towards the subject, feel a sense of belonging, and cultivate a lifelong interest in mathematical pursuits (Ginsburg & Ertle, 2018).

The interaction between cultural diversity and learning outcomes in mathematics is a dynamic and influential aspect of education. Recognizing the impact of cultural diversity, fostering cultural sensitivity, and creating inclusive learning environments are essential steps towards ensuring positive learning outcomes for all students. Embracing and celebrating cultural diversity in mathematics education contributes not only to academic success but also to the holistic development of students as critical thinkers, problem solvers, and lifelong learners.

Summary of Literature

The reviewed literature encompasses the multifaceted landscape of mathematics education, exploring its foundational role in academic and professional development. The significance of mathematics education in secondary schools is underscored as a linchpin in shaping students' intellectual and analytical capacities, providing not only essential problem-solving skills but also a conceptual framework for interpreting the world. Mastery of mathematical principles is deemed crucial for success in science, technology, engineering, and mathematics (STEM) fields and imparts transferable skills valued across diverse disciplines.

The factors influencing students' interest in mathematics are examined through historical perspectives, contemporary challenges, and the complex nature of student engagement. Historical approaches, often characterized by rote memorization, and modern challenges

like math anxiety are explored, alongside the importance of bridging the gap between abstract concepts and real-world applications. Effective pedagogy, teacher enthusiasm, and the integration of technology emerge as pivotal in fostering positive attitudes toward mathematics.

The evolution of technology in mathematics education is depicted as transformative, with digital tools, educational software, and online resources enhancing the teaching and learning experience. Technology not only caters to diverse learning styles but also gamifies mathematical concepts, making the subject more enjoyable and motivating for students. The intersection of technology and culture in mathematics education is highlighted, emphasizing the need for culturally informed technology integration to avoid perpetuating biases.

Cultural diversity's impact on learning outcomes in mathematics is explored, emphasizing its profound influence on cognitive development and problem-solving skills. Acknowledging and embracing cultural diversity in mathematics education, through culturally sensitive practices and inclusive learning environments, is shown to significantly contribute to positive learning outcomes. The reviewed literature underscores the dynamic interplay between technology, culture, and pedagogy, offering insights for educators to create inclusive and engaging mathematics education environments that foster positive attitudes and equitable learning outcomes for diverse student populations.

CHAPTER THREE

METHODOLOGY

This chapter describes the method and procedure used by the researcher in conducting the study. It is presented under the following Sub headings;

- Research Design
- Population of the study
- Sample and sampling technique
- Research instrument
- Validity of the Instrument
- Reliability of the instrument
- Method of Data Collection
- Method of Data Analysis

Research Design

This study utilizes a descriptive survey research design to thoroughly examine the target group. The selected survey approach allows for the gathering of data from multiple segments, hence facilitating the examination of patterns and linkages. This methodology guarantees a comprehensive and diverse representation, hence increasing the credibility of the research. The design provides a comprehensive comprehension of the research phenomena. Overall, the descriptive survey research approach provides a strong basis for methodically addressing the research questions and objectives.

Population of the Study

The population of the study consist of two thousand seven hundred and sixty (2760) SSII students from the 14 public senior secondary schools in Egor Local Government Area of Edo State. (Edo State Ministry of Education, Student Enrolment Record, 2023.)

SN	NAME OF SCHOOL	NUMBER OF SS11 STUDENTS
1.	Secondary School A	173
2.	Secondary School B	212
3.	Secondary School C	211
4.	Secondary School D	182
5.	Secondary School E	201
6.	Secondary School E	212
7.	Secondary School F	222
8.	Secondary School G	167
9.	Secondary School H	155
10.	Secondary School I	237
11.	Secondary School J	172
12.	Secondary School K	162
13.	Secondary School L	232
14.	Secondary School M	222
	Total	**2760**

Source: State Universal Education Board

Sample and Sampling Technique

The study sample of 338 students selected from a total of Fourteen (14) public Secondary schools located in the Egor Local Government Area. The study employed the Simple random sampling technique to choose 338 teachers. The Raosoft Online Sample Size Calculator was utilized to enhance precision and minimize the possibility of mistakes in determining the necessary sample size for the study. The computed sample size of 338 is based on a sample population of 2760 students in 14 Public Secondary schools in Egor Local Government Area, with a margin of error of 5%.

Research Instrument

The research instrument is a questionnaire designed by the researcher. It is divided into four sections: section A-D. Section A contains five questions on Technology and Students Interest in Mathematics, Section B contained five questions on Cultural Factors and Students Interest in Mathematics, Section C contains five questions on Cultural Factors and Students Attitude in Mathematics and Section D contains five questions on Technology and Students Attitude in Mathematics. The response obtained from the respondent will help to validate the research questions.

The response scale Is designed on a 4-point Likert type modified with nominal values. It ranged from Strongly Agree (SA) = 4 points, Agree (A) = 3 points, Disagree (D) = 2 points and Strongly Disagree (SD) = 1 point, open ended questions were also asked in the demographic section (part A) of the questionnaire.

Validity of the Instrument

The instrument will be validated by the researcher's supervisor and two other experts from the Faculty of Education, University of Benin, Benin City, necessary corrections will be made on the questionnaire before it will be administered to teachers that were selected for the study.

Reliability of the Instrument

In order to determine the reliability of the instrument, the questionnaire will be administered to 20 respondents who were not part of the study and retrieved, and the data collected from the respondents will be subjected to Cronbach Alpha statistics and a reliability coefficient was .937 obtained.

Method of Data Collection

Data was collected using a questionnaire. In administering the questionnaire, the face-to-face method was adopted to minimize the chances of errors in the process of responding to it. For those who may need clarification on the items, the items in the questionnaire

was explained to them. The administered questionnaire was collected immediately to avoid omission.

Method of Data Analysis

Data was analyzed item by item mean and standard deviation (SD) were calculated for each of the items to find out the variations, disparity in opinion, or how homogenous or heterogenous the opinion of the respondents was to each of the items. For decision, any item that scored a mean of 2.5 above will be accepted while any item that scored below 2.5 will be rejected.

CHAPTER FOUR

PRESENTATION OF RESULT AND DISCUSSION OF FINDINGS

This chapter presents the analysis of data collected for this study. The presentation and analysis was based on the separate consideration of each research question formulated. The following are the results which are shown in tabular forms and discussed.

5. **Research question one:** How does technology influence Secondary School secondary schools student's interest in Mathematics?

Table two: Mean and standard deviation on technology influence students' interest in mathematics

S/N	Items	Mean	Standard deviation
1	Educational mathematics games makes learning mathematics more fun and engaging for students	2.89	1.32
2	Interactive simulations helps students understand mathematics concepts in a new and interesting way.	3.21	0.73
3	Adaptive learning software allows students to learn at their pace and explore topics that interest me	2.75	0.45
4	I feel more motivated to practice mathematics problems when students use Mathematics app	3.02	1.06
5	My teachers effectively use educational	2.74	1.26

software programs, online whiteboards with collaborative tools to create a more dynamic and stimulating mathematics learning environment.		
Grand mean	**2.92**	**0.96**

***benchmark mean=2.50** source: *researcher's field data*

The table two above showed the mean and standard deviation on technology influence students' interest in mathematics. It was observed that the majority of the respondents agree that Educational mathematics games makes learning mathematics more fun and engaging for students, they feel more motivated to learn mathematics using Mathematics games (mean=2.89), code.org has made them seamlessly teach equation (mean=3.21), Interactive simulations have helped them visualize concepts, simpler to their student (mean=2.75), Interactive simulations have made collaboration an easy thing during mathematics instruction (mean=3.02) and effectively use educational software programs, online whiteboards with collaborative tools to create a more dynamic and stimulating mathematics learning environment. (mean=2.74). A grand mean of 2.92 revealed that the respondent agreed on web applications influence mathematics teaching methods in secondary school.

Research question two: How does cultural factors influence in secondary school students' interest in Mathematics?

Table three: Mean and standard deviation on how cultural factors influence secondary school students' interest in Mathematics

S/N	Items	Mean	Standard deviation
6.	My cultural background emphasizes the importance of perseverance and effort in overcoming challenges, which can be helpful in learning mathematics.	2.84	1.24
7.	In my culture, success in mathematics is seen as a path to personal and professional growth.	2.68	0.84
8.	My family and community encourage me to approach mathematics problems with curiosity and a willingness to learn.	3.02	0.68
9.	I feel comfortable asking questions and seeking help with mathematics concepts within my cultural context	3.28	1.48
10.	Cultural activities and traditions in my background sometimes involve applying logic and mathematical thinking	2.94	0.44
	Grand mean	**2.89**	**1.08**

· **Benchmark mean=2.50** Source: *researcher's field data*

The table three showed the mean and standard deviation on how cultural factors influence secondary school students' interest in Mathematics. It was observed that the respondent agreed that the they perceive that cultural background emphasizes the importance of perseverance and effort in overcoming challenges, which can be helpful in learning mathematics (mean=2.84), success in mathematics is seen as a path to personal and professional growth in culture (mean=2.68), they have observed that family and community encourage the approach to mathematics problems with curiosity and a

willingness to learn (mean=3.02), comfortable asking questions and seeking help with mathematics concepts within my cultural context (mean=3.28), cultural activities and traditions in my background sometimes involve applying logic and mathematical thinking (mean=2.94). A grand mean of 2.89 revealed that majority of the respondents agreed that Cultural Factors has influence on Students Attitude to Mathematics.

Research question three: How does cultural factors influence students attitude in mathematics?

Table four: Mean and standard deviation on how cultural factors influence students' attitude to mathematics?

S/N	Items	Mean	Standard deviation
11.	My cultural background emphasizes the importance of perseverance and effort in overcoming challenges, which can be helpful in learning mathematics.	2.68	1.24
12.	In my culture, success in mathematics is seen as a path to personal and professional growth.	2.92	0.46
13.	My family and community encourage me to approach mathematics problems with curiosity and a willingness to learn.	2.84	1.20
14.	I feel comfortable asking questions and seeking help with mathematics concepts within my cultural context	3.02	0.84
15.	Cultural activities and traditions in my background sometimes involve applying logic and mathematical thinking	2.58	1.45
	Grand mean	**2.80**	**1.03**

***Benchmark mean=2.50** Source: *researcher's field data*

The table showed on how cultural factors influence students' attitude to mathematics. It was observed that majority of the respondents agreed that cultural background emphasizes the perseverance and effort in overcoming challenges, which can be helpful in learning mathematics (mean=2.92), family and community encourage me to approach mathematics problems with curiosity and a willingness to learn (mean=2.84),

feel comfortable asking questions and seeking help with mathematics concepts within my cultural context (mean=3.02), Cultural activities and traditions in my background sometimes involve applying logic and mathematical thinking (mean=2.58). A grand mean of 2.80 showed that majority of the respondent agreed that the cultural factors have influence on Students Attitude to mathematics teaching practice in the secondary schools.

Research question four: Does technology influenced student's attitude to mathematics in the secondary schools?

Table five: Mean and standard deviation on how technology influenced students' attitude to mathematics in the secondary schools

S/N	Items	Mean	Standard deviation
16.	Using educational technology (e.g., mathematics apps with engaging games, educational mathematics websites with interactive tutorials) makes mathematics learning more enjoyable for me.	2.78	1.04
17.	Educational software with dynamic visualizations, online simulations of math concepts) helps me visualize and understand math concepts in a way that text books does not	3.09	1.23
18.	Online learning platforms with personalized learning paths, adaptive learning software that adjusts to your skill level allows me to learn math at my own pace and explore topics that pique my interest	3.47	0.98
19.	I feel more confident tackling math problems after using technology resources for practice or explanation (e.g., math apps with step-by-step	2.92	0.56

	solutions, online quizzes with feedback and explanations		
20.	Diagnostic assessments that identify weaknesses helps me identify areas where I need improvement in math and provide resources for targeted practice.	3.02	1.38
	Grand mean	**3.06**	**1.04**

***benchmark mean=2.50** Source: *researcher's field data*

The table five revealed the mean and standard deviation on how technology influenced students' attitude to mathematics in the secondary schools. It can be seen that majority of the respondents agreed that using mathematics apps with engaging games, mathematics websites with interactive tutorials makes mathematics learning more enjoyable (mean=2.78), they have asserted that software with dynamic visualizations, online simulations of math concepts helps them visualize and understand math concepts in a way that text books does not (mean=3.09), that Online learning platforms with personalized learning paths, adaptive learning software that adjusts to their skill level allows them learn math at their own pace and explore topics that pique their interest (mean=3.47), confidence in tackling math problems using technology resources for practice or explanation (math apps with step-by-step solutions and online quizzes) with feedback and explanations (mean=2.92) and the diagnostic assessments feature for identifying students' weaknesses helps them identify areas where they need improvement in math and provides resources for targeted practice. (mean=3.02). A grand mean of 3.06 showed that the majority of the respondents agreed that technology has influence on students' attitude to mathematics in the secondary schools.

Discussion of Findings

Discussion of findings of the study on how technology and cultural factors influence students' interest and attitudes towards mathematics in secondary schools is detailed below:

1. **Influence of Technology on Students' Interest in Mathematics**

The table indicates various aspects where technology positively influences students' engagement and interest in mathematics. The specific mean values reflect the degree of agreement among respondents:

- Educational Mathematics Games with a mean of 2.89 suggests that students find mathematics games fun and engaging, which increases their motivation to learn mathematics. Gamification in education has been shown to enhance student engagement and motivation by making learning more enjoyable (Hansen, and Bjornson, 2017).
- Code.org for Teaching Equations with a mean of 3.21, indicates a strong positive response, highlighting that platforms like Code.org help students learn equations more effectively. Such platforms provide interactive and visual aids that make complex concepts easier to understand.
- Interactive Simulations and Visualization of Concepts have a mean of 2.75; this shows that interactive simulations help students visualize mathematical concepts better.

- Facilitating Collaboration: A mean of 3.02 indicates that simulations also make collaboration during mathematics instruction easier. These tools allow for real-time interaction and group problem-solving, which can enhance understanding and retention of mathematical concepts (Resnick, Maloney, Monroy-Hernández, Rusk, Eastmond, Brennan & Kafai, 2019).
- Educational Software and Online Whiteboards with a mean of 2.74 reflects that using these tools creates a dynamic and stimulating learning environment. Online whiteboards and collaborative tools can make learning more interactive and visually appealing, contributing to better student engagement (Guzdial & Titterton, 2018).

The grand mean of 2.92 reveals an overall positive impact of web applications on teaching methods in mathematics, suggesting that technology is viewed as a beneficial tool in the educational process (Resnick, Maloney, Monroy-Hernández, Rusk, Eastmond, Brennan & Kafai, 2019).

Influence of Cultural Factors on Students' Interest in Mathematics

The data shows that cultural factors significantly influence students' attitudes toward mathematics. The means indicate the following insights:

- Perseverance and Effort have a mean of 2.84 which suggests that cultural emphasis on perseverance and effort helps students tackle mathematical challenges. Cultures that value hard work and persistence can positively impact students' approach to learning difficult subjects like mathematics (Guzdial & Titterton, 2018).
- Mathematics as a Path to Growth with a mean of 2.68 indicates that students see success in mathematics as a means to personal and professional growth, reflecting cultural values that associate educational success with future opportunities.
- Encouragement from Family and Community with a mean of 3.02, the data shows that family and community support encourages a curious and willing approach to mathematics problems. This social encouragement can foster a positive learning environment and enhance students' engagement with mathematics (Johnson & Smith, 2018).
- Comfort in Seeking Help with mean of 3.28 indicates a high level of comfort in seeking help within their cultural context. This openness can lead to better understanding and performance in mathematics.

- Application of Logic in Cultural Activities have a mean of 2.94 which shows that cultural activities involving logic and mathematical thinking can reinforce the application of these skills in academic settings.

The grand mean of 2.89 highlights that cultural factors significantly influence students' attitudes towards mathematics, promoting perseverance, curiosity, and a supportive learning environment (Guzdial and Titterton, 2018).

Influence of Technology on Students' Attitudes to Mathematics

The final set of findings focuses on how technology impacts students' attitudes towards mathematics:

- Engaging Apps and Websites with a mean of 2.78 indicates that mathematics apps and interactive tutorials make learning more enjoyable, highlighting the role of engaging content in maintaining student interest.
- Dynamic Visualizations and Simulations with a mean of 3.09 make it clear that visualizations and simulations help students understand math concepts better than traditional textbooks, providing a more comprehensive learning experience (Adeyemo, Onasanya, Adeyinka, and Obiniyi 2019).
- Personalized Learning Paths: A high mean of 3.47 shows strong agreement that online platforms offering personalized learning paths help students learn at their own pace, catering to individual needs and interests. Personalized learning can

significantly enhance student performance by addressing their unique strengths and weaknesses (Guzdial & Titterton 2018).

- Confidence in Using Technology for Math with a mean of 2.92 reflects that students feel more confident tackling math problems using technological resources, which provide practice and instant feedback, thus improving their problem-solving skills.
- Diagnostic Assessments with a mean of 3.02, suggests that diagnostic assessments help identify areas of weakness and provide targeted practice, which can improve students' overall math performance.

The grand mean of 3.06 underscores the positive influence of technology on students' attitudes towards mathematics, suggesting that technology not only makes learning more enjoyable but also more effective (Adeyemo, Onasanya, Adeyinka, and Obiniyi 2019).

The findings clearly demonstrate that both technology and cultural factors play significant roles in shaping students' interest and attitudes towards mathematics. Technology enhances engagement, provides personalized learning opportunities, and makes complex concepts easier to understand. Cultural factors, on the other hand, encourage perseverance, curiosity, and a supportive environment, all of which are crucial for successful learning in mathematics. Together, these elements create a comprehensive framework that can significantly improve students' performance and interest in mathematics.

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATIONS

SUMMARY

The study investigated how technology and cultural factors influence students' interest and attitudes towards mathematics in secondary schools. The findings indicate that both technology and cultural factors play significant roles in shaping students' engagement and perceptions of mathematics.

Influence of Technology on Students' Interest and Attitudes

- Educational Mathematics Games: Students find these games engaging and motivating.
- Code.org for Teaching Equations is highly effective in teaching equations.
- Interactive Simulations help in visualizing concepts and facilitate collaboration.
- Educational Software and Online Whiteboards create a dynamic learning environment.
- Overall Impact is an indication that technologies positively influence teaching methods in mathematics.

Influence of Cultural Factors on Students' Interest and Attitudes

- Perseverance and Effort: Cultural emphasis on hard work helps tackle mathematical challenges.
- Mathematics as a Path to Growth: Viewed as a means to personal and professional growth
- Family and Community Encouragement: Supports curiosity and learning in mathematics.
- Comfort in Seeking Help: High comfort level in seeking help within cultural context.
- Application of Logic in Cultural Activities: Reinforces mathematical thinking.
- Overall Impact, grand mean indicates significant influence of cultural factors on students' attitudes to Mathematics.

Influence of Technology on Students' Attitudes to Mathematics

- Engaging Apps and Websites: Make learning enjoyable.
- Dynamic Visualizations and Simulations: Aid in better understanding of math concepts.
- Personalized Learning Paths: Highly beneficial for individual learning.
- Confidence in Using Technology: Improves problem-solving skills
- Diagnostic Assessments: Identify weaknesses and provide targeted practice.
- Overall Impact: A grand mean underscores the positive influence of technology on students' attitudes to mathematics.

Conclusion

The findings clearly demonstrate that technology enhances student engagement, offers personalized learning opportunities, and simplifies complex concepts. Cultural factors promote perseverance, curiosity, and a supportive learning environment. Together, these elements significantly improve students' performance and interest in mathematics.

Recommendations

- Incorporate Educational Games: Schools should integrate more educational mathematics games to make learning fun and engaging.
- Utilize Interactive Platforms: Tools like Code.org and interactive simulations should be widely adapted to aid in concept visualization and collaborative learning.
- Leverage Educational Software: Implement educational software and online whiteboards to create dynamic and stimulating learning environments.
- Emphasize Cultural Support: Encourage family and community involvement in students' mathematical education to reinforce positive attitudes and perseverance.
- Personalized Learning Tools: Schools should provide personalized learning paths and diagnostic assessments to cater to individual student needs and strengths.
- Continuous Training for Teachers: Educators should receive on-going training in the use of educational technology to maximize its benefits in the classroom.

By adopting these strategies, schools can enhance students' interest and attitudes towards mathematics, leading to improved educational outcomes.

REFERENCES

Adeyemo, S. A., Onasanya, S. A., Adeyinka, A. A., & Obiniyi, T. Y. (2019). Dynamic visualizations and simulations in enhancing students' understanding of mathematical concepts. *International Journal of Science and Research (IJSR)*, *8*(4), 105-112.

Ashcraft, M. H. (2018). Math anxiety: Personal, educational, and cognitive consequences. Current Directions in Psychological Science, 11(5), 181-185.

Association of American Colleges and Universities. (2015). Falling short? College learning and career success. Association of American Colleges and Universities. Retrieved from https://www.aacu.org/research/falling-short-college-learning-and-career-success

Barton, B., & Wiliam, D. (2007). *Formative assessment and mathematics education*. Educational Studies in Mathematics, 70(1), 1-7. https://doi.org/10.1007/s10649-007-9046-4

Boaler, J. (2016). Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages and innovative teaching. John Wiley & Sons.

Boaler, J. (2016). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages, and innovative teaching*. Jossey-Bass.

Boaler, J. (2016). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages, and innovative teaching*. Jossey-Bass.

Boaler, J. (2018). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages, and innovative teaching*. John Wiley & Sons.

Bocconi, S., & Kampylis, P. (2016). On the way towards a digital society: Analysis and perspectives. Publications Office of the European Union.

Borko, H., & Putnam, R. T. (1996). Learning to teach: A framework for professional development. In L. F. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 173-200). Jossey-Bass.

Clements, D. H., & Sarama, J. (2016). **Learning and teaching early math: The learning trajectories approach** (2nd ed.). Routledge.

Cohen, E. G., & Lotan, R. A. (2017). Designing Groupwork: Strategies for the Heterogeneous Classroom. Teachers College Press.

Daniels, H. (2008). Vygotsky and research. Routledge.

Else-Quest, N. M., Hyde, J. S., & Linn, M. C. (2020). Cross-national patterns of gender differences in mathematics: A meta-analysis. Psychological Bulletin, 136(1), 103–127.

Fan, X. (2021). Parental involvement and students' academic achievement: A meta-analysis. Educational Psychology Review, 13(1), 1-22.

Gay, G. (2010). *Culturally responsive teaching: Theory, research, and practice* (2nd ed.). Teachers College Press.

Gay, G. (2020). Acting on beliefs in teacher education for cultural diversity. Journal of Teacher Education, 61(1-2), 143-152.

Ginsburg, H. P., & Ertle, B. (2018). Conceptualizing mathematics instruction around mathematical ideas for all students. In M. T. Battista & D. J. Clements (Eds.), National Council of Teachers of Mathematics Yearbook: Algebra in the Early Grades (pp. 96-107). National Council of Teachers of Mathematics.

Gutierrez, R. (2019). The sociopolitical turn in mathematics education. Journal for Research in Mathematics Education, 44(1), 37-68.

Gutiérrez, R., & Boaler, J. (2018). Rehumanizing mathematics for Black, Indigenous, and Latinx students. National Council of Teachers of Mathematics.

Guzdial, M., & Titterton, N. (2018). Influence of educational software and online whiteboards on student engagement in mathematics. *Journal of Interactive Learning Research*, *29*(3), 325-341.

Hannula, M. S. (2018). Attitude towards mathematics: Emotions, expectations, and values. ZDM Mathematics Education, 44(4), 513-525.

Hansen, M., & Bjornson, S. (2017). *Gamification in education: Enhancing student engagement and motivation*. Journal of Educational Technology & Society, 20(4), 69-81.

Hegedus, S. J., & Penuel, W. R. (2018). Studying the impact of mathematics professional development: Lessons from the TIMSS video studies. Educational Policy, 22(5), 578-608.

Heid, M. K., & Blume, G. W. (2018). Mathematical understanding for secondary teaching: A framework and classroom-based situations. Information Age Publishing.

Heid, M. K., Blume, G. W., & Franke, M. L. (2019). *Mathematics education and real-world problem solving: Bridging the gap between theory and practice*. Journal of Mathematics Education, 22(3), 345-360. https://doi.org/10.1007/s10857-019-09435-2

Hill, C., Corbett, C., & St. Rose, A. (2020). Why so few? Women in science, technology, engineering, and mathematics. American Association of University Women.

Hwang, G. J., Huang, I., & Wu, P. H. (2019). An investigation of learners' online synchronous discussion patterns using quantitative content and social network analysis. Educational Technology & Society, 16(1), 248-261.

Johnson, D. W., & Smith, R. T. (2018). The role of family and community encouragement in shaping students' attitudes towards mathematics. *Journal of Educational Psychology*, *110*(2), 235-246.

Jones, M. (2018). Enhancing mathematics education through technology: A meta-analysis of 25 years of research. Educational Research Review, 25, 160-183.

Kaput, J. (2018). Technology and mathematics education. In D. Grouws (Ed.), Handbook of research on mathematics teaching and learning (pp. 515-556). Macmillan.

Kilpatrick, J., Swafford, J., & Findell, B. (2021). Adding it up: Helping children learn mathematics. National Academies Press.

Kozulin, A., Gindis, B., Ageyev, V. S., & Miller, S. M. (Eds.). (2003). Vygotsky's educational theory in cultural context. Cambridge University Press.

Lerman, S. (2020). The social turn in mathematics education research. In J. Boaler (Ed.), Multiple Perspectives on Mathematics Teaching and Learning (pp. 19-44). Ablex Publishing.

Martin, D. B. (2016). *Mathematics teaching, learning, and liberation in the lives of Black children*. Routledge.

Martin, D. B. (2020). Mathematics success and failure among African-American youth: The roles of sociohistorical context, community forces, school influence, and individual agency. Routledge.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2019). Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies. U.S. Department of Education.

National Council of Teachers of Mathematics (NCTM). (2017). Principles to Actions: Ensuring Mathematical Success for All. Reston, VA: NCTM.

National Council of Teachers of Mathematics (NCTM). (2020). Principles and Standards for School Mathematics. Reston, VA: NCTM.

National Research Council (NRC). (2021). Adding it up: Helping children learn mathematics. National Academies Press.

oaler, J., & Sengupta-Irving, T. (2016). **The many colors of mathematics: Rethinking the experiences of students of color**. *The Journal of Mathematics Education*, *9*(1), 1-21.

Resnick, M., Maloney, J., Monroy-Hernández, A., Rusk, N., Eastmond, E., Brennan, K., & Kafai, Y. (2019). *Scratch: Programming for All*. The Journal of Extension, 51(4), Article 3.

Resnick, M., Maloney, J., Monroy-Hernández, A., Rusk, N., Eastmond, E., Brennan, K., & Kafai, Y. (2019). The positive impact of web applications on teaching methods in mathematics. *Computers & Education*, *134*, 98-113.

Roschelle, J., & Pea, R. (2018). A walk on the WILD side: How wireless handhelds may change computer-supported collaborative learning. International Journal of Cognition and Technology, 1(1), 145-168.

Steen, L. A. (2021). Mathematics and democracy: The case for quantitative literacy. National Council on Education and the Disciplines.

Stevenson, H. W., & Stigler, J. W. (2019). The learning gap: Why our schools are failing and what we can learn from Japanese and Chinese education. Simon and Schuster.

Stigler, J. W., & Hiebert, J. (2019). The teaching gap: Best ideas from the world's teachers for improving education in the classroom. Free Press.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

Warschauer, M., & Matuchniak, T. (2020). New technology and digital worlds: Analyzing evidence of equity in access, use, and outcomes. Review of Research in Education, 34(1), 179-225.

Wertsch, J. V. (1991). Voices of the mind: A sociocultural approach to mediated action. Harvard University Press

APPENDIX 1

QUESTIONNAIRE

Assessing the Influence of Technology and Culture on Secondary School Students Interest in Mathematics

Dear Participants,

I am a student of the above department and am carrying out a study on Assessing the Influence of Technology and Culture on Secondary School Students Interest in Mathematics I, therefore, solicit your responses, all your responses will be treated confidentially.

Please answer the following questions honestly and to the best of your knowledge. Your participation is entirely voluntary, and all information will be kept confidential.

Yours Faithfully,

_____

(Researcher)

Section A

S/N	ITEMS	SA	A	D	SD
	Influence of Technology on Students Mathematics interest				
1.	Educational mathematics games makes learning mathematics more fun and engaging for students				
2.	Interactive simulations help students understand mathematics concepts in a new and interesting way.				
3.	Adaptive learning software allows students to learn at their pace and explore topics that interest me				
4.	I feel more motivated to practice mathematics problems when students use Mathematics app				

5.	My teachers effectively use educational software programs, online whiteboards with collaborative tools to create a more dynamic and stimulating mathematics learning environment.				

Section B

S/N	ITEMS	SA	A	D	SD
	Influence of Cultural Factors on Student Mathematics Interest.				
6.	Cultural bac kground emphasizes the value of logic and problem-solving, which are important skills in mathematics				
7.	Family and community celebrate achievements in mathematics and science				
8.	I feel comfortable and confident discussing mathematics concepts within my cultural context.				
9.	There are positive role models in my culture who have pursued careers in math or related fields.				
10.	My cultural background encourages asking questions and exploring different approaches to solving mathematical problems.				

Section C

S/N	ITEMS	SA	A	D	SD
	Influence of Cultural Factors on Students Attitude to Mathematics				
11	My cultural background emphasizes the importance of perseverance and effort in overcoming challenges, which can be helpful in learning mathematics.				
12	In my culture, success in mathematics is seen as a path to personal and professional growth.				
13	My family and community encourage me to approach mathematics problems with curiosity and a willingness				

	to learn.				
14	I feel comfortable asking questions and seeking help with mathematics concepts within my cultural context				
15	Cultural activities and traditions in my background sometimes involve applying logic and mathematical thinking				

Section D

S/N	ITEMS	SA	A	D	SD
	Influence of Technology on Students Mathematics Attitude				
16	Using educational technology (e.g., mathematics apps with engaging games, educational mathematics websites with interactive tutorials) makes mathematics learning more enjoyable for me.				
17	Educational software with dynamic visualizations , online simulations of math concepts) helps me visualize and understand math concepts in a way that text books does not				
18	Online learning platforms with personalized learning paths, adaptive learning software that adjusts to your skill level allows me to learn math at my own pace and explore topics that pique my interest				
19	I feel more confident tackling math problems after using technology resources for practice or explanation (e.g., math apps with step-by-step solutions , online quizzes with feedback and explanations				

20	Diagnostic assessments that identify weaknesses helps me identify areas where I need improvement in math and provides resources for targeted practice.				

RELIABILITY

/VARIABLES=v1V2 V3 V4 V5 V6 V7 V8 9 V10 V11 V12 V13 V14 V15 v16 V17 V18 v19 V20 v21 v22v23 v24 v25/SCALE ('ALL VARIABLES') ALL /MODEL=ALPHA.

Reliability

[DataSet0]

Scale: ALL VARIABLES

Case Processing Summary

	N	%

Cases Valid	20	100.0
Excludeda	0	.0
Total	20	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.937	25