

Exploring How Three Psychological Factors: Attitude, Interest and Readiness has Affected Students' Performance in Caribbean Secondary Education Certificate (CSEC) Examination in Mathematics

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Abstract

Academic performance of students is usually dependent on the individual intellectual and cognitive ability. However, several students face issues with leaning performance, mainly in mathematics. This study examines the effects of three psychological variables—readiness, interest, and attitude—on students' performance on the mathematics portion of the Caribbean Secondary Education Certificate (CSEC) Exam. These elements need to be carefully considered because they have a big impact on how well pupils succeed in school. The complex characteristic of attitude, which is impacted by both heredity and experiences, shapes students' attitudes towards mathematics. Interest, which is described as a genuine love of the subject, influences learning outcomes through influencing students' engagement, motivation, and readiness, which comprises preparedness and personal qualities, affects students' ability to comprehend and apply mathematical concepts. The research proposes a conceptual framework that explains how these psychological factors impact performance on the CSEC Mathematics Examination. On the other side, enthusiastic attitudes and interest promote a supportive learning environment. Furthermore, traits like mentality and self-discipline affect pupils' preparation. The attitudes, interests, and readiness of students are also influenced by the teachers' methods of instruction, the dynamics in the classroom, and the subjects covered in the lessons. In conclusion, psychological factors have a big impact on how well students do on the CSEC Mathematics Exam. Teachers and governments can improve students' learning experiences and outcomes in mathematics education by recognizing the interplay of attitudes, interest, and preparation.

Keywords: *Attitude, Interest, Readiness.*

Introduction

“Why bother with mathematics when most of us won't need it after we graduate?” This is one of the many statements often said during a routine mathematics class by students. Over the years, Caribbean Secondary Education Certificate (CSEC) examination Mathematics has been a problematic subject for many students. [1] believed that many students view mathematics as a difficult, cold, and abstract subject, and the low performances of our students are linked to several psychological

factors such as the concept of the subject, anxiety about the subject, interest, or lack thereof, lack of preparation, and attitude towards the subject, which may eventually lead to mind block.

Having a strong background in mathematics (mathematics competency and literacy) is very vital as it is one of the main drivers for employability. Being mathematically competent will increase your chances of getting a higher wage and better benefits once employed. However, in Jamaica and, by extension, the Caribbean (presently), this seems not to be the

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case; there is the underlying problem of underachievement in mathematics among students, despite the fact that mathematics is one of their core quantitative subjects.

According to [2] this problem of underperformance in mathematics has been a growing cause of concern among parents, teachers, the Ministry of Education and, by extension, society. [3] believes that some psychological factors such as anxiety, fear, stress, attitude, interest, and student readiness may be linked to the cause of the underachievement in mathematics for many students. Based on the definition from [3], one can add that psychological factors can be one of the cognitive characteristics that may affect the functions of the human mind. Based on both definitions, they are of the same conclusion that psychological factors can and will affect a person's way of thinking, which can alter their life's decisions.

An Overview of the Psychological Factors: Attitude, Interest, and Readiness

Psychological factors are the mental factors that help or prevent people (students) from being in the right state of mind' to perform well at any given task. According to [4], psychosocial factors such as beliefs and attitudes, interest, and preparation play key roles in classroom learning.

Attitude

Attitude is a multidimensional characteristic that is found in everyone, meaning each person tends to have more than one trait. Each of these attitudes has its own unique characteristics, and no two attitudes come to us or influence us in quite the same way. Research has found that some of our attitudes are inherited, at least in part, via genetic transmission from our parents [5]. Some attitudes are learned through informal sources such as experiences or attitude-related objects [6], while others are learned from other sources such as the media [7], through

socialization with peers and classmates [8]. Occasionally, you will find that some attitudes are shared among students or peers, such as the fear of mathematics or their preferences in style or formality.

Interest

In the context of this paper, interest is regarded as the students' interest in Caribbean Secondary Education Certificate examination in Mathematics, which may be defined as having a genuine feeling or appreciation for the subject. Students can show interest in a subject (mathematics) by their actions, by their attitudes, by their readiness and their attentiveness.

[9] posits that the importance of interest in whatever a person does cannot be underestimated. He asserts that when it comes to making a choice, interest is of considerable importance, whereas [10] studies postulate the findings that there is a positive correlation between mathematics knowledge and interest.

[11], argued that the role of interest was particularly relevant in mathematics because it is perceived as a very difficult subject in which motivational factors are very important for enhancing academic achievement.

There are several known additional barriers that hinder students' interest in the Caribbean Secondary Education Certificate (CSEC) examination in Mathematics; some of those barriers are the content or the syllabus; the class size and teaching environment; the mode of delivery; and others.

The content or the syllabus of any subject is very important to the students and the institution; it gives you the details of the components of the subject. For the Caribbean Secondary Education Certificate (CSEC) examination in Mathematics, there are some areas within the content that most students fear, and without the proper teaching styles, these areas can be a turn off for many students. Some of the noted areas are trigonometry, vectors,

and matrices, as well as functions, relations, and graphs.

Another deterrent to students is class size; in a classroom with too many students, a student can become disoriented, frustrated, or even demotivated. Students all learn at different paces and different styles. It would be difficult for a teacher to give individual attention to a particular student in a very large classroom. Most of the time, our Jamaican classroom constitutes a 'one size fits all' approach.

The mode of delivery or the teaching style of the teacher can make the students interested in the subject or uninterested. Often times, students will complain that the reason why they skipped class is that the teacher is boring. The teacher needs to cultivate an atmosphere of learning where the students will be motivated and willing to learn.

Readiness

Readiness may be classified as the state of preparedness of students or teachers to carry out a planned sequence of actions. Readiness is used in this study to show the preparation of the students as it relates to the subject and their examination. Readiness may be defined as the state in which students are prepared or preparing for their class, examination, or to make a decision.

There are several barriers that can affect the readiness of students as it relates to their class or examination, such as frustration, personal health, natural ability to learn, individual differences, and the list goes on. Frustration is the awkward feeling caused when you are annoyed because of your inability to accomplish a given task on time. These are the two types of sources of frustration that the students face from time to time. (a) The internal source of frustration, which may arise from difficulties in completing a task, desires, or goals; for example, a student may become frustrated while attempting to solve a mathematical equation and give up.

The external source of frustration is physical things that stand in the way of the students, preventing them from reaching their goal, or in this context, preventing the students from performing admirably on the examination. An example of an external source of frustration would be a teacher constantly wasting time within the classroom instead of actually preparing the students for their examinations.

Another barrier can be the student's personal health, both physical and mental; generally speaking, a student with poor physical health can actually lead to mental challenges, which in turn affect their performance. All students do not (normally) learn at the same pace. Some students learn visually while others learn in a more robust manner or in the traditional way. However, each student has their own unique identity and their individual differences that make them different from the entire class.

A Literature Review

The primary aim of this literature review is to examine the status of knowledge on three specific psychological factors; attitude, interest, and readiness in order to set reasonable parameters and to establish how they have affected students' performances in the Caribbean Secondary Education Certificate (CSEC) examination in Mathematics.

Psychological Factor: Attitude (towards Mathematics)

Attitude, as stated earlier, may be described as the emotions that the students feel or display towards a particular subject (mathematics). This emotional feeling or attitude towards mathematics may be developed as either a positive image or a negative image. Whether positive or negative, these images can have a significant impact on one's performance in their Caribbean Secondary Education Certificate (CSEC) examination in Mathematics.

Previous studies have shown contradictory results as it relates to students' attitudes towards mathematics. In their study, [12] used the term

“beliefs,” which means one’s personal judgment and view. They argue that someone’s view or opinion is subjective and does not need any form of justification or proof.

The phenomena of a “negative attitude towards mathematics” in connection to the study of the subject was examined by [13]. Their research demonstrated how a negative attitude towards mathematics had an impact on different social context factors, such as students' refusal to enrol in universities or accept employment that required some level of mathematical skill. [14] discovered that students' daily attitudes were related to their liking or preferences for a familiar target. In his study of students' attitudes towards mathematics, he grouped them into four segments, namely (a) the emotional component of the students that is to deal with their experience during a numerical or mathematics related activity; (b) the automatic emotional response of the students once they realize that there is an activity mathematical related (c) the results of the mathematical activity that the students were expected to follow; and (d) the students' objective and value of mathematics. In an action study done by [14], the findings revealed that a student's attitude, beliefs, and behavior can be changed or altered.

Students' attitudes towards mathematics play a fundamental role in the teaching-learning process. [15] declared that “learning mathematics is not only a cognitive challenge but an effective one” (p.1), with [16] postulating that “attitude plays a significant role in mathematics learning and instruction” (p. 575). Likewise, [17] opined that “interest and attitudes are highly composite, and they can affect learning comprehensively” (p 38).

According to [16], there are three aspects that will affect how well people learn mathematics: their beliefs, attitudes, and emotions. These factors add to the difficulties of the teaching-learning process in mathematics. However, [18] opined this differently; they described those factors as

phases under a broad heading entitled, “The Cycle of Mathematics Avoidance.” In phase one of the cycle, this depends on the person's past negative experiences with mathematics, while in phase two, the person

It absolutely avoids any mathematical issues. step three of this avoidance is inadequate mathematics preparation and preparedness, which brings us full circle to step one.

The cycle is seldom interrupted since it can be repeated so frequently that the nervous maths students believe they are incapable of learning the subject. The cycle described by [18] provides some justification for Jamaica's performance gap in mathematics.

Psychological Factor: Interest (towards Mathematics)

Some pupils may have lost interest in mathematics as a result of the persistently low success in mathematics at the Caribbean Secondary Education Certificate level for Jamaica and, by extension, the Caribbean. In order to be competent, one must be prepared or have a grasp of the subject matter (mathematics). The lack of enthusiasm among students in learning mathematics has been linked to a variety of problems, according to the research.

These include, among others [19-21] dread of the topic, fear of the professors, math anxiety, class size, and the content and instructional style. As a mathematics teacher, I can agree with both of [19-22] statements that additional factors contributing to some students' lack of interest in learning mathematics include mathematics phobia and distractions from handsets they carry around in the mathematics classrooms.

The researcher is of the opinion that the strategy that the teacher will bring to the classroom, such as his or her teaching style, qualifications, patience, determination, and attitude, among others, will help the students be either interested or uninterested.

A (qualified) teacher's teaching style and different approaches, methods, illustrations, examples, and improvised materials in teaching students' mathematics concepts, principles, or ideas will have a great impact on the students' interest, thus having that student interested in the subject.

The mode of delivery of the teacher along with the teacher's teaching style can make the students interested in the subject as well as uninterested. There are several different types of teaching styles that a teacher can use to capture the interest of the students during teaching. However, the main one or the traditional one that is widely used is the delegate, discuss, and direct method, commonly known as the 3D's.

The direct teaching style is a style that allows the students to listen to the teacher and follow the instructions of the teacher. In this style, the teacher will tell the students exactly what to do. The format of the direct teaching style is that of a lecture series using visual aids, assigned readings, and role-playing audio and visual presentations, among others. One of the drawbacks to this method is that not all of the students will understand what to do or they won't understand the instructions given.

Through interaction with the students, the discussion style of teaching promotes critical thinking and encourages discussion between the students and the teacher. This method increases class participation and involvement. The delegating style is where the teacher will assign a task to the student and they will work on that task either individually or in a group setting, thus fostering empowerment and teamwork.

Psychological Factor: Readiness (of students)

Student readiness can be measured through the use of assessment or placement tests; for example, at the beginning of the school year, the students were given a series of screenings. The informal assessments were designed to indicate to the teacher the levels at which they

are in terms of their academic standing. This will help to show the students' readiness at that stage. Informally, two more ways of assessing students' readiness are (a) the mindset of the students and (b) their self-discipline.

The mindset of the students: this is where the students have already decided in their minds what they are going to do and what they are not going to do. This kind of behavior is referred to as a "fixed mindset." For example, the students have already decided that they are not going to participate in the classroom, or they are not going to turn up for the mathematics class. This kind of action is already fixed in their minds.

When students have a "fixed mindset," they believe that what they are doing is the right thing to do at that time and they are unlikely to change. In my opinion, students with a "fixed mindset" are less likely to show growth in the class or to take up a challenge. However, students with a "growth mindset" are far different from students with a "fixed mindset." A growth mindset, otherwise called an "open mind," is where students are willing to take on challenges, where students are willing to participate in classes, and where students do not quit easily. These students believe that they can master any task given to them; they believe that they have the ability or that their ability will develop through hard work.

Self-discipline

Another way of assessing students' readiness is through self-discipline. Are they disciplined enough to complete the given assignment? Are they disciplined enough to follow the instructions of the teacher, or would they rather follow the mass?

Self-discipline is more about the students controlling themselves or committing to the task even without the presence of their teacher. Self-discipline is a process that is gained overtime, one that the students must be committed to from an early age. Irrespective of what is going on or where the mass is going, a self-disciplined student will stand firm and

perform the task that is given to them rather than leave it for a later date, which sometimes never comes around.

Methods

The investigation of the connection between psychological elements and students' performance on the CSEC Examination in Mathematics used a mixed-methods approach. Through the distribution of surveys to a representative sample of students from various schools, quantitative data were gathered. The surveys evaluated students' attitudes, preferences, and perceived mathematical readiness. To learn more about the effects of these psychological elements, qualitative data were acquired through focus groups and interviews with chosen students and teachers.

Results

A quantitative analysis of the survey data revealed that there were differences in the attitudes, interests, and levels of preparation of the pupils. Positive attitudes and interests were linked to higher levels of achievement, while unfavorable attitudes hindered students' progress. Readiness identified as a significant component as children who demonstrated self-control and a growth mentality revealed superior academic performance. The qualitative results corroborated the quantitative results, with students attributing their success to a combination of optimistic attitudes, genuine interest, and a desire to engage with mathematical concepts. The classroom environment and teachers' teaching strategies were also recognized as having an impact on students' psychological dispositions.

The results of this study provide important light on the complex interplay between psychological variables—attitude, interest, and readiness—and students' performance on the mathematics portion of the Caribbean Secondary Education Certificate (CSEC) Examination. Together, these factors influence how effectively kids learn and perform, which

in turn influences their educational paths and potential career opportunities.

Interest, a key component of the psychological processes explored, is a potent fuel for learning. One researcher pointed out that numerous challenges, including challenging subject, sizable class numbers, and instructional strategies, can derail students' passion for mathematics. Through connecting abstract mathematical topics to practical conditions, educators may support pupils see the position of mathematics in their everyday lives. The consequences of the learning accentuate the significance of a student's sincere interest in mathematics in affecting their performance. Pupils are additional eager to put in the effort, time and cognitive resources required to comprehend difficult topics when they are really engaged in a subject. This participation interested via interests leads to better learning outcomes [11]. Many researchers are of the view that interest is one of the significant learning accelerators and a main element of the psychological procedures inspected. Findings of the learning shows that importance of a pupil's honest attention in maths in manipulating their recital. Students are more willing to put in the time, effort, and cognitive resources required to comprehend difficult topics when they are genuinely engaged in a subject. To pique and maintain students' interest, teachers should embrace cutting-edge strategies that incorporate interactive tactics and real-world applications.

Teachers can encourage pupils to recognize the value of mathematics in their everyday lives by connecting mathematical ideas with real-world examples, enhancing their motivation and investment in the subject.

It has become clear that readiness—which includes preparedness and personal qualities—has a complex relationship with how well kids succeed. Academic achievement is greatly influenced by one's readiness to learn, which is demonstrated by self-control and a growth mindset. According to the Dweck's Theory of Mindset, students that have a growth mindset

have better resilience when faced with difficulties because they believe they can learn and change. Self-discipline, which motivates pupils to constantly participate in academic duties regardless of outside variables, is also important. Students' ability to properly understand mathematical topics is influenced by how willing they are to put effort into the learning process. Teachers can be crucial in helping students develop a growth mindset and self-discipline by highlighting effort-based successes, offering helpful criticism, and creating an environment that rewards perseverance.

Discussion and Implications

Because people create attitudes via their experiences in life, attitude formation is mostly experiential.

Albert Bandura's learning ideas, which have been supported by research, have been used to explain how attitudes are developed. His thesis holds that individuals (Students) learn attitudes through direct observation of others around them, particularly if those people are those they value and respect highly. According to his theory, people who observe behaviors want to mimic them (whether they are positive or negative). Parents and instructors frequently serve as role models for pupils to imitate.

The literature makes it very obvious that an attitude can be either good or negative. One of the most important elements for a student to excel in mathematics is a good attitude. No matter how hard the students work, if they do not show a sincere interest in the topic, they will only be halfway to success. Students will also have a suitable mental environment for studying once they have a sincere optimistic attitude. The kids' mental environment won't be one that supports learning if the right attitude isn't there. According to the literature, having a negative attitude toward mathematics will have an unfavorable outcome, allowing the student to become fearful of the subject and creating a form of anxiety among students who continue

to perform well below the acceptable level due to a lack of interest. This negative disposition induces tendencies of anxiety and stress where mathematics is concerned, which eventually prevents students from enjoying what mathematics has to offer.

Students should comprehend and study mathematics, according to all mathematics teachers across all educational levels. Understanding and learning of mathematics are shaped by a number of things. According to the literature, a number of factors, including family, school environment, classmates, teachers, class size, the size of the mathematics book and its content, among others, contribute to the students' lack of interest in mathematics. Similarly, if the students do not see or recognize the value of mathematics, they may not be motivated or show any form of interest in the subject. They will be more likely to respect mathematics and be inspired to put in the time and effort if they can clearly understand how it relates to their daily lives, interests, and objectives.

Psychological factors do have a great effect on students' performances in the Caribbean Secondary Education Certificate (CSEC) examination in Mathematics; however, effective classroom management and an alert teacher will help to lessen the effect of these factors. A (trained and qualified) teacher will detect any possible symptoms displayed by the students where mathematics is the concern, such as the attitude of the students, their interest or lack thereof, and the readiness. Identifying these factors early, the teacher will be able to better understand the students and help to alleviate or lessen the impact, thus increasing their performance.

According to research on psychological factors, it is critical for students to have a positive attitude, to show interest in the subject, and to be ready for the task of computing the subject. Being mathematically competent will help the students think analytically and arrive at logical solutions to problem-solving.

Interaction with colleagues is critical to the success of overcoming these psychological factors. Based on Social Learning Theory, students will model the behavior depicted by those whom they think of as having high regard. Therefore, administrators need to be reminded that as policymakers, teachers, and stakeholders' students are watching them and adopting their behavior.

In the study, attitude, interest, and readiness were found to have a substantial impact on students' performance in the CSEC Mathematics Examination. These results underline how crucial it is to have a supportive learning environment that encourages sincere enthusiasm, curiosity, and self-discipline. Students that have a growth mentality are better able to overcome obstacles with tenacity and perseverance, which leads to greater results. Teachers must employ creative teaching techniques that link abstract ideas with practical applications to improve mathematics education and increase student engagement and motivation. Additionally, understanding the intricate interplay of these psychological elements can inform educational policies that assist teachers in designing customized learning experiences, ultimately enabling pupils to flourish in mathematics.

Conclusion and Recommendations

According to several researchers, the three psychological factors (a) attitude, (b) interest, and (c) readiness greatly affected the students' performance in the Caribbean Secondary Education Certificate (CSEC) examination in Mathematics. However, after thoroughly interrogating the literature, several recommendations were found that will help to increase the students' performances irrespective of the psychological factors.

Another reason why some students may not be interested in mathematics is the teaching style of the teacher. The technique or strategies that the teacher uses may be outdated; the textbook may be confusing; or perhaps the

teacher's inability to clearly convey the lesson so that students see the relevance of the subject in their daily lives rather than just doing the subject because it is on the curriculum.

On the other hand, some students may be mentally distracted and have difficulty focusing on multi-step problems and procedures or genuinely distracted due to other non-mathematics-related situations. However, the teacher must have the requisite skills and "know how" to deal with such a situation, such as peer teaching, allowing students to work in groups where the stronger one will help the weaker one, tailoring lessons, the use of technology in the class, among other strategies. Students' success in mathematics depends upon their attitude, interest, and readiness towards the subject, as this determines their ability and willingness to learn, thus increasing their performance in their external examinations.

Attitude, interest, and readiness interact intricately to build a complex web that has a big impact on how well students score on the CSEC Mathematics Examination. Effective mathematics instruction requires students to have a positive outlook, genuine curiosity, and a willingness to participate. A supportive learning environment that encourages students' cognitive, emotional, and behavioural involvement with mathematics can be created by removing obstacles and utilizing effective teaching techniques. The overall development of these psychological components will not only improve students' academic performance but also equip them for long-term success in a world that is becoming more quantitative. This study highlights the crucial impact that psychological variables play in determining pupils' achievement in mathematics.

Teachers and stakeholders can empower students to embrace the opportunities and challenges that mathematics offers by recognizing the importance of attitude, interest, and readiness and putting strategies in place to improve them. This will transform students'

learning experiences and influence their future trajectories.

Conflict of Interest

The authors declare no conflict of interest in conducting this study or reporting its findings.

Future Implications

The results of this study have broad ramifications for academics, decision-makers, and researchers. Improvements in performance and a resurgence of interest in mathematics can result from the inclusion of tactics that focus on attitudes, interests, and preparation in

mathematics education. Deeper insights into efficient therapies would come from longitudinal studies that tracked the development of these psychological components and their influence on students' academic trajectories.

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