

Causes of Poor Performance in Mathematics at School Education Examination (SEE)

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Abstract

This study aims to explore the causes of poor performance in mathematics at secondary level in Nepal specially in community school. I used phenomenological qualitative research paradigm for this study. I took five sample participants who had taken poor result in mathematics in SEE. Similarly, I have taken corresponding interview of their mathematics teachers in their respective schools as well as their parents. I used unstructured interview guidelines to take their in-depth interview. Weak foundation in basic level, ineffective teaching methods, lack of confidence, lack of motivation, and insufficient practices are main causes of poor performance in mathematics at secondary level. This study reveals that a comprehensive strategy involving parents, teachers, and students themselves is needed to address low performance in SEE. Early detection and intervention can help enhance academic performance as well as the general success of students.

Introduction

Enhancing mathematical knowledge and proficiency is essential for generating the next wave of creative problem solvers, innovators, and multidisciplinary thinkers (McKim, Velez, Evertt & Sorensen, 2017). One of the subjects that is most important to us in our daily lives is mathematics. For every individual, mathematics cannot be isolated from daily life, however mathematical outcomes of immutable or unchangeable laws of small numbers produce all of nature's effects. We are unable to say anything in the morning or evening without a working knowledge of math's so, mathematics is now widely acknowledged, learning challenges still exist locally (Acharya, 2017). Since ancient times, mathematics has been acknowledged as a crucial component of formal education (Bernardo, Cordel 2nd, & Lapinid, 2022). History demonstrates that early academics created mathematics by practically solving daily problems for learners. With lack of practical knowledge, students' poor academic performance has been connected to teachers' poor performance in completing the teaching assignment, their bad work attitude, and their poor teaching habits, which have been linked to low motivation. (Akiri, & Ugborugbo, 2009). Aesthetic, social, vocational, inter-disciplinary, practical, disciplinary, cultural, and intellectual values are all fulfilled by mathematics education (Deringöl, 2019). Mathematics must be taught in classrooms using a combination of traditional teaching methods, innovative teaching strategies, and technological advancements in order to fulfill its educational values and goals for learning (Ayuwanti, & Siswoyo, 2021). In today's environment, knowing mathematics is more crucial than ever. When it comes to competing in the job market, students who succeed in mathematics have an advantage over those who don't (Sa'ad, Adamu, & Sadiq, 2014). Even if they did not attend college, workers with a solid background in mathematics and science had a higher chance of finding employment and making more money than those with less achievement (Gegbe, Sundai, & Sheriff, 2015). One of the most significant subjects that serves as a link to all other subjects is mathematics, so the need for mathematic knowledge is rising in the ever-competitive world (Basturk, 2016). In order to predict students' mathematical ability, it is also considered that the different student, family, teacher, and school elements are interrelated. Self-report data on a wide range of variables, including students, families, teachers, classes, and schools, that may be able to predict student's mathematical aptitude, was gathered for the PISA 2018 study (Bernardo, Cordel, Lapinid, Teves, Yap, & Chua, 2022). The skills of reasonable speed, accuracy, and neatness in spoken and written computational work are developed through mathematics. Thus, the foundation and background for appreciating art are provided by mathematics (Mbugua, Kibet, Muthaa, & Nkonke, 2012). Understanding rhythm, balance, symmetry, and proportion requires a mathematical mindset. However, the knowledge aspects of mathematics are entirely contained in the methodical study of these designs and

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rhythmic orders (Jameel, Ali, & Phil, 2016). In every person's daily and lifelong planning, mathematics is an absolute necessity. A mathematical strategy is necessary for any advancement. In the teaching and learning of mathematics, teaching tools are essential. A few instructional aids serve as advance organizers, and students will make the connection between the aid and the material they will learn (Varaidzaimakondo, & Makondo, 2020). According to teachers in this study, when teachers lack the proper and essential teaching tools or resources, students struggle in mathematics. In certain cases, concrete items serve as teaching aids by offering concrete means to study mathematical concepts, so any strategy that ignores mathematical factors is likely to fail (Mabena, Mokgosi, & Ramapela, 2021). Anybody who wishes to succeed in life needs to be proficient in mathematics. In order to determine the reasons behind high school mathematics failure (Budhathoki, Khatri, Shrestha, Rana, Sigdel, Panta, & Thapa, 2014). It seems that the failed students belonged to a lower socioeconomic class and were older in age. This implies that their impoverished and uneducated parents are unable to adequately support their children's education by enrolling them in suitable schools.

Statement of the Problem

It is found that applying and understanding mathematics is too difficult in my teaching and learning experiences. The government, parents, and math teachers are particularly concerned about the low math performance of students. These facts are well attested to by the mathematics SLC exam annual reports. There exists a more profound correlation between the learning variable and achievement. The average SLC performance of girls has been historically lower than that of boys. In 2000-2004 the average overall score for girls was around 7% lower than that for boys, and the pass rate for girls was only 41% compared to a 50% rate for boys (Mathema, 2007). Most students perceive mathematics as a challenging subject because it is stressed similarly to language, so a lot of time and money are wasted on this issue. Even the country has wasted both manpower and effort. Peer groups, the physical surroundings of the school and home, attitudes toward the subject, the tools used in the teaching and learning process, and other factors all appear to have an impact on it. Without enhancing the proper management of the aforementioned facilities for student learning, we are unable to accomplish the desired outcome.

Influence of External and Internal Factors While Studying Mathematics

The low performance of students on the Secondary Education Examination (SEE) is mostly caused by both internal and external variables. Numerous internal and external factors have a major impact on secondary school students' experiences and performance in mathematics classes. Students' own cognitive capacities, motivation, study habits, and mental health are the main internal aspects to consider (Deringöl, 2019). It could be difficult for students to focus on their studies or perform well on exams, for example, if they have poor self-esteem or experience anxiety and tension.

Socioeconomic position has a significant external influence on students' engagement and possibilities for help (Tshabalala, & Ncube, 2013). Parental involvement and the school environment, including class sizes and teacher credentials, student's access to resources like technology and tutoring, family support, socio-economic status of the family (Ojukwu, 2016). Study habits and attitudes are further influenced by peer relationships. Moreover, students' internal approaches to mathematics are influenced by self-efficacy beliefs, learning styles, past knowledge and skills, and emotional elements such as anxiety (Najimi, Sharifirad, Amini, & Meftagh, 2013). Designing successful interventions and support systems to improve secondary students' mathematical learning experiences and outcomes requires an understanding of the complex interactions between these internal and external elements. Additionally important is the actual school setting, where learning outcomes can be significantly impacted by crowded classrooms, inadequately trained instructors, and restricted access to learning materials (Hussein, & Csikos, 2023). Also, sociological and cultural elements can either demotivate or excite students, which will impact how well they score on the SEE.

Methodology

There are various realities, according to the ontology of this study. This study's underlying premise is that the knowledge that mathematics students acquire is subjective. It has selected a qualitative research methodology. Investigating phenomena in their natural environments and applying several methods to interpret, comprehend, explain, and give meaning to them is known as qualitative technique. Multimethod studies in real-world settings are the norm for qualitative research, which is more realistic. The research design serves as both a project's strategy plan and a general framework for the investigation.

The researchers employ an emerging qualitative approach to inquiry when conducting the qualitative research, which involves gathering data in an environment that is sensitive to the people and places being studied and doing inductive data analysis that identifies patterns or themes. Primary data collection is the backbone of qualitative research, so qualitative research is an inquiry field that encompasses various disciplines and subject matters. Thematic analysis was used for this study.

In qualitative research, specific cases are analyzed in their temporal and local contexts, starting with the expressions and activities of students within the classroom setting. Parents, teachers, and weakening students from the Kathmandu district of community schools comprise the site's sample, which was chosen with purposefully. The participant's true name has not been revealed during the study in accordance with research ethics.

Theoretical Framework

According to Lev Vygotsky's theory, social interaction and cultural context are important components of learning. Ineffective communication and lack of teamwork in the classroom may be the cause of poor performance so, low

engagement and insufficient practical experience can lead to inadequate results. Moreover, teachers can use group projects, peer tutoring, and collaborative learning activities. According to this theory, students actively create their own conceptual understanding of mathematics. Teachers can use manipulatives, interactive activities, and real-world examples to improve the performance in mathematics. It's crucial to remember that there are often many facets to the causes of weak math performance, and combining these theories may lead to a more thorough understanding. Furthermore, it is essential to take into consideration the unique needs of each student and customize interventions accordingly. Causes of poor performance in mathematics can be addressed and improved through cooperative efforts involving parents, students, and teachers.

Conceptual Framework

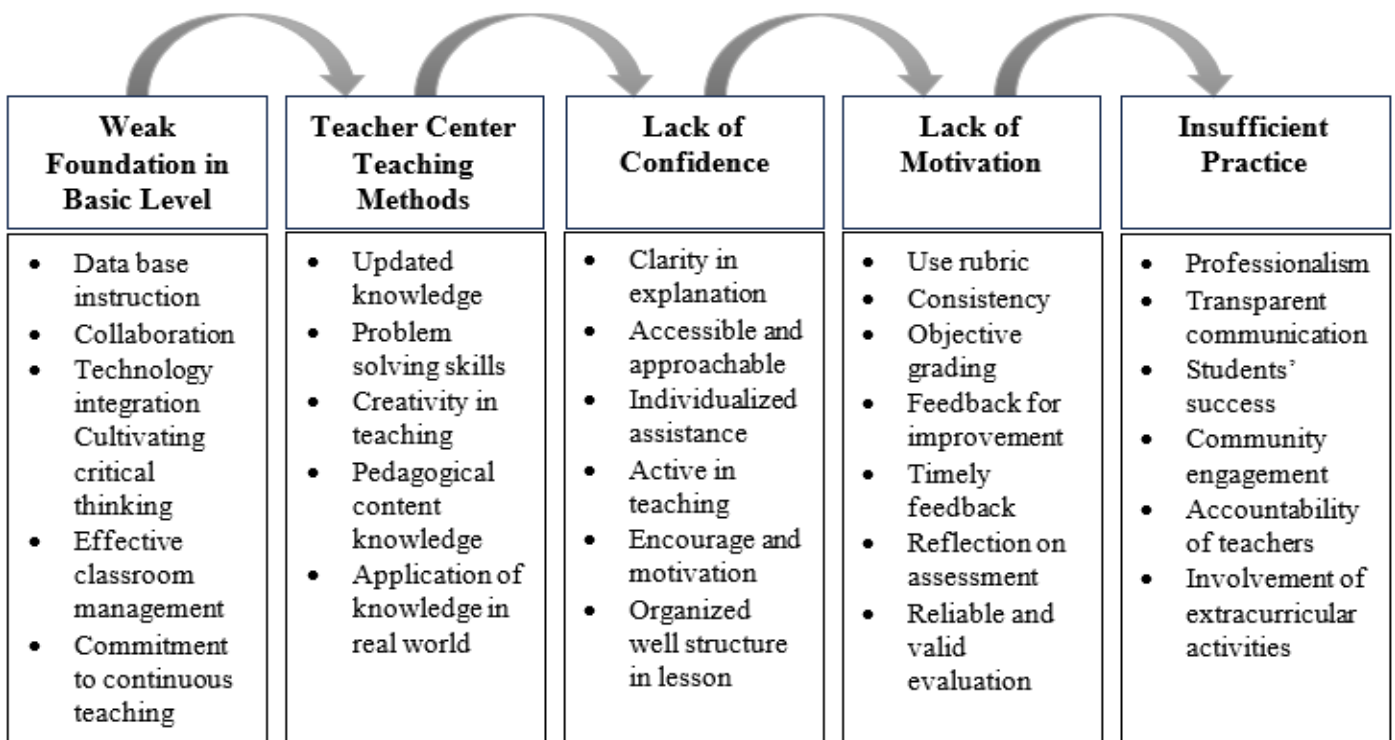
Math achievement may depend on various factors, as related literature has previously discussed. In this context, mathematics' poor achievement is typically influenced by the following factors, such as cognitive factors, psychological factors, socio economic factors and methodological factors. Not only this, time variability, personal behavior, social system, home and school environments, and mistakes made when solving problems are also influenced poor performance. Moreover, the number of students in a class, the qualifications and experiences of the mathematics teachers, and the physical aspects of the school environment were all covered. The educational background, employment status of the parents, home environment, physical facilities, teacher behavior, and peer behavior are associated with the school environment.

The qualifications and experiences of the teacher as well as the students' interests play a similar role in the teaching and learning process. Traditional teaching may influence and cultural customs indicate social variables and such variable includes the amount of time is devoted to practicing and exercising as well as learning.

Results and Discussion

Lack of Foundation

The main cause of students' poor scores on the Secondary Education Examination (SEE) is a poor foundational knowledge



base, which makes it difficult for them to understand the more complex ideas and abilities needed for success. For the poor performance, the participant A has said that in particular, *"I had ready for the SEE, despite my best efforts during the exam, I was unable to answer the questions since I had not had a strong foundation in math since primary school. My ability to learn more quickly will be helped by the knowledge I have acquired from my lower-level studies. I am failing in this situation since I was unable to answer the questions"*.

Poor performance at the secondary level can be caused by a lack of mathematical foundation for a number of reasons because mathematics contains cumulative topic, ideas from one chapter to other topics build on those from previous chapters (Casinillo, 2019). Students may find it difficult to master increasingly complex subjects if they don't have a firm grasp of the foundations. Moreover, deep comprehension of underlying concepts is necessary for mathematics; it is not enough to just memorize formulas and methods (Önder, 2016). In this context, subjects like trigonometry or geometry may be difficult for students to understand if they don't have a strong foundation in basic arithmetic, algebra, and geometry. Teachers act as educational technicians, ensuring students' academic progress through satisfactory teaching-learning interactions in schools, similar to an education factory (Ubah, Egwunyenga, & Asiyai, 2023). In this context, from the above cause lack of foundation is the cause of poor performance.

Participant B has expressed his view *“Even when I begin each exam problem, I never finish them. There are several reasons why I frequently find it difficult to finish mathematics tasks. A key contributing factor, in addition, is that I struggle to apply concepts to complex issues due to a lack of core understanding. I can also become confused during an exam due to my inadequate problem-solving techniques, including not segmenting the problem into smaller, more manageable portions”*.

Teacher said that, “Particularly, low performance is caused by the study environment and lack of study time at home for students, regardless of how effectively they are taught in school.”

In this context, Students could find it difficult to apply mathematical concepts to solve problems in the real world if their foundation is weak (Letuati, 2010). This may make it more difficult for them to evaluate and resolve more complex mathematical issues. Each topic in the sequential subject of mathematics builds upon the one before it. A student may find it more difficult to catch up when the difficulty level rises if they overlook important topics in earlier grades (Popoola, & Olarewaju, 2010). For instance, a student is likely to struggle with more difficult algebraic issues if they do not grasp basic algebraic ideas.

Parents expressed his view “For my son’s academic and professional future, I feel that it is essential that he understand basic mathematical principles. I’m not happy with the level of instruction and believe that teachers should be criticized for not giving students enough practice and help, engaging them in meaningful activities, or giving clear explanations.”

Students’ comprehension of increasingly complex subjects may suffer if they continue to have misconceptions or commit mistakes about basic concepts. The more sophisticated the topic gets, the more challenging it is to remove these erroneous beliefs, so many topics are frequently related in the interrelated field of mathematics (Zakariya, & Bamidele, 2015). For example, knowledge of geometry can help with comprehension of trigonometry, while algebraic abilities are necessary for mensuration. Students could find it difficult to understand the connections between various mathematical concepts if they don’t have a solid foundation in these related subjects (Suleiman, & Hamed, 2019).

Teacher Center Teaching Methods

There are a number of reasons why students’ poor performance can be adversely affected by teacher-centered instructional strategies. While teacher-centered learning is important to some extent, relying too much on conventional, lecture-based methods might be detrimental. The following are some explanations for why student performance may suffer while using teacher-centered instructional methods: In teacher-centered techniques, the teacher frequently gives lectures to the students (Gegbe, Sundai, & Sheriff, 2015). Moreover, decreased student involvement may arise from this passive learning strategy because students may lose interest in or feel cut off from the subject matter. **Participant C expressed her** view *“In particular, the math teacher utilized to teach teacher center techniques in math class. We are deprived of the opportunity to engage in cooperative education. Our ability to gain in-depth knowledge would depend on our ability to engage students. A similar effect that started in the eighth grade has continued to the tenth”*.

According to studies, teacher-centered approaches do not promote long-term retention and application of knowledge, even though they may help with short-term memorization. When Hake (1998) compared interactive engagement techniques with traditional lecture approaches in beginning physics courses, she discovered that students in interactive settings made much more conceptual progress. One corresponding parent said that,

“I believe that the typical teaching approach lacks opportunities for interactive and real-world problem-solving, fails to interest students, and does not take into account their various learning styles. It is common for parents to see that their children are not gaining a thorough comprehension of mathematical ideas, which is essential for their future prospects and academic achievement.”

Students may have less opportunity to actively participate in class discussions, pose questions, or work with classmates in teacher-centered classrooms (Utha, & Rinzin, 2019). Critical thinking and communication skills may suffer from this lack of interaction so there may be few opportunities for students to actively engage in discussions, pose questions, or work together with their peers in teacher-centered classrooms (Forsström, 2019).

According to a math teacher, “I used teacher-centered approaches for effective and practical teaching and organizing overcrowded classes, because this method enables to stay in charge and guarantee that every student receives teaching at the same time in such situations. It helps to cover the subject, it makes classroom management easier, however such type of method does give time individual students. Sometimes I also have applied collaborative method as well.”

The development of communication and critical thinking abilities may be hampered by this lack of engagement. The “one-size-fits-all” approach of traditional teaching methods assumes that all students learn in the same way and at the same speed. This may result in differences in knowledge and performance between students who need different teaching tactics or more support (Özdemir, 2015). Rather than encouraging a thorough comprehension of topics, teacher-centered training occasionally places an emphasis on rote memorizing of processes and data. Students may struggle to apply their knowledge in many contexts or problem-solving scenarios as a result, leading to surface-level learning.

Lack of Confidence

One important internal element that leads to low performance on the Secondary Education Examination (SEE) is students lack of confidence. Exam performance can be negatively impacted by students’ lack of confidence in their academic

abilities, which frequently results in increased anxiety and self-doubt. One student participant D says that *“I had gone school every day, I stayed in classroom when mathematics teacher teaches, I copied every problem from blackboard but I do not solve such problem independently, it means I lost my confidence.”* A lack of confidence hinders the students from reaching their maximum potential by acting as a psychological barrier, which in turn leads to poor performance (Kalhotra, 2013). Student’s that lack confidence may be plagued with self-doubt, a fear of failing, and a low opinion of their own skills and lack of parental involvement (Jay, Rose, & Simmons, 2018).

Moreover, mathematics teachers says that *“either students did not solve even single a problem at home or parents gave environment to study mathematics so students did not have confidence to solve the problems.”* This mental and emotional strain can immobilize initiative, causing students to be reluctant to speak up or take on new work. Tasks that involve risk or effort may be avoided out of a fear of making mistakes or receiving negative feedback, which can limit prospects for development and success (Karue, & Amukowa, 2013). Here, one corresponding parent, said that *“he has attended the same school from first grade since we sent him there to study. He used to hardly pass mathematics classes at earlier times, but today he failed. He used to study at home occasionally, but I was dependent on the school.”*

Furthermore, low confidence is frequently accompanied with critical thoughts about oneself and an internal story that validates feelings of inadequacy (Isack, 2015). This can lead to a self-fulfilling prediction in which low expectations and subpar performance are the norm. In the end, a lack of confidence undermines flexibility, drive, and the capacity to face.

Lack of Motivation

A major factor in poor performance is a lack of motivation, which reduces the zeal and drive required to succeed in a variety of tasks. One student participant E said that *“our mathematics teacher doesn’t really motivate us; he just teaches us and solves difficulties in the classroom. Whether you read it or not, you don’t really give it much thought. Regular teaching and job preparation are Sir’s duties.”*

Motivation is the fuel that drives students to make efforts, stick with something through difficulties, and set and achieve goals. Moreover, students who are unmotivated may show signs of decreased dedication, procrastination, and general indifference toward their obligations. Students may find it difficult in meaning or fulfillment in their work, which can lead to incomplete or poor-quality work (Najimi, Sharifirad, Amini, & Meftagh, 2013). Furthermore, a lack of drive frequently results in less focus, which hinders concentration and lowers the caliber of one’s production. In the end, the lack of a driving force weakens the effort, perseverance, and engagement needed for success, which has a detrimental effect on overall performance.

One mathematics teacher said, “regardless of how much time I spend teaching our students—even in the morning and evening—they have no interest in learning or in solving mathematical problems. There’s a perception that reading doesn’t help you get a job because, well, you already know the letters, therefore the outcome isn’t great.” Students’ low motivation levels have a major impact on their performance on the Secondary Education Examination (SEE) in Nepal because they cause them to participate less in class, have bad study habits, put in less effort, and have unclear goals for their academic careers. *One corresponding parent said that “I had admitted my child to school so that he could study, but math teacher didn’t really inspire his students— he just come in and answer problems. He didn’t really give it a lot of importance whether you read it or not. He used to claim that time pass and teaching are the two main aspects of Sir’s work. From our side the duty of teacher is help for sure his pupils pass”*

This lack of excitement for learning frequently leads to increased dropout rates and a bad perception of education (Mabena, Mokgosi, & Ramapela, 2021). Implementing techniques that improve the curriculum’s relevance and engagement, offer incentives, involve parents, create individualized learning experiences, and support students’ motivation of a student that is more motivated and focused.

Insufficient Practices

Insufficient practice hinders the development of necessary abilities and task familiarity, which results in poor performance. Poor performance on the Secondary Education Examination (SEE) in Nepal is largely caused by students’ lack of practice, which makes it difficult for newly taught concepts to be applied and reinforced, leaving gaps in their knowledge and abilities. In this context, participant named D stated that *“we don’t get enough opportunities to reinforce what we’ve learned and understand the material deeply because of this, which leads to poor performance on the Secondary Education Examination (SEE) in Nepal.”* *Without consistent practice, we struggle to control our time during tests, respond to a variety of question kinds, and feel secure in our skills. It is more difficult to do well on tests when there is a lack of preparation since it causes worry and tension.”*

When students don’t get enough practice, they get anxious and lose confidence because they can’t manage their time well during tests, they can’t solve problems, and they don’t know how the exam is structured (Marshman, & Goos, 2018). In order to address this problem and make sure that students are ready and able to perform to the best of their abilities, teachers and parents must support their children’s practice using a variety of methods, including homework, mock tests, and interactive learning activities (Onajite, 2022).

Developing skills, creating strength memory, and impressing knowledge into long-term memory all depend on practice. *According to a related teacher, “children are unable to grasp the necessary abilities and consolidate their learning due to insufficient practices. The development of critical problem-solving techniques, time management skills, and exam format familiarity are all hindered in students who do not practice on a regular and varied basis. When it comes to tests, this lack of experience frequently causes reduced confidence and more worry.”*

Consequently, students who don't practice enough could not be as proficient as they could be, which could result in clumsiness, inactive reaction times, and a higher chance of mistakes. Moreover, one parents said that, "inadequate practice also prevents students from learning efficient techniques and problem-solving abilities, which leaves them unable to deal with difficulties when performing." When students don't practice consistently and with purpose, they may feel unprepared and nervous in circumstances or tasks they haven't prepared enough, which further lowers their confidence (Ubah, Egwunyenga, & Asiyai, 2023). Generally, a lack of experience restricts one's capacity to function at peak efficiency and consistency across multiple areas of the learning field. Likewise, students belonging to ethnic and Dalit communities have a significantly much lower level of achievement than other groups (Mathema, & Bista, 2006).

Conclusion

Poor performance in mathematics at the secondary level can be caused by a variety of circumstances. One important contributing element is the great pressure and rivalry urban children face, especially in Kathmandu, where there is a highly competitive school system. Students' ability to perform well in mathematics might be adversely affected by stress and anxiety brought on by this pressure. Furthermore, the standard of teaching in different schools may differ, with certain teachers not having the resources or skills needed to teach mathematics successfully. Students from economically disadvantaged families may find it more difficult to learn mathematical ideas if they have limited access to extra resources and tutoring programs. Additionally, some schools' crowded classes may make it difficult for teachers to give each student the individualized attention they need, which could leave students with gaps in their knowledge of mathematical concepts.

Students' indifference and difficulties understanding mathematical topics may be caused by the employment of antiquated teaching methods and a lack of interactive and practical learning experiences. Additionally, how society views mathematics might have an impact on students' motivation and performance. Mathematical stereotypes that are unfavorable or a lack of community support on the subject's significance might affect students' self-esteem and enthusiasm.

A holistic approach to address these issues in education calls for the creation of dynamic and captivating instructional materials, teacher training programs, smaller class sizes, and community outreach initiatives that foster a favorable attitude toward mathematics. Governments, educators, and communities must work together to create an atmosphere that explodes students' passion for learning and gives them the tools they need to succeed in secondary mathematics.

Implication

This study identifies the detrimental elements linked to poor performance, and it is possible to raise students' performance by lessening their influence. It is a means of examining the most effective teaching practices and resolving their difficulties in the field of mathematics. These days, mathematics is the most harmful subject to learn and teach. As a result, in these circumstances, my research is a helpful tool for secondary math teachers looking to impart knowledge in an effective and efficient manner. Agencies and stakeholders will gain from additional action. In addition, this study suggested that in order to lower the number of failing students, parents and guardians should provide appropriate settings both inside and outside of the classroom. Lastly, this study offered guidance to curriculum designers, textbook authors.

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