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Understanding the Struggles of Stem 12 Students in Their Academic Competence

Nemrod S. Bantiling[1], Lovely Rein C. Bongcales[2], Charmyne Thea D. Elloreg[3], Casey D. Galope[4], Paul Andre L. Haquias[5], Cherish Shynn L. Hermoso[6], Prince Kylle Andrie S. Ribo[7], Jorge D. Tabaculde[8], Jefreniel Taborada[9], Mark Anthony Bell R. Bacang[10]

Diplahan National High School, Diplahan Zamboanga Sibugay, Philippines
Corresponding author: markanthonybell.bacang@deped.gov.ph

Abstract. *This study examined the academic struggles faced by Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students and the factors affecting their academic competence. The research aimed to analyze the common difficulties Science, Technology, Engineering, and Mathematics (STEM) students encounter in their studies and explore the underlying reasons behind these struggles. Utilizing a qualitative phenomenological approach, the researchers conducted surveys and interviews to gain insight into the students' academic experiences. The study involved a sample population of 10 out of 40 Science, Technology, Engineering, and Mathematics (STEM) 12 students from Diplahan National High School. The findings revealed that students faced various academic struggles, including difficulties in understanding complex Science, Technology, Engineering, and Mathematics (STEM) subjects, time management issues, and external pressures such as personal motivation and grade transmutation. Among these, the most prominent factors affecting their academic competence were the demanding nature of Science, Technology, Engineering, and Mathematics (STEM) subjects and the students' ability to adapt to the rigorous coursework. The results of this study may serve as a foundation for future research and the development of support systems to enhance Science, Technology, Engineering, and Mathematics (STEM) students' academic performance and well-being.*

Keywords: *Grade 12 STEM Students, Academic Competence, Struggles, Time Management, Motivation*

Introduction

The Science, Technology, Engineering, and Mathematics (STEM) strand is one of the most challenging academic tracks in senior high school. It prepares students for careers in fields that require critical thinking, problem-solving, and technical knowledge. However, many Sciences, Technology, Engineering, And Mathematics (STEM) students struggle to keep up with the demands of their subjects, which often affects their academic performance and overall confidence in learning. Academic competence refers to a student's ability to understand, apply, and perform well in their studies (Zimmerman & Schunk, 2011). It involves different factors such as study habits, motivation, time management, and access to learning resources. Understanding the struggles of Science, Technology, Engineering, And Mathematics 12 students in their academic competence is important because it helps identify the difficulties they face and find ways to support them in their education.

One of the biggest struggles for Science, Technology, Engineering, And Mathematics students is the complexity of their subjects. Mathematics, physics, chemistry, and other science-related courses require logical thinking and problem-solving skills. These subjects often involve difficult formulas, experiments, and projects that demand a lot of time and effort. Many students find it hard to grasp complicated topics, leading to frustration and loss of motivation (National Academies of Sciences, Engineering, and Medicine, 2018). According to studies, students who struggle with understanding their lessons tend to have lower self-confidence, which affects their ability to participate in class and perform well in exams (Bandura, 1997).

Another major struggle is academic pressure and stress. Science, Technology, Engineering, And Mathematics students are expected to excel in their subjects because they are seen as the future scientists, engineers, and technology experts. This expectation often puts a lot of pressure on them to achieve high grades and meet deadlines. The difficulty of their coursework, combined with personal and social responsibilities, can lead to stress and burnout (American Psychological Association, 2021). Stress affects students in many ways, including difficulty concentrating, lack of sleep, and even anxiety or depression. When students are overwhelmed, they may lose interest in learning and have a hard time keeping up with their academic requirements.

Time management is another common struggle for Science, Technology, Engineering, and Mathematics (STEM) students. Since their subjects require a lot of studying, they must learn how to manage their time properly. However, many students find it difficult to balance school, extracurricular activities, and personal life (Alvarez & Garcia, 2020). Some students also have responsibilities at home, such as helping with household chores or taking care of siblings, which limits the time they can spend studying. Poor time management often leads to unfinished assignments, late submissions, and lack of preparation for exams.

Aside from personal struggles, external factors also affect students' academic competence. The support they receive from their teachers, the quality of the learning environment, and the availability of educational resources all play an important role in their success. Studies show that students who have access to good learning materials, well-equipped laboratories, and supportive teachers perform better than those who do not (Tytler, 2021). Unfortunately, not all schools have enough resources for Science, Technology, Engineering, And Mathematics (STEM) students to fully develop their skills. In some cases, outdated textbooks, lack of laboratory equipment, and ineffective teaching methods make it harder for students to understand their lessons.

This study aimed to identify and understand the struggles that (STEM) 12 students face in their academic competence. It aimed to investigate the factors that affect their learning performance, including time management, academic pressure, topic difficulty, and outside assistance. By recommending potential interventions, support networks, and instructional techniques, the study also sought to offer insights and recommendations that can enhance (STEM) students' academic experiences. In the end, this study aimed to support the creation of better educational practices that would support (STEM) students' academic and professional success.

Statement of the Problem

This study aimed to understand the struggles of STEM XII Students in their Academic Competence at Diplahan National High School, Diplahan, Zamboanga Sibugay in School Year 2024-2025.

Specifically, this study sought to answer the following questions:

1. What are the struggles of (STEM) 12 students in their academic competence?
2. How do these struggles affect their overall academic performance and competence?
3. How do (STEM) 12 students address their struggles in their academic competence?

Results and Discussion

This study presents the results and discussion, which includes the presentation, analysis, and interpretation of the validation on Understanding the Struggles Grade 12 Science, Technology, Engineering, and Mathematics (STEM) Students in their Academic Competence.

Struggles of G12 Science, Technology, Engineering, and Mathematics (STEM) Students in their Academic Competence.

The researchers interviewed Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students to gather different perspectives on their struggles within Science, Technology, Engineering, and Mathematics (STEM). The researchers listened to their responses and analyzed the information and statements provided by each respondent. Each theme emerges from these responses, reflecting the students' struggles as Grade 12 students in the STEM program.

Subject Difficulty. The researchers gathered data from the interviews with respondents, two participants shared a common theme regarding the difficulty of their subjects as Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students. They expressed how challenging and overwhelming subjects like math and physics can be, especially when complex topics pile up across different subjects. In their statements, they highlighted their struggles in understanding difficult lessons, which at times pushed them to their limits and contributed to their academic exhaustion. (SR1 & SR5)

("I struggle with subjects like math, physics, and coding because they are difficult and require a lot of problem-solving".)

(SR1 03/06/25)

SR1 discussed the difficulties in areas like coding, physics, and mathematics, emphasizing the difficulties brought on by their complexity and the huge amount of problem-solving needed. The response highlighted the mental strain that comes from struggling with complex ideas, demonstrating how these subjects require patience and perseverance. It explores the demanding nature of Science, Technology, Engineering, and Mathematics (STEM) education, where students must complete difficult lessons that might cause cognitive tiredness and frustration (Robbins, A., 2023).

("Procrastination and just overall difficulty of the subjects".)

(SR5 03/06/25)

SR5 expressed the struggles encountered difficulties in their subjects. SR5 emphasized how procrastination often compounded the difficulty, turning an already demanding workload into an overwhelming burden. It was also noted how the combination of intricate subject matter and delays in tackling assignments led to heightened stress and cognitive exhaustion. This

reflects the rigorous nature of Science, Technology, Engineering, and Mathematics (STEM) education, where academic pressure, coupled with procrastination, can result in frustration and burnout (Brown, K., 2022).

The statement elaborated on the reasons why the respondent struggles in their academic competence, one of which is due to the subjects SR1 encountered. It was also emphasized in the respondents' statement about how tiring it was and how difficult the subjects were. It delves into the high-pressure world of high school students, particularly in competitive academic environments, where the pursuit of success can lead to exhaustion and burnout. (Robbins, A., 2023).

Academic Areas that Present the Greatest Struggles for Grade 12 Science, Technology, Engineering, and Mathematics (STEM) Students'

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Complexity of STEM Subjects. From the respondents' experiences, subjects such as Mathematics, Physics and Chemistry were identified as the most challenging due to their complex formulas and problem-solving requirements. Coding was also mentioned as a subject that becomes frustrating when errors occur, making it difficult for students to master. The difficulty of these subjects is further intensified by time constraints and limited resources. (SR1, SR2, & SR7)

"Math and physics have complex formulas, and coding can be frustrating when errors occur, making them the hardest subjects for me."

(SR1, 3/27/24)

SR1 emphasized the intricate nature of Mathematics and Physics, where students are required to understand and apply numerous formulas to solve problems. Additionally, coding presents a unique challenge due to its technical nature, where a single error can disrupt the entire program, making it a stressful subject for many STEM students. Physics is often perceived as an abstract and mathematically demanding discipline, leading to diminished interest and engagement among students. These perceptions are further compounded by traditional teaching practices that emphasize rote memorization and procedural problem-solving over fostering conceptual understanding and real-world applications. Mamdoh, Nafisah, and Salamah (2025)

("Physics. Complex subject with minuscule allotted time for students to complete and understand.")

(SR2, 3/27/24)

SR2 highlighted the difficulty of Physics, particularly due to the limited time given for students to fully comprehend the subject. The rigorous nature of Physics requires extensive problem-solving and conceptual understanding, yet the fast-paced curriculum often leaves students feeling unprepared. Many students struggle with learning processes due to poor comprehension, inefficient learning techniques, and inadequate motivation. These factors contribute to their struggles in Science, Technology, Engineering, and Mathematics (STEM) subjects, particularly in physics, where concepts build upon one another, requiring deep understanding and mastery Lin-Siegler et al. (2023) .

("Mathematics, physics, and chemistry. Although we STEM students do get the lesson during the said discussions, we tend to forget the lessons, especially the formulas and principles that are necessary, especially in calculations. The lack of scientific calculators during quizzes and adequate or enough study on the said topics is one of the huge factors that STEM students face as a challenge.")

(SR7, 3/27/24)

SR7 pointed out that while students may initially understand the lessons during discussions, they often struggle with retention, particularly regarding formulas and principles in Math, Physics, and Chemistry. The lack of access to scientific calculators and insufficient study time further contribute to the struggles they face. Students who labeled their struggles as failures were more likely to focus on performance outcomes, while those who viewed struggles as part of the learning process concentrated more on skill improvement. This suggests that students' struggles in retaining Science, Technology, Engineering, and Mathematics (STEM) concepts may stem from the emphasis on grades rather than understanding Xiaodong (2023)

Impact of Academic Struggles on the Competence of Science, Technology, Engineering, and Mathematics (STEM) 12 Students

The researchers interviewed Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students to gather different perspectives on their struggles within Science, Technology, Engineering, and Mathematics (STEM). The researchers listened to their responses and analyzed the information and statements provided by each respondent. Each theme emerges from these responses, reflecting the students' struggles as Grade 12 students in the Science, Technology, Engineering, and Mathematics (STEM) program.

Academic Performance vs. Grades. While some students may demonstrate a high level of academic performance through

their understanding of lessons and participation in class, their actual grades do not always reflect their competence. (SR2)

("Higher academic performance yet insignificant results on paper (grades on card) leading to diminished academic competence for (STEM).")

(SR2, 03/06/25)

SR2 expressed frustration over the disparity between their efforts and their recorded academic performance. This reflects the challenge many (STEM) students face—despite their dedication, their grades may not accurately represent their knowledge and abilities. Students who labeled their struggle experiences as failures tended to focus more on performance outcomes, whereas students who labeled their struggle experiences as neither failures nor successes focused more on the learning process (Xiaodong, 2023).

Effects of Heavy Workload and Stress. The Science, Technology, Engineering, and Mathematics (STEM) curriculum is known for its rigorous subjects, which often lead to stress, burnout, and a decline in academic confidence. SR5 highlighted how these factors affect their ability to focus and learn effectively. (SR5)
("These struggles can lower our academic performance and confidence. A heavy workload and difficult subjects can lead to stress and burnout, making it harder to focus and understand lessons.")

(SR5, 3/27/24)

SR5's emphasized how the overwhelming academic demands in Science, Technology, Engineering, and Mathematics (STEM) can negatively impact students' mental well-being, leading to exhaustion and difficulty in retaining information. Studies have shown that academic pressure and stress can reduce motivation and cognitive function, making it harder for students to perform well despite their efforts (Pascoe, Hetrick, & Parker, 2020).

Factors Outside of the Classroom that Contribute the Academic Struggles Faced by Grade 12 (STEM)

The researchers interviewed Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students to gather different perspectives on their struggles within Science, Technology, Engineering, and Mathematics (STEM). The researchers listened to their responses and analyzed the information and statements provided by each respondent. Each theme emerges from these responses, reflecting the students' struggles as Grade 12 students in the Science, Technology, Engineering, and Mathematics (STEM) program.

External Struggles. Factors outside the classroom, such as financial struggles, family issues, and mental health struggles, significantly affect Science, Technology, Engineering, and Mathematics (STEM) students' concentration, motivation, and overall academic performance. These pressures can lead to stress, anxiety, and burnout, making it harder to focus, learn, and complete tasks effectively. However, the impact varies depending on how individuals cope with these struggles. (SR3 & SR8
("It depends on how the person will act on the different factors. Problems outside of the classroom like mental health, financial problems and such reduce the concentration and motivation of the student/s".)

(SR3, 03/06/25)

SR3 expressed that the impact of external factors on academic performance depends on individual responses. However, issues like mental health struggles and financial difficulties often diminish students' concentration and motivation, the relationship between financial difficulties, increased anxiety levels, and diminished concentration, proposing that individual responses to these external pressures can significantly influence academic outcomes (Smith, 2020).
"Mental health affects (STEM) students by causing stress, anxiety, and burnout. Too much pressure and lack of rest make it hard to focus, understand lessons, and finish schoolwork".

(SR8, 03/06/25)

SR8 pointed out that mental health issues, including stress, anxiety, and burnout, adversely affect Science, Technology, Engineering, and Mathematics (STEM) students' academic performance. The high-pressure environment of Science, Technology, Engineering, and Mathematics (STEM) fields can exacerbate these conditions, leading to difficulties in focusing, understanding lessons, and completing schoolwork. SR8 emphasizes emotional and mental fulfillment are critical components of student motivation. It highlights the consequences of a lack of motivation due to feelings of disconnect between effort and expected rewards and its direct effects on students' academic performance and overall competence (Thrap, 2019)

Respondents Address their Struggles in their Academic Competence.

The researchers interviewed Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students to gather different perspectives on their struggles within Science, Technology, Engineering, and Mathematics (STEM). The researchers listened to their responses and analyzed the information and statements provided by each respondent. Each theme emerges from these responses, reflecting the students' struggles as Grade 12 students in the Science, Technology, Engineering, and Mathematics (STEM) program.

Academic Struggles. The researchers gathered data from the respondents, the researchers encountered a lot of different perceptions, one to two relates that time management is important for them to overcome the struggles they faced. The information gathered.

("Grade 12 STEM students overcome their struggles by managing our time wisely, setting

priorities, and following a study schedule. We seek help from teachers, classmates, or online

resources when they find subjects difficult".)

(SR5, 03/06/25)

SR5 stated that grade 12 Science, Technology, Engineering, and Mathematics (STEM) students effectively navigate academic struggles by employing strong managing skills, including the prioritize task and following a study schedule and proactively seeking help from teachers and classmates. SR5 also pointed out that online resources help students demonstrate commitment to learning and self-improvement. The good use of these educational resources and technologies can not only assist students' formal classroom learning but also cultivate the self-regulated learning of students (Wong, 2020).

("Open discussion with close friends, advisers, subject teachers, trusted personnel, or even consider counseling to address personal problems that affect the students' academic performance. Consider also evaluating and creating an effective time schedule to address time management effectively and efficiently".)

(SR7, 03/06/25)

SR7 pointed out that Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students should address their personal issues that affect their academics by openly communicating with trusted individuals and implementing effective time management strategies. Effective time management strategies and open communication with trusted individuals can significantly impact the academic performance of senior high school students. It emphasized the need for students to address personal issues and foster support networks to enhance their learning experiences Salgado et. al., (2020).

Strategies Used by (STEM) Grade 12 Students to Address Their Academic Struggles

The researchers interviewed Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students to gather different perspectives on their struggles within Science, Technology, Engineering, and Mathematics (STEM). The researchers listened to their responses and analyzed the information and statements provided by each respondent. Each theme emerges from these responses, reflecting the students' struggles as Grade 12 students in the Science, Technology, Engineering, and Mathematics (STEM) program.

***Personal Resilience and Individual Coping Mechanisms*.** Some Science, Technology, Engineering, and Mathematics (STEM) students preferred to handle their struggles independently, believing that the respondents alone are responsible for overcoming their academic difficulties. Others choose to take breaks and engage in self-care strategies to maintain focus and reduce stress. (SR3 & SR8)

("For me, I keep it all to myself. The only person who can do it all is me. It's my problem, it's also my responsibility, and I also pray to God that everything will be fine.")

(SR3, 03/06/25)

SR3 expressed a strong sense of personal responsibility in managing academic struggles, choosing to rely on self-motivation and prayer. Students who labeled their struggles as failures focused more on performance outcomes, while those who did not view their struggles as failures concentrated more on the learning process. This suggests that students like SR3, who internalize their struggles, may place more emphasis on results rather than skill development (Xiaodong, 2023)

("By giving myself a break to rest and relax. This helps me manage stress and stay

focused.")

(SR8, 3/27/24)

SR8 highlighted the importance of taking breaks and allowing time for rest as a strategy to cope with academic stress. Students' perceptions of competence and relatedness significantly influence their learning processes and achievement. Taking breaks and

prioritizing mental well-being can help students maintain motivation and sustain academic performance despite struggles Hilts et. al. (2018)

The Need for Effective Learning Strategies. While independent coping mechanisms can be helpful, studies suggest that Science, Technology, Engineering, and Mathematics (STEM) students benefit from structured academic support and collaborative learning. Students 1 who sought additional support from teachers, utilize study groups, actively engage in practice problems, and leverage online learning resources are more likely to overcome academic struggles successfully with Wahono (2020).

Academic Strategies. The researchers interviewed the Science, Technology, Engineering, and Mathematics (STEM)12 students, one to two relates that time management is important for them to overcome the struggles they face. The information gathered from the interview highlights peer tutoring, setting priorities and set goals. (SR5 & SR7)

("Grade 12 (STEM) students overcome their struggles by managing our time wisely, setting priorities, and following a study schedule. We seek help from our teachers, classmates, or online resources when they find subjects difficult.")

(SR5, 03/06/25)

SR5 stated that Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students effectively navigate academic struggles by employing strong managing skills, including the prioritizing task and following a study schedule and proactively seeking help from teachers and classmates. SR5 also pointed out that online resources help students demonstrate a commitment to learning and self- improvement. The good use of these educational resources and technologies can not only assist students' formal classroom learning but also cultivate the self-regulated learning of students (Wong, 2020).

("Open discussion with close friends, advisers, subject teachers, trusted personnel, or even consider counseling to address personal problems that affect the student's academic performance. Consider also evaluating and creating an effective time schedule to address time management effectively and efficiently".)

(SR7, 03/06/25)

SR7 pointed out that Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students should address their personal issues that affect their academics by openly communicating with trusted individuals and implementing effective time management strategies, effective time management strategies and open communication with trusted individuals can significantly impact the academic performance of senior high school students. It emphasizes the need for students to address personal issues and foster supportive networks to enhance their learning experiences Salgado et. al, (2020).

Respondents Coping Mechanisms or Support Systems to Overcome their Academic Struggles

The researchers interviewed Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students to gather different perspectives on their struggles within Science, Technology, Engineering, and Mathematics (STEM). The researchers listened to their responses and analyzed the information and statements provided by each respondent. Each theme emerges from these responses, reflecting the students' struggles as Grade 12 students in the Science, Technology, Engineering, and Mathematics (STEM) program.

Students' Support System. The researchers gathered data from the respondents, encountered a lot of different perceptions from the respondents, one to two are related to the support system that is important for them to overcome the struggles they face. The information gathered from the interview highlights the importance of collaboration, online sources, and peer tutoring. (SR1 & SR5)

("I use peer support, tutoring, and online resources to understand my lessons better, and they help a lot when I stay consistent".)

(SR1, 03/06/25)

SR1 emphasized the effectiveness of collaboration learning strategies. SR1 felt that it's best to learn by working with others, online sources and studying consistently. Grade12 Science, Technology, Engineering, and Mathematics (STEM) address their struggle by seeking additional support from teachers, utilizing study groups, actively engaging in practice problems, seeking clarification on complex concepts, leveraging online learning resources, managing their time effectively, and developing strong study habits: with a focus on understanding the practical applications of Science, Technology, Engineering, and Mathematics (STEM) subjects to enhance motivation and engagement, (Wahono, 2020).

("STEM Grade 12 students overcome academic struggles through peer support, tutoring, and online resources, which help us to understand difficult concepts and stay motivated".)

(SR5, 03/0625)

SR5 pointed out that Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students' academic success is significantly enhanced by a multifaceted approach incorporating peer learning, expert guidance, and available online resources. This

demonstrates the power of collaborative learning and supplemental support in navigating complex Science, Technology, Engineering, and Mathematics (STEM) concepts and maintaining academic engagement. Teamwork in higher Education presents an intervention with a control group and a formal evaluation or assessment. Moreover, these studies are almost exclusively outside Science, Technology, Engineering, and Mathematics (STEM) disciplines, raising questions about their extensibility (Gragory, et. al, 2024)

Stress Reduction Techniques. The researchers interviewed the Science, Technology, Engineering, and Mathematics (STEM) 12 students' one to two relates that music therapy is helpful when they face their academic struggles. They express that listening to music reduces the stress they face. In their statements, the respondents found out that there's a lot of ways to overcome their academic struggles. (SR2 & SR7)

("Music therapy. It's the most effective way for me to cope; I can't say for others").

(SR2, 03/06/25)

SR2 expressed that listening to music has a positive effect to reduce the anxiety levels in individuals. This shows that listening to music helps the students improve cognitive function, including attention, memory and focus (Neslihan Aker, 2024).

("Listening to music, playing video games, sleeping and giving yourself a time off in social involvement (which we exclude to give importance that the benefit of being alone to our mental health), etc. This creates room and space for students to think and give themselves a break from academic pressures".)

(SR7, 03/06/25)

SR7 extracts out that listening to music, playing video games, getting enough sleep, and taking social breaks from social activities can help reduce stress and improve mental health. Studies show that these factors can help lower stress hormones, improve mood and help you relax, hence, students become willing and able to assume responsibility for self-regulating their academic achievement. In students' personal attributes and psychological processes underlying their self-regulation of academic learning and performance (Zimmerman, 2023)

Conclusion

This research sought to identify the struggles of Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students at Diplahan National High School in their academic competence. The results showed a multifaceted interplay of factors that led to these struggles. Although the challenging nature of Science, Technology, Engineering, and Mathematics (STEM) subjects, such as mathematics, physics, and coding, posed major struggles, time limitations and knowledge retention problems further added to these struggles. This research also revealed the influence of external factors, including socioeconomic disadvantages and mental health issues, on academic achievement. These external pressures tend to intensify already poor academic performance, causing more stress and less motivation. Despite these obstacles, the study acknowledged the strength and resilience of the Science, Technology, Engineering, and Mathematics (STEM) students as they used varied coping mechanisms and support systems for navigating their courses. The techniques employed are autonomy, cooperation via peer assistance and internet sources, and stress moderation.

This study concludes that there is a need for an all-around approach to assist Science, Technology, Engineering, and Mathematics (STEM) students. This must involve curriculum modification to meet the complexity and tempo of Science, Technology, Engineering, and Mathematics (STEM) courses, provision of sufficient resources, mental health support programs, and collaborative learning environments. By balancing academic excellence and student welfare, schools can establish a more caring and inclusive learning environment that enables Science, Technology, Engineering, and Mathematics (STEM) students to better cope with adversity and reach their full potential.

Recommendations

Based on the findings, a number of steps can be taken to improve the learning experience of Grade 12 Science, Technology, Engineering, and Mathematics (STEM) students. These involve providing access to fundamental learning resources like scientific calculators, textbooks, and online resources to facilitate effective learning; setting up mental health programs, stress management workshops, and counseling services to assist students in managing academic stress; promoting cooperative learning methods such as peer tutoring, study groups, and collaborative projects to facilitate peer support and belongingness; and implementing a holistic academic approach that strikes a balance between academic success and student well-being by incorporating holistic learning methods. By adopting these suggestions, schools can create a more inclusive and supportive learning environment that enables STEM students to excel and realize their full potential.

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