

Academic Performance in Mathematics during Pandemic among Senior High School Students

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Abstract: *Mathematics is a critical subject that plays a significant role in shaping a student's academic and career trajectory. However, many students struggle with mathematics, leading to poor academic performance. This research aims to determine the factors affecting the academic performance in mathematics under the pandemic among the senior high school students of Surigaodel Norte State University - Del Carmen Campus. New normal education is ushered in by the pandemic, one where working and learning methods are compelled by digitalization. It pushes education toward increased technologization, a trend that is already well under way and is being supported by commercialism and the dominant market ideology. This study used the descriptive survey research design employing a survey technique. It is used primarily to conduct quantitative research and gather data that is easy to analyze statistically. However, it can also provide qualitative data that will help describe and understand the research subject. Survey questionnaires are the primary method of collecting data for this study. The study found that mental health, study habits, family, and social media all play a role in academic performance*

Keywords: Mathematics, Learning experience, study habits, mental health, social media, academic performance

I. INTRODUCTION

One of the organizations that has been severely impacted by the coronavirus is the educational system. During the pandemic, 186 countries and over 1.2 billion students are not in school. The SARS COV 2 fundamentally altered the educational scene. After a month of lockdown, numerous countries tried to resume courses, but many of them failed (COVID-19 Has Fuelled a Global 'Learning Poverty' Crisis, 2020).

In PISA 2018, mathematics literacy is defined as student's capacity to formulate, employ, and interpret mathematics in a variety of contexts. One of the nations with worries about mathematics proficiency, particularly in high school, is the Philippines. Less than 1% of students scored at Level 5 or higher in mathematics. Six Asian countries and economies had the largest shares of students who did so: Beijing- Shanghai-Jiangsu-Zhejiang (China) (just over 44%), Singapore (nearly 37%), Hong Kong (China) (29%), Macao (China) (nearly 28%), Chinese Taipei (just over 23%) and Korea (just over 21%). These students can model complex situations mathematically, and can select, compare and evaluate appropriate problem-solving strategies for dealing with them (OECD, 2018).

Student academic performance measurement has received considerable attention in previous research. It is a challenging aspects of academic literature, and grade - 11 students performance in mathematics are affected due to mental health, study habits, family and social media factors. These factors strongly influence on the student performance, but these factors vary from person to person and country to country.

The "new normal learning" have gained greater popularity soon after the global pivoting to online learning (Basilaia&Kvavadze, 2020; Li, 2020; Male, 2020; Puri, 2020). As the world continuously evolve in modernization. One of the student's problem nowadays is environmental change. It had greatly affected the students focus on their studies. There are causes and effects that can be considered. In this study, it will entertain the factors.

Hence, this research aimed to determine the factors affecting the academic performance in mathematics under the pandemic among the senior high school students of Surigaodel Norte State University - Del Carmen Campus. The key research question for this research study were the following: (1) What is the demographic profile of the respondents in terms of gender, age, and strand; (2) What is the academic performance of the grade - 11 students in mathematics in

terms of Grades; (3) What are the factors affecting the academic performance of the grade - 11 students in the new normal learning as to mental health , study habits, family, and social media.

II. RESEARCH METHODOLOGY

In the pursuit of understanding on how the impact of new normal on learning mathematics to the SHS students. This study used the descriptive survey research design employing a survey technique. It is used primarily to conduct quantitative research and gather data that is easy to analyze statistically. However, it can also provide qualitative data that will help describe and understand the research subject.

This study had been conducted at Surigaodel Norte State University - Del Carmen Campus (SNSU - DC). Purok - 6, Brgy. San Jose, Del Carmen, Siargao Island, Northernmost part of the Mindanao Region in Philippines.

This study involved senior-high-school students in Surigaodel Norte State University - Del Carmen Campus, Del Carmen Siargao Island, the Philippines, of school year 2022 - 2023. One group composed of 25 students from Science, Technology, Engineering, and Mathematics (STEM) section, and 31 Information and Communication Technology (TVL-ICT) sections served as participants. The researchers determined the appropriate sample size from a population which is the SHS students of Surigaodel Norte State University - Del Carmen Campus with no sampling bias and to identify the sample size population with sufficient precision.

Survey questionnaires are the primary method of collecting data for this study. For the purpose of gathering data and gathering quantitative information, the researcher created self-administered questionnaires. It is designed so that responders will find it easy to complete the questionnaire. The Likert Scales of Quality and Agreement was therefore taken into consideration when developing the surveys. An example of a psychometric response scale is one in which participant's rate how much they agree or disagree with a statement using a scale of 1 to 4: Strongly Disagree, Disagree, Agree, and Strongly Agree. In this form of inquiry, respondents had a choice of responses.

Table 1. The Mean Distribution for Interpretation of the Ratings

Scale	Parameters	Verbal Interpretation
4	3.46 – 4.45	Strongly Agree
3	2.46 – 3.45	Agree
2	1.46 – 2.45	Disagree
1	1.00 – 1.45	Strongly Disagree

The researcher had draft an informed consent and sent it to the Surigaodel Norte State University - Del Carmen Campus administration as well as the subject teacher to verify the goals of the study. After getting consent, the researchers proceeded over the study's objectives with the selected participants and make sure that each subject satisfies the prerequisites. The researchers used observation and surveys that will be handed out to gather information on conditions and perceptions. After the tests are finished, the responses had been looked over, judged, and analyzed.

The researcher guarantee that the data acquired from them are treated with the utmost confidentiality as a sign of respect for the information provided by the participants. For the sake of using code names, the researchers had referred to them as student 1, 2, 3, and so on. With regard to the survey questions that had been sent to the participants, the researchers had accepted their decision when they chose not to respond. The results of the questionnaire will only be used for research and will not be used for any other purpose.

The researcher used the following statistical tools:(1) Frequency Count and Distribution in Percent. The relative frequency of survey responses from SHS students at SNSU - DC will be expressed using this tool; (2)Mean Count. This tool will be used to identify the elements that are sufficient to support or negate the impact of new normal on learning mathematics towards the SHS students of Surigaodel Norte State University - Del Carmen Campus; and (3) Hypothesis Testing for each variable whether it may be rejected or not to support the studies.

Analysis and interpretation of the academic performance of the respondents such as their grade-point average was done using the mean. Table 1 below was used to interpret the rating scale of the grade point average (GPA) of the respondents. This is based on Deped Order No. 8, S. 2015. Policy Guidelines on Classroom Assessment for the K to 12 Basic Education Program.

Table 2. Rating Scale for Verbal Interpretation of the Average Grade

GRADE(Academic Performance)	VERBAL INTERPRETATION
90 – 100	Outstanding
85 – 89	Very Satisfactory
80 – 84	Satisfactory
75 – 79	Fairly Satisfactory
Below 75	Did Not Meet Expectation

III. LITERATURE REVIEW

In normal conditions, mathematics is typically seen as difficult (Fritz et al., 2019). However, a lot of these research weren't particularly focused on mathematics (Astri, 2017). Several studies have focused on the use of technical resources as a mediator in the teaching of mathematics.

The pandemic hasn't contributed anything new to society, education, or more precisely the curriculum; instead, it has accelerated previously established patterns that can be summed up as technological advancement. Those with this privilege make use of it by taking advantage of our increasingly digital society. (Koopman, 2019; Couldry&Mejias, 2019). New normal education is ushered in by the pandemic, one where working and learning methods are compelled by digitalization. It pushes education toward increased technologization, a trend that is already well under way and is being supported by commercialism and the dominant market ideology. According to Daniel (2020, p. 1), "many institutions had intentions to use technology in teaching more, but the outbreak of Covid-19 has meant that adjustments supposed to occur over months or years had to be done in a few days."

In Delta Central Senatorial District, Delta State, Nigeria, he investigated how kid's study behaviors and math performance related. From 25 public secondary schools that took part in the study, 500 pupils were chosen at random. The data was analyzed using regression and ANOVA, and the results showed a substantial connection between the students' study habits and arithmetic achievement, as well as a significant difference between students with good and poor study habits in terms of math achievement (Odiri, 2015).

In the study entitled "Changes in Study Habits of Chinese Adolescents and Factors Supporting These Habits-Focusing on the Transition Period from Elementary School to Junior High School" conducted by Okado, Kida, and Sakai (2018), a high correlation was indicated between the study habits of the students and academic results. Their research came to the conclusion that the development of academic achievement is a result of good study habits. The academic success of mathematics students is influenced by certain study habit structures, including homework, time management, reading and note-taking, and instructor consultation (Atsuwe& Moses, 2017). The results of their study's data analysis showed that the study habits described have a significant impact on the respondents' academic achievement.

Furthermore, Oladeni and Bimbo (2017) investigated the connections between the mathematical study variables for secondary school students. The results showed a significant relationship between note-taking, library use, and time management with student's academic achievement in mathematics. This implies that these elements can help students in enhancing their academic achievement.

Moreover, students may become sidetracked when they have leisure time to play games, media, watch TV or sleep in. Developing habits like this may lead to sloppy performance for students and a rude revelation when they start working full-time. A calm learning environment provides psychological support by providing a pleasant and comfortable setting for students to be more motivated to study (Cooper, 2020).

According to Lau (2017), Everyone's daily life had been influenced by social media, but this was especially true of the generation of students who were the best at using it. Yet, the study found that social media use for academic purposes was not a reliable indicator of academic performance.

These days, it's well accepted that utilizing social media for non-academic objectives decreases students' learning time. This has a significant impact on how well pupils perform academically. In the study entitled "Impact of social networking sites on study habits among Saudi nursing students in Hail University" conducted by Alsagri and Dayrit (2018), it has been shown that social media can have a major effect on the students. If it affects the study habits, then it will also affect the academic performance of the respondents. According to Joshi & Sharma (2017), internet users

reported poorer study habits than non-users in terms of dimension-wise, sex-wise, and stream-wise. According to the study, students who use the internet less frequently perform better academically than those who use it more frequently. However, social media has more adverse effects than positive ones (Woods and Scott, 2016). Due to the fact that students frequently use social media for purposes other than learning, this tends to distract them from the classroom and hinder their academic development (Bekalu et al., 2019; Hettiarachchi, 2014). Moreover, using social media can cause depression and anxiety and has a bad impact on mental health.

Mathematics anxiety has been shown to be associated with poorer performance in mathematics (Hambleton & Zhang, 2019). Psychological as well as physiological symptoms may appear when feeling anxious about mathematics (Chang & Beilock, 2016). According to studies conducted within the European Union, the COVID-19 pandemic has caused stress and anxiety levels to rise for over 60% of students in France, Spain, and Poland (Husky et al., 2020; Diaz-Jimenez et al., 2020; Rogowska et al., 2020). Between 40-60% of students from universities throughout different federal states of Germany reported increasing mental stress, feelings of loneliness, and worry of the future (Schlichtiger et al., 2020; Herchenröder et al., 2020; Pauli et al., 2020).

Moreover, several research have examined the pandemic's effects on university students' mental health and the causes of greater levels of distress. For instance, 195 undergraduate students from one university in the US who participated in an interviewsurvey reported negative effects of the COVID-19 pandemic and the urgent need to create interventions and preventive measures (Son et al., 2020). High levels of mental health distress were discovered in a separate US study of 162 undergraduates, and depression was correlated to difficulties concentrating on academic performances (Keckojevic et al., 2020). High levels of depression were also discovered in a July 2020 online survey of 255 students at a university in Hong Kong, with perceived availability of peer support being negatively correlated with depressive symptoms (Sun et al., 2020).

Social support is an important factor in the prevention of mental illness and the promotion of health (Parkerson et al., 2020). Living with parents and social support of relatives were also protective factors against anxiety [Cao et al., 2020; Diaz-Jiménez. et al., 2020]. Several studies have shown that a child's academic achievement in school is significantly influenced by the character of their home background. The family back ground plays has a big on the academic performance of children at all levels of education in the school system. It is well acknowledged that the effectiveness of family interactions has a strong connection with the student's motivation and success in school. For instance Ryan (2000), shows that there is a significant effect of family background variables, parent support and teacher support on a child's educational attainment. According to (Morgan et al., 2009), In comparison to their peers from higher socio-economic status families, children from low socio-economic status households and communities are said to develop their academic skills more slowly. Low socio- economic position (family experiencing financial hardship) deprives children of

necessities for their development and growth. Early academic achievement is linked to the family environment, where prolonged stress and a lack of literacy involvement harm a child's academic performance. Parents from low socio-economic background are less likely to have the financial resources or time availability to provide children with academic support.

3.1 Conceptual Framework

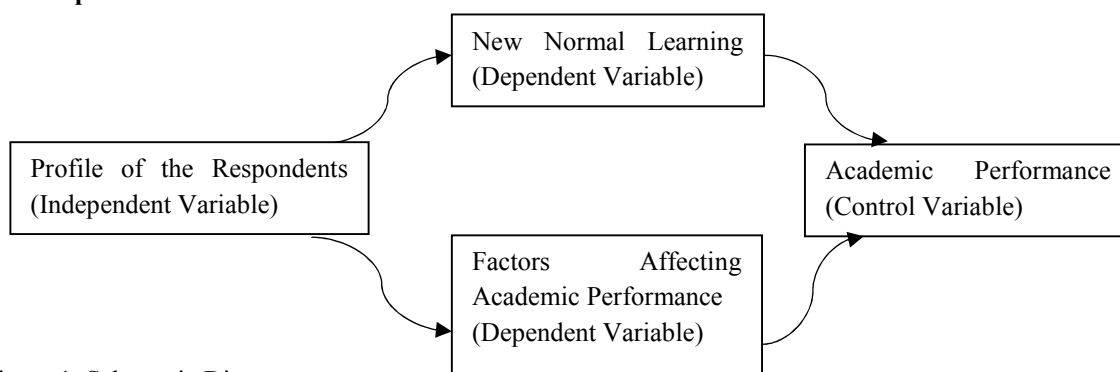


Figure 1. Schematic Diagram

The leftmost box represents that first step of the construction which is the demographic profile of the respondents; gender, age and strand. The middle upper box represents the new normal learning.

The middle lower box represents the factors affecting academic performance; mental health, study habits, family, and social media.

The rightmost box represents the academic performance of learning mathematics specifically in general mathematics among grade - 11 students.

The inclusion of the general mathematics subject for grade - 11 students in Surigaodel Norte State University - Del Carmen Campus is in recognition that General Mathematics is indeed needed in the completion of the curriculum.

IV. RESULTS AND DISCUSSION

This chapter presents the interpretation of the gathered data and the treatment of Factors Affecting the Academic Performance in Mathematics during the Pandemic among Senior High School Students of Surigao del Norte State University - Del Carmen Campus

A. Demographic Profile of the Respondents

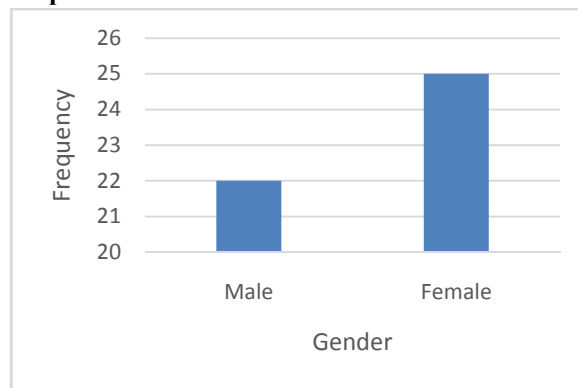


Figure 2. Profile of the Respondents in Terms of Gender

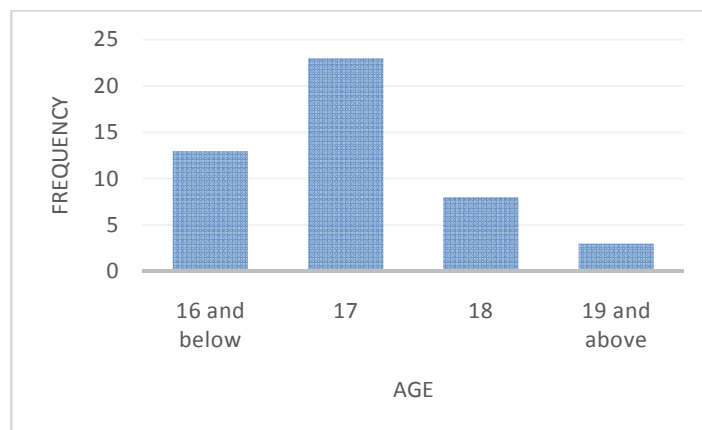


Figure 3. Profile of the Respondents in Terms of Age

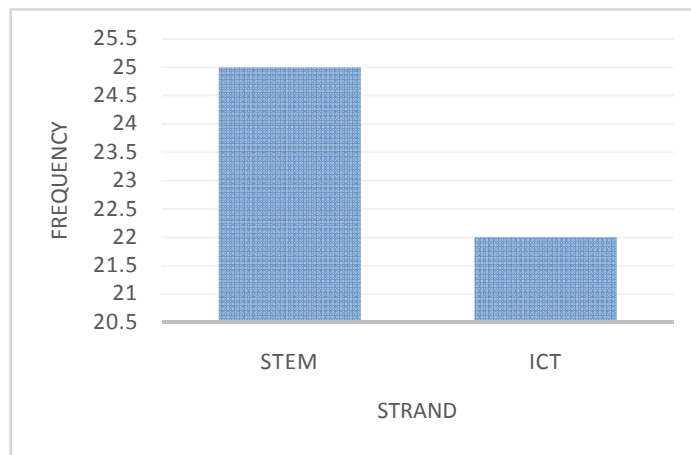


Figure 4. Profile of the Respondents in Terms of Strand

Figure 2 shows the profile of respondents in terms of gender, with 25 female corresponds to 53% and 22 number of male which is 47%. This indicates a relatively balanced gender distribution among the sample.

As reflected in Figure 3 shows the majority of the respondents (49%) are 17 years old, followed by those who are 16 years old and below (28%). Only a small percentage of the respondents are 18 years old (17%) and 19 years old and above (6%). This indicates that the sample used in this study is primarily composed of students in the 16-17 age range, which may limit the generalizability of the results to other age groups. However, it is worth noting that this age range corresponds to the typical high school student age range, which is the target population for the study.

As shown on Figure 4, the majority of the respondents (53%) belong to the STEM strand, while the remaining 47% are from the ICT strand. This indicates that the sample used in this study is primarily composed of students from these two academic tracks, which may limit the generalizability of the results to students from other academic tracks.

B. Academic Performance of the Grade - 11 Students in Mathematics

Table 3. Academic Performance of the Grade - 11 Students In Mathematics

Academic Performance(Grades)	Frequency	Interpretation
79 and below	6	Did Not Meet Expectation
80-84	26	Fairly Satisfactory
85-89	11	Satisfactory
90-94	4	Very Satisfactory
95 and above	0	Outstanding

Table 3 shows the distribution of respondents based on their grades. The majority of the respondents which is 26 (55%) belong to the 80-84 grade range which has a verbal interpretation of Fairly Satisfactory, followed by 11(23%) in the 85-89 range interpreted as Satisfactory and 6 (3%) in the 79 and below range. Only 4(9%) a small percentage of respondents have grades in the 90-94 range, while none of the respondents have reached grades of 95 and above. This may suggest that the sample used in this study is primarily composed of students with average grades, which may limit the generalizability of the results to high-achieving students. However, it is worth noting that the sample still represents a range of academic performance levels, which is important for understanding the relationship between social media use and academic performance across different levels of academic achievement.

C. Factors Affecting the Academic Performance

MENTAL HEALTH	MEAN	DESCRIPTION
1. I feel anxious when I'm answering mathematical problems.	2.89	Agree

2. I've been able to enjoy my day-to-day activities in class.	2.74	Agree
3. I am nervous in new situations, I easily lose confidence.	3.02	Agree
4. My self-esteem increases every time I understand a lesson or learn something new.	3.34	Agree
MEAN AVERAGE	3.00	AGREE
3.2 STUDY HABITS		
1. I listen to music while studying.	2.87	Agree
2. I prefer to study during midnight.	3.06	Agree
3. I eat snacks while studying.	3.00	Agree
4. I watch educational videos on YouTube.	2.98	Agree
5. I learn effectively in a peaceful surrounding.	3.60	Strongly Agree
MEAN AVERAGE	3.10	AGREE
FAMILY		
1. My parents have a high-paying job.	2.23	Disagree
2. My family supports me in my studies.	3.47	Strongly Agree
3. Family problems affects me in my studies.	3.06	Agree
4. My family pressures me in my academic performance.	2.45	Disagree
MEAN AVERAGE	2.80	AGREE
SOCIAL MEDIA		
1. I don't spend the majority of my time on social media.	2.26	Disagree
2. It's easier for me to understand mathematics concept due to social media.	2.78	Agree
3. Social media distracts me from my studies.	3.10	Agree
4. Cyberbullying tires me from doing anything.	2.60	Agree
5. I use social media platforms for academic purposes.	3.04	Agree
MEAN AVERGAE	2.75	AGREE

In this case, the mean distribution is presented for factors affecting academic performance related to mental health. The mean average for these factors is 3.00, which falls within the "Agree" category.

The interpretation of the mean average score indicates that, on average, the participants in the study agreed with the statements related to mental health. Specifically, the participants reported feeling anxious when answering mathematical problems, enjoying their day-to-day activities in class, being nervous in new situations and losing confidence easily, and experiencing increased self-esteem when understanding a lesson or learning something new. Chang & Beilock (2019), stated that psychological as well as physiological symptoms may appear when feeling anxious about mathematics.

As a result, these findings suggest that mental health plays an important role in academic performance and that addressing mental health concerns may be beneficial for improving academic outcomes.

The mean ratings for each of the statements range from 2.87 to 3.60, with an overall mean average of 3.10, which falls under the "Agree" interpretation. The data indicate that students generally agree with the study habits-related statements provided. This suggests that students have specific study habits that work for them and that they prefer studying in a peaceful environment.

It is important to note that while these study habits may work for some students, they may not work for all students. Additionally, some study habits may be more effective than others in improving academic performance. Further research and analysis may be necessary to obtain a more comprehensive understanding of effective study habits and their impact on academic performance. The academic success of students in mathematics is influenced by certain study habit structures. The study conducted by Atsuwe & Moses (2017) indicates that the study habits described have a significant impact on the respondent's academic achievement.

Thus, the results of this study suggest that study habits-related factors is important in understanding and addressing academic performance issues among students. Schools and educators may need to pay attention to the study habits of students and provide guidance on effective study habits that may improve academic performance. Additionally, schools may need to provide resources and support to help students develop effective study habits.

The mean ratings for each of the statements range from 2.23 to 3.47, with an overall mean average of 2.80, which falls under the "Agree" interpretation. The data indicates that students generally agree with the family-related statements provided. This suggests that family support and family problems may play a role in student's academic performance. In particular, family support is strongly associated with academic success, while family problems can negatively impact student's academic performance. Student's academic achievement is linked to the family environment, where prolonged stress and a lack of literacy involvement harm a child's academic performance. For instance, Ryan (2000), shows that there is a significant effect of family background variables and parent support on a child's educational attainment.

It is interesting to note that the statement "My parents have a high-paying job" received a mean rating of 2.23, indicating disagreement. This may suggest that students do not view their parent's income level as a significant factor in their academic performance.

Hence, the results of this study suggest that family-related factors, particularly family support and family problems, may be important in understanding and addressing academic performance issues among students. Schools and educators may need to work with families to provide support and resources to help students succeed academically, while also addressing any family problems that may be affecting their academic performance.

Based on the mean average of 2.75, the interpretation of the rating is "Agree" which means that the respondents generally agree that social media affects their academic performance.

Among the statements, the highest mean rating is for statement 3, "Social media distracts me from my studies" with a score of 3.10, which indicates that the respondents are more likely to be distracted from their studies due to social media usage. According to according to Bekalu et al., 2019; Hettiarachchi, 2014), due to the fact that students frequently use social media for purposes other than learning, this tends to distract them from the classroom and hinder their academic development.

On the other hand, the statement with the lowest mean rating is statement 1, "I don't spend the majority of my time on social media" with a score of 2.26, which implies that most of the respondents spend a considerable amount of time on social media.

Overall, it can be inferred that social media has a significant impact on the academic performance of the respondents, particularly in terms of distraction. However, the respondents also acknowledge the potential benefits of social media for academic purposes, as indicated by the agreement with statement 5, "I use social media platforms for academic purposes".

V. CONCLUSION

The study aimed to investigate the factors affecting academic performance among grade - 11 students. The study found that mental health, study habits, family, and social media all play a role in academic performance. The mean

distributions for each factor were presented, with the mean average falling within the "Agree" category for all factors except for "My parents have a high-paying job," which fell within the "Disagree" category.

In terms of mental health, participants in the study reported feeling anxious when answering mathematical problems, enjoying their day-to-day activities in class, being nervous in new situations and losing confidence easily, and experiencing increased self-esteem when understanding a lesson or learning something new. The findings suggest that addressing mental health concerns may be beneficial for improving academic outcomes.

Regarding study habits, students generally agreed with the statements related to their study habits, suggesting that students have specific study habits that work for them and that they prefer studying in a peaceful environment. However, it is important to note that while these study habits may work for some students, they may not work for all students, and further research may be necessary to obtain a more comprehensive understanding of effective study habits and their impact on academic performance.

Family-related factors, particularly family support and family problems, may be important in understanding and addressing academic performance issues among students. Family support is strongly associated with academic success, while family problems can negatively impact students' academic performance. Finally, social media affects students' academic performance, with students generally agreeing that social media distracts them from their studies. However, some students also reported that social media platforms can be used for academic purposes, such as for learning mathematics concepts.

Therefore, the results of this study suggest that addressing mental health concerns, providing guidance on effective study habits, working with families to provide support and resources, and managing social media use can all be beneficial for improving student's academic performance.

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