PARENTAL INVOLVEMENT, STUDENTS' ENGAGEMENT, AND PERFORMANCE IN MATHEMATICS: A PATH ANALYSIS

MELQUE A. CAMILLO, CARLITO B. BALANDRA

Southern Philippines Agri-Business and Marine and Aquatic School of Technology

Corresponding Author: carlito.balandra@spamast.edu.ph

ABSTRACT

The study investigated the relationship between parental involvement, students' engagement, and their performance in Mathematics among Grade 9 students in selected public secondary schools in Malita, Davao Occidental, a region known for its unique educational challenges, during the school year 2021-2022. The research utilized a descriptive-correlational approach and various statistical tools, including Pearson's correlation, multiple regression analysis, and structural modeling (SEM). The study identified significant correlations between parental involvement and students' engagement, as well as between parental involvement and students' performance in Mathematics. Specifically, parents' role as home teachers, facilitators of independence, and sources of support was linked to students' engagement and performance in Mathematics. Notably, among the aspects of students' engagement, only "students' social engagement" exhibited a significant influence on Math performance, with a regression coefficient of 1.48. It implied that a one-standard-deviation increase in social engagement led to a 1.48-point improvement in Math performance. The regression model was $Y = 79.35 + 1.48X_1$, where X_1 represents the student's

social engagement, with an associated R2 value of 0.054. The study established a path model illustrating that parental involvement, students' behavioral engagement, and social engagement significantly contributed to students' Mathematics performance. These findings emphasize the importance of parental involvement and specific dimensions of student engagement in enhancing Math performance among Grade 9 students.

INTRODUCTION

Since it has been recognized in day-to-day activities, learning mathematics must be emphasized for both individuals and societies. However, across the globe, governments and educators are concerned that young people are graduating with insufficient mathematics skills to meet life's challenges in the twenty-first century (Seaton et al., 2014).

Learning from home (remote learning) due to COVID-19 was unprecedented, and schools needed to make quick decisions about how to best facilitate this, with little time to obtain resources and upskill. Studies conducted early in 2020, internationally and nationally, have shown that teachers were feeling stressed when navigating these changes and were concerned that students' academic and social needs were not being met (Flack et al., 2020; Hamilton et al., 2020).

The study of Kalogeropoulos et al. (2021) on Learning Mathematics from Home during COVID-19 showed that teachers are under extraordinary pressure—dealing with unfamiliar technologies and teaching methods and struggling with additional demands for preparation. The students needed access to the internet and needed more learning support from parents or guardians. Hence, students from disadvantaged backgrounds are likely to be more at risk of falling behind during remote learning.

Otani (2017) states that parental involvement influences educational outcomes through three mechanisms: modelling school-related behaviors and attitudes, reinforcing specific aspects of school learning, and instruction.

In the Philippines, educators have found many problems with remote learning. One of the significant obstacles the teacher faces is the gap between the learners' homes and the instruction provided by parents as learning facilitators. Some students need parents who can assist them in studying at home, and some parents answer SLMs for their children. In this regard, some parents are using self-learning modules, which the teachers believe is the most commonly perceived type of cheating in today's educational system and, at the same time, does not deliver effective learning to the students (Barrot et al., 2021).

In Benjamin Velasco Bautista Sr. National High School, the proponent, a mathematics teacher, observed that several students left some of the learning activities of the self-learning modules in mathematics unanswered. In addition, the various handwriting reflected in the learning modules signifies that not all

students answer all the learning tasks. Hence, the teachers' goal to sustain the quality of education despite the pandemic was defeated. Teachers depend solely on their faith that the students and their parents/guardians will ensure the accomplishment of the modules by students on their own.

With this scenario, the proponent was highly interested in determining the factors that contribute to the learning engagement in mathematics among Grade 9 students. The hypothetical factors that the researcher explored were parental involvement and the students' engagement in mathematics learning.

The result of this study, with its practical implications, will serve as a compass for policymakers and schools, guiding them to design more effective parental involvement activities and strategies. These insights will empower them to foster a conducive learning environment that nurtures students' engagement and enhances their performance in Mathematics.

OBJECTIVES OF THE STUDY

This study was meticulously designed to determine the significant correlation between parental involvement, students' engagement, and their performance in Mathematics. With this clear objective in mind, the study aimed to:

Specifically, this study aimed to:

1. Determine the level of parental involvement in terms of:
   1.1 Parents as Home-Teachers;
   1.2 Parents as facilitators of independence; and
   1.3 Parents as Source of Support.
2. Determine the level of students' learning engagement in Mathematics in terms of:
   2.1 Cognitive Engagement;
   2.2 Behavioral Engagement;
   2.3 Emotional Engagement; and
   2.4 Social Engagement.
3. Determine the level of the student's performance in Mathematics under distance learning.
4. Determine whether there is a significant relationship between the level of parental involvement and the level of students' engagement in Mathematics.
5. Determine whether there is a significant relationship between the level of parental involvement and the level of students' performance in Mathematics.
6. Determine whether there is a significant relationship between the level of students' engagement and performance in Mathematics.

7. Determine the indicators of parental involvement and student engagement that best predict the students' performance in Mathematics.
8. Determine the best-fit path model of the student's performance in Mathematics.

Conceptual Framework of the Study
Figure 1
The conceptual framework of the study

Independent Variable   Dependent Variable
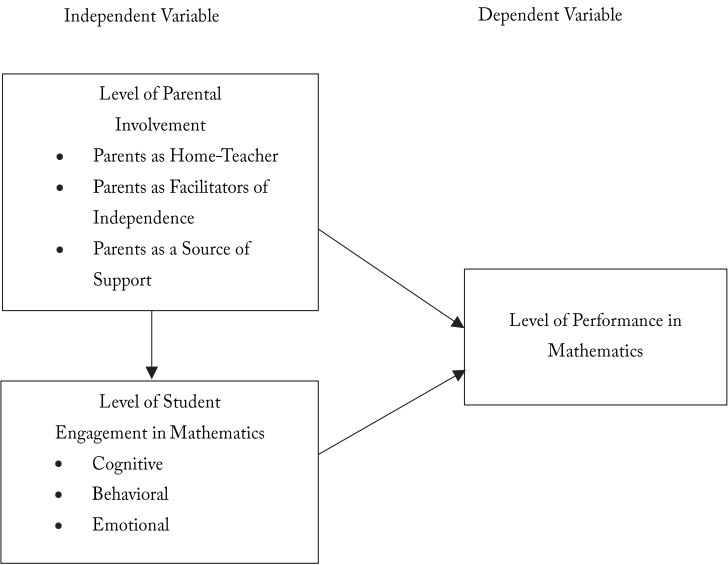
Figure 1 shows the interplay of the variables in the study. The independent variables are the level of parental involvement and the level of students' engagement in mathematics. The dependent variable is the student's performance in mathematics. The arrow shows the interplay of the variables.

Hypotheses

The null hypotheses of this study were tested at a 0.05 alpha significance level.

H_{o1}: There is no significant relationship between the level of parental involvement and the level of students' engagement in Mathematics.
H_{o2}: There is no significant relationship between the level of parental involvement and the level of students' performance in Mathematics.

H_{o3}: There is no significant relationship between the level of the student's engagement and their performance in Mathematics.

H_{o4}: There is no indicator of parental involvement and student engagement that best predicts the students' performance in Mathematics.

H_{o5}: There is no best-fit path model of the student's performance in Mathematics.

MATERIALS AND METHODS

Research Locale

This research was carried out in four designated public secondary schools located in the Municipality of Malita, Davao Occidental, Philippines. These schools include Benjamin Velasco Bautista Sr. National High School (BVBSNHS), B'laan National High School (BNHS), Demolok Valley National High School (DVNHS), and Mariano Peralta National High School (MPNHS), each representing one of the four districts within the municipality. These educational institutions are managed by appointed school principals operating under the Department of Education.

Malita, a first-class municipality and the provincial capital of Davao Occidental, is home to a diverse population of approximately 118,197 residents, each with unique cultural backgrounds. The province boasts a total of 40 public elementary schools and eight public secondary high schools, with many of these schools situated in both highland and coastal areas. This geographic distribution ensures that all schools are readily accessible, facilitating consistent monitoring of the Department of Education's program implementation.

Research Design

A descriptive-correlational method was used in this study. As pointed out by Grobecker (2016), the descriptive-correlational design involves subjecting the variables to statistical treatment to find out their significant relationship.

The independent variable was parental involvement, which was analyzed regarding parents as home teachers, facilitators of independence, and as a source of support. The level of students' engagement was analyzed in terms of cognitive, behavioral, emotional, and social engagement. Further, the students' performance in mathematics was based on the first and second quarter ratings for the school year 2021-2022.

Moreover, the correlation method was used to determine a significant relationship between the study variables. A path analysis was conducted to determine which among the variables of parental involvement and student involvement best predict students' performance in mathematics.

Sampling Design and Technique

The total population of Grade 9 students in the selected four (4) public secondary schools in Malita, Davao Occidental was 1,300. In this study, Slovin's formula was used to determine the appropriate sample size. A sample

size of 306 Grade 9 students was utilized as sample respondents to represent the population. The representative per school was determined using the percentage rate and stratified random sampling.

The schools were selected due to the health protocols set by IATF to contain the spread of COVID-19 and the absence of face-to-face classes. The researchers only selected one big secondary public school per district of the Municipality of Malita. It was based on the accessibility of the schools in support of the health protocols set by the IATF to contain the spread of COVID-19 and the absence of face-to-face conduct of classes.

Respondents of the Study

The study's respondents were taken from the selected public secondary schools. Hence, only the Grade 9 students in the selected public secondary schools in Malita, Davao Occidental, for the school year 2021-2022 were considered in the study. The respondents were chosen through a percentage rate and stratified random sampling.

There were 306 total respondents from the four (4) selected Public Secondary Schools of Malita, Davao Occidental. The distribution of respondents is shown in Table 1.

Table 1. *Distribution of Respondents in Public Secondary Schools of Malita, Davao Occidental S.Y. 2021–2022*

Name of School	Grade 9 Population	Sample Size
Benjamin Velasco Bautista Sr. National High School	135	32
B'laan National High School	209	49
Demolok Valley National High School	220	52
Mariano Peralta National High School	736	173
Total	**1,300**	**306**

Research Instruments

The primary research instrument of this study was the survey questionnaire. The survey questionnaire was composed of two parts.

The first part of the questionnaire was the Parental Involvement Questionnaire on Parents as Facilitators of Independence and Parents as Sources of Support from the study of Dinoy and Bantilan (2023). The Indicators of Parents as Home-Teachers were modified from the study of Rahman (2001) on the Effects of Parental Involvement on Student Success. The questionnaire was composed of 30 questions divided into three indicators, namely:

- Parents as Home-Teachers,
- Parents as Facilitators of Independence, and
- Parents as Sources of Support.

The instrument was developed specifically for this study, so validity and reliability could only be established after data collection. The only basis for its validity and reliability is that the instrument was published. Hence, a validation from the pool of experts was conducted to ensure the indicators fit the current situation. From the instrument, the respondents rated each indicator based on their perception of how this indicator was manifested. It was rated in the following manner: 5 (strongly agree), 4 (agree), 3 (undecided), 2 (disagree), and 1 (strongly disagree).

Part two of the questionnaire was an adopted questionnaire from Wang et al. (2016) on The Math and Science Engagement Scales: Scale Development, Validation, and Psychometric Properties of the University of Pittsburgh, USA. It was composed of 20 questions classified into assessments of:

- cognitive,
- behavioral,
- emotional, and
- social engagement.

The instrument has undergone validity tests, and the results demonstrate the soundness of the psychometric properties of the Math and Science Engagement Scales with a high Cronbach's alpha for the overall scale of 0.93 and 0.92, respectively. Moderate to high reliability was found for each of the four subscales. It was rated as 5 (strongly agree), 4 (agree), 3 (undecided), 2 (disagree), and 1 (strongly disagree). Due to its minor modification to fit the current learning modality, the questionnaires were validated by the pool of experts.

Data Analysis

In interpreting the degree of parental involvement, the scale and interpretation were provided:

Scale Interval	Description	Interpretation
4.21 – 5.00	Very High	The respondent strongly agrees that the indicator for the level of parental involvement is consistently demonstrated.
3.41 – 4.20	High	The respondent agrees that the indicator for the level of parental involvement is manifested and observed on many occasions.

2.61 – 3.40	Average	The respondent cannot decide that the level of parental involvement is manifested and observed on some occasions.
1.81 – 2.60	Low	The respondent disagrees that the indicator for the level of parental involvement is manifested and observed on all occasions.
1.00 – 1.80	Very Low	The respondent strongly disagrees that the indicator for the level of parental involvement is manifested and observed on all occasions.

To interpret the degree of students' engagement in mathematics, the scale and interpretation are provided:

Scale Interval	Description	Interpretation
4.21 – 5.00	Very High	The respondent strongly agrees that the indicator for the level of students' engagement is manifested and observed on all occasions.
3.41 – 4.20	High	The respondent agrees that the indicator for the level of students' engagement is manifested and observed on many occasions.
2.61 – 3.40	Average	The respondent cannot decide that the indicator for the level of students' engagement is manifested and observed on some occasions.
1.81 – 2.60	Low	The respondent disagrees that the indicator for the level of students' engagement is manifested and observed on all occasions.
1.00 – 1.80	Very Low	The respondent strongly disagrees that the indicator for the level of students' engagement is manifested and observed on all occasions.

The mathematics performance of the students was analyzed based on the DepEd Order No. 31, s—2012 on the Department of Education Scale.

Parameter	Limits	Description
Advanced	90% above	The students at this level exceed the core requirements regarding knowledge, skills, and understanding, and can transfer them automatically and flexibly through authentic tasks.
Proficient	85–89	The students at this level have developed fundamental knowledge, skills, and understanding, and can transfer them automatically and flexibly through authentic tasks.
Approaching Proficient	80–84	The students at this level develop fundamental knowledge and skills and, with guidance from the teacher or peers, can transfer this understanding through authentic tasks.
Developing	75–79	The students at this level possess the minimum knowledge, skills, and core understanding, but need help with authentic tasks.
Beginning	74%	The students at this level struggle with his/her understanding of prerequisites and fundamental knowledge or skills that have not been acquired or developed.

Data Gathering Procedure

While gathering the needed data for this study, the researchers prepared a letter requesting permission to conduct the study from the office of the School Division Superintendent. The Dean of the Graduate School of the SPAMAST, Malita, Davao Occidental, noted it.

Another request letter was sent for approval by the Public Schools Division Superintendent and to the Principals and School Heads of the four (4) selected secondary schools in the Municipality of Malita, Division of Occidental.

The completed questionnaire was distributed and returned to the Grade 9 students along with the self-learning modules. The students' performance ratings were requested from the Grade 9 Mathematics teachers, under whom the respondents were placed.

Ethical Consideration

Prior to collecting any data, approval to conduct the study was obtained. An orientation with the respondents was conducted to ensure the study's objectives were understood. Further, the respondents were assured that their responses to the survey questionnaire would not be connected to any evaluative efforts within the school district.

To ensure anonymity throughout the study, pseudonyms were utilized, and no pictures or images were displayed. Additionally, to maintain data security and protect the confidentiality of the study respondents, all information related to the study was kept strictly confidential. Further, the researcher, during the conduct of the study, had to ensure that it was at the respondents' convenient hours as permitted by the school administrators.

Statistical Tools

The data collected were tallied, tabulated, and analyzed using descriptive and inferential statistics.

The Arithmetic Mean was employed to determine the average scores of the samples. It was used in the analysis of objectives 1 and 2.

Pearson Product-Moment Correlation Coefficient was used to analyze the hypothesis and relationship between the variables presented in this study. It was explicitly used in the analysis of objectives 4, 5, and 6.

r – Values	Description
1	Perfect Correlation
+0.81 – +0.99	Very High Correlation
+0.61 – +0.80	High Correlation
+0.41 – +0.60	Moderate Correlation
+0.21 – +0.40	Low Correlation
+0.01 – +0.20	Slight Correlation
0	No Correlation

Statistical Tools

Multiple Regression Analysis was used to test the hypothesis, specifically for objectives 4, 5, and 6.

Structural Equation Modeling (SEM), Maximum Likelihood was used to determine the indicators of parental involvement and student engagement that best predict the students' performance in Mathematics, and the best-fit path model of the Grade 9 students' performance in Mathematics.

Structural equation modeling (SEM) is a multivariate structural analysis technique used to analyze structural relationships. It has the standard fit indices that must be satisfied as presented below:

SEM Standard Fit Indices and Their Respective Critical Values

Index	Critical Value
CMIN/DF (The minimum Discrepancy divided by its degrees of freedom)	< 2
P-Value	> 0.05
GFI (The Goodness of Fit Index)	> 0.95
CFI (The Comparative Fit Index)	> 0.95
TLI (Tucker-Lewis Index)	> 0.95
NFI (The Normal Fit Index)	> 0.95
RMSEA (The Root Mean Square Error of Approximation)	< 0.05

RESULTS AND DISCUSSION

The Level of Parental Involvement

The Level of Parental Involvement is shown in Table 2. As reflected in the table, the overall mean rating was 4.09, suggesting a high level of parental involvement.

Parental Involvement as Home-Teachers

As disclosed in the table, in terms of Parents as Home-Teachers, the result showed that the highest indicator of the Level of Parental Involvement as Parents as Home-Teacher is the "Supervise module learning and monitor my learning progress," with a mean of 4.32, indicating a very high level of involvement. Parents are constantly monitoring their children's progress. However, the other indicators showed that the parents' involvement as home teachers is high, which means that the involvement is manifested and observed on many occasions.

Overall, the results imply that the parents were highly engaged in students' learning as demonstrated by their support in supervising the children's modular learning and monitoring their learning progress, communicating with teachers regularly, checking and ensuring that homework was accurately accomplished, and participating in extra-curricular activities online, assisting and helping the children understand the lessons, checking modules before submission, and ensuring all modules were submitted on time. During the pandemic, it is the parents who have a more significant role to play in sustaining quality

education. Hence, it is also the role of the teachers to communicate regularly with parents. In this study, it is therefore acknowledged that the parents have effectively done their roles as facilitators of children's remote learning.

According to Christenson and Reschly (2010), Parent-school partnership allows for the conceptualization of roles and relationships and the impact on the development of children in a broader way. From this approach, families and schools are the leading actors in constructing their roles and forms of involvement, generating new and varied actions to relate to each other according to the specific educational context.

Parental Involvement as Facilitator of Independence

The role of the teacher as a facilitator in learning is very significant, but because of the pandemic, this role was also transferred to our parents. It is a challenge for them to take over some of the tasks given by the teachers. As shown in Table 2, the overall mean of Parental Involvement of facilitators of independence is 4.15 with SD=0.52, which implies a high description.

Taken individually, the indicator that got the highest mean is "Respect for privacy" with a mean of 4.40 and SD = 0.70, which denotes a very high description. The second indicator is "gave me the freedom to experiment and learn independently," with a mean of 4.28, SD = .70, and the third indicator is that they have trust and confidence in me. It implies that these indicators showed that respondents agree that the indicator for the level of parental involvement is manifested and observed on many occasions. However, the other indicators for parental involvement as a facilitator of independence imply a high description.

Overall, the result implies that the level of parental involvement in facilitating independence was high. It was manifested as the parents respecting the privacy of their children, providing them the freedom to experiment and learn things on their own judgment and decisions. Further, the parents do not impose their ideas and values on me because they believe in their children's autonomy. Hence, the parents demonstrate a high level of involvement as facilitators of independence. In this way, this is training the children to become independent. In the new normal, independent learning is promoted and enhanced. The parents' trust and confidence given to their children could be felt by the students as they were supported.

Robinson (2017) said that while most parents want to be involved, they need help figuring out how to do so. Novianti and Garzia (2020) mentioned that if parents do not feel capable of becoming involved, they will avoid involvement opportunities. However, parents will become more involved when welcomed and invited.

Hindin and Mueller (2016) expanded the definition of parent involvement, broadening it to include not only parent-school activities but also parent-child activities such as discussing experiences, reading together, and telling stories. They considered showing children they value education and encouraging

students to do well in school and participate in activities.

Parental Involvement as a Source of Support

Regarding Parental Involvement as a Source of Support, data showed an overall mean of 4.16 and SD=0.52, indicating high levels of parental involvement. Taken singly, indicators 1 and 5 got a very high description. These are: "are giving me advice or guidance on the difficulties in distance learning" with a mean of 4.24 and SD = .72; parents are always advising their children and giving full support in the learning process of their children, which denotes a very high description. "Encourage me to feel more confident that I can do all things for my study," with a mean of 4.33 and SD=.83, implies that parents encouraged their students to continue their studies and always believed their children can do better and be the best.

Overall, the level of parental involvement as a source of support was high. It was demonstrated that the parents were showing they are available to confide in their children's thoughts and feelings every time they feel burned out with their modules, letting their children feel that they are people to whom they can look for support in times of distress and difficulties, and give advice or guidance on the difficulties in distance learning. Furthermore, the parents were also showing high involvement in support, as their children feel that they can seek advice or guidance on the difficulties in learning, to help them cope with their difficulties in the lessons. Most of all, when parents encourage their children to be more confident, they can make the most of their studies.

Table 2. *The Level of Parental Involvement*

Parents as Home-Teacher	Mean	SD	Descriptive Rating
1. Supervise my module learning and monitor my learning progress.	4.31	0.72	Very High
2. Communicate with my teacher regularly.	3.92	0.8	High
3. Check if I am doing my homework; it does not allow me to skip homework to participate in extra-curricular activities	4	0.95	High

4. Answer the assessments in the module if I find the lessons too difficult to answer.	3.82	1	High
5. Discuss and help me understand what we are reading.	4.21	0.85	High
6. Ask for help from someone else to assist me in the lessons I found difficult.	4.1	0.93	High
7. Ensure that I have completed my homework before participating in other activities	4.05	0.89	High
8. Check my work-week tasks and accomplishments.	4	0.86	High
9. Check my modules before submitting.	4.28	0.76	High
10. Get and submit learning modules on time.	4.15	0.79	High
Total	4.09	0.53	High

Parents as Facilitators of Independence	Mean	SD	Descriptive Rating
1. Respect my privacy.	4.4	0.7	Very High
2. Take my opinions and ideas seriously.	4.19	0.72	High
3. Are persons to whom I can express differences of opinion on important matters.	4.1	0.74	High
4. Provided me with the freedom to experiment and learn things on my own.	4.28	0.7	Very High

5. Have trust and confidence in me.	4.26	0.81	Very High
6. Respect my judgment and decisions, even if they differ from what they would want.	4.09	0.9	High
7. They do not impose their ideas and values on me because they believe in my will and power.	3.94	0.87	High
8. I do not have a moment to try to control my life or dictate what I should do.	3.85	0.83	High
9. Give me advice when I feel I need it.	4.17	0.87	High
10. Always allow me to do things independently, yet be willing to help and listen when I do something wrong.	4.19	0.81	High
Total	4.15	0.52	High

Parents as a Source of Support	Mean	SD	Descriptive Rating
1. Are you giving me advice or guidance on the difficulties in distance learning?	4.24	0.72	Very High
2. Have given me as much attention in my learning.	4.09	0.77	High
3. Assist me in my difficulty coping with the lessons.	4	0.71	High

4. I am available to confide my most personal thoughts and feelings when I feel burned out with my modules.	4.13	0.7	High
5. Encourage me to feel more confident that I can do everything for my studies.	4.33	0.83	Very High
6. They are the ones who let me feel that I can confidently do the tasks in my modules.	4.16	0.76	High
7. Are the people to whom I can look for support in times of distress and difficulties when I almost give up on my studies?	4.18	0.86	High
8. Help me with my studies when I feel some learning difficulties, and encourage me to pursue higher goals in life.	4.14	0.83	High
9. Always ready to support me when I need it.	4.19	0.75	High
10. Guide me constantly to what I have to do, but never interfere in the things I have done.	4.07	0.75	High
Total	4.16	0.52	High

Parental Involvement: Discussion

According to Redding (2014), parents' aspirations and role as support systems facilitate children's gain of knowledge, attitudes, and abilities that help them to understand and deal with emotions, set goals, embrace empathy for others, and be responsible. Also, El Nokali et al. (2010) said that parental involvement is a challenging task, as it encompasses multiple behaviors. In this

Review, parental involvement is seen as those behaviors shown by the parents, including the home and school environments, that are intended to support not only their children's educational progress but also their social/emotional skills.

Overall, among the indicators, it is the parents' support that students highly recognize as the most influential in their studies. Moreover, the parents also have a high level of involvement as facilitators of independence, which boosts the students' confidence. The parents, as home teachers, were also found to have high involvement. Although the result shows it has the lowest mean among the three indicators, it still marked a high level of involvement. It further implies that the students recognized their parents' involvement as facilitators, but not as the primary source of support. As the mathematics competencies in Grade 9 are becoming increasingly challenging for the students, they are even more challenging for the parents. Hence, the parents are home teachers in some other way, but it is the student's independent learning ability that matters.

According to Đurišić and Bunijevac (2017), educators and parents play significant roles in the educational success of students. Students need a positive learning experience to succeed in school: one that provides support, motivation, and quality instruction. With increasing demands on the family, parental involvement in students' education extends beyond the school building. Many families are faced with overwhelming and unpredictable schedules and circumstances while juggling school, sports, family situations, family time, work schedules, and other responsibilities, allowing minimal time to provide support in any one given area.

Students' Learning Engagement in Mathematics

Table 3 shows the level of students' learning engagement in Mathematics. It was assessed regarding cognitive, behavioral, emotional, and social engagement. Numerical data were presented and discussed as follows:

Cognitive Engagement

Regarding Cognitive Engagement, the overall mean of 4.14 implies high cognitive engagement. Taken individually, among the indicators in Cognitive engagement of students, "I make sure I go through the work for math class and make sure that it is right" got the highest mean of 4.19, followed by "I connect what I am learning to things I learned before" with a mean of 4.18. Overall, all the indicators were rated high, denoting a high level of cognitive engagement; this further implies that the level of students' cognitive engagement is evident. The student's effort, persistence, and compliance with the learning tasks are observed most of the time. It further implies that the students were fully engaged in their learning under the new modality. The students exert effort to make sure they are on the right track in accomplishing the learning tasks.

Xie et al. (2020) stressed that the cognitive engagement of the students is measured by the extent to which the students use shallow and deep learning

strategies to learn and understand material, self-regulation, and persistence. Barkley and Major (2020) described the students who are cognitively engaged as putting more significant time, effort, and willingness to take on the learning task at hand. It includes the effort students are willing to invest in working on the learning tasks.

According to Bear et al. (2018), engaged students exhibit active attention, participation, motivation, and interest in the study, whereas their disengaged counterparts manifest boredom, passiveness, poor motivation, and low grades. In addition, students with high engagement levels attend school routinely and attain higher grades than their colleagues with low engagement levels.

Behavioral Engagement

The Level of Students' Learning Engagement in Mathematics in terms of Behavioral Engagement has an overall mean of 4.22, which implies a high level of behavioral engagement. Taken individually, two indicators got the highest mean: "I stay focused in my lessons," with a mean of 4.34, and "I follow the rules," with a mean of 4.34. There is also an indicator with a mean of 4.24, "I keep trying even if something is hard," indicating a very high level of behavioral engagement. Furthermore, the indicator "I put effort into learning Mathematics" means 4.12, denoting high behavioral engagement. Lastly, "I complete my learning tasks on time" means 4.03, which denotes a high behavioral engagement.

It means that the level of students' behavioral engagement is evident. The student's effort, persistence, and compliance with the learning tasks are observed most of the time. It implies that the students do the tasks in the learning modules and work on them routinely.

The result conforms to the study of Rajabalee and Santally (2021) using descriptive statistics, which reported that regularity and persistence in learning activities are related to the students' behavioral engagement and successful performance. Behaviorally engaged students have the energy and time dedicated to their educational activities, where meaningful learning occurs.

According to Fredricks et al. (2004), behavioral engagement entails involvement in learning and academic tasks, as well as participation in school-related activities. Involvement in learning and academic tasks includes student behaviors related to concentration, attention, persistence, effort, asking questions, and contributing to class discussions. Participation in school-related activities includes athletics or school government.

Emotional Engagement

The Emotional Engagement's overall mean is 4.15, which denotes a high level of emotional engagement. Taken individually, the indicator with the highest mean stated, "I want to understand what is learned in math class," with a mean of 4.32, denoting a very high emotional engagement. On the

other hand, the other indicators got a high emotional engagement. It means that the level of students' emotional engagement is evident. The student's effort, persistence, and compliance with the learning tasks are often observed. This implies that the students are happy and excited working on their modules at home, a manifestation that they value learning. They easily get adjusted to the current learning modality.

The result conforms to the statement of Greller et al. (2017) that emotionally engaged students possess positive emotions, such as interest, excitement, or happiness, as they participate in the learning activities. It further described the number of feelings of a student towards learning.

Devito (2016) emphasized that the emotional engagement of the students is conceptualized as the presence of positive emotional reactions to learning activities, as well as valuing learning and having an interest in the learning content. It is measured with items about students' emotional reactions, such as interest, enjoyment, and the perceived value of learning.

According to Ruzek and Hafen (2016), student-teacher interactions stimulate learners to participate in class activities as they foster an emotionally favorable and supportive classroom environment. Research found that students whose teachers provide considerable emotional support exhibit high levels of social, emotional, and cognitive engagement, and vice versa. They claimed that the teacher is tasked to create a positive and safe environment that meets the unique behavioral and emotional needs of each student. The sense of connectedness and belonging to a school develops emotional engagement. Mata et al. (2012) investigated how certain distinct but related variables, such as student background, motivation, and social support, affect student attitudes toward mathematics; results revealed that most students held positive attitudes toward mathematics.

Social Engagement

The Level of Students' Learning Engagement in Mathematics in terms of Social Engagement has an overall mean of 4.11, implying high social engagement. Among the indicators given in the table, only one got the highest mean: "When working with others, I share ideas." It has a mean of 4.21, meaning students like to share their learning and ideas with others. It will promote social interaction and collaboration with others and build strong connections. The remaining indicators on students' learning engagement in Mathematics in terms of Social Engagement have a high description; it implies that the respondent agrees that the indicators are manifested and observed many times. It further implies that the students have established good communication and collaboration with others or peers, build on others' ideas, try to understand other people's ideas in Mathematics class, work with others who can help in doing their performance tasks in Mathematics, and help others who are struggling in Mathematics.

Gunasekara et al. (2022) stated that students were more engaged when

they had teachers who not only possessed pertinent knowledge, skills, and a cheerful social disposition but also when connections were made to the experiences of the students. That is, students were more engaged and found learning to be most effective when their teachers possessed a cheerful social disposition, which led to an environment that students found conducive to learning.

Furthermore, the student's behavioral engagement has the highest mean of 4.22, described as very high. It denotes that, above all, indicators of learning engagement are seen as the highest-level influencing factor. At the same time, social engagement is the lowest. It further implies that in the new regular education, the student's behavior toward learning predicts their academic success. Although social engagement is high, due to the absence of physical contact and communication, the students' social engagement may be different when they meet every day and talk about their lessons. Virtual collaborative dialogues about the lessons are more common, but less often than when meeting in schools.

The overall result of the students' engagement, as supported by the data presented in Table 3, is that the level of students' engagement towards Mathematics has an overall mean score of 4.155, denoting a high level of engagement. All components under students' engagement towards Mathematics have a verbal description of high. It indicates that the level of students' learning engagement is very high. The learner's effort, persistence, and compliance with the learning tasks are regularly observed. It implies that the students manifest favorable learning engagement as they are persistent and happy, immersing themselves in learning under the new modality.

Table 3. *The Level of Student Learning Engagement in Mathematics*
Cognitive Engagement

1. I make sure I go through the work for math class and make sure that it is right.	4.19	0.79	High
2. I think about different ways to solve Mathematics problems in the module.	4.06	0.77	High
3. I connect what I have learned in math to what I need to learn.	4.17	0.75	High
4. I connect what I am learning to things I learned before.	4.18	0.82	High
5. I make sure I go through the work for math class and make sure that it is right.	4.09	0.85	High

Total	4.14	0.55	High

Behavioral Engagement

1. I stay focused on my lessons.	4.34	0.67	Very High
2. I follow the rules.	4.34	0.74	Very High
3. I put effort into learning Mathematics.	4.12	0.83	High
4. I keep trying even if something is hard.	4.24	0.81	Very High
5. I complete my learning tasks on time.	4.03	0.83	High
Total	4.22	0.55	Very High

Emotional Engagement

1. I build on others' ideas.	4.05	0.78	High
2. I try to understand other people's ideas in Mathematics class.	4.17	0.82	High
3. I work with others who can help me with my performance tasks in Mathematics.	4.12	0.83	High
4. I help others who are struggling in Mathematics.	3.97	0.86	High
5. When working with others, I share ideas.	4.21	0.98	Very High
Total	4.11	0.61	High
Overall	4.155	0.59	High

The result conforms to the findings of previous research conducted by Wang et al. (2016) that student learning engagement is evident in a facilitating instructional climate. Further, students' engagement was a strong predictor of academic performance and choice. Students who are extensively engaged tend to attain higher grades and aspire for higher academic achievement. Students who enjoy, value, and feel competent in their social interactions are more likely to enlist the support of others for academic tasks.

The Level of the Students' Performance in Mathematics under Distance Learning

Table 4 shows the students' performance level in Mathematics under Distance Learning. The majority, or 132 (43.14%), were at the approaching level of proficiency, which implies very satisfactory performance.

Table 4. *The Level of the Students' Performance in Mathematics under the Distance Learning.*

Range of Scores	Descriptive Level	Frequency (f)	Percentage (%)
90% and above	Advanced	32	10.46
85% – 89%	Proficient	125	40.85
80% – 84%	Approaching Proficiency	132	43.14
75% – 79%	Developing	17	5.56
74% and below	Beginning	0	0

n=306; %=100; Mean=85.440; SD=3.896

It means that the students at this level have developed fundamental knowledge, skills, and understanding, and can transfer them automatically and flexibly through authentic tasks. The students at the Developing level were only 17 (5.56%), and none were at the beginning level. This further shows that the students have an excellent academic performance despite the absence of face-to-face interaction.

It further implies that the student-respondents were at the approaching proficiency level, having nearly mastered the competencies they are expected to develop or demonstrate. They can perform the task at their own pace with minimal assistance or guidance from their teacher. It may be because of the effort of the teachers and the pupils' parents/guardians who help ensure learning occurs during the pandemic. In addition, the quality of the developed Self-Learning Modules addressed the needs of the pupils to have explicit instruction at a self-paced level of difficulty. Moreover, the parents also have subjected their pupils to private tutorials if they cannot do it. At the same time, some of the pupils have their older siblings to assist them in discussing the lessons and simultaneously accomplishing the learning tasks and formative assessments.

According to Cole (2020), Kazu and Demirkol (2014), and Hesse (2017) on blended learning's impact on high school students' writing, it was shown that the majority of students were proficient with the writing concepts after

engaging in blended learning instruction in comparison to the students who received traditional forms of instruction.

Significant Relationship between the Level of Parental Involvement and the Level of Students' Engagement in Mathematics

The test of a significant relationship between the level of parental involvement and the level of students' engagement in Mathematics was determined using the Pearson r correlation between the total scores for each student's responses. The results of the data analysis are presented in Table 5.

As disclosed in the table, all factors of parental involvement show a very high correlation to the student's engagement in Mathematics, with an overall r-value of 0.734 and p-value of 0.000, which is lower than the 0.05 significance level, denoting a significant correlation.

The results indicated that the relationship between the level of parental involvement and the level of students' engagement in Mathematics showed a very high correlation. The numerical data show sufficient evidence to reject the null hypothesis. It implies that parental involvement has a significant relationship with the level of the student's engagement in Mathematics. The quality of the parents' involvement significantly influences the quality of the students' learning engagement in Mathematics. It further implies that the increase in the level of parental involvement increases the students' learning engagement in mathematics.

Table 5. *The Significant Relationship between the Level of Parental Involvement and the Level of Students' Engagement in Mathematics*

Indicators	r-value	Description	P-value	Interpretation
Home-Teacher	0.633	Very High Correlation	0	Significant
Facilitator of Independence	0.729	Very High Correlation	0	Significant
Source of Support	0.712	Very High Correlation	0	Significant
Overall Involvement	0.734	Very High Correlation	0	Significant

The result is supported by Erol and Turhan (2018) on the relationship between parental involvement in the education of students and student engagement in school, which shows a significant relationship between

parental involvement and students' engagement in school. Sixteen percent of the variance in engagement scores on the school scale was derived from the parental involvement scale. In order to increase students' engagement in school, parents' involvement in the educational process should be increased, and families should be encouraged to be more involved.

Family and school are social institutions where social rules and approved social behaviors are learned. Families, students, and schools are the foundation of education and training, and families need to contribute to their children's education and training. Research shows that the involvement of parents in education and teaching is related to many variables. In particular, several studies show that the academic achievement of individuals and their motivation to learn are related to the involvement of the parents in the schools (Sad, 2012; Erol & Turhan, 2018).

Significant Relationship between the Level of Parental Involvement and the Level of Students' Performance in Mathematics

The test of a significant relationship between the level of parental involvement and the level of students' performance in Mathematics was determined using the Pearson r correlation between the total scores for each student's responses. The results of the data analysis are presented in Table 6.

Table 6. *Significant Relationship between the Level of Parental Involvement and the Level of Students' Performance in Mathematics*

Indicators	r-value	Description	P-value	Interpretation
Home-Teacher	0.173	Low Correlation	0.002	Significant
Facilitator of Independence	0.223	Low Correlation	0	Significant
Source of Support	0.205	Low Correlation	0	Significant
Involvement (Overall)	0.218	Low Correlation	0	Significant

As disclosed in the table, all factors of parental involvement show a very high correlation to the student's performance in Mathematics, with an overall r-value of 0.218 and p-value of 0.000, which is lower than a 0.05 significance level, denoting a significant correlation.

It further implies that parental involvement significantly affects the student's academic performance in Mathematics. The parents' involvement in school and all academic undertakings of their children is demonstrated in

multiple ways; these include activities that parents engage in at home and school, like parent-teacher conferences, school extra-curricular activities, and others.

The result is supported by Topor et al. (2010) on parent involvement and student academic performance: A multiple mediational analysis, which found that parent involvement in a child's education is consistently positively associated with a child's academic performance. Results indicated a statistically significant association between parent involvement and a child's academic performance, beyond the impact of the child's intelligence. A multiple mediation model indicated that the child's perception of cognitive competence fully mediated the relation between parent involvement and the child's performance on a standardized achievement test.

Parental involvement in school has been demonstrated to be a key factor for children's academic outcomes. On an international scale, parental involvement in schools has long been heralded as an essential and positive variable in children's academic and socioemotional development that contributes positively to a child's socioemotional and cognitive development (Lara & Saracostti, 2019).

Significant Relationship between the Level of Students' Engagement and Performance in Mathematics

The test of a significant relationship between students' engagement in Mathematics and the level of students' academic performance was determined using the Pearson r correlation between the total scores for each student's responses. The results of the data analysis are presented in Table 7.

As disclosed in the table, all factors of the students' engagement show a low correlation to the students' performance in Mathematics, with an overall r-value of 0.207 and p-value of 0.000, which is lower than the 0.05 significance level, denoting a significant correlation.

It means that there is a significant relationship between the level of students' engagement and the students' performance. It further implies that when the students actively engage in learning in all aspects—cognitive, behavioral, emotional, and social—they are likely to perform well in class. If students do not have a sense of school engagement, they will likely lose interest in studying.

The result was supported by Delfino (2019), who conducted a study on student engagement and academic performance and found that behavioral, emotional, and cognitive engagements were positively correlated with the academic performance of the students. The teacher, the school, and the parents should collaborate strongly to provide more opportunities for students to maximize their engagement.

Moreover, the result corroborates the findings of the study conducted by Wonglorsaichon et al. (2014) on the influence of students' school engagement on learning achievement, which revealed a significant correlation between

student engagement and academic performance. It is further asserted that the emphasis of the educational system at present has been placed on students' school engagement since prior findings have established that school engagement is significant in promoting the learning achievement of students.

Furthermore, Delfino (2019) cited that student engagement is one of the essential constructs used to understand the behavior of the student towards the teaching-learning process. Understanding students' behavior in academic institutions will show how instruction and academic practices are implemented in the schools. As such, it could be used as a powerful tool by teachers and academic supervisors to design effective pedagogical techniques to maximize the learning experiences of the students. The data on student engagement provides information on what students are doing.

Table 7. *Significant Relationship between the Level of Students' Engagement and Performance in Mathematics.*

Indicators	r-value	Description	P-value	Interpretation
Cognitive Engagement	0.118	Low Correlation	0.038	Significant
Behavioral Engagement	0.171	Low Correlation	0.003	Significant
Emotional Engagement	0.157	Low Correlation	0.006	Significant
Social Engagement	0.226	Low Correlation	0	Significant
Overall Involvement	0.207	Low Correlation	0	Significant

The Indicators of Parental Involvement and Student Engagement that Best Predict the Students' Performance in Mathematics

Table 8 shows the summary of stepwise Multiple Regression Analysis, highlighting the indicators of parental involvement and student engagement that best predict the students' performance in Mathematics.

As disclosed in the table, among the indicators considered in this study, only "social engagement" significantly influences the students' performance in Mathematics, with a regression coefficient of 1.484. This means that if "social engagement" is increased by one standard deviation, performance in Mathematics is likely to increase by 1.484.

In addition, the p-value is less than 0.05, indicating a significant contribution to the performance in mathematics. With a constant of 79.349, the regression model is presented as follows:

The regression model is presented as follows:

$$y = 79.349 + 1.484x$$
where,
$$x = social$$
$$y = math\ performance$$

Further, the $r^2 = 0.054$ reveals that 5.40% of the considered data fit the regression model.

Table 8. *Summary of Stepwise Multiple Regression Analysis*

Predictor	Unstandardized Coefficients	p-value	Interpretation
(Constant)	79.349	0	Significant
Social	1.484	0	Significant

$r^2 = 0.054$

Hence, numerical data provide sufficient evidence to reject the null hypothesis and conclude that there is a regression model that best fits academic math performance, with "social engagement" as its predictor. It further implies that the students in the new normal need someone like their parents, whom they trust, to support them, encourage, motivate, and assist them in completing the modules, especially in Mathematics.

As mentioned by Wonglorsaichon et al. (2014), school administrators or related educational agencies should raise awareness of the significance of teachers' roles in promoting students' school engagement, beginning with the following measures:

Knowledge about what school engagement is, how important it is, and with which methods teachers can promote students' school engagement should be disseminated.

Teachers' knowledge and understanding about the establishment of school engagement should be examined to use the findings to improve and develop the first step to increase its efficiency; and

Teachers should be assigned to use methods to create students' school engagement to evaluate the effectiveness of each method. If teachers realize the benefits and outcomes that have occurred with the students, they should become aware of the importance of their role in further promoting students' school engagement.

Structural Model of the Students' Performance in Mathematics

The conceptual model developed by the researcher was tested to determine whether it is the best-fit model for the students' performance in Mathematics. The model is a framework of structural models that defines the relations among the observed variables. Moreover, the assessment of fit forms a basis for accepting or rejecting the model.

Hypothesized Model 1 is shown in Figure 3. Model 1 considered the two latent variables of the student's performance in Mathematics, which are parental involvement and student engagement, as endogenous variables. The results revealed that some of the indicators in the latent variables had to be removed to meet the required criterion. Furthermore, in Model 1, all the resulting values failed to satisfy the recommended critical values. Hence, generating an improved hypothesized model is recommended.

Figure 3 is the diagram of the hypothesized path model 1, showing the interaction of parental involvement and student engagement on the student's performance in Mathematics. As illustrated, parental involvement and student engagement have direct effects of 0.12 and 0.10, respectively, on the students' performance. The model obtained an R-squared value of 0.03.

Figure 3
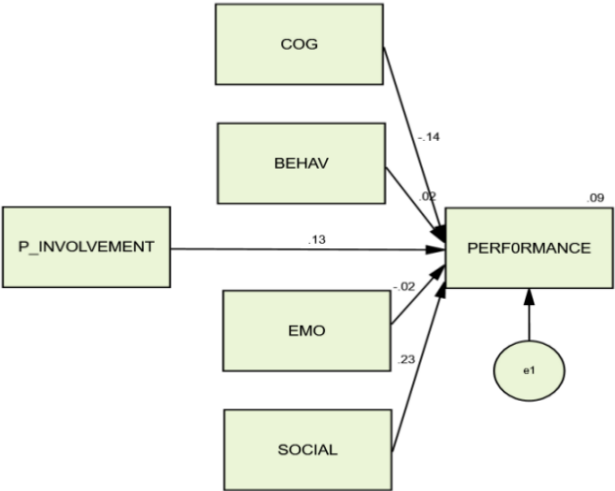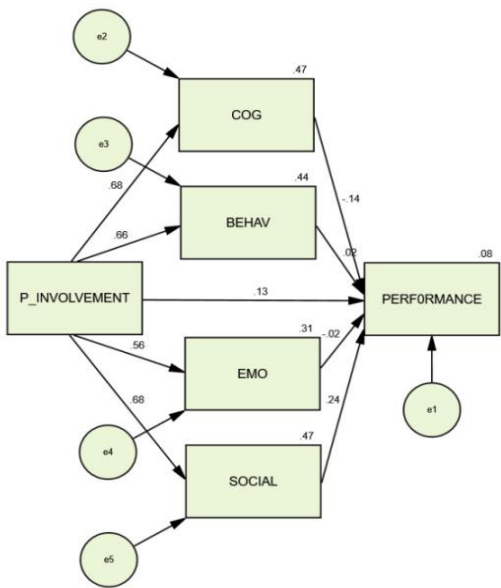
The Hypothesized Path Model 1

Table 9 presents the model fit values of hypothesized path model 1. Results failed to meet the value criteria for the seven indices. CMIN/DF is greater than 3.00, p-value is less than 0.05, RMSEA is greater than 0.05, and NFI, TLI, CFI, and GFI are all less than 0.95. These results indicate better fits than the hypothesized path model 1. Hence, a modification to the model is recommended.

Table 9. *Test Results of Hypothesized Path Model 1*

Index	Criterion	Model Fit Values
CMIN/DF	<3.0	85.465
P-value	>.05	.000
NFI	>.95	.024
TLI	>.95	-0.472
CFI	>.95	.019
GFI	>.95	.431
RMSEA	<.05	.524

Hypothesized Path Model 2

Figure 4 shows the modified model of the Hypothesized Path Model 1; the modification connects parental involvement to the student's engagement: cognitive, behavioral, emotional, and social.

Figure 4

The Hypothesized Path Model 2

Table 10 presents the model fit values of hypothesized path model 2. Results failed to meet the value criteria for the seven indices. CMIN/DF is greater than 3.00, p-value is less than 0.05, RMSEA is greater than 0.05, and NFI, TLI, CFI, and GFI are all less than 0.95. These results indicate better

fits than the hypothesized path model 2. Hence, a modification to the model is recommended.

Table 10. *Test Results of Hypothesized Path Model 2*

Index	Criterion	Model Fit Values
CMIN/DF	<3.0	29.869
P-value	>.05	0
NFI	>.95	0.795
TLI	>.95	497
CFI	>.95	0.799
GFI	>.95	0.806
RMSEA	<.05	0.308

It means that parental involvement, both as a home-teacher, as a source of support, and as a facilitator of independence, was not the factor that best predicted students' engagement in terms of cognitive, behavioral, emotional, and social dimensions that make the sound fit model. It implies that parental involvement and social engagement may not only be factors influencing students' performance.

Hypothesized Path Model 3

Figure 5 shows the modified model of the Hypothesized Path Model. The modification was done by deleting cognitive engagement, as it has a negative influence on the performance of the students in Mathematics. However, the results failed to meet the value criteria for the seven indices.

Figure 5
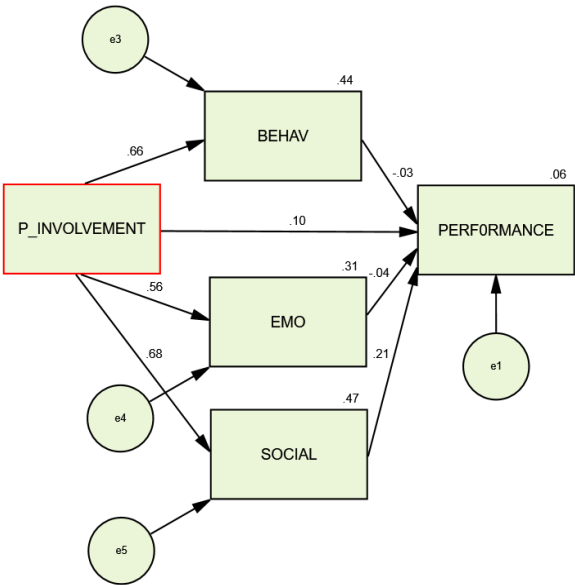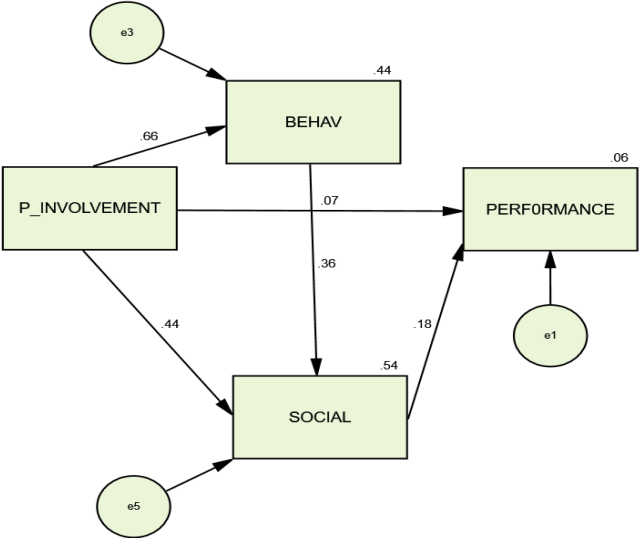*The Hypothesized Path Model 3*

Table 11 presents the model fit values of hypothesized path model 3. Results failed to meet the value criteria for the seven indices. CMIN/DF is greater than 3.00, p-value is less than 0.05, RMSEA is greater than 0.05, and NFI, TLI, CFI, and GFI are all less than 0.95. These results indicate better fits than the hypothesized path model 3. Hence, a modification to the model is recommended.

Table 11. *Test Results of Hypothesized Path Model*

Index	Criterion	Model Fit Values
CMIN/DF	<3.0	27.254
P-value	>.05	0
NFI	>.95	0.86
TLI	>.95	0.542
CFI	>.95	0.863
GFI	>.95	0.895
RMSEA	<.05	0.293

It means that even parental involvement sets aside the students' cognitive engagement, as this depends on their mental capacity. Still, it needs to make a

better fit for the student's engagement. There may be better variables to predict the level of student engagement.

Hypothesized Path Model 4

Figure 6 shows the modified model of the Hypothesized Path Model; the deletion of emotional engagement does the modification, as it has a negative influence on the performance of the students in Mathematics. Results failed to meet the value criteria for the seven indices.

Figure 6
The Hypothesized Path Model 4

Table 12 presents the model fit values of hypothesized path model 3. Results failed to meet the value criteria for the seven indices. CMIN/DF is greater than 3.00, p-value is less than 0.05, RMSEA is greater than 0.05, and NFI, TLI, CFI, and GFI are all less than 0.95. These results indicate better fits than the hypothesized path model 4. Hence, a modification to the model is recommended.

Table 12. *Test Results of Hypothesized Path Model 4*

Index	Criterion	Model Fit Values
CMIN/DF	<3.0	0.247
P-value	>.05	.619
NFI	>.95	.999
TLI	>.95	1.011
CFI	>.95	1.000
GFI	>.95	1.000
RMSEA	<.05	.000

It means that when parental involvement is disconnected from both cognitive and emotional engagement, the results show that it does not make a good fit for the student's performance in Mathematics.

Hypothesized Path Model 5

Figure 7 shows the modified model of the Hypothesized Path Model; the modification is done by disconnecting behavioral engagement from performance engagement and connecting emotional engagement to social engagement, as it has a negative influence on the performance of the students in Mathematics. Results failed to meet the value criteria for the seven indices.

Figure 7
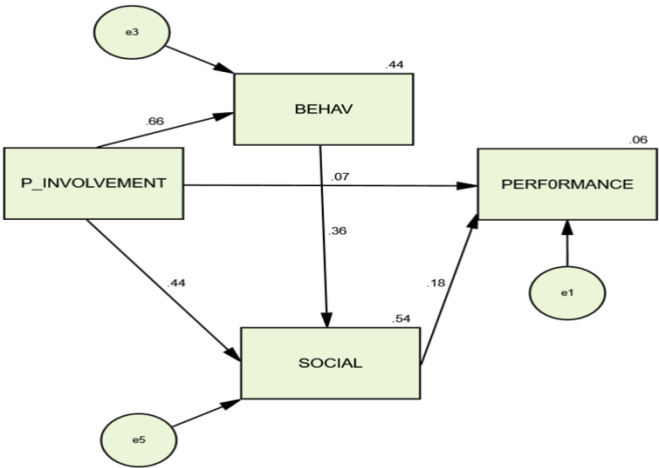*The Hypothesized Path Model 5*

Table 13 shows the test results of Hypothesized Path Model 5. The CMIN/DF is greater than 3.00, the p-value is less than 0.05, RMSEA is greater than 0.05, and NFI, TLI, CFI, and GFI are all less than 0.95. These results indicate that the hypothesized path model 5 is an acceptable fit.

Table 13. *Test Results of Hypothesized Path Model 5*

Index	Criterion	Model Fit Values
CMIN/DF	<3.0	0.247
P-value	>.05	.619
NFI	>.95	.999
TLI	>.95	1.011
CFI	>.95	1.000
GFI	>.95	1.000
RMSEA	<.05	.000

The result shows that the study finally obtained a path model that fitted the students' mathematics performance. Correspondingly, parental involvement, students' behavioral engagement, and students' social engagement are significantly associated with the mathematics performance of the students.

CONCLUSIONS

Based on the numerical and qualitative findings, the study concluded that:
1. The parental involvement is high, indicative that parents were highly involved in the students' learning as home-teachers, as facilitators of independence, and as sources of support.
2. The students' engagement was high, indicative that the students were highly engaged in learning in terms of cognitively, behaviorally, emotionally, and socially.
3. The student's performance in Mathematics was proficient, indicative that the students performed well in Mathematics amid the pandemic.
4. There is a significant relationship between the level of parental involvement and the level of students' engagement in Mathematics.
5. There is a significant relationship between the level of parental involvement and the level of students' performance in Mathematics.
6. Social engagement is a factor of parental involvement that best

predicts the Students' performance in Mathematics.
7. There may be a better-fit path model of the student's performance in Mathematics. However, fit indices criteria were acceptable (such as CMIN/DF, GFI, NFI, TLI, and RMSEA), where parental involvement, students' behavioral engagement, and students' social engagement were significantly associated with the students' Mathematics performance.

RECOMMENDATIONS

In light of the preceding findings, the following were recommended.
1. The school administration and teachers shall continue and strengthen the partnership with parents to encourage parents to continue to get themselves highly involved with students' learning. Open communication between teachers and parents shall be established for parents' queries on the students' academic-related tasks.
2. The teachers should use more student-centered teaching strategies. These Strategies should provide opportunities for students to maximize their engagement in the teaching and learning process.
3. Teachers should be given the same teaching load in line with their expertise so that mastery of the competencies in mathematics is enhanced. Maximum learning experiences can be provided to the students and further enhance their performance.
4. Parents should continue facilitating students' learning at home even when Face-to-face conduct of classes resumes.
5. Since the suggested model was found to be the acceptable fit model for the students' performance in mathematics, DepEd officials, school administrators, and teachers should include in their strategic plans the development of programs and interventions that promote parental involvement in learning and increase students' learning engagement.

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