International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Study Math Anxiety, Attitudes toward ICT and Study Habits Among Senior High School Students: A Path Model Analysis on Student Academic Motivation in Mathematics

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DOI: https://doi.org/10.55248/gengpi.5.0724.1722

ABSTRACT:

The study tried to find the Best Fit Path Model on student academic motivation as influenced by study math anxiety, attitudes toward ICT, and study habits among senior high school students using descriptive-correlational technique through Path Model Analysis among 421 public senior high school students in Davao Region, Philippines. Findings revealed a very high level of attitudes toward ICT while study habits and student academic motivation in mathematics revealed high levels whereas study math anxiety obtained moderate level. Further, findings showed significant negative correlation between study math anxiety and student academic motivation; positive correlation between attitudes toward ICT and student academic motivation; and between study habits and student academic motivation. Finally, results showed that the generated Model 3 was the best-fit path model described by the significant impacts of attitude towards ICT and study habits on student academic motivation while study math anxiety and study habits had positive influence on attitude towards ICT, respectively. The findings could serve as a valuable baseline to students, educators, parents, policymakers, and other initiatives aimed to the development of more effective strategies to support student success in high school and beyond. The findings of the study could also be the basis for future researches.

Keywords: study math anxiety, attitudes toward ICT, study habits, student academic motivation in mathematics, path model analysis, higher education institutions, Region XII, Philippines

1. INTRODUCTION

Student academic motivation is an important educational variable as it promotes new learning and performance by using previously gained abilities, techniques, and behaviors (Ryan & Deci, 2020). However, students confront several challenges when it comes to academic motivation in mathematics (Ma, 2024). Herges (2019) revealed that students' motivation has long been a concern for mathematics educators. The Anxiety about mathematics is linked to decreased levels of motivation to learn mathematics, and motivation is seen as a critical component of success in any human learning activity (Awofala, Adeyemi, & Lawani, 2020).

Students' academic motivation is a predictor of Math Anxiety demonstrating the importance of motivation in reducing negative attitudes toward mathematics learning. Furthermore, in Malaysia, it was discovered that Malaysian eighth-grade students' underperformance in mathematics was closely related to their high levels of anxiety and low self-efficacy in mathematics learning in the PISA 2012 hence, mathematics anxiety might be minimized by developing instructional strategies that increase students' motivation about mathematics. (Baity, 2021; Schukajlow, Rakoczy, & Pekrun, 2017).

Moreover, students' academic motivation is a predictor of information and communication technologies (ICT), and ICT use should be tailored to the new generation's interests, motivations, habits, and demands (Widyaningtyas & Wahidah, 2022). Nonetheless, students in Samar, Philippines, faced learning hurdles as a result of internet access problems and course design flaws. Coping techniques included relocating to a better internet connection and getting assistance from classmates (Lapada, 2023).

Students' academic motivation might help them create and maintain healthy study habits. The relationship between study habits and student motivation is mutually reinforcing. When students are driven to learn and succeed academically, they are more likely to develop productive study habits that support their objectives (P. Ramesh & K V L N Murthy, 2020). Nonetheless, the Philippines scored 77th out of 81 nations in the OECD's student assessment for 15-year-old learners from the most recent Program for International Student Assessment (PISA) 2022, according to DepEd - National Report of the Philippines (2023). This worrying finding revealed that Filipino kids scored nearly 120 points lower than the average, with 355 in arithmetic, 347 in reading, and 373 in science. It is also reported that 16% of students acquired at least Level 2 competency in mathematics, much lower than the average across OECD countries (OECD average: 69%).

Recognizing the relevance of student academic motivation in mathematics, the researcher undertook a thorough evaluation of potential variables that could influence student motivation in mathematics. A number of studies demonstrated a link between student academic motivation in mathematics and math anxiety (Wang, Shakeshaft, Schofield, & Malanchini, 2018). Student motivation in mathematics links with math anxiety because it can exacerbate or alleviate anxiety in mathematics. Outcomes include not only motivation in math-related situations, but also long-term benefits such as efficient learning, course and even occupational decisions (Luttenberger, Wimmer & Paechter, 2022). Similarly, it has been demonstrated that attitude toward ICT is connected with student academic motivation, as evidenced by the fact that successful and motivated students had more positive attitudes about ICT (Sipila 2009). Another author observed that study habits are related to student academic motivation in mathematics, as there is a positive correlation between self-confidence, enjoyment, and motivation in mathematics (Capuno & Necesario et al, 2019). Furthermore, the researcher has not found a study that establishes the association between student math anxiety, attitude toward ICT, study habits and Student academic motivation in mathematics among senior high school students in the local context. Thus, this study is necessary.

This study is based on Wigfield and Eccles (2000) Value Expectation Theory of Motivation, which examines the relationship between a student's expectancy for success at a task or goal achievement and the value task completion. In addition, value expectation theory suggests constructive strategies to motivate students on their learning style and study habits as well as demonstrate its efficacy in motivating students in classroom (Nicolls, 2017; Shang et al., 2023). Furthermore, this theory proposes in terms of study habits that students' attitudes and behaviors are influenced by their views about their skills (expectancies) and the significance they place on studying (values) and it also addresses the student's conduct and motivation to learn (Corwyn & Mcgarry, 2021).

Meece et al. (1990) found that the Expectancy-Value Theory has proven to be a useful tool in forecasting math anxiety and its impact on students' course enrollment intentions and performance. Research showed that poor math practices among college students are linked to high levels of devaluation beliefs, which are based on the Expectancy-Value Theory (Hendy et al., 2014). The theory has also been used to evaluate engineering students' motivational beliefs, demonstrating its applicability in assessing academic activities (Williamson et al., n.d.). A useful framework for comprehending people's attitudes toward information and communication technology (ICT) and their subsequent actions in using ICT tools in educational settings is provided by the Expectancy-Value Theory. A person's attitude toward ICT includes their opinions, views, and beliefs regarding contemporary technology. This affects how they behave and how they use ICT in educational settings (Hussain et al., 2021).

The theory of the study is supported by Attribution theory of motivation is concerned with how individuals interpret events and how this relates to their thinking and behavior (Weiner, 1974). Moreover, it explains how individuals attribute success (effort or ability) and failure (lack of effort or external factors) in academic contexts. It also applies to attitudes toward ICT, where perceptions of usefulness and ease of use influence positive attitudes through attributions of personal competence or external support. The theory is used in constructing the Path Model Analysis. The respondents' responses are treated to test hypothesized causal models and examine the direct and indirect effects of exogenous and endogenous variables on an outcome. This is crucial for understanding complex relationships between variables While there have yet to be studies undertaken in the Philippines. Moreover, most research above restricts their investigation to the bivariate association between the variables. The researcher was motivated to investigate the four variables using the Path Model Analysis within the context of the Philippines (Hernando & Oliva, 2022).

The study aims to find out the relationship among math anxiety, attitude towards ICT and study habits and its influence on student academic motivation in mathematics among senior high school students in Region XI, this study seeks answers to the following objectives. Firstly, to determine the level of exogenous variable study math anxiety in terms of general mathematics self-efficacy, grade anxiety, students' futures, self-efficacy and assignments. Secondly, to describe the level of exogenous variable attitude towards ICT in terms of perceived ease of use, perceived usefulness and attitudes towards the use of ICT.

Thirdly, to ascertain the level of exogenous variable study habits in terms of note taking, use of library and time allocation to study. Fourth, to define the level of endogenous variable student academic motivation in mathematics in terms of Interest, performance-approach goals, self-efficacy beliefs, mastery goals and fear of failure. Fifth, to determine whether there is significant correlation between exogenous and endogenous variables. Lastly, to determine the best fit model of the exogenous and endogenous variables.

In addition, the Hypothesis such as no significant relationships between math anxiety and student academic motivation in mathematics, attitudes toward ICT and student academic motivation in mathematics, study habits, and student academic motivation in mathematics, and no model that best fits student academic motivation in mathematics of public senior high schools in Region XI when tested at 0.05 significance level.

Meanwhile, the Conceptual Model 1 illustrated in Figure 1 reflects the direct causal relationship between exogenous and endogenous variables. The hypothesized model consists of two types of latent constructs: exogenous and endogenous factors. The exogenous variables in this study are student math anxiety, attitudes toward ICT, and study habits. In contrast, the endogenous variable is student academic motivation in mathematics. Since the latent variables are not immediately observed, they cannot be directly measured. Each latent concept was related with a number of measures or observable variables. As a result, one of the key goals of this research will be to determine the extent of regression lines from the latent to observable variables.

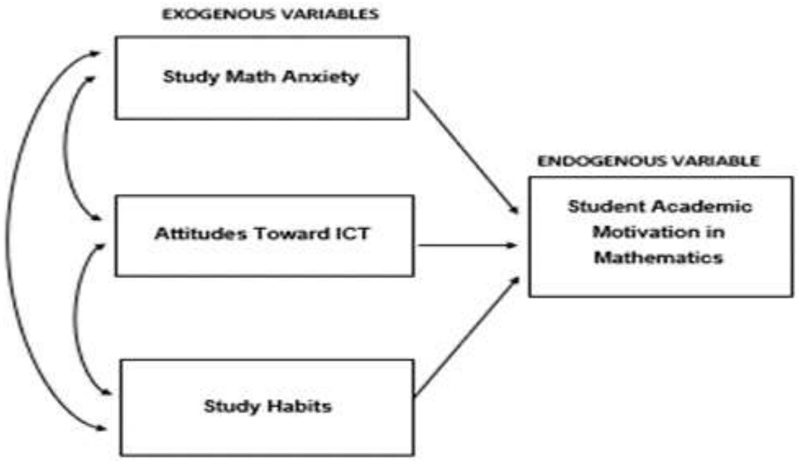

Figure 1. Hypothesized Model 1 shows the interrelationship between the exogenous variables: Mathematics Anxiety, Attitude Towards ICT and Study Habits to the endogenous variable Student Academic Motivation in Mathematics.

The latent student math anxiety has 5 indicators namely: general mathematics self-efficacy, grade anxiety, mathematics for students' futures, self-efficacy and anxiety in class and mathematics self-efficacy on assignments. General mathematics self-efficacy includes personal characteristics and beliefs and how these characteristics and beliefs affected their self-efficacy in mathematics classes. Grade anxiety means self-efficacy and anxiety with respect to grades in mathematics classes. Mathematics for students' future stands for self-efficacy and anxiety regarding future courses and careers of how student's confident on using mathematics in their career. Self-efficacy and anxiety in class covering students' self-efficacy and anxiety related to asking questions in class. Finally, Mathematics self-efficacy on assignments students' self-efficacy and anxiety related to completing assignments (May, D., 2009).

The latent attitude towards ICT has three indicators namely: perceived ease of use, perceived usefulness and attitudes towards the use of ICT. Perceived ease of use stands for the degree to which a user believes that using technology is free of effort. Perceived usefulness refers to the degree of which a user believes that using technology will increase his/her job performance. Attitudes towards the use of ICT refers to the level of liking a user derives from using the computer orientation (Yang, S., & Kwok, D., 2002).The latent study habits have 3 indicators namely: note taking, use of library and time allocation to study. Note taking is a form of writing activity that can aid learning and remembering as well as academic success. The use of library enables the students to acquire new skills, knowledge and idea which could foster good academic performance in mathematics. Lastly, Time allocation to study it is the process of organizing one's activities to achieve the best results within the available time (Sanni, K. 2017).

Student academic motivation in mathematics consist of five indicators namely: Interest, performance-approach goals, self-efficacy beliefs, mastery goals and fear of failure. Interest is the engagement in an activity for its own innate satisfactions and enjoyment rather than for some separable consequences. Performance-approach goals refer to the purpose of demonstrating competence, focusing on attempts to create an impression of high ability often through the comparison with others' ability. Self-efficacy beliefs include individuals' belief that they can successfully achieve at a specific level on an academic task or attain an academic goal. Mastery goals refer to an individual's purpose of developing personal competence and growth. Fear of failure is interpreted as 'a self-evaluative' framework that influences how the individual defines, orientates to, and experiences failure in achievement situations (Philippou G., & Pantiaza M., 2013).

Motivation is prerequisite for learning. Most of the time, students learn the subjects they are curious about and interested in a short time. Students who are not motivated enough are also not ready to learn, and if they are motivated enough, they will succeed to the extent that they are more motivated to study their homework and exams. Previous beliefs have demonstrated that student concerned with math anxiety, attitude towards ICT and study habits are associated to student academic motivation in mathematics that it is the recipe in helping students succeed and grow in the subject. However, when the beliefs were examined, there is no available research including and regarding math anxiety, attitude towards ICT, study habits and its influence on student academic motivation in mathematics among senior high school students altogether (Tahiroğlu and Çakır 2014; Suren, N., & Kandemir, M. A.,2020).

Over the years, there have been several studies exploring the student academic motivation in mathematics. However, no study, specifically in the Mindanao context has attempted to summarize the path model for math anxiety, attitude towards ICT and study habits illustrating the student academic motivation in mathematics among senior high school students. Assumed that using the above metrics it can provide more insightful and targeted result to help students acquire the right motivation in mathematics. It is in this context that math anxiety, attitude towards ICT and study habits can be a path model on student academic performance as this can raise awareness to the extended beneficiaries to the study and possibly develop intervention scheme to improve student academic motivation in the region.

Furthermore, it is the utmost reason that the researcher was prompted to conduct the study and the researcher has not come across with a study establishing the relationship between the participation in decision making and student motivation in mathematics in the local setting. Identifying influences will be needed to have concrete evidence and data in finding solutions to answer the problems best the school system.

The study’s findings will be utilized to provide valuable information to educators worldwide, curriculum developers and most importantly, the Department of Education (DepEd). This will be useful to many education stakeholders such as government, community, prominent individuals, government leaders, students and teachers to seek for answers to the issues that our educational system is facing. Therefore, the result of the study would be valuable to educational administrators, teachers, parents, students, policy makers and other organization involved in education.

School heads, on the other hand, can benefit on the study as result of the study would gain advantage to the school administration since this will provide additional information on the student motivation in mathematics.

Moreover, this research will benefit future researchers as this would give them insights in making research in which the topic presented is relevant to them that they will about to make.

Similarly, it is expected that the result of the study will provide direct benefits to beneficiaries for the improvement of their well-being and personal effectiveness as teachers, as their needs will be address and those who play a vital role in the lives of the students will be able to strengthen their weaknesses and sustain their strengths in order to provide adequate support and necessary intervention to the students.

Lastly, this study will contribute to attaining the Sustainable Development Goals as it highlights fostering motivated students which more likely to engage in education, drive innovation, and contribute positively to societal and environmental sustainability. Hence, the result on the significance of the exogenous variables to the endogenous variable will help to identify what are the factors that could be a hindrance to motivation of students. Furthermore, recommendation will be given on what are the possible ways to address the problems.

2. METHODOLOGY

The study's research respondents would be public senior high school students from several divisions in Davao Region, selected using a proportionate approach directing on large schools with a large student population in every division. The current total number of public senior high school pupils in the Department of Education (DepEd) Davao area is 74,214. The Raosoft online sample size calculator was used to calculate the 421 responses (96% confidence interval, 5% margin of error, and 50% response distribution). In selecting the respondents, to Thomas (2022), stated that proportionate sampling, researchers can estimate statistical measures for each group. Each population stratum is then sampled using a different probability sampling technique, such as clustering or simple random sampling.

This survey included every school division in the Davao region except Davao de Oro Division. The number of senior high school per division was specially computed as follows: Davao City with 143 participants (34 percent), Davao del Norte with 63 participants (15 percent), Davao del Sur with 44 participants (10 percent), Davao Oriental with 46 participants (11 percent), Davao Occidental with 33 participants (9 percent), Island Garden City of Samal with 16 Participants (4 percent), Mati City with 18 participants (5 percent), Panabo City with 24 participants (6 percent) and Tagum City with 24 participants (6 percent). The region encompasses the Davao Gulf, and Davao Region serves as its regional hub (Philippine Statistics Authority, 2020).

The study's respondents were senior high school students attending a public secondary school in the Davao Region. To participate in the study, the student must be enrolled in at least one linked mathematical topic, indicate his or her willingness to be included among the respondents, and complete the certificate of permission form. Students enrolled outside of the Davao Region and in private secondary schools, those who withdraw from the study, those who manipulated or had significantly incomplete data, and those who did not indicate their intention to participate in the study by not signing the consent form are all excluded from the study. Furthermore, no justification is necessary if participants wish to withdraw as respondents, as long as they do so ahead of time for whatever reason.

Materials and Instrument

To obtain data, the researcher used modified and adapted questionnaires. Each of the four instruments was built particularly to meet the stated study objectives. Some of the questions were written by professionals, while the rest were created using standardized instruments available on web platforms.The student academic motivation in mathematics survey was modified by Pantziara & Philippou (2014). This tool includes 24 statements in total. There were five items intended to have an impact on interest, five items to have an impact on performance-approach goals, five items to have an impact on self-efficacy beliefs, four items to create a significant effect on mastery goals and five items to have an impact on fear of failure. The pilot testing process was conducted for this study and the score of .818 indicates that the items' internal consistency is good.

Meanwhile, the questionnaire on math anxiety was adapted from May (2009). This tool includes twenty-four (24) statements in total. There were seven items intended to have an impact on general mathematics self-efficacy, seven items to have an impact on grade anxiety, nine items to have an impact on instructional self-efficacy, three items to create a significant effect on disciplinary self-efficacy, five items to have an impact on mathematics for students’ future, five items to have an impact on anxiety in-class and mathematics self-efficacy on assignment. The instrument underwent pilot testing, yielding a value of .664, indicating that the items exhibit questionable level of internal consistency.

Twelve survey items made up the research instrument for the attitudes toward ICT was derived from Yang & Kwok (2017). four were intended for recognizing implicit perceived ease of use, four were for proactive feedback- seeking perceived usefulness and four were for the attitude towards the use of ICT. The items were subjected to pilot testing, which yielded a result of .886, indicating a good internal consistency level. Adapted from Sanny (2017), the study habits questionnaire is a standardized tool that may be accessed online. Note taking, use of library and time allocation to study were the four factors that made up the survey, each with five-item questions. The survey's alpha coefficient of .864 indicates that its items have a comparatively good level of internal consistency.

This study indicates that the amount of agreement and disagreement ranged from strong agreement to strong disagreement, with all linked variables having values ranging from 5.00 to 1.00. The rating scale employed in this study assigns a value of 5 to Strongly Agree (SA), indicating that the statement is consistently true. Agree (A) is assigned a rating of 4, indicating that the statement is frequently seen. Neither agree nor disagree (NA) is assigned a rating of 3, indicating that the statement is seen on occasion. Disagree (D) has a value of 2, indicating that the assertion is rarely encountered. Finally, the Strongly Disagree (SD) value is set to one, indicating that the assertion is not observed.

The survey questionnaire was customized according to the local context with the assistance of an advisor and the input of competent validators who assessed its substance. For construct validity. The questionnaire obtained an average value of 4.3, suggesting a high level of descriptive equivalency. Finally, before the instrument is utilized, the final version will be generated, taking into consideration the validators' errors, remarks, and recommendations. Cronbach's alpha is used to assess the scales' reliability, and the results are reported in the tool description.

Design and Procedure

The researcher will use a quantitative, non-experimental, correlational analysis and Path Model Analysis. In order to collect and evaluate numerical data, detect trends and means, forecast results, establish causal relationships, and extend findings to larger populations, this study used quantitative technique (Bhandari, 2020; Jain & Chetty, 2021). Furthermore, correlational analysis, a non-experimental study aimed at ascertaining the degree of association or correlation between variables, was employed in the interim to investigate the statistical link between variables without researcher manipulation (Hassan, 2022).

The processes that the researcher followed in collecting the data needed for this study are as follows: First, the researcher will write a letter of authorization to the Regional Director's office, requesting permission to conduct this study at the following regional schools. This will occur after the panel of experts has validated the survey questionnaire and given authorization for the study to proceed. Furthermore, the University of Mindanao Ethics and Review Committee (UMERC) Certificate of Approval, UMERC Protocol No., UMERC-2024-014, also verified the study. The researcher meticulously followed a prescribed procedure and technique to get the data. After receiving authorization and endorsement from the Department of Education, Region XI, the researcher submitted a formal request letter to the Office of the Schools Division Superintendents. Upon receiving approval, the researcher seek permission to conduct the study from the principal of the school and organize the distribution of questionnaires to the respondents' schedule. In contrast, survey questionnaires were distributed via Google Forms to reach a larger group of respondents without jeopardizing health regulations and some were distributed face to face. Moreover, the use of this program permitted accurate data collection and presentation.

In Addition, to ensure that each respondent fully comprehends the survey, the researcher provide instructions, translate the questions into vernacular, and answer any questions they may have. The questionnaire will be collected the same day. After being summed, the data will be forwarded to a statistician for statistical analysis. Data collecting will begin in the second week of January 2024 and will be finished by March 2024. The researcher got a clearance letter detailing where the survey would be performed and how the data would be collected in accordance with the Office of Professional Schools at the University of Mindanao's ethical guidelines. These requirements included completing the Ethics Review process. After acquiring the adviser's clearance and the UMERC, the letters were distributed to several divisions.

Furthermore, before receiving approval, the researcher was directed to each Division's Research Management and Development Officer (DRMDO) for online submission of chapters 1-2 of the draft manuscript, validated survey questionnaire, and the researcher's request letter, signed by her advisor and dean of professional schools. Following that, the questionnaire was administered while paying particular attention to the various methods, but it was not limited to Voluntary Participation.

Moreover, participants willingly participated in the study and they might have withdrawn whenever they needed to. The removal of the volunteers had no negative impact on the study. The privacy and confidentiality according to Section 4 of the Data Privacy Act of 2012, all personal information submitted by respondents was processed for research purposes, with a public benefit in mind, and following any applicable laws, norms, or ethical standards. Data collection, retrieval, disposal, and storage were all done with the highest discretion. To avoid misconceptions during data collection, the researcher provided informed permission forms outlining the relevant elements and how the process will be carried out. The researcher provided detailed explanations of the study's objectives and significance. The study excluded instances that would expose responders to dangerous situations.

Similarly, the study benefit school administrators empower their teachers by providing them with the resources they needed to deliver excellent instruction. Furthermore, the researcher was under no duty to provide any incentives or certificates for positive study replies with the guarantee that the information shared would be kept private and adhered to the delivery instructions specified in the consent form, notably in terms of participant identification. Moreover, the researcher submitted the document for plagiarism check using tools such as Grammarly and Turnitin to ensure that the paper met its validity and integrity criteria and study found no indication of willful misinterpretation, data creation and/or addition, or observations or characterizations made outside of data collection or experiments. It also followed ethical guidelines to avoid falsification, exaggeration, or distortion to meet theoretical expectations. The study used both online and offline venues to collect the relevant data, as explained to respondents.

Moreover, the data were analyzed by computing the mean to examine and comprehend the exogenous variables of math anxiety, attitudes toward ICT, study habits, and the endogenous variable of student academic motivation in mathematics. Pearson-r was utilized to assess the significance of the link between the exogenous and endogenous variables. The study examined how math anxiety, attitude toward ICT, and study habits influence student academic motivation in mathematics among senior high school students in the Davao region.

Furthermore, Path Model Analysis was used to test the hypothesized models and determine the best fit model for student academic motivation in mathematics. It examined which exogenous variables were most effective in improving academic motivation among senior high school students in Region XI. In Addition, the Path analysis is a statistical technique that looks at both direct and indirect effects inside a model to help researchers explore intricate interactions between variables. It is especially helpful when evaluating the fit of theoretical models and finding meaningful correlations between variables while accounting for other variables (Peters & Bodkin, 2021). Moreover, path analysis manages many regression equations at once, enabling researchers to assess the overall model fit and verify that the theoretical model is consistent with the data that was gathered (Sun, 2024). Lastly, in the conduct of the report, this analysis considered authorship credentials. Together with the research consultant's assistance and guidance, the researcher contributed significantly to the conception and design, or data acquisition, or data analysis and interpretation. The researcher and consultant collaboratively drafted the paper and critically updated it for significant intellectual material. Both contributed to the analysis that led to the study being published.

3. RESULTS AND DISCUSSION

This section presents the data derived from the study's findings. The first section analyzes the amount of study math anxiety, attitudes toward ICT, and study habits that affect student academic motivation in mathematics among public senior high school students. The second section shows the relationship between study math anxiety, attitudes towards ICT, study habits, and student academic motivation in mathematics. It also depicts the variables that most accurately predict student academic motivation in mathematics. The third section discusses the many path theories for student academic motivation in mathematics. It could be noticed that the standard deviation in all descriptive tables is less than 1.00, which is the average standard deviation for five-point Likert scaled studies, according to Wittink and Bayer (1994). This shows that the respondents to this survey provided consistent responses.

Level of Study Math Anxiety

Table 1 shows students' levels of study math anxiety as judged by four indicators: general mathematics self-efficacy, grade anxiety, mathematics for students' future and anxiety in class, and mathematics self-efficacy on assignment. Each of these describes how the students evaluated their own attributes when developing their self-definition. The overall mean rating of study math anxiety is moderate or 2.96 with a standard deviation of 0.435 distributed into four indicators with mean ratings arranged from highest to lowest, namely: 3.37 or moderate on grade anxiety, 3.22 or moderate on anxiety in class and mathematics self-efficacy on assignment, 2.64 or moderate on mathematics for students' future, and 2.60 or moderate on social general mathematics self-efficacy.

Table 1: Level of Study Math Anxiety

Indicator	SD	Mean	D.E.
General Mathematics Self-Efficacy	0.771	2.60	Moderate
Grade Anxiety	0.526	3.37	Moderate
Mathematics for Students' Future	0.626	2.64	Moderate
Anxiety In-Class and Mathematics Self-Efficacy on Assignment	0.627	3.22	Moderate
Overall	**0.435**	**2.96**	**Moderate**

The result suggest that the respondent's study habits is most influenced by their believe that they are the kind of person who is not good at mathematics, they also believe that they don't feel confident when taking a mathematics test as well they don't believe that they can do well on a mathematics test. Moreover, as depicted in the result the students don't feel confident enough to ask questions in mathematics class. Additionally, the result of this study is aligned with Hart & Ganley (2019) indicates that the nature of math anxiety in adults, revealing that moderate levels of math anxiety are prevalent and can adversely affect math performance, particularly among women as they don't feel confident in mathematics test. Moreover, student's self-efficacy is most influenced by their ability to control decisions related to significant school issues, express their opinions regarding necessary school amenities, and even impact the level of instructional help they receive (Cabayag & Guhao, 2024).Furthermore, these findings are consistent with earlier research demonstrating that understanding the characteristics of math anxiety is critical for establishing focused interventions to help persons coping with this issue. Wang, Lukowski, Hart, Lyons, Thompson and Petrill (2015) discovered that the impacts of math anxiety on mathematics performance varied according to students' motivation levels, implying that motivated students may be able to overcome the negative influence of math anxiety on their performance. On the other side, Escalera-Chávez, Moreno-García, García-Santillán, and Rojas-Kramer (2016) noted that while a reasonable level of worry can motivate students to better understand mathematical ideas, excessive anxiety can have a negative impact on performance.

Level of Attitudes Toward ICT

Table 2 display the statistics on attitudes toward ICT, with an overall mean value of 4.26 (extremely high). Perceived usefulness obtained 4.35 mean level or very high, followed by attitude toward ICT use with a mean rating of 4.26 or very high, and perceived ease of use with a mean rating of 4.16 or high.

Table 2: Level of Attitudes Toward ICT

Indicators	SD	Mean	D.E.
Perceived Ease of Use	0.696	4.16	High
Perceived Usefulness	0.478	4.35	Very High
Attitude Towards Use of ICT	0.509	4.27	Very High
Overall	**0.422**	**4.26**	**Very High**

The findings imply that, in general, the attitudes toward ICT of the respondents very high attributed to their perceived usefulness and attitude towards the use of ICT. Further, the respondents can find it easy to get ICT to do what the teachers want them to do. Moreover, the respondents believe that using ICT improve their learning and they look forward to lessons that require them to use ICT.

These results align with Ninković, Adamov and Makivić (2022) indicating that the use of ICT encourages motivation to learn, promotes cooperation between students and teachers, enhances interactivity in the classroom and improving their learning. ICT-related motivational components are critical to the development of ICT literacy among students (Senkbeil, 2021). Furthermore, the use of ICT in learning environments has been linked to increased student performance, motivation, and efficiency (Hoesni et al., 2020).

Additionally, students' attitudes about Information and Communications Technology (ICT) have been identified as a key element impacting their motivation and performance in educational settings (Gubbels, Swart, & Groen, 2020). According to research, good views about ICT can boost student motivation (Pardede, 2020). Furthermore, students' attitudes about ICT are influenced by their views about its use, as well as their perceived ease of use and usefulness (Arif & Handayani, 2021). Integrating ICT into teaching and learning has been shown to improve students' motivation, performance, confidence, and attitude toward learning (Majeed, Abbasi, Mustafa, Hussain, Saeed, & Khattak, 2021). As a result, access to and usage of ICT has been associated to good motivational effects, including increased student activity and engagement (Nouri, Zandi, & Etemadizade, 2022)

Level of Study Habits

Reflected on Table 3 are the data on the level of study habits with the overall mean rating of 4.12 or high. Note taking obtained 4.22 mean level or very high followed by time allocation to study with mean rating of 4.09 or high and lastly use of library with rating of 4.06 or high.

As depicted in the appended Table 3 the result suggest that the respondent's study habits are most influenced by the items "I have developed skills for effective note taking during every lesson" as well as students shows high response on their interest in library resources utilization and devoting extra-time to thoroughly learn a certain subject like mathematics.

Table 3: Level of Study Habits

Indicators	SD	Mean	D.E.
Note Taking	0.482	4.22	Very High
Use of Library	0.654	4.06	High
Time Allocation to Study	0.613	4.09	High
Overall	**0.405**	**4.12**	**High**

The result suggests that positive study habits like effective note taking in every lesson, along with interest, attitude, and motivation, are essential factors that contribute to students' success in mathematics. Moreover, stressed the impact of achievement motivation, locus of control, and study habits in predicting mathematical achievement among students, demonstrating that good study habits were connected with higher mathematics achievement (Villa & Sebastian, 2021). Furthermore, self-efficacy beliefs, academic anxiety, emotional intelligence, and cognitive engagement are strongly related to study habits and might have an impact on students' learning results (Bilge et al., 2014; Kaur et al., 2021; Iqbal et al., 2022). Furthermore, efficient study habits have been linked to higher academic achievement (Razia, 2015; Uju and Paul, 2017).

The association between study habits and student motivation has been extensively researched. While some research indicates a link between study habits and motivation (Aluja & Blanch, 2004), others imply that students' motivation levels may not always influence the establishment of study habits (Carredo et al., 2022). Nonetheless, it is obvious that effective study habits are required for students to meet their academic objectives (Viholainen et al., 2023). Hence, developing excellent study habits is critical for increasing students' motivation and academic achievement. Educators should encourage the development of excellent study habits, use technology to help learning, and consider individual differences in motivation and learning styles while creating an optimal learning environment.

Level of Student Academic Motivation in Mathematics

Table 4 shows the data on the level of student academic motivation in mathematics, with an overall mean rating of 3.82 or high and a standard deviation of 0.361. The indicators that define student academic motivation in Mathematics are arranged from highest to lowest as follows: mastery goals with a mean rating of 4.16 or high; interest with a mean rating of 4.10 or high; performance-approach goals with a mean rating of 4.07 or high; self-efficacy beliefs with a mean rating of 2.73; and fear of failure with a rating of 2.73 or moderate.

Table 4: Level of Student Academic Motivation in Mathematics

Indicators	SD	Mean	D.E.
Interest	0.622	4.10	High
Performance-approach Goals	0.782	4.07	High
Self-efficacy Beliefs	0.658	4.05	High
Mastery Goals	0.589	4.16	High
Fear of Failure	0.799	2.73	Moderate
Overall	**0.361**	**3.82**	**High**

The respondents' interest, performance-approach goals, self-efficacy beliefs and mastery goals has contributed to their level of student academic motivation in mathematics, as evident in their thinking that mathematics lessons are interesting and they can do almost all the mathematics work in class if they don't give up. Additionally, the respondents also believe that it is important that they thoroughly understand their mathematics work.

This in in cognizance with the findings that Wilkins (2021) stressed the importance of student motivation, engagement in mathematics classes and thinking that mathematics lessons are interesting, highlighting the relevance of mathematics across various disciplines. Furthermore, Ningsih (2018) found that implementing high-touch teachers and creating a good academic self-concept greatly increased students' interest in mathematical topics. Similarly, achievement motivation direct competence-relevant to the behavior of why individuals strive toward competence success and away from ineptitude failure (Centina, R.A.C., & Guhao, 2022). Moreover, Rodríguez (2020) found that students who performed well in mathematics had increased mastering motivation and felt competence in the subject.

Correlation between Study Math Anxiety and Student Academic Motivation in Mathematics

Shown on Table 5.1 is the correlation between study math anxiety and student academic motivation in mathematics among public senior high school students with an overall r value of -0.028 with p<0.568. Since the p value is greater than 0.05, therefore, findings imply that there was a not significant relationship between study math anxiety and student academic motivation in mathematics. The correlations between different aspects of student math anxiety and academic motivation in mathematics reveal key patterns. Stronger general mathematics self-efficacy corresponds to lower fear of failure and a stronger emphasis on mastering the subject. Conversely, grade anxiety aligns with heightened fear of failure and a focus on performance rather than understanding. The perception of math's importance for students' futures doesn't significantly impact other aspects of math anxiety or motivation. Anxiety experienced in class, coupled with self-efficacy beliefs, drives a focus on mastery. Overall, higher math self-efficacy is linked to reduced fear of failure and an emphasis on understanding, while anxiety, especially concerning grades and in-class experiences, correlates with heightened fear of failure and prioritization of performance outcomes.

Table 5.1 Significance on the Relationship between Levels of Student Math Anxiety and Student Academic Motivation in Mathematics

Student Math Anxiety	Student Academic Motivation in Mathematics					
	Interest	Performance-approach Goals	Self-efficacy Beliefs	Mastery Goals	Fear of Failure	Overall
General Mathematics Self-Efficacy	-.055 (0.257)	-.062 (0.202)	-.254* (0.000)	-.067 (0.169)	.222 (0.000)	-.062 (0.203)
Grade Anxiety	-.067 (0.167)	.005 (0.919)	-.177* (0.000)	-.055 (0.262)	.107* (0.028)	-.056 (0.250)
Mathematics for Students' Future	-.031 (0.524)	.086 (0.077)	.010 (0.839)	-.036 (0.461)	.007 (0.878)	.022 (0.656)
Anxiety In-Class and Mathematics Self-Efficacy on Assignment	-.040 (0.412)	.019 (0.695)	.113* (0.021)	-.019 (0.691)	.173* (0.000)	.023 (0.633)
Overall	-.070 (0.150)	.012 (0.809)	-.203* (0.000)	-.066 (0.178)	.196* (0.000)	-.028 (0.568)

Math anxiety has been a subject of interest in educational psychology due to its potential impact on students' academic motivation and performance in mathematics. Several studies have explored the relationship between math anxiety and student outcomes in mathematics. Meece et al.

(2021) highlighted the mediating influence of math anxiety on students' course enrollment intentions and performance in mathematics (Meece et al., 1990; . Wang et al., 2015) found that there are inverted-U relations between math anxiety and math performance in students with high intrinsic math motivation, indicating a complex interplay between anxiety and motivation (Wang et al., 2015).

Correlation between Attitude Towards ICT and Student Academic Motivation in Mathematics

Reflected in Table 5.2 is the relationship between attitude towards ICT and student academic motivation in mathematics. Considering the latent relationships, data illustrate that r-value and p-value indicate positive relationship towards each variable. The findings further show that the three observed indicators of attitude towards ICT had probability value of p<0.01 towards latent student academic motivation in mathematics.

Table 5.2: Significance on the Relationship between Levels of Attitude Towards ICT and Student Academic Motivation in Mathematics

Student Math Anxiety	Student Academic Motivation in Mathematics					
	Interest	Performance-approach Goals	Self-efficacy Beliefs	Mastery Goals	Fear of Failure	Overall
General Mathematics Self-Efficacy	-.055 (0.257)	-.062 (0.202)	-.254* (0.000)	-.067 (0.169)	.222 (0.000)	-.062 (0.203)
Grade Anxiety	-.067 (0.167)	.005 (0.919)	-.177* (0.000)	-.055 (0.262)	.107* (0.028)	-.056 (0.250)
Mathematics for Students' Future	-.031 (0.524)	.086 (0.077)	.010 (0.839)	-.036 (0.461)	.007 (0.878)	.022 (0.656)
Anxiety In-Class and Mathematics Self-Efficacy on Assignment	-.040 (0.412)	.019 (0.695)	.113* (0.021)	-.019 (0.691)	.173* (0.000)	.023 (0.633)
Overall	-.070 (0.150)	.012 (0.809)	-.203* (0.000)	-.066 (0.178)	.196* (0.000)	-.028 (0.568)

Students' perceptions and attitudes towards information and communication technology (ICT) significantly impact their academic motivation in mathematics. Firstly, perceiving ICT as easy to use correlates positively with self-efficacy beliefs and mastery goals. This suggests that students who find ICT user-friendly are more likely to have confidence in their mathematical abilities and strive to master concepts. Secondly, perceived usefulness of ICT strongly correlates with all aspects of academic motivation, particularly self-efficacy beliefs and mastery goals. Students who view ICT as beneficial tend to be more motivated in mathematics and exhibit confidence in their abilities. Additionally, a positive attitude towards using ICT is positively correlated with all aspects of academic motivation, indicating that students with favorable attitudes towards ICT usage are more motivated in mathematics, with a strong focus on mastering the subject. Overall, the findings suggest that students' attitudes towards ICT, especially perceiving it as useful and having a positive attitude towards its use, are associated with higher academic motivation in mathematics, including greater self-efficacy beliefs and mastery goals. While perceived ease of use also influences motivation, its impact is comparatively less significant than perceived usefulness and attitude towards ICT use.

Higgins et al. (2017) conducted a meta-analysis that showed an overall impact of technology on student achievement, motivation, and attitudes in mathematics. Ayub et al. (2012) found that there are positive relationships between teachers' attitudes towards integrating ICT in teaching and learning and school support, school facilities, and ICT culture. Sulistiyo et al. (2022) confirmed a positive and significant correlation between students' attitude and their actual use of ICT. Adhikari (2020) highlighted that effective and innovative uses of ICT in mathematics education stimulate and sustain student engagement levels. Arif & Handayani (2021) emphasized that motivation and ICT skills are associated with particular beliefs about the use of ICT, which mediate students' attitudes toward ICT.

Correlation between Study Habits and Student Academic Motivation in Mathematics

Reflected in Table 5.3 is the relationship between study habits and student academic motivation in mathematics with an overall r value of 0.194 with p<0.000. Considering the latent relationships, data illustrate that r-value and p-values indicate positive relationship towards each variable. The findings further show that the four observed variables of teacher self-efficacy had probability value of p<0.0. The table shows positive associations between study habits and academic motivation in math. Note-taking, library use, and study time allocation correlate with higher motivation, especially regarding self-efficacy, mastery goals, and overall motivation. Note-taking is linked to performance-approach goals, self-efficacy, mastery goals, and overall academic motivation. Library use correlates with performance-approach goals, self-efficacy, and overall motivation. Study time allocation strongly correlates with all aspects of academic motivation, particularly mastery goals and overall motivation. However, fear of failure does not significantly correlate with these study habits. These findings highlight the importance of effective study habits in enhancing academic motivation, particularly in mathematics.

Table 5.3: Significance on the Relationship between Levels of Study Habits and Student Academic Motivation in Mathematics

Study Habits	Student Academic Motivation in Mathematics					
	Interest	Performance-approach Goals	Self-efficacy Beliefs	Mastery Goals	Fear of Failure	Overall
Note Taking	.084 (0.084)	.105* (0.031)	.174* (0.000)	.102* (0.037)	-.081 (0.098)	.136* (0.005)
Use of Library	.051 (0.295)	.108* (0.027)	.102* (0.036)	-.004 (0.932)	-.080 (0.101)	.065 (0.185)
Time Allocation to Study	.088 (0.072)	.160* (0.001)	.201* (0.000)	.054 (0.272)	.045 (0.354)	.210* (0.000)
Overall	.105* (0.032)	.180* (0.000)	.225* (0.000)	.065 (0.182)	-.052 (0.286)	.194* (0.000)

In examining the relationship between study habits and student academic motivation in mathematics, several studies offer valuable insights. (Caprara et al., 2011; highlighted the importance of self-efficacy beliefs and personality traits in academic achievement, emphasizing the role of perceived self-efficacy in mastering specific academic subjects like mathematics (Caprara et al., 2011; Magulod, 2019) confirmed a positive correlation between study habits and academic achievement, supporting the idea that effective study habits contribute to better academic performance (Magulod, 2019). Additionally, found a substantial positive correlation between study habits and academic achievements of high school pupils, further emphasizing the significance of study habits in academic success (Sasi & R, 2020).

Moreover, Tella (2007) investigated the impact of motivation on academic achievement in mathematics among secondary school students, revealing significant gender differences in the relationship between motivation and academic achievement (Tella, 2007; . Villa & Sebastian, 2021) identified achievement motivation, locus of control, and study habits as predictors of mathematics achievement among college students, highlighting the role of study habits in academic success (Villa & Sebastian, 2021). Furthermore, Bibi et al. (2020) conducted a correlational study showing a positive relationship between students' study habits and academic achievement, reinforcing the importance of effective study habits in enhancing academic performance (Bibi et al., 2020).

Goodness of Fit Measures of the Three Path Analysis Models

To come up with the best model for student academic motivation in mathematics, path analysis was applied to three hypothesized models. The values of model fitting are presented in table and figure.

Generated Model 1. Figure 2 shows the generated path model 1 involving latent variables study math anxiety, attitudes toward ICT, study habits and student academic motivation in mathematics. The figure display student academic motivation in mathematics directly influences by attitudes toward ICT and study math anxiety. However, study math anxiety and study habits significantly affects attitudes toward ICT. Moreover, study math anxiety significantly correlated to study habits. Hence, it can be gleaned from the figure that study math anxiety to student academic motivation in mathematics has a β-coefficient of -0.01 and attitudes toward ICT to student academic motivation in mathematics 0.15. On the other hand, looking into the effect of the latent variables it revealed high β-coefficient value of study math anxiety and study habits with 0.08 coefficient.

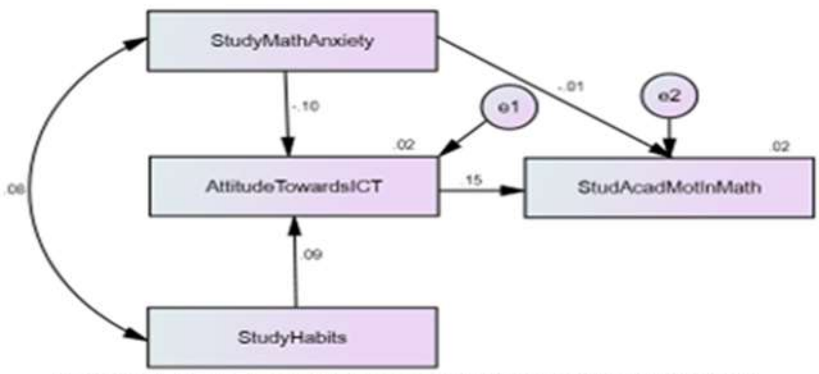

Figure 2. Path Analysis Model 1 in Standardized Solution

Legend: StudyMathAnxiety – Study Math Anxiety
AttitudeTowardsICT – Attitude Towards ICT
Study Habits – Study Habits
StudAcadMotInMath – Student Academic Motivation in Mathematics

Generated model 1 table 6.1 goodness of fit of measures of path model analyses scale was tested for parsimoniousness. Table 8 shows that the model did not fit. Close fitting models have P-close and RMSEA values above and below 0.05 (Kenny, 2015). The derived model values of P-close is

0.002, CMIN/DF is 14.824, RMSEA .181, CFI is .516, NFI is .571 and TLI is -1.903 indicate poor match. Stinger (2007) states that CMIN/DF should be less than 2 and Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI) should be better than 0.95 for a reasonable fir and close to 1 for an exceptional fit. Backed by table 8 data failed the basic requirement.

Table 6.1: Goodness of Fit Measures of Path Analysis Model 1

INDEX	CRITERION	MODEL FIT VALUE
P-Close	> 0.05	.002
CMIN/DF	0 < value < 2	14.824
P-value	> 0.05	.000
GFI	> 0.95	.983
CFI	> 0.95	.516
NFI	> 0.95	517
TLI	> 0.95	-1.903
RMSEA	< 0.05	.181

Legend:

CMIN/DF	-	Chi-Square/Degrees of Freedom
NFI	-	Normed Fit Index
TLI	-	Tucker-Lewis Index
CFI	-	Comparative Fit Index
GFI	-	Goodness of Fit Index
RMSEA	-	Root Means Square of Error Approximation
Pclose	-	P of Close Fit
P-value	-	Probability Level

Generated Model 2: The generated model 2 is shown in figure 3 latent variables study math anxiety, attitudes toward ICT, study habits and student academic motivation in mathematics. The figure presents student academic motivation in mathematics directly influences by study math anxiety and study habits. Furthermore, study math anxiety and study habits significantly affects attitudes toward ICT. Additionally, study math anxiety is significantly correlated to study habits. Moreover, the figure shows that study math anxiety to student academic motivation in mathematics has a β-coefficient of -0.04 and attitudes toward ICT to student academic motivation in mathematics 0.20. Conversely, looking into the effect of the latent variables it revealed high β-coefficient value of study math anxiety and study habits with 0.08 coefficient.

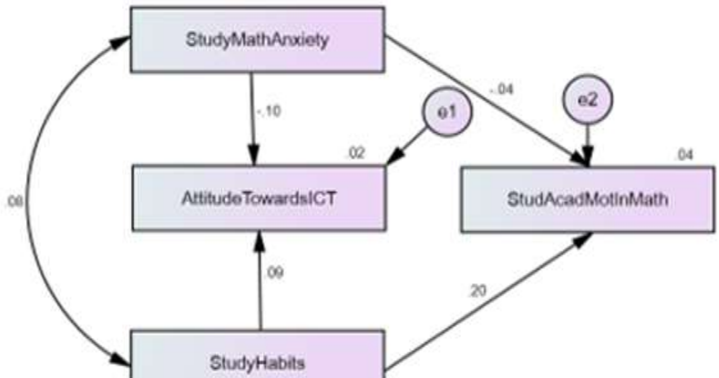

Figure 3. Path Analysis Model 2 in Standardized Solution
Legend: StudyMathAnxiety – Study Math Anxiety
AttitudeTowardsICT – Attitude Towards ICT
Study Habits – Study Habits
StudAcadMotInMath –Student Academic Motivation in Mathematics

The table 6.2 goodness of fit of measures of path model analyses scale was tested for parsimoniousness. Table 8 shows that the model did not fit. Close fitting models have P-close and RMSEA values above and below 0.05 (Kenny, 2015). The derived model values of P-close is 0.043, CMIN/DF is 7.527, GFI is .991, CFI is .772, NFI is .782, TLI is -.371 and RMSEA .125 indicate poor match. Stinger (2007) states that CMIN/DF should be less than 2 and Tucker-Lewis Index (TLI) and Comparative Fit Index (CFI) should be better than 0.95 for a reasonable fir and close to 1 for an exceptional fit. Backed by table 8 data failed the basic requirement.

Table 6.2: Goodness of Fit Measures of Path Analysis Model 2

INDEX	CRITERION	MODEL FIT VALUE
P-Close	> 0.05	.043
CMIN/DF	0 < value < 2	7.527
P-value	> 0.05	.006
GFI	> 0.95	.991
CFI	> 0.95	.772
NFI	> 0.95	.782
TLI	> 0.95	-.371
RMSEA	< 0.05	.125

Legend:
CMIN/DF - Chi-Square/Degrees of Freedom
NFI - Normed Fit Index
TLI - Tucker-Lewis Index
CFI - Comparative Fit Index
GFI - Goodness of Fit Index
RMSEA - Root Means Square of Error Approximation
Pclose - P of Close Fit
P-value - Probability Level

Generated Model 3: Illustrated in figure 4 is the generated model 3 with latent variables study math anxiety, attitudes toward ICT, study habits and student academic motivation in mathematics. The figure presents student academic motivation in mathematics directly influences by attitudes toward ICT and study habits. Furthermore, study math anxiety and study habits significantly affects attitudes toward ICT. Additionally, study math anxiety is significantly correlated to study habits suggesting a good fit.

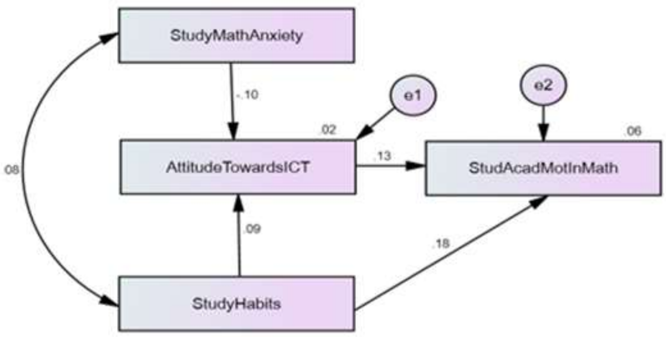

Figure 4. Path Analysis Model 3 in Standardized Solution
Legend: StudyMathAnxiety – Study Math Anxiety
AttitudeTowardsICT – Attitude Towards ICT
Study Habits – Study Habits
StudAcadMotInMath –Student Academic Motivation in Mathematics

The table 6.3 shows Goodness of Fit Measures of Path Analysis Model 3 came out as the best fit model satisfying the criteria for the standard-fit as a result of the causal model data fitting using Pearson r, which should be significant. Other criteria to be considered in order to have a good model fit as follows: a value of 0.95 or greater for CFI, which is comparative fit index (Byrne, 2001), RMSEA value of less than 0.05, which is the root means square of error approximation (Meyers, Gamst & Guarino, 2006), NFI or normed fit index value more than 0.95 (Hu & Bentler, 1999).

Furthermore, the model fits the observed data well and model 3 has satisfied all these criteria given that the P-Close value of .691 indicates acceptable fit, as it surpasses the threshold of 0.05. The CMIN/DF ratio of .428 falls within the ideal range of 0 to 2, suggesting a good fit. Furthermore, the p-value of .513 confirms the adequacy of model fit. The GFI value of .999 and CFI of 1.000 both exceed the recommended threshold of 0.95, indicating excellent fit. The NFI value of .988 indicates very good fit, while the TLI, although unusual with a value exceeding 1.000, still suggests good fit. Additionally, the RMSEA value of .000, being less than 0.05, suggests an excellent fit. Overall, the model exhibits good to excellent fit across all indices, accurately representing the relationships between variables in the observed data.

Additionally, table 6.3 shows that model 3 fits the latent variables. Third model is parsimonious. This study rejects the second null hypothesis that there is no optimal model for describing student academic motivation in mathematics among public senior high school students in region XI. The generated path model 3 shows the direct link of the exogenous variable with the endogenous variable and the current model was best of all, there was no need to test another model. There may be an ideal model that accurately predicts public senior high school students on their academic motivation in mathematics however the model shows that study math anxiety, attitudes toward ICT and study habits can predict student academic motivation in mathematics.

Table 6.3: Goodness of Fit Measures of Path Analysis Model 3

INDEX	CRITERION	MODEL FIT VALUE
P-Close	> 0.05	.691
CMIN/DF	0 < value < 2	.428
P-value	> 0.05	.513
GFI	> 0.95	.999
CFI	> 0.95	1.000
NFI	> 0.95	.988
TLI	> 0.95	1.120
RMSEA	< 0.05	.000

Legend:
CMIN/DF - Chi-Square/Degrees of Freedom
NFI - Normed Fit Index
TLI - Tucker-Lewis Index
CFI - Comparative Fit Index
GFI - Goodness of Fit Index
RMSEA - Root Means Square of Error Approximation
Pclose - P of Close Fit
P-value - Probability Level

This relationship is further supported by studies indicating that adolescents with low math motivation exhibit a negative association between math anxiety and math performance (Milovanović, 2020). Furthermore, the effect of math anxiety on motivation has been highlighted, emphasizing the impact of anxiety on students' overall academic drive (Zakaria & Nordin, 2008).

Moreover, attitudes toward Information and Communication Technologies (ICT) have been linked to student motivation. Positive attitudes toward ICT education have been associated with better academic performance. Studies have confirmed a positive and significant correlation between students' attitudes and their actual use of ICT, indicating the importance of fostering positive attitudes toward technology in education to enhance student motivation (Sulistiyo et al., 2022). Teachers' positive attitudes toward ICT have also been shown to influence their level of technology use in classrooms, further emphasizing the role of attitudes in promoting effective ICT integration and student motivation (Alzaidiyeen et al., 2010).Furthermore, study habits play a crucial role in student motivation. Factors such as metacognitive awareness, self-efficacy, and academic motivation have been found to positively influence students' attitudes toward mathematics (Nourozzade & Soleimani, 2022). Additionally, the use of ICT in teaching has been shown to enhance students' motivation, creativity, and critical thinking, highlighting the importance of technology in promoting student engagement and motivation (Yumnam, 2021). The incorporation of ICT in education has been found to positively impact students' attitudes, leading to improved performance, motivation, and efficiency (Hoesni et al., 2020).

CONCLUSION

Study math Anxiety levels consistently remained moderate, as frequently observed. The heightened levels of the indicators namely: general mathematics self-efficacy, grade anxiety, mathematics for student's future, anxiety in-class and mathematics self-efficacy on assignment contribute to the observed level of anxiety in this study. Thus, Moderate level of math anxiety allow pursuit of learning goals despite manageable discomfort.

The level of attitudes toward ICT exhibited high standard. The heightened levels of the indicators namely: perceived ease of use, perceived usefulness and attitude towards the use of ICT contribute to the elevated level of the variable. Based on the findings there was an important link between attitude towards ICT and students' academic motivation in mathematics as it highlights Students' positive attitudes towards ICT, alongside its perceived usefulness and ease of use, positively influence academic motivation in math. Perceived usefulness correlates with interest, self-efficacy beliefs, and mastery goals, while attitude towards ICT correlates with interest, performance-approach goals, self-efficacy beliefs, and mastery goals. This suggests that favorable perceptions of ICT enhance motivation in mathematics, particularly regarding interest, self-efficacy beliefs, and mastery goals, with fear of failure showing no significant correlation. Thus, a very high attitudes show students acknowledge technology's educational value and benefits.

Most of the time, study habits are observed with high level of the variable resulted from the high level of most indicators namely: note taking, use of library and time allocation to study contributed to the high-level result of study habits. The relationship between of study habits with the indicators note-taking and time allocation positively correlate with math motivation, including performance-approach goals, self-efficacy beliefs, mastery goals, and overall motivation. Note-taking also negatively correlates with fear of failure. Library use is less strongly correlated but still positively associated with performance-approach goals and self-efficacy beliefs. These habits contribute to students' interest, self-efficacy beliefs, and mastery goals in mathematics. Hence, strong study habits signal students' readiness to engage actively, positively impacting their motivation and success.

The level of student academic motivation in mathematics is high, indicating a frequent occurrence. Moreover, the heightened levels of the indicators namely: interest, performance-approach goals, self-efficacy beliefs, mastery goals and fear of failure contributed to the elevated degree of student academic motivation in mathematics. Thus, a high student academic motivation reflects strong drive, enthusiasm and commitment toward educational goals and pursuits.

Model 3 emerged as the best fit model that predicts the student's academic motivation in mathematics. The third derived model path model is considered the most appropriate one because it accurately captures the investigated variables. The result of this study provides evidences against the second null hypothesis, which posits that there is optimal model for explaining the level of student academic motivation in mathematics among public senior high school students.

The data showed the major impact on the endogenous variable student academic motivation in mathematics and exogenous variables study math anxiety, attitude towards ICT and study habits. The research findings corroborated by Wigfield & Eccles (2000) which posits that motivation describes the relationship of student's expectancy for success at a task or the achievement of a goal in relation to the value of task completion or goal attainment supported by Weiner (1974) on Attribution theory of motivation which concerned with how individuals interpret events and how this relates to their thinking and behavior.

RECOMMENDATION

The study revealed that study math anxiety has a moderate mean among the variables; therefore, the researcher recommends that teachers may support students with moderate math anxiety involves enhancing coping strategies, creating supportive setting, involving parents, and using technology to foster resilience, engagement, and academic achievement offering holistic assistance. Additionally, the school administration might implement strategies and programs to enhance technology attitudes fosters academic success and equitable access, maximizing its potential in education. In terms of study habits, students should prioritize organization and time management for enhanced academic success. Develop structured study approaches and set realistic goals to optimize learning outcomes and achieve academic excellence. Additionally, The Department of Education personnel may implement programs that will boost student academic motivation in mathematics like goal-setting workshops, peer mentoring, extracurriculars, positive feedback, and student leadership to foster student motivation and enhance academic drive. Moreover, encourage students to cultivate effectively study habits, backed by teachers, parents, and the department of education. Offer resources to boost math motivation, promote achievement in academics and confidence. Furthermore, Students, teachers, and parents might recognize performance factors since Model 3's good fit suggests a reliable framework for understanding educational variables, while the Department of Education can use the findings for informed policy decisions, improving educational outcomes.

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