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RESEACH ARTICLE

Integrating Technology in Mathematics Instruction Among Senior High School Students at Mindanao State University - Sulu

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ABSTRACT. The degree to which senior high school students at Mindanao State University-Sulu are using technology in their mathematics education is being investigated in this descriptive-quantitative study. Using Pearson's r test of correlation, one-way ANOVA, weighted mean, standard deviation, and t-test for independent samples. The study's conclusions are as follows: 1) There is an equal gender distribution among the 136 students who responded from Mindanao State University-Sulu, with the same proportion of male and female students. The majority of responders are between the ages of 17 and 20, which is the typical age range for seniors in high school and those just starting college. The STEM strand has a higher enrollment rate than the GAS strand in terms of academics, indicating a preference for fields connected to science, technology, engineering, and mathematics. 2) Senior high school students at Mindanao State University-Sulu generally perceive the integration of technology in mathematics instruction positively. However, in terms of reliability, perceptions were moderate, indicating that while technology supports instruction, certain areas require improvement. 3) No significant differences were found in students' perceptions of technology integration in mathematics instruction when grouped by age, academic strand, and grade level. However, gender was found to influence specific areas of perception, leading to the rejection of the hypothesis related to gender. And 4) The study examined the correlation among various aspects of technology integration in mathematics instruction among senior high school students at Mindanao State University-Sulu.

KEYWORDS: Technology Integration, Mathematics Instruction, Senior High School

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Introduction

The 21st century is characterized by swift progress in innovation, development, and technology, all of which have reshaped the educational environment. In the current digital era, technology is essential in almost every facet of life, affecting how students acquire knowledge and how educators instruct. From city hubs to distant rural areas, availability of digital devices and internet access has become more common. In this scenario, incorporating technology into education is not merely advantageous but crucial. Especially in the field of mathematics education, technology offers chances to enhance learning, increase engagement, and promote a deeper understanding of concepts (Comeros, N.A., Cuilan, J.T., Chavez, J.V., 2024).

As noted by Serin (2023), technology has greatly transformed the teaching and learning of mathematics, evolving past conventional approaches like textbooks and chalkboards. Technological resources—from virtual simulations to cooperative digital platforms—enhance the accessibility, engagement, and personalization of mathematics. These resources promote critical thinking, problem-solving, and learner independence, motivating students to engage with mathematics with assurance and inquisitiveness. Nonetheless, despite its advantages, the incorporation of technology is often uneven throughout various educational institutions, frequently because of constraints in resources, professional development, or access to dependable infrastructure (Garil B.A., Entong M.B.M., Muarip V.C., et al., 2024).

As education evolves in the 21st century, there is a growing emphasis on cultivating advanced thinking skills, effective communication, collaboration, and adaptability in students. Sachdeva and Eggen (2021) state that it is essential for students to be encouraged to reflect on and take charge of their learning journeys. In reply, teachers are urged to adopt innovative teaching techniques that leverage digital educational tools—such as web-based resources and interactive eBooks—to promote engaging and inclusive learning environments. Bozkurt and Mujgan (2015) highlight how these materials improve engagement and comprehension. Moreover, research by Vale and Barbosa (2023) highlights that active learning methods enhanced by technology enhance mathematical communication and promote collaborative problem-solving. Despite these clear advantages, many students at Mindanao State University – Sulu Senior High School Department continue to struggle with fundamental math concepts. This problem is compounded by a lack of captivating instructional techniques and limited availability of technological tools in learning environments. As contemporary learners are familiar with digital media, their academic success and enthusiasm can significantly improve with interactive, technology-based instructional approaches (Bondoc Jr. RS.,2023).

Effective integration of technology in mathematics requires more than merely possessing devices; it significantly depends on teachers' skills, mindsets, and the available support structures. Serin (2017) highlights that the technological competence of educators and their ability to incorporate digital tools with educational goals are crucial for achieving meaningful learning outcomes. To emphasize this, Christensen and Knezek (2017) underscore the importance of professional development that equips educators with the enthusiasm and skills to incorporate mobile devices and other technologies into their instructional approaches.

Nevertheless, factors such as insufficient internet access, lack of computer resources, and teachers' limited digital skills as barriers to effective technology use in classrooms (Roble et al.,2020). Even in schools where technology is available, research by Wachira and Keengwe (2011) indicates that its potential remains underutilized.

Recognizing these gaps, this study seeks to examine the integration of technology in mathematics instruction among senior high school students at Mindanao State University-Sulu. It aimed to assess how technology affects students' engagement and performance, and whether its application meets the learners' academic needs (Espartero MM, Caldaza KPD, Prado RTD., 2024). As noted by Ben Abu and Kribushi (2022), effective technology integration requires careful selection and management of tools to support knowledge construction and engagement. Additionally, Backfisch et al. (2021) assert that the success of technology in enhancing learning depends largely on how it was embedded into teaching practices.

Through this research, the goal was to evaluate the current extent of technology integration in mathematics instruction and to identify gaps and opportunities for improvement. The findings aimed to offer practical insights for educators, encouraging them to adopt digital tools effectively and align them with pedagogical strategies that enhance student learning. Ultimately, this study contributed to a broader understanding of how to harness technology to transform mathematics education and foster a more dynamic, inclusive, and effective learning environment.

Research Questions

1. What is the profile of faculty-respondents in terms of:

1.1.Gender;
1.2.Age;
1.3.Civil status;
1.4.Length of Service; and
1.5.Educational attainment?

2. What is the extent of gender role conflict among faculty members of Sulu State College in the context of:

2.1. Success, power and competition;
2.2. Restricted emotionality
2.3. Restrictive affectionate behavior; and
2.4.Conflicts between works and family relation;

3. Is there a significant difference in the gender role conflict among faculty members of Sulu State College when data are categorized according to:

3.1.Gender;
3.2. Age;
3.3.Civil status;
3.4. Length of service; an
3.5.Educational attainment?

4. Is there a significant correlation among sub-categories subsumed under the extent of gender role conflict among faculty members of Sulu State College in terms of Restricted emotionality, Success, power and competition, Restrictive affectionate behavior; and Conflicts between works and family relations?

Literature

Foreign Studies and Literature

Structure for Technological Pedagogical and Content Knowledge (TPACK). As mentioned in online education by McGraw Hill Canada (2019). Viewing technology as a separate field of knowledge presents challenges; however, understanding the Technological, Pedagogical, and Content Knowledge (TPACK) framework allows us to effectively integrate technology into our instructional content and teaching strategies, enhancing our students' learning experiences. (Mishra & Koehler, 2006) propose that the creation of curriculum and teacher training ought to be directed by Technological, Pedagogical, and Content Knowledge (TPACK). To implement Technological, Pedagogical, and Content Knowledge (TPACK) in our classrooms, Harris, J.B. and colleagues (2010) collaborated with university peers from various institutions across the United States to create Activity Types. Their paper, "'Grounded' Technology Integration: Instructional Planning with Curriculum-Based Activity Type Taxonomies," explains how TPACK can transform our regular lesson planning.

Customized Education. According to the U.S. Department of Education (2010, 2016), it refers to adjusting the speed of learning and teaching techniques to fit the requirements of every individual learner. This implies that learning objectives, teaching strategies, and educational materials (as well as their arrangement) can all be adjusted according to the needs of the learner. "Learning is an inherent human endeavor influenced by individual experiences, cognitive understanding, personal prejudices, beliefs, cultural heritage, and surroundings." Thus, education is a tailored process that enables individuals to broaden their knowledge, views, abilities, and comprehension (Bucoy RK, Enumerabellon KM, Amilhamja AJ, et al. 2024). Therefore, incorporating technology can be essential for customizing the learning experience. (Shemshack and Spector, 2020). Moreover, the learning activities hold great importance and relevance for the students, shaped by their interests, and are often started by the learners themselves (2016, p. Sure! Please provide the text you would like me to paraphrase. Bray and McClaskey (2015) define a personalized learning environment as a setting where learners take an active role in their educational journey. This implies they can also select how to showcase their knowledge and offer proof of their comprehension. The student should concurrently cultivate various elements of his character and mental skills (Kaminskiene & DeUrraza, 2020).

In a learner-centered environment, "student-centered teaching methods in the context of technology-supported personalized learning stimulate the cognitive activation of the students, and the supportive climate increases slightly with a higher degree of students' voice and choice on the computer."Schmid, et al. (2022) while the teacher serves as a guide on their personal journey (p. 14) and the student creates their own unique learning path in collaboration with their peers. (Humanistic Perspective).

Usefulness. According to research on technology use and integration, schools and teachers are more likely to use technology to personalize learning "if it complements current, student-centered practices and aids in problem-solving or addressing challenges; it is a component of an organization-wide, systemic effort to implement student-centered learning; and teachers have access to a wealth of professional development opportunities and continuous support." (Rathore, M. K., & Sonawat, R., 2015; Integration of technology in education and its impact on learning of students).

Reliability. A study on the Integration of Technology in Education and its Effects on Learning and Teaching, et.al., (2023) noted that technology has enhanced teaching methods and student learning experiences, significantly influencing education. Nonetheless, issues with hardware failures, software incompatibilities, and internet connectivity emerge regarding the reliability of technology in education, which obstructs its seamless integration in classrooms (Leon AJTD, Jumalon RL, Chavez JV, et al., 2024). To enhance reliability in IC design, educators are tackling these challenges by incorporating reliability aspects into circuit and systems education and emphasizing a holistic perspective on digital systems.

Walkington, C., & Bernacki, M. L. (2020) remarked that "Personalized Learning maintains its ability to generate enthusiasm and excitement among educators, leaders, and schools, yet can elicit less enthusiasm from researchers." PL might be seen as overly variable in its definition, insufficiently rigorous, and too unconcerned with learning theory to be suitable for empirical research. When implemented thoughtfully, personalized learning can enhance students' enthusiasm and motivation in mathematics by tailoring lessons to suit individual needs, building mathematical confidence, and encouraging overall educational development. (Sharma, P., 2024). Specifically, the adoption of adaptable content tools and a learning setting that considers students' interests, requirements, skill levels, and assistance must be included in professional learning for math educators. (Ogwari et al., 2020). According to Saal, P. E., & Graham, M. A. (2023), educators should receive continuous professional training on incorporating technology into math teaching from those in governance. Training sessions should be customized based on the instructors' experiences and skills, along with the school's needs for digital infrastructure (Verdeflor RN, 2024).

Fitriasari, L., & Abadi, A. M. (2019). "A survey on the perception of students against technology in learning mathematics" Technology plays a role in supporting many activities, including learning activities, and can support the learning process. Advances in information and communication technologies have changed people's perceptions of the world, including the field of education (Cuilan JT., Chavez JV., Soliva KJG., et.al. 2024). It was found out that 70% of learners were enthusiastic and interested in using technology, particularly while learning mathematics. As a major facilitator, Mohamudally-Boolaky, A., & Padachi, K., (2024) technology helps students get ready for a world that is extremely complicated and gives them the chance to think mathematically, which could improve their chances in a society that is driven by technology. Ince-Muslu, B., & Erduran, A. (2020) demonstrated that both teacher-driven and non-teacher-driven elements influenced the process of integrating technology which benefit greatly from the use of innovative technologies in relevant mathematics instruction.

The study revealed a proposed framework: A conceptualization of the elements influencing technology integration in mathematics education. Ince-Muslu, B., & Erduran, A. (2020) identified 20 factors that influence the teachers. These elements encompassed planning, self-assurance, understanding of technology, views on technology, and technological resources; nine elements were linked to aspects not influenced by educators, such as environmental conditions, administrative backing, student preparedness, financial status, mathematics curriculum, and mathematics curriculum methodology (Mundo MAD, Reyes EFD, Gervacio EM.,2024). The factors that impacted the integration of technology in mathematics education were interconnected, and a structure was suggested to tackle these elements. Likewise, it was found that ICT training had a notable impact on perceived utility and perceived ease of use. (Arthur, 2022)

Susuoroka, et.al., (2023) on their study entitled, Technology use among senior high school mathematics teachers and the factors that influence it. Based on the findings, "Mathematics teachers' technology uses in teaching Mathematics at the Junior High School level in the district was low (2.048 ± .85388). These technologies were grouped into manipulatives, digital/computer-based and audio-visual technologies. The results established that most of the teachers used manipulates in teaching Mathematics (3.120 ± 1.063). Examined how the interplay between these themes evoked ranges of social, tangible, and digital entities resulting in different learning experiences. Draw on notions of collectives to articulate a socio-technological assemblage and suggest that the notion of an assemblage helps to understand how teachers can use educational technologies to support new learning experiences in their mathematics classrooms." (Castro FLT, Ventura BLO, Estajal, RS, et al. 2024).

According to Kocbas, E. & Koc, M. (2023). Review of Graduate Theses Conducted in Turkey on the Use of Technology in Mathematics Teaching. The more technology advances, the more it is used in education in general and in math instruction in particular. Based on their study, using technology in the classroom improves student attitudes, boosts achievement, and gives concepts greater meaning through visualization. It also makes maths sessions more fun. Additionally, It was discovered that Students' interest in mathematics acts as a partial mediating factor in the statistically significant relationship between using technology in math instruction and learning and math performance. (Bright, et. Al., 2024)

Atteh,et.al., (2020). "Integration of ICT in mathematics education also has a positive impact on mathematics teaching and learning. It is therefore necessary for teachers in mathematics to use technology in teaching, and also to encourage students to use technology in mathematics learning (Verdeflor RN.,2024). With the teaching and learning of mathematics becoming more and more technology base these days to the younger generations, it is, therefore, crucial to throw more light on the use of technology among school mathematics teachers and students which is the new wave of recommended instructions." Nurhidayat, et.al, (2024) Understanding how teaching and learning work together is essential for educational progress in a time when technology has completely changed these two processes. The findings demonstrate that teacher competency and technology integration have a major impact on the evolution of 21st-century learning. Thus, as discussed by Sharafeeva, L. (2022). This can be used to evaluate the importance of the motivating factor in advanced training, retraining, and teaching staff training in the area of mobile learning for mathematics (Calzada KP. D.,2024).

Apparently, It is recommended by Temel & Gür (2022) that teacher candidates take more courses in digital technology use during their undergraduate studies. However, Lack of resources and teacher technology proficiency are obstacles to the adoption of technology-based learning. As a result, it was clear that students had a very favourable opinion of the use of computers in maths classes, despite the fact that nearly all of them had little to no access to computers at school. To guarantee that teaching and learning go smoothly, the institution should make sure that every student has their data card filled with uncapped data. (Maqoqa, 2023).

Local Studies and Literature

As stated by Roble, D. B. et al. (2019) in their research, Teachers' Views on Incorporating Technology in Mathematics Classes among educators in Cagayan De Oro City, Philippines. Even though math teachers hold positive views on integrating technology into the classroom, they still need training on utilizing different technological tools that can enhance students' math skills. In collaboration with DepEd, HEIs could develop a sustained training workshop on integrating technology into mathematics education. For the desired goals to be met, technology should be integrated into the curriculum as well. Therefore, the movement towards encouraging increased utilization of technology and blending it with education and subject matter is evident in the areas of science, technology, engineering, and mathematics. Morales, M. P. E. et al., (2021)

As narrated by Abas, M. S., & David, A. D. (2019) study on "Teachers' self-assessment towards technology integration in teaching mathematics". High levels of competency in using technology were demonstrated by their positive evaluation regarding the use of technology in the classroom and its beneficial effects on students' behaviour during the teaching-learning process, they were optimistic. The most frequently utilized technology was the scientific calculator, while the least popular was the television. They also asserted that they must teach many concepts twice, with and without technology as the only variable that does not impede the use of technology.

An investigation into Flexible Teaching-Learning Approaches in Mathematics Education at a State University in the Western Philippines. Bautista & Valtoribio (2024) demonstrated that adaptable teaching-learning approaches influence education by removing barriers and enhancing student engagement. It highlighted the importance of combining technology and offering professional development opportunities to enhance the quality and accessibility of flexible teaching and learning, which will ultimately lead to inclusive learning environments (Savellon KIS, Asiri MS, Chavez JV). 2024). Thus, to teach mathematics effectively, the educational institution needs to tailor the learning experience by integrating online platforms and various assessments (Murro RA, Lobo JG, Inso ARC, Chavez JV). 2023). To promote student comprehension of the content and enhance the engagement of teaching resources, math instructors ought to adopt strategies that ignite their curiosity and interest (Inoferio HV, Espartero MM, Asiri

MS, et al., 2024). In order for students to genuinely grasp the material and satisfy their desire to learn, the module must be straightforward and incorporate additional resources like videos for further clarification alongside the physical copy. (Sakili, M. et al., 2024). Nevertheless, this remains a major barrier in rural areas where teachers struggle to utilize the instructional materials. (Mendiola, A. C., & Estonanto, A. J. 2022).

De Gracia, (2019) During the school years when instructional technology was included into the classroom, students' performance on periodic exams did not improve; instead, improvements were only seen in their final math grades. This does not imply, however, that employing educational technology is not a successful teaching method. Actually, the majority of the learners who responded said that they learn more effectively when their professors employ technology in the classroom. Administrators should ensure that instructors receive regular and ongoing training to become proficient with the use of technology in the classroom, even when teachers would prefer to learn how to utilize it on their own.

A study on Embracing Digital Technologies into Mathematics Education, revealed that "When teachers do not try to develop standard procedures for utilizing technology, students often struggle to use the instrument well. Teachers can only possibly assist their pupils in integrating teacher and agent instructions when they grasp how the tool works for themselves. Instead of having one cohesive learning experience, students are kept from their teachers and devices." (Gamit, 2023) "Results also indicate that male and female teachers differ significantly in their attitudes toward using technology in mathematics teaching. Likewise, it is suggested that mathematics teachers should develop and strengthen a positive attitude towards learning and teaching with technology."(Marpa, E. P.,2021)

Rasid, S.B. and Rasid, R.A. (2018) discussed the Integration of Technology-Aided Instruction in teaching mathematics for 10th-grade students, aligning with the results of Clark, J. (2008); Apperson, J.M. et al. (2006); Pearson, M. et al. (1994); and Sazabo, A. and Hasting, N. (2000). "Clearly, technology-assisted instruction was more effective than conventional teaching in boosting the academic performance of Grade 10 students; tools like PowerPoint presentations may improve students' learning, extend their attention span, and enhance memory retention." According to Gurrea, A. T. et al. (2023) in their article titled "Making Math Fun and Engaging Through Modern Technology: Capacity Building for Mathematics Teachers." Therefore, it is suggested that the Department of Education consider providing training for teachers on utilizing various technological tools in mathematics at all educational levels, enabling math teachers to skillfully integrate technology into their classrooms. (Roble, D. B. et al., 2020) The research indicates that "Mathematics educators ought to enhance their skills in employing ICT-driven instruction to boost teaching effectiveness." Offering professional development programs can help educators incorporate technology efficiently into their teaching. As noted by (Pasayloon, 2023).

However, due to a lack of resources and constrained funding from the Maintenance and Other Operating Expenses (MOOE), the respondents seldom use telecommunication tools such as cable, satellite, fax machines, and others to interact with students. Widely acknowledged challenges comprised insufficient ICT resources, inadequate training, and a lack of confidence in using ICT (Carpio LB, Caburnay ALS, Nolledo SM, et al., 2024). Considering the information presented, the researchers recommended that mathematics teachers should have more opportunities to participate in ICT-oriented seminars and training programs. Alcantara et al., (2020). Based on their study, the degrees of ICT skills and use among Mathematics educators and their views on ICT incorporation and students' problem-solving skills. (Pastor & Pedro, 2023). Schools are urged to allow teachers to use computers more openly and offer extensive training to improve their computer skills and literacy. Educators could employ advanced technology and the capability to create new teaching resources and methods in this endeavor (Jacinto & Samonte, F. A., 2022).

Methodology

1. *Population and Sampling Design*

This research employed a descriptive research design. As stated by Dela Cruz and Silverio (2019), the Descriptive Research Design demonstrates current traits, situations, visuals, and similar aspects based on the impressions, perceptions, or responses of the participants. The research was carried out at Mindanao State University-Sulu, specifically within the Senior High School Department situated at Capitol Hills, Patikul, Sulu. The research involved one hundred thirty-six students from various strands out of 160 chosen students from Mindanao State University-Sulu Senior High for the academic year 2024-2025. A method called stratified random sampling chooses a subset of items from the population through random selection and categorization.Subsequently, upon determining the total count of students, the researcher categorized the grade 11 and grade 12 students based on their strands, which are exclusively STEM and GAS. In the third step, after determining the total number of students from the specified strands, the researcher categorized the students by their gender as either male or female. In the final step, the researcher chose the target number of participants after refining the selection from the total population based on gender to clearly define the selected respondents for the study. As stated by Talikan (2024), stratified sampling is a type of probability sampling method where the characteristics of the population are assessed concerning a particular variable (Iliyasu & Etikan, 2021).

2. *Research Instruments*

The research instrument used was derived from three (3) related studies of sample close-ended questionnaires to acquire substantial data in determining the extent of integrating technology in mathematics instruction towards students' performance in mathematics. It adapted and conformed from Rizada, C.S., & Rey, R.P (2023) model in their research article entitled, Effects of using technology on the academic performance in mathematics of the college millennial learners.The questionnaire was divided into sections. Part I dealt with collecting the demographic profile of the respondents. Part II was consisted of the three (3) context which are Personalized Learning (10 items); Usefulness (20 items); and Reliability (20 items).

3. *Data Gathering Procedure*

The researcher secured a letter of permission from the Dean's Office of Graduate Studies for the launching of questionnaire. After securing the letter of permission from the Dean's Office of Graduate Studies, the researcher immediately proceed to seek the letter of approval from the Chancellor of Mindanao State University-Sulu Campus. After the approval of the Chancellor, the researcher then asked permission from the Senior High School Department Director. The Director agreed and permitted, the researcher also seek guidance from the advisers to administered the instruments to the sample respondents who was included in the list.

4. *Data Analysis*

The data evaluation for this research will utilize both qualitative and quantitative approaches to thoroughly assess the feedback collected from the surveys. Descriptive statistics will be employed to outline the demographic characteristics of the participants, incorporating variables like age, gender, and educational strand (STEM or GAS). In analyzing the sections of the questionnaire, especially those related to Personalized Learning, Usefulness, and Reliability, average scores will be determined for every item in these areas. This will allow the researcher to assess the general trends in students' views on the integration of technology in their math instruction. To investigate the connections between variables more deeply, inferential statistical techniques like t-tests or ANOVA can be utilized. These assessments will enable the researcher to identify if there are statistically meaningful variations in perceptions related to gender or educational track. Qualitative data, should there be any open-ended replies, will be examined through thematic analysis. Ultimately, the outcomes of the quantitative and qualitative analyses will be combined to form thorough conclusions about the influence of technology integration on students' performance in mathematics. The results will be examined in connection with current literature, emphasizing their significance for teaching methods and potential future research paths.

Results

Question 1. What is the demographic profile of the student-respondents from Mindanao State University- Sulu Senior High School Department in terms of 1.1 Gender, 1.2 Age, 1.3 Strand and 1.4 Grade Level?

The demographic profile of student responses by gender is displayed in Table 1.1. This table shows that 68 (50.0%) of the 136 student responders are male, and 68 (50.0%) are female. The results of this study showed that women made up over half of the student responders in total. This suggests that, in terms of gender, the vast majority of Mindanao State University-Sulu's elementary students who responded were female.

Gender	Number of respondents	Percent
Male	68	50.0%
Female	68	50.0%
Total	136	100%

The age distribution of the student responses from Mindanao State University-Sulu is displayed in Table 1.2. This table shows that, of the 136 students who responded, 35 (25.7%) are 16 years of age or younger, 80 (58.8%) are 17–20 years old, and 21 (15.4%) are 21 years of age or older. More than half of the student respondents in this study are between the ages of 17 and 20, according to the findings. The results of this survey are pertinent to this educational level because it was further inferred that the majority of the student respondents are within the typical age range for senior high school and early college education.

Age	Number of respondents	Percent
16 years old and below	35	25.7%
17-20 years old	80	58.8%
21 years old and above	21	15.4%
Total	136	100%

The demographic profile of student respondents by Strand was displayed in Table 1.3. This table shows that 71 (52.2%) of the 136 student respondents were enrolled in the STEM strand, whereas 65 (47.8%) were enrolled in the GAS strand. According to this report, over half of the student respondents are enrolled in the STEM strand. This further suggested that while a nearly equal percentage of students are pursuing a more general academic track, a sizable portion are attracted toward fields connected to science, technology, engineering, and mathematics.

Strand	Number of respondents	Percent
STEM	71	52.2%
GAS	65	47.8%
Total	136	100%

Table 1.4 showed the demographic profile of student-respondents in terms of Grade Level. It can be seen from this table that out of 136 student-respondents, 69 (50.7%) were from Grade 11, while 67 (49.3%) were from Grade 12. This study revealed that nearly half of the total number of student-respondents are in Grade 12. This further implied that the student-respondents involved in this study were almost equally distributed across Grade 11 and Grade 12, ensuring a balanced representation of both levels in the study.

Grade Level	Number of respondents	Percent
Grade 11	69	50.7%
Grade 12	67	49.3%
Total	136	100%

Question 2. What is the extent of integrating technology in mathematics instruction among senior high school senior high school students in terms of 2.1 Personalized Learning, 2.2 Usefulness: 2.2.1 Advantages, and 2.2.2 Disadvantages, 2.3 Reliability, and 2.4 Teaching Strategies

The degree of technological integration in senior high school math classes within the framework of personalized learning was displayed in Table 2.1. Senior high school students generally viewed technology integration in mathematics instruction favorably, as it improved engagement, comprehension, and the overall learning experience. This category received a total weighted mean score of 3.64 with a standard deviation of 0.58608, rating it as "Agree."

	Statements	Mean	S.D	Rating
1	I am glad to learn math with the help of technology.	4.24	.722	Agree
2	I pay more attention and feel more active in the subject matter of mathematics during the learning process with the help of technology.	3.78	.875	Agree
3	Learning math with the help of technology makes it easier for me to understand the subject matter.	4.07	.827	Agree
4	I asked questions that I did not understand when learning mathematics with the help of technology.	3.89	.924	Agree
5	I will get a loss if I do not follow the process of learning math with the help of technology.	3.40	1.028	Partially Agree
6	Using technology such as Mobile Phone, iPad, Laptop, or Projector in math is interesting.	3.74	.996	Agree
7	I am nervous in my math class if the teacher is using technology.	3.19	1.126	Partially Agree
8	I feel insecure if some of my classmates are using a gadget in my math class.	2.81	1.208	Partially Agree
9	Using a mobile phone, I am more comfortable in math.	3.56	.995	Agree
10	I improve my math performance using technology.	3.68	.988	Agree
	Total Weighted Mean	3.6353	.58608	Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

.The degree of technological integration in senior high school math classes was displayed in Table 2.2 in relation to reliability. With a total weighted mean score of 3.44 and a standard deviation of 0.50475, this category received a rating of "Partially Agree." This meant that students thought technology integration in math classes was moderately reliable, with some elements working well and others needing work.

	Statements	Mean	S.D	Rating
1	My teacher in Mathematics shows mastery of the subject and uses varied strategies.	4.10	.713	Agree
2	My teacher in Mathematics uses technology such as Laptop, LED TV, iPad, Apple TV, etc.	3.44	1.045	Partially Agree
3	My teacher in Mathematics presents the lessons clearly and within the level of the learning.	4.12	.710	Agree
4	My teacher in Mathematics arranges activities with increasing difficulty and gives the opportunity to participate in class discussions.	4.14	.781	Agree
5	My teacher in Mathematics is friendly and willing to answer students' questions.	4.20	.824	Partially Agree
6	My teacher in Mathematics refuses to answer students' questions.	2.44	1.332	Disagree
7	My teacher in Mathematics gives praise whenever I answer correctly.	3.84	.854	Partially Agree
8	My teacher in Mathematics teaches fast.	3.35	1.132	Partially Agree
9	My teacher in Mathematics ignores weak students and scolds me from time to time when my answer is wrong.	2.38	1.283	Disagree
10	My teacher in Mathematics uses to call bright students and plays favoritism in the class.	2.42	1.262	Disagree
	Total Weighted Mean	3.4434	.50475	Partially Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

The degree of technological integration in senior high school math classes was displayed in Table 2.3.1 according to Usefulness: Benefits. Students generally viewed technology as helpful in mathematics instruction, improving their learning experience and comprehension of mathematical concepts, according to this category's weighted mean score of 3.95 with a standard deviation of 0.49260, which is rated as "Agree."

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	Statements	Mean	S.D	Rating
1	Technology makes calculations and graphing quicker and easier.	4.18	.687	Agree
2	Technology helps students to understand concepts.	4.07	.674	Agree
3	Technology enables the study of real-life applications.	3.74	.861	Agree
4	Technology allows students to see links between different representations (graphic, algebraic, and numeric).	3.93	.800	Agree
5	Technology makes sophisticated concepts accessible to students.	3.88	.735	Agree
6	Technology helps students explore unfamiliar problems.	4.18	.687	Agree
7	Technology provides rapid and dynamic feedback to students (e.g., when transforming graphs of functions).	3.79	.780	Agree
8	Technology improves student attitudes towards mathematics.	3.72	.867	Agree
9	The use of technology can allow students to work at their own pace.	3.93	.766	Agree
10	Allowing students to learn and refine these skills prepares them for life beyond the classroom.	4.04	.676	Agree
	Total Weighted Mean	3.9463	.49260	Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

The degree of technological integration in senior high school math classes was displayed in Table 2.3.2 according to Usefulness: Drawbacks. With a weighted mean score of 3.42 and a standard deviation of 0.63139, this category received a rating of "Partially Agree." This meant that although students recognized some drawbacks to the use of technology in math classes, they did not consider these issues to be significant barriers to learning.

	Statements	Mean	S.D	Rating
1	It is difficult to get access to computer laboratories.	3.63	.988	Agree
2	There is a time constraint in preparing materials to support technology.	3.51	.886	Agree
3	There are not enough teaching resources, such as software.	3.32	1.023	Partially Agree
4	There are not enough graphics calculators in the school.	3.43	.956	Partially Agree
5	Poor internet connectivity in the classroom limits the use of technology.	3.73	.946	Agree
6	Technology weakens students' foundational mathematical knowledge.	3.26	1.090	Partially Agree
7	Students' comprehension of mathematical ideas is not enhanced by technology.	3.07	1.113	Partially Agree
8	Teaching students to use technology takes time.	3.28	1.093	Partially Agree
9	Students are overwhelmed with excitement and real challenges when competing to win electronic games in the class, which are unrelated to the discussion.	3.38	1.026	Partially Agree
10	Instructors are available online when we are at home doing our assignments and provide us with remarks.	3.54	1.017	Agree
	Total Weighted Mean	3.4154	.63139	Partially Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

Table 2.4 showed the extent of integrating technology in mathematics instruction among senior high school students in terms of Teaching Strategies. This category obtained a total weighted mean score of 3.51 with a standard deviation of 0.59642, which was rated as "Agree." This result indicated that students generally perceived the use of technology in teaching strategies as beneficial in mathematics instruction, although some aspects require further improvement.

	Statements	Mean	S.D	Rating
1	The teacher integrates LED TV/Laptop successfully in his/her math class and shows different videos to enhance our skills in math.	3.44	1.203	Partially Agree
2	Our instructor communicates with us via Zoom or Messenger to inform us about projects, assignments, grades, and observation about our performance.	3.44	1.246	Partially Agree
3	Lessons presented by Smart Board and PowerPoint presentations are more exciting than traditional lessons.	3.29	1.168	Partially Agree
4	The teacher uses a chalkboard if technology is not available.	4.06	.901	Agree
5	The teacher is subject-centered and uses the lecture method.	3.90	.769	Agree
6	The teacher lets his/her students bring and use their mobile phone or laptop in the classroom discussion.	3.18	1.081	Partially Agree

7	The teacher allows students to take pictures of the lessons using an iPhone, Mini iPad, iPad, or mobile phone instead of copying using a ballpen and notebook.	3.68	.994	Agree
8	The teacher asks the students to open their Facebook, Messenger, Twitter, Instagram, or Edmodo accounts for their notes.	2.80	1.281	Partially Agree
9	The teacher discusses and lets students answer on the board, encouraging them to watch videos on the internet about their lessons.	3.70	1.137	Partially Agree
10	The teacher is student-centered and evaluates students using technology intended to improve math performance.	3.62	1.068	Agree
	Total Weighted Mean	3.5118	.59642	Agree

Legend: (5) 4.50-5.00=Strongly Agree; (4) 3.50-4.49=Agree; (3) 2.50- 3.49=Partially Agree; (2) 1.50- 2.49=Disagree; (1) 1.00- 1.49=Strong Disagree

Question 3. Is there a significant difference in the extent of integrating technology in mathematics instruction among senior high school senior high school students when data are grouped according to 3.1 gender, 3.2 age, 3.3 strand and 3.4 grade level?

When data are categorized by senior high school students' demographic profile in terms of gender, Table 3.1 shows the variation in the degree of technology integration in mathematics education. This table indicates which t-values and probability values are significant at alpha 0.05 and which are not.

Variables	Grouping	Mean	S.D	Mean Difference	t	Sig.	Description
Personalized Learning	Male	3.763	.59523	.25588*	2.600	.010	Significant
	Female	3.507	.55188				
Reliability	Male	3.509	.54547	.13088	1.519	.131	Not Significant
	Female	3.378	.45510				
Usefulness Advantage	Male	4.062	.52661	.23088*	2.801	.006	Significant
	Female	3.831	.42960				
Disadvantage	Male	3.512	.65347	.19265	1.794	.075	Not Significant
	Female	3.319	.59782				
Teaching Strategy	Male	3.650	.59788	.27647*	2.769	.006	Significant
	Female	3.374	.56611				

Note. * Significant at alpha 0.05

When data are categorized by age demographic profile, Table 3.2 shows the variation in the degree of technology integration in math instruction among senior high school students. All of the probability values and F-values were not significant at alpha 0.05, as this table illustrates.

Sources of Variation		Sum of squares	df	Mean Square	F	Sig.	Description
Personalized Learning	Between Groups	.220	2	.110	.316	.729	Not Significant
	Within Groups	46.151	133	.347			
	Total	46.371	135				
Reliability	Between Groups	.050	2	.025	.096	.908	Not Significant
	Within Groups	34.344	133	.258			
	Total	34.394	135				

Usefulness							
Advantages	Between Groups	.134	2	.067	.273	.761	Not Significant
	Within Groups	32.624	133	.245			
	Total	32.758	135				
Disadvantages	Between Groups	.277	2	.138	.343	.710	Not Significant
	Within Groups	53.541	133	.403			
	Total	53.818	135				
Teaching Strategies	Between Groups	.533	2	.266	.746	.476	Not Significant
	Within Groups	47.488	133	.357			
	Total	48.021	135				

Note. * Significant at alpha 0.05

When data are categorized by senior high school students' demographic profile in terms of strand, Table 3.3 shows the variation in the degree of technology integration in mathematics education. Every t-value and probability value in this table is not significant at alpha 0.05.

Variables	Grouping	Mean	S.D	Mean Difference	t	Sig.	Description
Personalized Learning	STEM	3.589	.59126	-.09742	-.968	.335	Not Significant
	GAS	3.686	.58065				
Reliability	STEM	3.386	.43762	-.12024	-1.38	.171	Not Significant
	GAS	3.506	.56593				
Usefulness							
Advantage	STEM	3.958	.47829	.02390	.282	.779	Not Significant
	GAS	3.934	.51121				
Disadvantage	STEM	3.420	.62097	.00895	.082	.935	Not Significant
	GAS	3.411	.64738				
Teaching Strategy	STEM	3.472	.56598	-.08355	-.815	.416	Not Significant
	GAS	3.555	.62949				

Note. * Significant at alpha 0.05

When data are categorized by grade level and demographic profile, Table 3.4 shows the variation in the degree of technological integration in math education among senior high school students. This table indicates which t-values and probability values are significant at alpha 0.05 and which are not.

Variables	Grouping	Mean	S.D	Mean Difference	t	Sig.	Description
Personalized Learning	11	3.683	.53246	.09604	.955	.341	Not Significant
	12	3.587	.63697				
Reliability	12	3.465	.48714	.04432	.511	.611	Not Significant
	12	3.421	.52499				
Usefulness							
Advantage	11	4.036	.46557	.18250*	2.190	.030	Significant
	12	3.854	.50582				
Disadvantage	11	3.378	.64097	-.07547	-.696	.488	Not Significant
	12	3.454	.62385				
Teaching Strategy	11	3.601	.58749	.18205	1.794	.075	Not Significant
	12	3.419	.59575				

Note. * Significant at alpha 0.05

Question 4. Is there a significant correlation among the sub-categories subsumed under the extent of integrating technology in mathematics instruction among senior high school senior high school students?

The relationships between the subcategories that fall under the umbrella of senior high school students' use of technology in mathematics instruction were shown in Table 4. All of the subcategories' calculated Pearson correlation coefficients ® show statistically significant correlations at alpha 0.01 between these variables, underscoring their interdependence.

Variables		Pearson *r*	Sig.	N	Description
Dependent	Independent				
Personalized Learning	Reliability	.546**	.000	136	High
	Usefulness (Advantages)	.527**	.000	136	High
	Usefulness (Disadvantages)	.388**	.000	136	Moderate
	Teaching Strategies	.602**	.000	136	High
Reliability	Usefulness (Advantages)	.373**	.000	136	Moderate
	Usefulness (Disadvantages)	.532**	.000	136	High
	Teaching Strategies	.619**	.000	136	High
Usefulness (Advantages)	Usefulness (Disadvantages)	.325**	.000	136	Moderate
	Teaching Strategies	.544**	.000	136	High
Usefulness (Disadvantages)	Teaching Strategies	.431**	.000	136	Moderate

Note. **Correlation coefficient is significant at alpha .01
Correlation Coefficient Scales Adopted from Hopkins, Will (2002):
0.0-0.1 = Nearly Zero; 0.1-0.3 = Low; 0.3-0.5 = Moderate; 0.5-0.7 = High; 0.7-0.9 = Very High; 0.9-1 = Nearly Perfect.

Conclusion

The demographic profile of senior high school students at Mindanao State University-Sulu revealed an equal distribution of male and female students, with most falling within the 17–20 age range. Students are almost equally divided between the STEM and GAS strands, ensuring a balanced representation of academic backgrounds.However, perceptions of reliability were moderate, indicating that while technology supports learning, certain challenges still exist. No significant differences were found in students' perceptions of technology integration based on age, academic strand, or grade level. However, gender were found to influence specific aspects of their views on technology, suggesting that individual experiences and preferences may shape their perceptions. A significant positive correlation exists among the subcategories of technology integration, particularly between personalized learning, reliability, usefulness, and teaching strategies. This indicates that students who recognize the benefits of technology in one aspect are likely to perceive its advantages in other areas as well. These findings emphasize the need for continued refinement of technology-enhanced teaching strategies, ensuring that digital tools are both reliable and effective in improving student learning. Additionally, addressing gender-based differences and overcoming perceived challenges in technology integration can further enhance mathematics instruction at Mindanao State University-Sulu.

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