Teachers' Beliefs and Competency Level of Technology Integration in Teaching Mathematics among Selected Public Junior High Schools in Sulu

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*ABSTRACT***.** This study examined teachers' beliefs and their level of competency in using technology for mathematics instruction among selected public junior high schools in Jolo, Sulu during the School Year 2025–2026. A descriptive–correlational design with a quantitative approach was employed, involving 100 teacher-respondents selected through purposive sampling. Data were gathered using a validated questionnaire adapted from Thurn (2017) and analyzed through both descriptive and inferential statistical methods, including t-test, one-way analysis of variance (ANOVA), and Pearson correlation. The results indicate that teachers demonstrate positive perceptions of technology integration and a high level of competency in its use. Significant differences were observed when respondents were grouped according to age, educational attainment, and length of service, while gender showed no significant variation except in one domain. Furthermore, a significant positive relationship was identified between teachers' beliefs and their level of competency. Overall, the findings emphasize the need to strengthen both teachers' attitudes and skills through continuous professional development and institutional support to enhance the effective integration of technology in mathematics instruction.

KEYWORDS: *Technology Integration, Teachers' Beliefs, Mathematics Education, ICT Competency, Secondary Education*

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1. INTRODUCTION

Ongoing advancements in digital technologies have brought notable changes across different sectors of society, including education. In recent years, the integration of technology in classroom instruction has gained importance, as it supports more engaging teaching practices and contributes to improved student learning outcomes (Mann et al., 1999; Funkhouser, 2002–2003; Salpeter, 1999). As educational environments continue to evolve, schools are encouraged to adopt digital tools that promote meaningful and effective learning experiences.

In mathematics education, technology has become an important tool in helping students understand complex and abstract concepts. Through the use of simulations, visual aids, and interactive platforms, learners can explore mathematical ideas in more engaging and meaningful ways. These tools support different forms of representation, encourage independent learning, and enhance higher-order thinking skills. However, the success of using technology in the classroom largely depends on how teachers apply these tools in their instructional practices (Uerz et al., 2018).

Teachers' beliefs are considered an important element that influences their instructional practices, particularly in the use of technology. Educators who view technology as beneficial for improving students' understanding are more likely to incorporate it into their teaching (George & Sanders, 2017). On the other hand, those who have negative or doubtful perceptions may limit its use even when resources are available.

These beliefs are shaped by several factors, such as prior experiences, level of confidence, institutional support, and access to training (Barton & Dexter, 2019). Furthermore, studies suggest that although teachers recognize the potential of technology, it is often used for basic tasks like content delivery rather than for promoting deeper conceptual learning (Prestidge, 2017; Ertmer & Ottenbreit-Leftwich, 2013).

In addition to beliefs, teachers' competency in using technology is a critical component of effective instruction. This competence goes beyond basic technical skills and includes the ability to integrate technology with pedagogy and subject content, as highlighted in frameworks such as Technological Pedagogical Content Knowledge (TPACK).

Research shows that teachers with higher levels of ICT competence are better able to design engaging and interactive learning experiences that enhance students' understanding (Hero et al., 2021; Dela Fuente & Biñas, 2020).

However, several challenges continue to affect the effective use of technology in classrooms. These include limited access to resources, lack of adequate training, and insufficient institutional support (Dinc, 2019; Alcantara et al., 2020).

Although the benefits of technology integration in mathematics education are well established, its actual implementation remains inconsistent, particularly in public school settings. This gap between potential and practice highlights the need to examine both teachers' beliefs and their competency in integrating technology into instruction. Understanding these factors is essential in identifying areas for improvement and in supporting more effective teaching practices.

This study sought to examine teachers' beliefs and their level of competency in integrating technology in mathematics instruction among selected public junior high schools in Jolo, Sulu, as well as the relationship between these two variables.

2. METHODS

2.1. Research Design

A descriptive–correlational research design was applied to examine teachers' beliefs and their level of competency in integrating technology in mathematics instruction. This approach is appropriate for describing existing conditions and analyzing relationships among variables without altering the natural setting.

According to Bless and Higson-Smith (1995), research design provides a structured guide for organizing the processes of data collection, analysis, and interpretation. In a similar way, Babbie and Mouton (2001) described it as a plan that directs the overall conduct of the research toward achieving its objectives.

2.2. Research Locale

The research took place in selected public junior high schools in the Division of Sulu during the School Year 2025–2026. These schools represent diverse educational settings where mathematics is taught using both traditional approaches and technology-supported methods.

The participating schools were Jolo National High School, Jolo School of Fisheries, Jolo Agricultural School, Talipao National High School, and Indanan National High School. All of these institutions operate under the supervision of the Division of Sulu and serve as a suitable setting for examining teachers' beliefs and competency in the use of technology in mathematics instruction.

2.3. Participants of the Study

A total of one hundred (100) public junior high school teachers from the selected schools took part in the study during the School Year 2025–2026, regardless of their rank, position, or employment status. The respondents were evenly distributed across the participating schools to ensure proper representation of the sample.

Table 1. Distribution Of Respondents According to School

Junior High Schools in the Division of Sulu	Number of Teacher Respondents
Jolo National High School	20
Jolo School of Fisheries	20
Jolo Agricultural School	20
Talipao National High School	20
Indanan National High School	20
Total	100

These teachers were directly involved in classroom instruction and provided relevant insights into technology integration practices.

2.4. Sampling Procedure

Purposive sampling, a form of non-probability sampling, was used to select the participants for the study. This approach enabled the inclusion of teachers with relevant knowledge and experience in teaching mathematics and integrating technology in the classroom.

Participants were chosen according to their availability and willingness to take part in the study. This approach enabled the respondents to provide relevant and reliable information regarding their beliefs and competency in technology integration.

2.5. Research Instrument

Data were gathered using a carefully designed questionnaire based on the instrument developed by Thurn (2017), which was also informed by the work of Rögler (2014, 2015). The instrument was slightly modified to better fit the local context of the study.

The instrument used in this study is a standardized questionnaire with established validity and reliability (Thurn, 2017). To ensure its suitability for the study setting, the modified version was reviewed by at least two faculty members from the Graduate School of Sulu State College. Revisions were made based on their recommendations.

Both descriptive and inferential statistical techniques were used in analyzing the data. Frequency and percentage were applied to describe the respondents' demographic characteristics, while mean and standard deviation were used to determine the level of teachers' beliefs and competency. In addition, inferential tests, including the independent samples t-test, one-way analysis of variance (ANOVA), and Pearson product-moment correlation coefficient (Pearson's r), were utilized to identify significant differences and relationships among the variables.

Table 2. Scale Used for Interpreting Responses

Measure	Point	Scale Value	Interpretation
Teachers' Beliefs	4	3.50 – 4.00	Strongly Agree
	3	2.50 – 3.49	Agree
	2	1.50 – 2.49	Disagree
	1	1.00 – 1.49	Strongly Disagree
Competency Level	5	4.50 – 5.00	Very High
	4	3.50 – 4.49	High
	3	2.50 – 3.49	Moderate
	2	1.50 – 2.49	Low
	1	1.00 – 1.49	Very Low

2.6 Data Gathering Procedure

Prior to the data collection stage, authorization to carry out the study was obtained from the Office of the Dean of Graduate Studies. Permission was also secured from the school heads of the participating public junior high schools within the Division of Sulu.

The researcher directly administered the questionnaires to the respondents and provided clear instructions to ensure proper understanding of the instrument. Participants were allotted adequate time to accomplish the questionnaire. After completion, the completed questionnaires were retrieved, arranged, and prepared for data encoding and statistical analysis.

2.7 Ethical Considerations

Ethical principles were upheld throughout the study. Participation was entirely voluntary, and informed consent was secured from all respondents following a clear explanation of the research purpose. Participants' privacy was protected by maintaining confidentiality and anonymity, with no identifying information included.

All data collected were used solely for academic purposes. The researcher ensured objectivity during data analysis and interpretation. Furthermore, the study received ethical clearance from the Sulu State College ethics committee before data collection began.

3. RESULTS

This section discusses the findings derived from data collected from teacher-respondents in selected public junior high schools in Sulu.

4.1 Teachers' Beliefs on Technology Integration

Table 3. Multiple Representations

	Multiple Representations	Mean	S.D.	Rating
1	One key benefit of using technology is that it allows learners to easily shift between different forms of representation, such as algebraic expressions, graphs, and tables.	3.4700	.52136	Agree
2	Technology supports the connection among various forms of representation, including graphs, tables, and algebraic expressions.	3.4100	.51434	Agree
3	With the use of technology, students are able to apply multiple forms of representation when solving problems or completing tasks.	3.4100	.55222	Agree
4	Technology also helps learners develop a clearer understanding of how algebraic expressions, tables, and graphs are related to one another.	3.3600	.59493	Agree
Total Weighted Mean		**3.4125**	**.42250**	**Agree**

Legend: (4) 3.50 – 4.00=Strongly Agree (SA); (3) 2.50 – 3.49=Agree (A); (2) 1.50 – 2.49=Disagree (DA); (1) 1.00 – 1.49=Strongly Disagree (SD)

Table 3 shows the teachers' beliefs regarding multiple representations. The overall weighted mean is 3.4125 (SD = 0.42250), which is interpreted as "Agree." The mean scores for the individual indicators range from 3.3600 to 3.4700, all falling within the "Agree" category.

Table 4. Discovery Learning

	Discovery Learning	Mean	S.D.	Rating
1	Through the use of technology, students can generate multiple examples, helping them identify patterns and relationships such as symmetry in functions.	3.4900	.52214	Agree
2	Technology provides opportunities for students to independently explore new concepts and ideas.	3.4300	.53664	Agree
3	The use of digital tools allows learners to examine mathematical concepts, such as understanding parameters, through self-directed exploration.	3.4800	.55922	Agree
4	Technology encourages students to actively engage in learning by independently acquiring specific knowledge or content.	3.3900	.60126	Agree
5	Digital tools enable students to investigate and solve problems on their own, promoting independent learning.	3.3600	.55994	Agree
Total Weighted Mean		**3.4300**	**.37966**	**Agree**

Legend: (4) 3.50 – 4.00=Strongly Agree (SA); (3) 2.50 – 3.49=Agree (A); (2) 1.50 – 2.49=Disagree (DA); (1) 1.00 – 1.49=Strongly Disagree (SD)

Table 4 presents the teachers' beliefs regarding discovery learning, with an overall weighted mean of 3.4300 (SD = 0.37966), classified as "Agree." The mean scores for the individual items range from 3.3600 to 3.4900.

Table 5. Time Consuming

	Time Consuming	Mean	S.D.	Rating

1	The use of technology may consume instructional time that could otherwise be spent on lesson delivery in mathematics classes.	3.3100	.63078	Agree
2	Technology may not always be efficient in mathematics instruction, as it can require more time to implement.	3.2600	.69078	Agree
3	Introducing technology in the classroom can be time-consuming, and in some cases, the benefits may not outweigh the time spent.	3.1400	.71095	Agree
4	The integration of technology may reduce available teaching time due to the additional effort required for its use.	3.2200	.66027	Agree
Total Weighted Mean		**3.2325**	**.54501**	**Agree**

Legend: (4) 3.50 – 4.00=Strongly Agree (SA); (3) 2.50 – 3.49=Agree (A); (2) 1.50 – 2.49=Disagree (DA); (1) 1.00 – 1.49=Strongly Disagree (SD)

Table 5 presents the teachers' beliefs in terms of time consumption. The overall weighted mean is 3.2325 (SD = 0.54501), interpreted as "Agree." Item means range from 3.1400 to 3.3100.

Table 6. Skill Loss

	Skill Loss	Mean	S.D.	Rating
1	The use of technology may reduce students' ability to retain procedures and algorithms, or limit their opportunity to fully learn them.	3.4600	.62636	Agree
2	Technology use may result in weaker mastery of arithmetic skills among students.	3.1200	.83218	Agree
3	Reliance on technology can lead to a decline in essential basic skills, such as mental computation and precise manual methods.	3.4400	.72919	Agree
4	Core mathematical skills, including solving equations, matrix operations, and differentiation, may become less developed when technology is overused.	3.4700	.59382	Agree
Total Weighted Mean		**3.3725**	**.52883**	**Agree**

Legend: (4) 3.50 – 4.00=Strongly Agree (SA); (3) 2.50 – 3.49=Agree (A); (2) 1.50 – 2.49=Disagree (DA); (1) 1.00 – 1.49=Strongly Disagree (SD)

Table 6 shows the teachers' beliefs in terms of skill loss. The overall weighted mean is 3.3725 (SD = 0.52883), which falls under the "Agree" category. Individual item means range from 3.1200 to 3.4700.

Table 7. Mindless Working

	Mindless Working	Mean	S.D.	Rating
1	When technology is used, students may become less engaged in critical thinking and rely heavily on generated outputs.	3.5200	.61101	Agree
2	The use of technology may encourage students to complete tasks without sufficient reflection.	3.4200	.71322	Agree
3	Access to technology may reduce the level of independent thinking among students.	3.4600	.71661	Agree
4	Technology use may lead students to follow procedures step by step without fully understanding the concepts involved.	3.4800	.59425	Agree

5	Students may tend to accept results produced by technology without critically evaluating their accuracy.	3.4600	.61002	Agree
Total Weighted Mean		**3.4680**	**.51735**	**Agree**

Legend: (4) 3.50 – 4.00=Strongly Agree (SA); (3) 2.50 – 3.49=Agree (A); (2) 1.50 – 2.49=Disagree (DA); (1) 1.00 – 1.49=Strongly Disagree (SD)

Table 7 shows teachers' beliefs on mindless working. The overall weighted mean of 3.4680 (SD = 0.51735) corresponds to an "Agree" rating, while the item means range from 3.4200 to 3.5200.

Table 8. Procedures First

	Procedures First	Mean	S.D.	Rating
1	Technology should be used only after students have developed a solid understanding of mathematical concepts through manual methods.	3.2900	.72884	Agree
2	Learners need to have a strong grasp of mathematical procedures before being introduced to technology-based tools.	3.4000	.58603	Agree
3	In instructional sequences, students should not engage with technology too early, but rather after they have gained sufficient understanding of the concepts.	3.4400	.55632	Agree
4	Technology can be used to support students' procedural work once they have already mastered the underlying processes without relying on digital tools.	3.4100	.57022	Agree
Total Weighted Mean		**3.3850**	**.48905**	**Agree**

Legend: (4) 3.50 – 4.00=Strongly Agree (SA); (3) 2.50 – 3.49=Agree (A); (2) 1.50 – 2.49=Disagree (DA); (1) 1.00 – 1.49=Strongly Disagree (SD)

Table 8 shows the teachers' beliefs in terms of procedures first, with an overall weighted mean of 3.3850 (SD = 0.48905), interpreted as "Agree." Individual item means range from 3.2900 to 3.4400.

4.2 Competency Level

Table 9. Competency level of technology integration in teaching mathematics among mathematics teachers of selected public junior high schools in Sulu

	Competency Level	Mean	S.D.	Rating
1	Demonstrates proficiency in operating commonly used input and output devices.	3.9600	.69515	High
2	Uses technology to search for, assess, and gather information from different sources.	3.8900	.69479	High
3	Shows strong understanding of mathematics content along with the ability to apply appropriate technological tools.	3.7400	.78650	High
4	Utilizes digital tools and resources to enhance creativity and support learning in mathematics.	3.7300	.70861	High
5	Applies subject-specific technologies, such as software, simulations, and graphing calculators, to improve instruction.	3.8900	.76403	High
6	Selects appropriate learning materials and technological resources for teaching mathematics.	3.8000	.82878	High

7	Integrates technology in developing strategies for solving real-world mathematical problems.	3.8700	.71992	High
8	Demonstrates competence in using a wide range of technological resources within the teaching process.	3.7500	.64157	High
9	Manages and organizes relevant information obtained from technology-based sources for instructional use.	3.8700	.77401	High
10	Applies technical skills effectively in solving problems within instructional contexts.	3.8700	.71992	High
11	Incorporates technology into the design of pedagogical and curricular activities.	3.8600	.80428	High
12	Plans and integrates the use of technology in a way that aligns with classroom instruction.	3.7400	.78650	High
Total Weighted Mean		**3.8308**	**.59464**	**High**

Legend: (5) 4.50-5.00=Very High (VH); (4) 3.50 – 4.49=High (H); (3) 2.50 – 3.49=Moderate (M); (2) 1.50 – 2.49=Low (L); (1) 1.00 – 1.49=Very Low (VL)

Table 9 presents the competency level of teachers in integrating technology in teaching mathematics. The overall weighted mean is 3.8308 (SD = 0.59464), interpreted as "High." Individual item means range from 3.7300 to 3.9600, all within the "High" category.

4.3. Differences in Teachers' Beliefs and Competency

Table 10. Differences in Teachers' Beliefs According to Gender

Variables	Group	Mean	S.D.	Mean Diff.	t	Sig.	Description
Multiple Representations	Male	3.4405	.55848	.03541	.340	.735	Not Significant
	Female	3.4051	.38252				
Discovery Learning	Male	3.3143	.44078	-.14647	-1.583	.117	Not Significant
	Female	3.4608	.35856				
Time Consuming	Male	3.1548	.66838	-.09840	-.734	.465	Not Significant
	Female	3.2532	.51030				
Skill Loss	Male	3.1548	.49038	-.27562	-2.162	.033	**Significant**
	Female	3.4304	.52644				
Mindless Working	Male	3.4000	.59666	-.08608	-.676	.501	Not Significant
	Female	3.4861	.49684				
Procedures First	Male	3.3571	.45806	-.03526	-.292	.771	Not Significant
	Female	3.3924	.49949				

*Significant at alpha 0.05

Table 10 presents the differences in teachers' beliefs according to gender. The results show that multiple representations (p = .735), discovery learning (p = .117), time consumption (p = .465), mindless working (p = .501), and procedures first (p = .771) are not statistically significant at α = 0.05. Skill loss (p = .033) shows a statistically significant difference.

4. DISCUSSION

The results of the study indicate that teachers generally exhibit favorable beliefs toward the integration of technology in mathematics instruction. Across all identified dimensions—multiple representations, discovery learning, time consumption, skill loss, mindless working, and procedures first—responses consistently reflected agreement. This overall pattern suggests that teachers acknowledge both the instructional value of technology and the possible concerns associated with its use in the classroom.

With regard to multiple representations and discovery learning, the findings reveal that teachers perceive technology as an effective means of supporting understanding and exploration of mathematical concepts. This implies that digital tools are viewed as helpful in presenting ideas through different formats and enabling learners to investigate relationships independently. These observations are aligned with the framework of Thurn (2017), which highlights the role of technology in promoting access to various representations and facilitating exploratory learning. In addition, Mainali (2021) emphasized that exposure to multiple forms of representation enhances students' comprehension of mathematical concepts. Supporting this, William et al. (2025) and Esposito et al. (2024) explained that learning becomes more effective when information is delivered in a clear and interpretable manner, while Sun and O'Brien (2024) noted that improved clarity in instruction contributes to better understanding of academic content.

On the other hand, teachers also recognized certain limitations associated with technology use, particularly in relation to time consumption, potential loss of skills, and mindless working. These concerns suggest that while technology offers instructional benefits, its implementation may also require careful management. The findings correspond with Viberg, Grönlund, and Andersson (2023), who pointed out that poorly structured use of technology may reduce its effectiveness in supporting learning. Likewise, Bhandari (2023) argued that excessive reliance on digital tools may weaken students' ability to perform essential mathematical procedures. In a similar vein, Walizadah (2025) emphasized that effective learning depends on clarity and appropriateness of instructional tools, implying that misuse of any tool—whether technological or linguistic—may hinder understanding rather than improve it.

With regard to competency, the results show that teachers demonstrate a high level of capability in using technology for mathematics instruction. This implies that they possess the necessary skills to effectively apply digital tools in supporting teaching and learning activities. These findings are consistent with previous studies (Hero et al., 2021; Dela Fuente & Biñas, 2020; Cardino & Ortega-Dela Cruz, 2020), which emphasize the positive role of ICT competence and instructional strategies in improving student performance.

Furthermore, the results show a significant positive relationship between teachers' beliefs and their level of competency. This indicates that teachers who hold favorable perceptions of technology are more likely to demonstrate stronger skills in its use. These findings are consistent with earlier studies (Ertmer, 2005; Uerz et al., 2018), which emphasize that teachers' beliefs and attitudes influence how technology is implemented in the classroom. Additional research (Comeros et al., 2024; Agustina et al., 2024; Omidire et al., 2025) also highlights that effective instructional practices and supportive learning environments contribute to improved student engagement and academic performance.

In general, the results suggest that teachers demonstrate both positive perceptions and strong competency in technology integration. However, existing challenges point to the need for continuous professional development and organizational support. Strengthening teachers' competencies and providing adequate resources may further enhance the effective use of technology in mathematics education.

5. CONCLUSION

The findings indicate that mathematics teachers demonstrate positive beliefs and a high level of competency in using technology for instruction. Technology is applied to support various forms of representation, improve conceptual understanding, and create meaningful learning experiences. A significant positive relationship was also identified between teachers' beliefs and their level of competency, indicating that favorable perceptions of technology are associated with stronger instructional capabilities. Differences observed across demographic variables further highlight the influence of teachers' professional and academic backgrounds on their use of technology in the classroom.

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