IGNATIAN
INTERNATIONAL JOURNAL FOR MULTIDISCIPLINARY RESEARCH
www.icceph.com
ISSN 2984-9942

ASSESSING THE EFFECTIVENESS OF MATHEMATICS TEACHING STRATEGIES AT THE COLLEGE OF TEACHER EDUCATION – SULU STATE COLLEGE

Percival J. Piñero and Ricky S. Morales Jr.

School of Graduate Studies, Sulu State College, Jolo, Sulu, Philippines

https://doi.org/10.5281/zenodo.20092227

ABSTRACT

This study assessed the extent of effectiveness of mathematics teaching strategies at the College of Teacher Education - Sulu State College. A descriptive–correlational research design was employed, involving 100 purposively selected freshman students. The study examined mathematics teaching strategies in terms of repetition, timed testing, pair work, manipulation tools, and math games, while considering respondents' demographic profiles such as age, gender, and program. Findings revealed that the majority of the respondents were aged 21–23 years old, with female students comprising a larger proportion of the sample, and slightly more than half enrolled in the Bachelor of Secondary Education program. Results indicated that repetition was consistently practiced, while timed testing, pair work, manipulation tools, and math games were often practiced, suggesting that these strategies are generally effective in facilitating mathematics learning. No significant differences were found in the extent of effectiveness of mathematics teaching strategies when respondents were grouped according to age, gender, and program. Moreover, significant positive correlations ranging from low to moderate were identified among several teaching strategies, suggesting that these strategies are interrelated and mutually reinforcing. Based on the findings, it is recommended that curriculum developers and policymakers strengthen the integration of diverse mathematics teaching strategies, administrators support continuous professional development for teachers, mathematics instructors adapt strategies to learners' needs, students actively engage in varied learning activities, and future researchers conduct further studies to expand understanding of effective mathematics instruction.

Keywords: *Curriculum Evaluation, Instructional Techniques, Mathematics Education, Pedagogical Effectiveness, Teaching Strategies*

INTRODUCTION

Education is an elixir of national development, while mathematics is its soul linguistic (logic and precise) force behind science, technology and innovation (UC.J.E.R.O.M.S., 2021). But mathematics education is a special case, requiring students to make sense of very abstract systems. International data, such as those provided by the Programs for International Student Assessment (PISA) indicate large differences in mathematical literacy. Even then, the performance of Filipino students in mathematics was below the international average (OECD, 2019), indicating an urgent need to reconsider teacher education programs. Programs need to focus not only on the content but the pedagogy necessary to instill critical and analytical thinkers of this century (NCTM, 2020).

Good mathematics education is one that which supports intellectual discipline, logical thinking and reasoning, the capacity to solve problems: such being the basic requirements in a digital, data heavy society (Hiebert & Grouws 2007; Anthony & Walshaw, 2009). Instruction to support understanding and making sense is emphasized in recommendations from the National Council of Teachers of Mathematics (2020). However, there is still a strong international public perception that mathematics was difficult and does not have much to do with real life which may at least in part be caused by conservative, transmission-oriented didactical traditions (Umugiraneza et al., 2018). This underscores that the real problem was not what is taught, but how this instruction is given: how to enable teachers to make more concrete abstract knowledge.

These problems are especially evident in the Philippines. In fact, despite the reforms done including K to 12 Basic Education Program, students' low performance in national and international assessments (i.e., NAT, PISA) highlights an a pressing need for improved instructional practices (DepEd, 2020). Contextual barriers in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) such as inadequate supply of teachers, and differences in levels of teacher competence, add further to this problem (MBHTE, 2022). As a major teacher educating center in Sulu, the College of Teacher Education (CTE) at the Sulu State College carries a great responsibility in producing future teachers who can cope up with these challenges. But classroom observations revealed that conventional lecture approaches still prevailed with little attention to learner-centered activities (DepEd,2020). A methodical analysis of the current teaching strategies was needed in this context.

Research Questions

This study attempted to assess the effectiveness of Mathematics Teaching Strategies at the College of Teacher Education, Sulu State College. Specifically, this investigation answered the following sub-problems raised:

1. What is the demographic profile of the freshman students in terms of:
   1.1. Age;
   1.2. Gender; and
   1.3 Program?

2. What is the extent of effectiveness of mathematics teaching strategies as assessed by the students in terms of:
   2.1. Repetition;
   2.2. Timed Testing;
   2.3. Pair Work;
   2.4. Manipulation Tools; and
   2.5. Math Games?
3. Is there a significant difference in the extent of effectiveness of mathematics teaching strategies as assessed by the students when grouped according to their demographic profile in terms of:
   3.1. Age;
   3.2. Gender; and
   3.3 Program?
4. Is there a significant correlation among the sub-categories subsumed under the extent of effectiveness of mathematics teaching strategies as assessed by the students at College of Teacher Education, Sulu State College?

METHODOLOGY

To ensure a systematic and logical conduct of the study on assessing the effectiveness of mathematics teaching strategies at the College of Teacher Education-Sulu State College, the researcher described the orderly steps undertaken in accomplishing the study as follows:

Research Design

This study employed a descriptive-correlational research design, which was appropriate for identifying, describing, and analyzing the current mathematics teaching strategies as assessed by freshman students. It aimed to determine the level of effectiveness of mathematics teaching strategies at the College of Teacher Education, Sulu State College. The design allowed for the collection and analysis of quantitative data from students' evaluations, providing an objective assessment of teaching practices such as repetition, timed testing, pair work, manipulation tools, and math games. A survey questionnaire served as the primary research instrument for gathering the necessary data.

Research Locale

The research was done at the College of Teacher Education, Sulu State College Jolo, Sulu. This is a school of education preparing future teachers and has several education programs and classes (including in mathematics teaching). It was selected because it was an ideal place to study how well teaching techniques in math work.

Respondents of the Study

The respondents of the study were limited to the 100 freshman education students who were taking up education programs and courses including mentioned mathematics-related subjects at Sulu State College this first semester Academic Year 2025–2026. From the official record in the Dean's office of the college aforementioned, there are 382 freshmen who are officially registered as subjects of the study and deemed suitable to be included in this study since they are currently exposed to various modes of mathematics instruction and can offer information on their possible effect. Their stories were used as a yardstick by which to measure the success of strategies for learning questions in mathematics.

Therefore, the researcher is one of the part-time teachers and had a teaching load in mathematics at this college from the first semester 2023-2024 academic years up to present made the motivating factors for pursuing this study.

Table 1 the distribution of respondents across the programs offered in the College of Teacher Education.

Table 1. ***Distribution of respondents***

Programs	Enrolled 1st Year 2025-2026	No. of Respondents	Percentage %
BECED	46	12	12.04%
BEED	159	41	41.62 %
BSED	177	47	46.34 %
TOTAL	382	100	100 %

Sampling Design

The study utilized a purposive sampling technique in selecting respondents. This method was chosen because the research specifically targeted freshman students within the College of Teacher Education who were currently enrolled in mathematics courses.

Data Gathering Procedure

The researcher secured a letter of permission from the Dean's Office of Graduate Studies for the launching of the questionnaire. After obtaining the letter of permission, the researcher immediately proceeded to seek a letter of approval from the Office of the President of Sulu State College. Once approval from the concerned authority was granted, the researcher presented the approved letter to the Dean of the College of Teacher Education to inform her that data collection for the study would be conducted. After the coordinator grants permission, the researcher administered the validated survey questionnaires to the identified sample respondents.

The participants were assured that their responses would remain confidential and anonymous. The questionnaires were retrieved after one week, and their completeness was be verified. Questionnaires with missing or unclear responses were not be included in the analysis. The validated responses were then be encoded, organized, and prepared for statistical analysis.

Research Instrument

A survey questionnaire in checklist form was used in this study and was adopted, patterned, and revised from the authors and models referenced of Mr. Antony Manisan Bulawit in his study on Strategies in Teaching Mathematics for Academic Performance of Learners in Kabasalan District: An avenue for productive learning, 2016.

The questionnaire was divided into two sections. Part I consisted of questions about the demographic profile of the respondents. Part II consisted of five constructs which were Repetition (5 items); Timed Testing (5 items); Pair Work (5 items); Manipulation Tools (5 items) and Math Games (5 items). The students were required to give their agreement on each item based on the four-point Likert scale: 4 – Always Practiced (AP) 3 – Often Practiced (OP) 2 – Sometimes Practiced (SP), and 1 – Never Practiced (NP).

Validity And Reliability

The instrument that was used in this study was adopted, patterned, and revised based on the authors and models referenced of Mr. Antony Manisan Bulawit in his study on Strategies in Teaching Mathematics for Academic Performance of Learners in Kabasalan District: An avenue for productive learning, 2016.

However, to suit its applicability to the present study and its local settings, the questionnaire was subjected for perusal by at least two experts from among the faculty members of the Graduate Studies of Sulu State College.

Statistical Treatment

The following statistical tools were utilized to treat the data that were gathered.

1. For Research Question No. 1, which states: What is the demographic profile of the freshmen students in terms of age, gender and program.?
   The statistical tools used were Frequency and Percentage.
2. For Research Question No. 2, which states: What is the extent of effectiveness of mathematics teaching strategies as assessed by the students in terms of Repetition, Timed Testing, Pair Work, Manipulative Tools, and Math Games?
   The statistical tools used were Weighted Mean and Standard Deviation.
3. For Research Question No. 3, which states: Is there a significant difference in the extent of effectiveness of mathematics teaching strategies as assessed by the students when grouped according to their demographic profile in terms of age, gender and program?

The statistical tools used were the T-test for gender and the Analysis of Variance (ANOVA) for the rest of the profile variables to determine significant differences.

4. For Research Question No. 4, which states: Is there significant correlation among the sub-categories subsumed under the extent of effectiveness of mathematics teaching strategies as assessed by the students at the College of Teacher Education, Sulu State College?

   The statistical tool used was the Pearson Product-Moment Correlation to determine the significant correlation among variables.

To quantitatively determine the extent of effectiveness of mathematics teaching strategies as assessed by the students, the researcher used a four-point Likert Scale table as follows:

Table 2 ***LIKERT'S SCALE TABLE***

Point	**Scale value**	**Interpretation**
4	3.5 – 4.00	Always Practiced (AP)
3	2.5 – 3.49	Often Practiced (OP)
2	1.5 – 2.49	Sometimes Practiced (SP)
1	1 – 1.49	Never Practiced (NP)

RESULTS AND DISCUSSION

This section presented the analysis and interpretation of the data gathered for this study. It provided insights into the extent of effectiveness of mathematics teaching strategies at the College of Teacher Education, Sulu State College, as assessed by the freshman students. Specifically, the section described the demographic profile of the respondents in terms of age, gender, and program. It further examined the extent of effectiveness of mathematics teaching strategies in terms of repetition, timed testing, pair work, manipulative tools, and math games. Moreover, this section analyzed the significant differences in the extent of effectiveness of mathematics teaching strategies when respondents were grouped according to their demographic variables and determined the significant correlations among the identified teaching strategies. The findings presented in this section served as the basis for the discussion, conclusions, and recommendations of the study.

The presentations, analyses, and interpretations of results were based on the proper scoring and statistical treatment of the data, corresponding to each of the research questions outlined in this study.

1. What is the demographic profile of the freshman students in terms of: 1.1. Age, 1.2. Gender, and 1.3. Program?

1.1 In terms of Age

Table 1.1 presented the demographic profile of freshman students at the College of Teacher Education, Sulu State College in terms of age. The data showed that out of 100 respondents, 14 students (14.0%) were 18 years old and below, 9 students (9.0%) belonged to the 18–20-year-old age group, 72 students (72.0%) fell within the 21–23-year-old bracket, and 5 students (5.0%) were 24 years old and above. These findings indicated that the majority of the respondents were aged 21–23 years old, comprising more than two-thirds of the total population.

Table 1.1 ***Demographic Profile of Freshman Students at the College of Teacher Education, Sulu State College by Age***

Age	Number of respondents	Percent
18 years old and below	14	14.0%
18-20 years old	9	9.0%
21-23 years old	72	72.0%
24 years old and above	5	5.0%
Total	**100**	**100%**

1.2 In terms of Gender

Table 1.2 presented the demographic profile of freshman students at the College of Teacher Education, Sulu State College in terms of gender. The data indicated that out of 100 respondents, 35 students (35.0%) were male, while 65 students (65.0%) were female. These results revealed that female students comprised the majority of the respondents, accounting for more than half of the total population.

Table 1.2 ***Demographic Profile of Freshman Students at the College of Teacher Education, Sulu State College by Gender***

Gender	Number of respondents	Percent
Male	35	35.0%
Female	65	65.0%
Total	**100**	**100%**

1.3 In terms of Program

Table 1.3 presented the demographic profile of freshman students at the College of Teacher Education, Sulu State College in terms of program. The data showed that out of 100 respondents, 47 students (47.0%) were enrolled in the Bachelor of Elementary Education program, while 53 students (53.0%) were taking the Bachelor of Secondary

Education program. These findings indicated that a slightly higher proportion of the respondents were enrolled in the Bachelor of Secondary Education program.

Table 1.3 ***Demographic Profile of Freshman Students at the College of Teacher Education, Sulu State College by Program***

Program	Number of respondents	Percent
Bachelor of Elementary Education	47	47.0%
Bachelor of Secondary Education	53	53.0%
Total	**100**	**100%**

2. What is the extent of effectiveness of mathematics teaching strategies as assessed by the students in terms of: 2.1. Repetition, 2.2. Timed Testing, 2.3. Pair Work, 2.4. Manipulation Tools, and 2.5. Math Games?

2.1 In the context of Repetition

Table 2.1 presented the extent of effectiveness of mathematics teaching strategies as assessed by the students in terms of repetition. The results showed a total weighted mean of 3.61 with a standard deviation of 0.35, which corresponded to an overall descriptive rating of “Always Practiced.” This indicated that repetition was consistently employed by mathematics instructors and was perceived by the students as an effective strategy in facilitating understanding and mastery of mathematical concepts.

Among the indicators, the statement “My mathematics instructor repeats rules in solving math problems to clarify ideas” obtained the highest mean score ($\bar{x}$ = 3.77, SD = 0.51), rated Always Practiced, suggesting that repeated explanation of rules and procedures was the most evident practice observed by the students. High mean ratings were also noted in the statements “My mathematics instructor reviews information so we can better comprehend lessons” ($\bar{x}$ = 3.61, SD = 0.55), “My mathematics instructor asks us to recall and provide the correct formulas” ($\bar{x}$ = 3.58, SD = 0.64), and “My mathematics instructor helps us master concepts through constant repetition” ($\bar{x}$ = 3.57, SD = 0.62), all of which were rated Always Practiced. These results implied that repetition was regularly integrated into mathematics instruction to reinforce learning and promote retention.

The findings indicated that repetition was an effective teaching strategy in mathematics instruction. This result was consistent with behaviorist learning theory, which emphasized practice and reinforcement as key elements in learning (Thorndike, 1922; Skinner, 1968). Similar findings were also documented in mathematics education research, highlighting that consistent repetition supports procedural fluency and reduces cognitive load, thereby improving students’ overall performance in mathematics (Sweller, 1988; Richter et al., 2022).

Table 2.1 ***Extent of Effectiveness of Mathematics Teaching Strategies as Assessed by the Students in Terms of Repetition***

	Statements	Mean	S.D	Rating
1	My mathematics instructor repeats rules in solving math problems to clarify ideas.	3.77	.510	Always Practiced
2	My mathematics instructor reviews previous lessons to connect them with the present lesson.	3.54	.658	Always Practiced
3	My mathematics instructor asks us to recall and provide the correct formulas.	3.58	.638	Always Practiced
4	My mathematics instructor reviews information so we can better comprehend lessons.	3.61	.549	Always Practiced
5	My mathematics instructor helps us master concepts through constant repetition.	3.57	.624	Always Practiced
	Total Weighted Mean	**3.6140**	**.34961**	**Always Practiced**

Legend: (4) 3.50-4.00=Always Practiced; (3) 2.50-3.49=Often Practiced; (2) 1.50- 2.49=Sometimes Practiced; (1) 1.00- 1.49=Never Practiced

2.2 In the context of Timed Testing

Table 2.2 presented the extent of effectiveness of mathematics teaching strategies as assessed by the students in terms of timed testing. The results showed a total weighted mean of 3.35 with a standard deviation of 0.49, which corresponded to an overall descriptive rating of "Often Practiced." This indicated that timed testing was frequently used by mathematics instructors and was generally perceived by the students as an effective instructional strategy.

Among the indicators, the statement "My mathematics instructor gives short quizzes within a specific time to assess understanding" obtained the highest mean score ($\bar{x}$ = 3.50, SD = 0.75), rated Always Practiced, suggesting that short, time-bound quizzes were the most commonly utilized form of timed testing. The remaining indicators, measuring mastery of math concepts ($\bar{x}$ = 3.33, SD = 0.67), promoting alertness in solving problems ($\bar{x}$ = 3.39, SD = 0.70), developing focus in accomplishing tasks ($\bar{x}$ = 3.35, SD = 0.80), and reviewing previous lessons ($\bar{x}$ = 3.18, SD = 0.74), were all rated Often Practiced. These results implied that while timed testing was regularly incorporated in mathematics classes, its use varied depending on the intended instructional purpose.

The findings indicated that timed testing was an effective teaching strategy when used appropriately in mathematics instruction. This result was consistent with studies reporting that time-bounded assessments enhance students' focus, retrieval speed, and procedural fluency when applied in a supportive and low-pressure environment (Agarwal & Bain, 2019; Adesope et al., 2020). However, other studies also emphasized the importance of careful implementation to avoid increasing mathematics anxiety, particularly when timed tests were overly emphasized or used in high-stakes contexts (Boaler, 2016; Thompson & Hayes, 2022).

Table 2.2 ***Extent of Effectiveness of Mathematics Teaching Strategies as Assessed by the Students in Terms of Timed Testing***

	Statements	Mean	S.D	Rating
1	My mathematics instructor gives timed tests to measure mastery of math concepts.	3.33	.667	Often Practiced
2	My mathematics instructor uses timed tests to review previous lessons.	3.18	.744	Often Practiced
3	My mathematics instructor gives short quizzes within a specific time to assess understanding.	3.50	.745	Always Practiced
4	My mathematics instructor uses timed tests to promote alertness in solving problems.	3.39	.695	Often Practiced
5	My mathematics instructor uses timed tests to develop focus in accomplishing tasks.	3.35	.796	Often Practiced
	Total Weighted Mean	**3.3500**	**.49021**	**Often Practiced**

Legend: (4) 3.50-4.00=Always Practiced; (3) 2.50-3.49=Often Practiced; (2) 1.50- 2.49=Sometimes Practiced; (1) 1.00- 1.49=Never Practiced

2.3 In the context of Pair Work

Table 2.3 presented the extent of effectiveness of mathematics teaching strategies as assessed by the students in terms of pair work. The results showed a total weighted mean of 2.92 with a standard deviation of 0.65, which corresponded to an overall descriptive rating of “Often Practiced.” This indicated that pair work was generally utilized in mathematics instruction, though its application was not consistently implemented across all learning activities.

Among the indicators, the statement “My mathematics instructor develops our critical thinking through collaborative work” obtained the highest mean score ($\bar{x}$ = 3.32, SD = 0.82), rated Often Practiced, suggesting that collaborative activities were particularly effective in enhancing students’ critical thinking skills. This was followed by “My mathematics instructor designs pair activities suited to our learning styles” ($\bar{x}$ = 3.07, SD = 0.84) and “My mathematics instructor encourages class discussions and teamwork in problem solving” ($\bar{x}$ = 3.05, SD = 0.89), both also rated Often Practiced. In contrast, the statement “My mathematics instructor lets us solve math problems with a partner” received the lowest mean score ($\bar{x}$ = 2.41, SD = 1.05), rated Sometimes Practiced, indicating that direct partner-based problem solving was less frequently employed.

The findings indicated that pair work was a moderately effective teaching strategy in mathematics instruction. According to cooperative learning research, structured pair work enhances students’ engagement, critical thinking, and understanding through peer interaction and shared problem solving (Hattie, 2012; Capar & Tarim, 2015).

Table 2.3 ***Extent of Effectiveness of Mathematics Teaching Strategies as Assessed by the Students in Terms of Pair Work***

	Statements	Mean	S.D	Rating
1	My mathematics instructor lets us solve math problems with a partner.	2.41	1.045	Sometimes Practiced
2	My mathematics instructor encourages class discussions and teamwork in problem solving.	3.05	.892	Often Practiced
3	My mathematics instructor develops our critical thinking through collaborative work.	3.32	.815	Often Practiced
4	My mathematics instructor designs pair activities suited to our learning styles.	3.07	.844	Often Practiced
5	My mathematics instructor guides us to work cooperatively with a partner.	2.77	.973	Often Practiced
	Total Weighted Mean	**2.9240**	**.65368**	**Often Practiced**

Legend: (4) 3.50-4.00=Always Practiced; (3) 2.50-3.49=Often Practiced; (2) 1.50- 2.49=Sometimes Practiced; (1) 1.00- 1.49=Never Practiced

2.4 In the context of Manipulation Tools

Table 2.4 presented the extent of effectiveness of mathematics teaching strategies as assessed by the students in terms of manipulation tools. The results showed a total weighted mean of 2.96 with a standard deviation of 0.69, which corresponded to an overall descriptive rating of “Often Practiced.” This indicated that the use of manipulation tools was frequently employed by mathematics instructors and was generally perceived by the students as an effective instructional strategy.

Among the indicators, the statement “My mathematics instructor lets us use tools to better understand problem-solving concepts” obtained the highest mean score ($\bar{x}$ = 3.17, SD = 0.92), rated Often Practiced, suggesting that manipulation tools were particularly used to support students’ understanding of problem-solving processes. This was followed by “My mathematics instructor builds our basic math skills through manipulation tools” ($\bar{x}$ = 3.00, SD = 0.88) and “My mathematics instructor helps us learn more easily through manipulatives” ($\bar{x}$ = 2.95, SD = 0.85), both also rated Often Practiced. The remaining indicators, including the use of manipulatives to stimulate interest in learning ($\bar{x}$ = 2.94, SD = 0.89) and the use of concrete materials to teach math concepts ($\bar{x}$ = 2.74, SD = 0.98), were similarly rated Often Practiced, indicating a consistent application of this strategy.

The findings indicated that manipulation tools were an effective teaching strategy in mathematics instruction. According to research, the use of concrete and visual materials helps learners better visualize abstract mathematical concepts and supports deeper conceptual understanding (Carbonneau et al., 2013; Clements, 2000). Studies further emphasized that manipulatives enhance student engagement and facilitate skill development when integrated meaningfully into instruction (Kim & Rehder, 2022; Alqahtani & Powell, 2023).

Table 2.4 ***Extent of Effectiveness of Mathematics Teaching Strategies as Assessed by the Students in Terms of Manipulation Tools***

	Statements	Mean	S.D	Rating
1	My mathematics instructor uses manipulatives (e.g., blocks, counters, models) to teach math concepts.	2.74	.981	Often Practiced
2	My mathematics instructor lets us use tools to better understand problem-solving concepts.	3.17	.922	Often Practiced
3	My mathematics instructor helps us learn more easily through manipulatives.	2.95	.845	Often Practiced
4	My mathematics instructor builds our basic math skills through manipulation tools.	3.00	.876	Often Practiced
5	My mathematics instructor stimulates our interest in learning by using tools.	2.94	.886	Often Practiced
	Total Weighted Mean	**2.9600**	**.69224**	**Often Practiced**

Legend: (4) 3.50-4.00=Always Practiced; (3) 2.50-3.49=Often Practiced; (2) 1.50- 2.49=Sometimes Practiced; (1) 1.00- 1.49=Never Practiced

2.5 In the context of Math Games

Table 2.5 presented the extent of effectiveness of mathematics teaching strategies as assessed by the students in terms of math games. The results showed a total weighted mean of 2.66 with a standard deviation of 0.90, which corresponded to an overall descriptive rating of “Often Practiced.” This indicated that math games were frequently used in mathematics instruction and were generally perceived by the students as an effective strategy for enhancing learning.

Among the indicators, the statement “My mathematics instructor uses games as strategies to reinforce learning of concepts” obtained the highest mean score ($\bar{x}$ = 2.79, SD = 1.07), rated Often Practiced, suggesting that math games were primarily utilized to strengthen students’ understanding and retention of mathematical concepts. This was followed by “My mathematics instructor incorporates games to make mathematics engaging” ($\bar{x}$ = 2.69, SD = 0.97) and “My mathematics instructor helps us remember concepts more easily through games” ($\bar{x}$ = 2.66, SD = 1.05), both of which were also rated Often Practiced. The remaining indicators, including varying math games based on available resources ($\bar{x}$ = 2.55, SD = 1.02) and making lessons more interesting through games ($\bar{x}$ = 2.62, SD = 1.12), similarly fell under the Often-Practiced category.

The findings indicated that math games were an effective teaching strategy in mathematics instruction. Studies reported that game-based learning enhances student engagement, motivation, and conceptual understanding when integrated appropriately into classroom instruction (Byun & Joung, 2018; Kebritchi & Hirumi, 2021).

Table 2.5 ***Extent of Effectiveness of Mathematics Teaching Strategies as Assessed by the Students in Terms of Math Games***

	Statements	Mean	S.D	Rating
1	My mathematics instructor makes lessons more interesting by using math games.	2.62	1.117	Often Practiced
2	My mathematics instructor helps us remember concepts more easily through games.	2.66	1.047	Often Practiced
3	My mathematics instructor varies math games depending on available resources.	2.55	1.019	Often Practiced
4	My mathematics instructor incorporates games to make mathematics engaging.	2.69	.971	Often Practiced
5	My mathematics instructor uses games as strategies to reinforce learning of concepts.	2.79	1.066	Often Practiced
	Total Weighted Mean	**2.6620**	**.89564**	**Often Practiced**

Legend: (4) 3.50-4.00=Always Practiced; (3) 2.50-3.49=Often Practiced; (2) 1.50- 2.49=Sometimes Practiced; (1) 1.00- 1.49=Never Practiced

3. Is there a significant difference in the extent of effectiveness of mathematics teaching strategies as assessed by the students when grouped according to their demographic profile in terms of: 3.1. Age, 3.2. Gender, and 3.3 Program?

3.1 According to Age

Table 3.1 presented the differences in the extent of effectiveness of mathematics teaching strategies as assessed by the students when the data were grouped according to age. The table showed the computed F-values and corresponding significance values (Sig.) for the five mathematics teaching strategies, namely Repetition, Timed Testing, Pair Work, Manipulation Tools, and Math Games.

For Repetition, the computed F-value was 0.938 with a Sig. value of 0.426, which was higher than the alpha level of 0.05. This indicated that there was no significant difference in the extent of effectiveness of repetition as a teaching strategy when students were grouped according to age.

In terms of Timed Testing, the results revealed an F-value of 1.061 and a Sig. value of 0.370, which was likewise greater than 0.05. This suggested that the effectiveness of timed testing did not significantly vary among students across different age groups.

For Pair Work, the obtained F-value was 0.669 with a Sig. value of 0.573, indicating no significant difference in the extent of effectiveness of pair work when students were grouped by age. This implied that students' perceptions of collaborative learning activities remained consistent regardless of age.

Similarly, Manipulation Tools showed an F-value of 0.416 and a Sig. value of 0.742, which was also above the alpha level of 0.05. This result indicated that the effectiveness of using manipulation tools in mathematics instruction did not significantly differ according to students' age.

Lastly, for Math Games, the computed F-value was 1.076 with a Sig. value of 0.363, which was greater than 0.05. This indicated that students' assessment of the effectiveness of math games as a teaching strategy did not significantly vary across age groups.

The results revealed that age did not significantly influence the extent of effectiveness of mathematics teaching strategies across all five dimensions. Therefore, the null hypothesis stating that "There was no significant difference in the extent of effectiveness of mathematics teaching strategies as assessed by the students when grouped according to their demographic profile in terms of age" was accepted.

Table 3.1 ***Difference in the Extent of Effectiveness of Mathematics Teaching Strategies as Assessed by the Students When Grouped According to their Demographic Profile in Terms of Age***

Sources of Variation		**Sum of squares**	**df**	**Mean Square**	**F**	**Sig.**	**Description**
Repetition	Between Groups	.344	3	.115	.938	.426	Not Significant
	Within Groups	11.756	96	.122			
	Total	12.100	99				
Timed Testing	Between Groups	.763	3	.254	1.061	.370	Not Significant
	Within Groups	23.027	96	.240			
	Total	23.790	99				
Pair Work	Between Groups	.867	3	.289	.669	.573	Not Significant
	Within Groups	41.436	96	.432			
	Total	42.302	99				
Manipulation Tools	Between Groups	.608	3	.203	.416	.742	Not Significant
	Within Groups	46.832	96	.488			
	Total	47.440	99				
Math Games	Between Groups	2.584	3	.861	1.076	.363	Not Significant
	Within Groups	76.832	96	.800			
	Total	79.416	99				

Note. * Significant at alpha 0.05

3.2 According to Gender

Table 3.2 presented the differences in the extent of effectiveness of mathematics teaching strategies as assessed by the students when the data were grouped according to gender. The table showed the computed mean scores, mean differences, t-values, and corresponding significance values (Sig.) for the five mathematics teaching strategies, namely Repetition, Timed Testing, Pair Work, Manipulation Tools, and Math Games.

For Repetition, the results showed a computed t-value of –0.412 with a Sig. value of 0.681, which was higher than the alpha level of 0.05. This indicated that there was no significant difference in the extent of effectiveness of repetition as a teaching strategy between male and female students.

In terms of Timed Testing, the obtained t-value was –0.277 with a Sig. value of 0.783, which was likewise greater than 0.05. This suggested that students' assessment of the effectiveness of timed testing did not significantly differ between male and female respondents.

For Pair Work, the computed t-value was 1.570 with a Sig. value of 0.120, indicating no significant difference between male and female students in terms of the effectiveness of pair work as a teaching strategy.

Similarly, Manipulation Tools yielded a t-value of 1.587 and a Sig. value of 0.116, which was also above the alpha level of 0.05. This result indicated that the perceived effectiveness of manipulation tools did not significantly vary between male and female students.

However, for Math Games, the results revealed a computed t-value of 2.608 with a Sig. value of 0.011, which was lower than the alpha level of 0.05. This indicated a significant difference in the extent of effectiveness of math games when students were grouped according to gender. The mean scores further showed that male students ($\bar{x}$ = 2.97) rated math games as more effective compared to female students ($\bar{x}$ = 2.50).

The findings indicated that gender did not significantly influence the extent of effectiveness of mathematics teaching strategies in terms of repetition, timed testing, pair work, and manipulation tools. However, a significant difference existed in terms of math games, suggesting that male and female students differed in their perceptions of the effectiveness of this strategy. Thus, the null hypothesis stating that "There was no significant difference in the extent of effectiveness of mathematics teaching strategies as assessed by the students when grouped according to their demographic profile in terms of gender" was accepted.

Table 3.2 ***Difference in the Extent of Effectiveness of Mathematics Teaching Strategies as Assessed by the Students When Grouped According to their Demographic Profile in Terms of Gender***

Variables	Grouping	Mean	S.D	Mean Difference	t	Sig.	Description
Repetition	Male	3.594	.37412	-.03033	-.412	.681	Not Significant
	Female	3.625	.33821				
	Male	3.331	.46512	-.02857	-.277	.783	

Timed Testing	Female	3.360	.50646				Not Significant
Pair Work	Male	3.063	.66292	.21363	1.570	.120	Not Significant
	Female	2.849	.64132				
Manipulation Tools	Male	3.109	.71017	.22857	1.587	.116	Not Significant
	Female	2.880	.67435				
Math Games	Male	2.971	.77784	.47604	2.608	.011*	Significant
	Female	2.495	.91591				

Note. * Significant at alpha 0.05

3.3 According to Program

Table 3.3 presented the differences in the extent of effectiveness of mathematics teaching strategies as assessed by the students when the data were grouped according to program. The table showed the computed mean scores, mean differences, t-values, and corresponding significance values (Sig.) for the five mathematics teaching strategies, namely Repetition, Timed Testing, Pair Work, Manipulation Tools, and Math Games.

For Repetition, the computed t-value was –0.261 with a Sig. value of 0.794, which was higher than the alpha level of 0.05. This indicated that there was no significant difference in the extent of effectiveness of repetition as a teaching strategy between students enrolled in the Bachelor of Elementary Education (BEE) and those in the Bachelor of Secondary Education (BSE).
In terms of Timed Testing, the results showed a t-value of –1.870 with a Sig. value of 0.066, which was also greater than 0.05. This suggested that the perceived effectiveness of timed testing did not significantly differ between BEE and BSE students.

For Pair Work, the obtained t-value was –0.497 with a Sig. value of 0.620, indicating no significant difference in the effectiveness of pair work between the two programs.

However, for Manipulation Tools, the computed t-value was –3.870 with a Sig. value of 0.000, which was lower than the alpha level of 0.05. This indicated a significant difference in the extent of effectiveness of manipulation tools when students were grouped according to program. The mean scores further revealed that BSE students ($\bar{x}$ = 3.20) rated manipulation tools as more effective compared to BEE students ($\bar{x}$ = 2.69).

Lastly, for Math Games, the computed t-value was –0.695 with a Sig. value of 0.489, which was greater than 0.05. This indicated that there was no significant difference in the extent of effectiveness of math games between BEE and BSE students.

The findings indicated that program did not significantly influence the extent of effectiveness of mathematics teaching strategies in terms of repetition, timed testing, pair work, and math games. However, a significant difference existed in terms of manipulation tools, suggesting that students from different programs differed in their perceptions of the effectiveness of this strategy. Thus, the null hypothesis stating that "There was no significant difference in the extent of effectiveness of mathematics teaching strategies as assessed by the students when grouped according to their demographic profile in terms of program" was accepted.

Table 3.3 ***Difference in the Extent of Effectiveness of Mathematics Teaching Strategies as Assessed by the Students When Grouped According to their Demographic Profile in Terms of Program***

Variables	Grouping	Mean	S.D	Mean Difference	t	Sig.	Description
Repetition	BEE	3.604	.38105	-.01839	-.261	.794	Not Significant
	BSE	3.623	.32263				
Timed Testing	BEE	3.251	.60212	-.18667	-1.87	.066	Not Significant
	BSE	3.438	.34654				
Pair Work	BEE	2.889	.64039	-.06536	-.497	.620	Not Significant
	BSE	2.955	.66984				
Manipulation Tools	BEE	2.694	.68886	-.50261	-3.87	.000*	Significant
	BSE	3.196	.60953				
Math Games	BEE	2.596	.93761	-.12501	-.695	.489	Not Significant
	BSE	2.721	.86143				

Note. * Significant at alpha 0.05

4. Is there a significant correlation among the sub-categories subsumed under the extent of effectiveness of mathematics teaching strategies as assessed by the students at College of Teacher Education, Sulu State College?

Table 4 presented the correlations among the sub-categories subsumed under the extent of effectiveness of mathematics teaching strategies as assessed by the students at the College of Teacher Education, Sulu State College. The computed Pearson correlation coefficients (r) showed both significant and non-significant relationships among the variables at the 0.01 level of significance, based on a sample size of 100 respondents.

The degrees of correlation among the sub-categories were as follows:

1. A moderate positive correlation was observed between Repetition and Timed Testing (r = 0.414, Sig. = 0.000), suggesting that increased use of repetition was associated with more frequent application of timed testing strategies in mathematics instruction.
2. A low positive correlation existed between Repetition and Pair Work (r = 0.288, Sig. = 0.004), indicating that repetition was weakly but significantly related to the use of collaborative learning activities.
3. No significant relationship was found between Repetition and Manipulation Tools (r = 0.022, Sig. = 0.825) and between Repetition and Math Games (r = 0.158, Sig. = 0.115), suggesting that repetition operated independently of these strategies.

4. A moderate positive correlation was noted between Timed Testing and Pair Work (r = 0.349, Sig. = 0.000), implying that instructors who frequently employed timed testing also tended to incorporate collaborative learning activities.
5. A low positive correlation was observed between Timed Testing and Manipulation Tools (r = 0.288, Sig. = 0.004), indicating a weak but significant association between these two strategies.
6. A moderate positive correlation was found between Timed Testing and Math Games (r = 0.412, Sig. = 0.000), suggesting that time-bound assessments were moderately associated with the use of game-based instructional approaches.
7. A moderate positive correlation existed between Pair Work and Manipulation Tools (r = 0.306, Sig. = 0.002), indicating that collaborative learning was moderately related to the use of concrete instructional materials.
8. A moderate positive correlation was also observed between Pair Work and Math Games (r = 0.489, Sig. = 0.000), suggesting that collaborative activities were strongly linked with game-based strategies in mathematics instruction.
9. Lastly, a moderate positive correlation was found between Manipulation Tools and Math Games (r = 0.475, Sig. = 0.000), implying that instructors who utilized manipulation tools also tended to employ math games as part of their teaching strategies.

The results indicated that several sub-categories of mathematics teaching strategies were significantly interrelated, particularly those involving active, collaborative, and engaging instructional approaches. However, some strategies, such as repetition, showed limited association with tool-based and game-based methods. Therefore, the hypothesis stating that "There was no significant correlation among the sub-categories subsumed under the extent of effectiveness of mathematics teaching strategies as assessed by the students at the College of Teacher Education, Sulu State College" was rejected.

Table 4 ***Correlations Among the Sub-Categories Subsumed Under the Extent of Effectiveness of Mathematics Teaching Strategies as Assessed by the Students at College of Teacher Education, Sulu State College***

Variables		Pearson	Sig.	N	Description
Dependent	**Independent**	***r***			
Repetition	**Timed Testing**	.414**	.000	100	Moderate
	Pair Work	.288**	.004	100	Low
	Manipulation Tools	.022	.825	100	Not significant
	Math Games	.158	.115	100	Not significant
Timed Testing	**Pair Work**	.349**	.000	100	Moderate
	Manipulation Tools	.288**	.004	100	Low
	Math Games	.412**	.000	100	Moderate

Pair Work	**Manipulation Tools**	.306**	.002	100	Moderate
	Math Games	.489**	.000	100	Moderate
Manipulation Tools	**Math Games**	.475**	.000	100	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.

Conclusions

The study concludes that:

1. The freshman students of the College of Teacher Education, Sulu State College are predominantly within the 21–23 years old age group, with female students comprising a larger proportion of the respondents, and a slightly higher number enrolled in the Bachelor of Secondary Education program. This demographic composition reflects the typical profile of pre-service teachers in higher education institutions and suggests a relatively mature cohort preparing for professional teaching roles.
2. Mathematics teaching strategies at the College of Teacher Education, Sulu State College are generally effective as assessed by the students. Repetition was found to be consistently practiced, while timed testing, pair work, manipulation tools, and math games were often practiced. These strategies collectively contributed to improved understanding, engagement, collaboration, and motivation in mathematics learning. This conclusion is supported by learning theories emphasizing practice and reinforcement (Thorndike, 1922; Skinner, 1968), social interaction and collaborative learning (Vygotsky, 1978; Bandura, 1977), and experiential learning through concrete and interactive activities (Kolb, 1984).
3. There are generally no significant differences in the extent of effectiveness of mathematics teaching strategies when students are grouped according to age, gender, and program. This indicates that most strategies are perceived as effective across diverse student groups. However, significant differences were observed in specific strategies, particularly in math games when grouped according to gender and manipulation tools when grouped according to program. This suggests that while many teaching strategies function uniformly, interactive and resource-based approaches may be experienced differently depending on learner characteristics. This conclusion aligns with studies emphasizing that demographic and contextual factors can moderate the effectiveness of instructional strategies, especially those involving collaboration, tools, and games (Gardner, 1983; Johnson et al., 2023; Carbonneau et al., 2013).
4. Several mathematics teaching strategies are significantly and positively correlated, indicating that these strategies are interrelated and mutually reinforcing. Repetition, timed testing, pair work, manipulation tools, and math games tend to

complement one another, particularly strategies that emphasize active engagement and collaborative learning. However, some strategies, such as repetition, operate independently of more interactive approaches like manipulation tools and math games. This finding supports theoretical perspectives that view mathematics learning as a multidimensional process involving cognitive, behavioral, and social components (Sweller, 1988; Vygotsky, 1978; Kolb, 1984).

Recommendations

This study recommends the following:

1. Curriculum Developers and Policymakers may consider integrating a balanced combination of mathematics teaching strategies—such as repetition, timed testing, pair work, manipulation tools, and math games—into teacher education curricula. Emphasis may be placed on flexible and inclusive instructional approaches that accommodate diverse learner characteristics while promoting both procedural fluency and conceptual understanding in mathematics.
2. Sulu State College, College of Teacher Education Administrators may support mathematics instruction by organizing regular professional development programs and instructional workshops that enhance faculty competence in applying varied and interactive teaching strategies.
3. Mathematics Teachers may continue utilizing repetition and timed testing while further enriching instruction through structured pair work, appropriate manipulation tools, and meaningful math games. Teachers may also consider adjusting these strategies based on students' needs, gender differences, and program-specific requirements to maximize learning effectiveness.
4. Students may actively engage in collaborative learning activities, make effective use of available learning tools, and participate meaningfully in math-related games and exercises.
5. Future Researchers may conduct similar studies involving larger samples, other colleges or institutions, and additional variables such as mathematics learning styles, academic achievement in mathematics, or mathematics anxiety.

Compliance with Ethical Standards

The researcher, Percival J. Piñero, declares that the research was conducted with strict adherence to ethical principles and professional standards. Prior to data collection, informed consent was obtained from all participants, who were explicitly informed of their right to withdraw from the study at any time without penalty or consequence. To protect the privacy of the participants, anonymity was strictly maintained throughout the process, and all personal information was handled in full compliance with Data Privacy regulations. The well-being of the respondents was prioritized and safeguarded at every stage of the research.

The researcher further confirms that no conflict of interest exists regarding the conduct or publication of this study. Plagiarism was strictly avoided, ensuring the originality of the work, and the interpretation of the findings was executed without bias to maintain the integrity of the data. The results gathered from the College of Teacher Education at Sulu State College were utilized purely for research purposes. Furthermore, the author declares that no Artificial Intelligence (AI) was utilized in the generation of this research, ensuring full disclosure and transparency of the academic process.

Upholding ethical standards was essential to maintain the reliability, validity, and integrity of the research process. All data collected for analysis and interpretation were strictly conform to recognized ethical guidelines.

Specifically, the researcher observed the following ethical protocols in the conduct of the study:

1. **Informed Consent** – Participants were fully informed about the purpose, procedures, and scope of the study. Their voluntary participation was sought through a signed consent form, and they were free to withdraw at any time without penalty.
2. **Confidentiality and Anonymity** – The identity of the participants and the institutions involved were kept strictly confidential. No identifying information was appeared in any report, presentation, or publication related to this study.
3. **Voluntary Participation** – Participation in the study was entirely voluntary. No form of coercion, pressure, or undue influence was used to obtain participation.
4. **Integrity of Data** – The researcher ensured that all data were gathered, recorded, analyzed, and reported truthfully and accurately. Fabrication, falsification, or misrepresentation of data was strictly avoided.
5. **Respect for Persons** – The researcher upheld respect for the rights, dignity, and well-being of participants, ensuring that their views and experiences were valued throughout the research process.
6. **Beneficence and Non-Maleficence** – The study was conducted with the intent to benefit participants and the community, ensuring that no harm—physical, psychological, or social—came to those involved.
7. **Compliance With Institutional Guidelines** – The conduct of this research adhered to the ethical policies and procedures of the School of Graduate Studies, Sulu State College (SSC), as well as relevant national and international ethical standards for educational research.
8. **Ethical Clearance** – Prior to the administration of the survey questionnaire, the researcher secured an official Ethical Clearance from the Research Ethics Committee or authorized body of Sulu State College (SSC) to ensure that the study met all institutional and professional ethical requirements.

Acknowledgments

The author wishes to express his heartfelt thanks and deep appreciation to all the people, as well as the following individuals and institutions, who have contributed significantly to the realization of this work.

To the members of the Sulu State College – Graduate School Defense Panel for their valuable feedback and examination of this work: Dr. Masnona Sabdani-Asiri, chairman and Dean of the School of Graduate Studies; Dr. Nelson U. Julhamid, member and Vice President for Academic Affairs; and Dr. Charisma Samparani-Ututalum, CESE, member and SUC President II of Sulu State College. To Sir Ricky S. Morales, Jr., MA-Math, the thesis adviser, for his supervision, academic guidance, and patience throughout the research and writing process.

Further, he would like to acknowledge Prof. Masnona Sabdani-Asiri, DPA, for her support. He would also like to thank Prof. Nelson U. Julhamid, Ph.D., for his academic advice. And express his gratitude to Prof. Charisma Samparani-Ututalum, Ed.D., for providing opportunities during the period that inspired this paper, as well as for her administrative assistance in the research and preparation of this paper. He wishes to thank Assoc. Prof. Marivel T. Sarabi, Dean of the College of Teacher Education, for her collegiality and insightful suggestions.

He extends recognition to Mrs. Shelma S. Dammang, Principal of Cirilo Bueno Sr. Elementary School, for her administrative assistance; Mr. Zaidali Maguindra, Ph.D., Principal IV of Kabasalan District, Zamboanga Sibugay, for his brotherly advice on this indispensable matter; and Mr. Antony Manisan Bulawit, Ed.D., for allowing the use of his research instrument.

A deep appreciation is expressed to his family members who have supported this research: Armando Maulana Piñero (amah) and Hja. Irao Karima Jerun Jaafar (inah); Erna Jailani Piñero,MAED, MALTF, (loving wife); Pernashreen Jailani Piñero (daughter); and El-Aashnar Jailani Piñero (son). Thanks to the study participants, his colleagues at Hadji Gulamu Rasul Elem. School, Salih Ututalum Elem. School, Cirilo Bueno Sr. Elem. School, and Muhammad Jajurie Elem. School, and graduate school peers for their contributions and camaraderie.

Lastly, the writer appreciates with deep veneration the guidance and blessings of Almighty Allah in this academic pursuit.

REFERENCES

Adesope, O. O., Trevisan, D. A., & Sundararajan, N. (2020). Rethinking the use of tests: A meta-analysis of practice testing. Review of Educational Research, *90*(4), 487-519.

Agarwal, P. K., & Bain, P. M. (2019). Retrieval practice & timed testing: A learning tool. Journal of Applied Research in Memory and Cognition, *8*(2), 134-146.

Alqahtani, M. M., & Powell, A. B. (2023). The effectiveness of physical and digital manipulatives in mathematics learning: A meta-analysis. Educational Research Review, *38*, 100502.

Anthony, G., & Walshaw, M. (2009). Effective pedagogy in mathematics. International Academy of Education.

Bandura, A. (1977). Social learning theory. Prentice Hall.
Boaler, J. (2016). Designing mathematics classes to promote equity and engagement. The Journal of Mathematical Behavior, *41*, 172-178.
Byun, J., & Joung, E. (2018). Digital game-based learning for K–12 mathematics education: A meta-analysis. School Science and Mathematics, *118*(3-4), 113-126.
Capar, G., & Tarim, K. (2015). Efficacy of the cooperative learning method on mathematics achievement and attitude: A meta-analysis research. Educational Sciences: Theory & Practice, *15*(2), 553-559.
Carbonneau, K. J., Marley, S. C., & Selig, J. P. (2013). A meta-analysis of the efficacy of teaching mathematics with concrete manipulatives. Journal of Educational Psychology, *105*(2), 380–400.
Clements, D. H. (2000). From exercises and tasks to problems and projects: The evolution of mathematics education. Journal of Mathematical Behavior, *19*(1), 89-104.
Gardner, H. (1983). Frames of mind: The theory of multiple intelligences. Basic Books.
Hattie, J. (2012). Visible learning for teachers: Maximizing impact on learning. Review of Educational Research, *82*(4), 520-556.
Hiebert, J., & Grouws, D. A. (2007). The effects of classroom mathematics teaching on students' learning. National Council of Teachers of Mathematics.
Johnson, M. K., Smith, L. D., & Brown, R. T. (2023). Gender differences in response to mathematics teaching strategies: A meta-analytic review. Educational Psychology Review, *35*(1), 123-147.
Kebritchi, M., & Hirumi, A. (2021). The effects of teacher mediation in mathematics game-based learning environments. Journal of Educational Computing Research, *59*(3), 435-458.
Kim, S., & Rehder, B. (2022). The role of guidance in learning with manipulatives: Preventing cognitive overload. Cognitive Science, *46*(1), e13085.
Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Prentice-Hall.
MBHTE. (2022). Annual report on education in the Bangsamoro Autonomous Region in Muslim Mindanao. Ministry of Basic, Higher and Technical Education. https://www.mbhte.gov.ph
National Council of Teachers of Mathematics. (2020). Catalyzing change in early childhood and elementary mathematics. NCTM.
Richter, T., Scheiter, K., & Eitel, A. (2022). Distributed practice reduces cognitive load in complex mathematics learning. Learning and Instruction, *77*, 101527.
Skinner, B. F. (1968). The technology of teaching. Appleton-Century-Crofts.
Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. Cognitive Science, *12*(2), 257–285.
Thompson, R., & Hayes, S. (2022). An adaptive timing system for reducing mathematics anxiety and improving achievement. British Journal of Educational Technology, *53*(5), 1245-1263.
Thorndike, E. L. (1922). The psychology of arithmetic. The Macmillan Company.

UC.J.E.R.O.M.S. (2021). Mathematics education and national development. University Consortium for Journal of Educational Research and Organizational Management Studies. http://www.ucjeroms.org

Umugiraneza, O., Bansilal, S., & North, D. (2018). Exploring teachers' perceptions of the causes of difficulties in teaching mathematics. Pythagoras, *39*(1), a364.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

APA Citation:

Piñero, P. J., & Morales Jr., R. S. (2026). ASSESSING THE EFFECTIVENESS OF MATHEMATICS TEACHING STRATEGIES AT THE COLLEGE OF TEACHER EDUCATION – SULU STATE COLLEGE. Ignatian International Journal for Multidisciplinary Research, 4(5), 938–961. https://doi.org/10.5281/zenodo.20092227

Corresponding author: *percivalpinero19@gmail.com*