

Mathematics Attitude and Growth Mindset Among Filipino Preservice Teachers in Classroom-Based Learning: Basis for Inputs to a Mathematics Teaching Enhancement Program

Ana Gretchen David Tobe

Northwest Samar State University, Philippines

Email: anagretchen.tobe@nwssu.edu.ph

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ABSTRACT:

Developing a positive attitude toward mathematics and fostering a growth mindset are essential components in preparing effective future teachers. This study examined the mathematics attitude and growth mindset of Filipino preservice teachers in classroom-based learning as a basis for inputs to a mathematics teaching enhancement program. The study employed a descriptive–correlational research design involving 97 preservice teachers from a state university in the Philippines. Data were gathered using the Classroom-Based Mathematics Attitude and Growth Mindset Scale, which measured three domains: knowledge in teaching primary mathematics, teaching skills in mathematics, and confidence in teaching mathematics. Descriptive statistics, tests of normality, and nonparametric inferential statistics were utilized to analyze the data. Results revealed that preservice teachers demonstrated a high level of mathematics attitude and growth mindset ($M = 3.77$, $SD = 0.56$). Among the domains, knowledge in teaching primary mathematics obtained the highest mean ($M = 3.92$), followed by teaching skills ($M = 3.79$) and confidence in teaching mathematics ($M = 3.59$). Findings showed no significant differences in knowledge, teaching skills, and confidence when grouped according to age and sex. However, a significant difference was found in teaching skills when grouped according to year level, suggesting that preservice teachers in higher year levels tend to demonstrate stronger instructional skills. Correlation analysis further revealed significant positive relationships among knowledge, teaching skills, and confidence in teaching mathematics. The findings highlight the importance of strengthening preservice teachers' mathematical knowledge, pedagogical skills, and teaching confidence. The results provide empirical inputs for developing a mathematics teaching enhancement program aimed at improving instructional competence and fostering positive mathematics attitudes among future teachers.

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Introduction

Mathematics is often regarded as a challenging subject for learners and a demanding domain for teachers, particularly at the primary level, where foundational skills and conceptual understanding are developed. The quality of mathematics instruction in the classroom is highly influenced not only by teachers' content knowledge but also by their pedagogical skills, confidence, and attitude toward the subject (Yamada et al 2024). In recent years, educational research has emphasized the importance of fostering a positive mathematics attitude and a growth mindset among teachers as essential components of effective teaching (Dong, Jia, & Fei, 2023, Damrongpanit, 2020 Metu, Marbán, & Espina, 2025).

A positive attitude toward mathematics enables teachers to engage learners with enthusiasm and to model problem-solving strategies, while a growth mindset, as conceptualized by Carol S. Dweck (Dweck & Yeager, 2020), encourages educators to believe that abilities in mathematics can be developed through effort, practice, and learning from mistakes. These qualities are critical in equipping preservice teachers with the resilience, confidence, and instructional competence required to facilitate meaningful learning experiences in the classroom (Wijaya et al, 2025).

Preservice teachers, as individuals in training to become professional educators, represent a key group for interventions aimed at improving mathematics teaching. Research indicates that their knowledge, teaching skills, and self-efficacy are closely linked to their attitude toward mathematics and their capacity to adopt effective teaching strategies. According to Lee S. Shulman (2000), the development of pedagogical content knowledge is a central factor in teaching effectiveness, as it enables teachers to convey complex concepts in ways that students can understand and relate to real-life contexts. In parallel, Albert Bandura (Nabayi & Bijandi, 2012) emphasizes that teachers with higher confidence are more likely to implement

innovative instructional strategies, manage classroom challenges, and motivate learners. These theoretical perspectives highlight that cultivating strong knowledge, skills, and confidence is crucial for the development of effective mathematics educators.

Despite its importance, studies have shown that many preservice teachers still face challenges in translating content knowledge into practical teaching strategies (Van Driel, & Berry, 2022, Kim & Tan, Chang, Annisa, N., & Chen, 2025), often due to limited classroom exposure, insufficient practice in lesson planning, or low confidence in addressing learners' misconceptions. In the context of the Philippines, teacher education programs aim to equip future educators with the necessary competencies through a combination of theoretical coursework, field study, and practicum experiences. However, empirical evidence on the attitudes and growth mindset of Filipino preservice teachers in mathematics is limited, creating a need for systematic investigation (Caballero, 2026, Nob, et al 2025, Magat, 2026). Understanding the current levels of knowledge, teaching skills, and confidence among these teachers can provide actionable insights for curriculum development and targeted professional development programs.

The present study seeks to examine the mathematics attitude and growth mindset of Filipino preservice teachers in classroom-based learning, focusing on three domains: knowledge in teaching primary mathematics, teaching skills in mathematics, and confidence in teaching mathematics. It also explores the relationships between these dimensions and demographic variables such as age, sex, and year level. By identifying patterns in preservice teachers' attitudes, skills, and confidence, the study aims to provide empirical evidence to guide the design of a mathematics teaching enhancement program. This program intends to strengthen the instructional competence, self-efficacy, and pedagogical development of future teachers, ultimately improving student outcomes and

fostering a culture of positive mathematics learning in the classroom.

Objectives of the Study

Generally, the study examined the mathematics attitude and growth mindset of Filipino preservice teachers in classroom-based learning, focusing on three domains: knowledge in teaching primary mathematics, teaching skills in mathematics, and confidence in teaching mathematics. It addressed the following specific objectives: (1) Assess the Mathematics Attitude and Growth Mindset Scale for Filipino Preservice Teachers; (2) Test of Differences on the Classroom-Based Mathematics Attitude and Growth Mindset when Grouped according to Profile Variables (Non-Parametric Test); (3) Ascertain Relationship between Age, Year Level and Dimensions of Mathematics Attitude and Growth Mindset; and (4) Propose Inputs to a Mathematics Teaching Enhancement Program

Methodology

Research Design

This study employed a descriptive-correlational research design to examine the mathematics attitude and growth mindset of Filipino preservice teachers in classroom-based learning. The design allowed for the investigation of both

the level of knowledge, teaching skills, and confidence in teaching mathematics, as well as the relationships among these dimensions and selected demographic variables, including age, sex, and year level. Descriptive statistics provided an overview of participants' attitudes and growth mindset, while nonparametric inferential tests were applied to determine differences and relationships due to the violation of normality assumptions.

Respondents

The study involved 97 preservice teachers enrolled in a state university in the Philippines. Participants were selected using a purposive sampling technique to ensure that they were actively engaged in teacher education programs and had exposure to mathematics coursework and classroom-based learning. The participants' ages ranged from 17 to 25 years, with a mean age of 20.15 years. The majority of respondents were female (82.5%), while males comprised 17.5%. Participants represented all four year levels in the teacher education program, with the largest group in the fourth year (37.1%) and the smallest in the third year (10.3%). Most participants had not completed any field study courses (64.9%), while others had completed one to three courses.

Table 1: Profile Characteristics of the Sampled Respondents

Profile Variable	Category	F (n=97)	%
Age (years) Mean Age	17–18	22	22.7
	19–20	32	33.0
	21–22	34	35.1
	23–24	7	7.2
	25 and above	2	2.1
	M = 20.15 years		
Sex	Male	17	17.5
	Female	80	82.5
Year Level	1st Year	31	32.0
	2nd Year	20	20.6
	3rd Year	10	10.3

	4th Year	36	37.1
Number of Field Study Courses Completed	0	63	64.9
	1	20	20.6
	2	5	5.2
	3	4	4.1
	Others	5	5.2

Instrumentation

Data were collected using the Classroom-Based Mathematics Attitude and Growth Mindset Scale, which was developed to measure preservice teachers' knowledge in teaching primary mathematics, teaching skills, and confidence in teaching mathematics. The scale consisted of three domains: (1) knowledge in teaching primary mathematics, (2) teaching skills in mathematics, and (3) confidence in teaching mathematics. Items were rated on a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The scale demonstrated acceptable reliability, with Cronbach's alpha values above 0.70 for all domains, indicating internal consistency.

Data Gathering Procedure and Statistical Analysis

Prior to data collection, permission was obtained from the university administration and course instructors. Participants were briefed about the study's objectives, and informed consent was secured. The survey instrument was administered during class sessions, and respondents were given sufficient time to complete it. Data were encoded and analyzed using descriptive statistics, Kruskal–Wallis H test, Mann–Whitney U test, and Spearman's rho correlation to determine levels, differences, and relationships among the variables.

Table 3 Tests of Normality for Grand Mean of Classroom-Based Mathematics Attitude and Growth Mindset (N = 97)

Test	Statistic	df	p-value
Kolmogorov–Smirnov (Lilliefors correction)	0.104	97	.012*
Shapiro–Wilk	0.963	97	.008*

Note. N = 97. * $p < .05$ indicates violation of normality assumption.

The results of the normality tests (Table 3) indicate that the grand mean of the Classroom-Based Mathematics Attitude and Growth Mindset scale did not meet the assumption of normality. Both the Kolmogorov–Smirnov test ($D = 0.104$, $p = .012$) and the Shapiro–Wilk test ($W = 0.963$, $p = .008$) were significant at $p < .05$, suggesting that the distribution of scores is significantly different from a normal distribution. Therefore, non-parametric statistical analyses may be more appropriate for further inferential testing.

Ethical Considerations

The study adhered to ethical guidelines for research involving human participants. Participation was voluntary, and respondents were informed of their right to withdraw at any time without penalty. Confidentiality and anonymity of participants were ensured by assigning numerical codes instead of names. The study was reviewed and approved by the university's research ethics board, ensuring compliance with principles of informed consent, privacy, and protection of participants' rights.

Results and Discussion

Mathematics Attitude and Growth Mindset Scale for Filipino Preservice Teachers

Table 2 presents the descriptive statistics for the Classroom-Based Mathematics Attitude and Growth Mindset Scale for Filipino preservice teachers. The scale measured three domains: knowledge in teaching primary mathematics, teaching skills in mathematics, and confidence in teaching mathematics. The grand mean for the overall Mathematics Attitude and Growth Mindset Scale was 3.77 (SD = 0.56), which falls in the high range. This suggests that Filipino preservice teachers generally possess a positive attitude and a growth mindset toward teaching primary mathematics, with a strong sense of knowledge, teaching skills, and confidence in the classroom.

A closer inspection of the data showed that for knowledge in teaching primary mathematics,

participants reported a mean of 3.92 (SD = 0.57), which is interpreted as high. This indicates that preservice teachers generally feel knowledgeable about basic mathematics concepts, curriculum standards, and problem-solving strategies, and are capable of connecting mathematics to real-life contexts. In the domain of teaching skills in mathematics, participants scored a mean of 3.79 (SD = 0.62), also interpreted as high. This suggests that preservice teachers are able to apply diverse teaching strategies, manage classroom activities, integrate technology effectively, and adapt instruction based on learners' needs. For confidence in teaching mathematics, the mean was 3.59 (SD = 0.71), interpreted as high, indicating that preservice teachers feel capable of teaching mathematics, handling pupils' questions, motivating learners, and facing instructional challenges.

Table 2 presents the descriptive statistics Classroom-Based Mathematics Attitude and Growth Mindset Scale for Filipino Preservice Teachers

Domain	Item Description	Mean	SD	Interpretation
Knowledge in Teaching Primary Mathematics	I understand the basic concepts of addition, subtraction, multiplication, and division	4.55	0.80	Very High
	I can explain fractions, decimals, and percentages in ways that are easy for pupils to understand	3.84	0.75	High
	I am knowledgeable in teaching problem-solving strategies in primary mathematics	3.58	0.72	High
	I can connect mathematics concepts to real-life situations	4.04	0.83	High
	I am familiar with the K–12 curriculum standards in mathematics for primary grades	3.80	0.80	High
	I understand the common misconceptions pupils have in mathematics	3.69	0.73	High
	I can prepare lesson plans that align with curriculum competencies	3.66	0.85	High
	I can use appropriate instructional materials and visual aids in teaching math	3.84	0.81	High
Mean for Knowledge in Teaching Primary Mathematics		3.92	0.57	High
Teaching Skills in	I can apply different teaching strategies to cater to diverse learners	3.72	0.80	High

Mathematics	I can effectively integrate technology in teaching mathematics	3.81	0.83	High
	I can manage classroom activities during mathematics instruction	3.78	0.81	High
	I can assess pupils' learning through tests, activities, and performance tasks	4.03	0.74	High
	I can adjust my teaching methods based on learners' needs and performance	4.01	0.71	High
Mean for Teaching Skills in Mathematics		3.79	0.62	High
Confidence in Teaching Mathematics	I feel confident teaching mathematics lessons to a class of primary pupils	3.46	0.87	High
	I can handle pupils' questions in mathematics effectively	3.53	0.75	High
	I am comfortable speaking in front of pupils during math instruction	3.46	0.80	High
	I believe I can motivate pupils to enjoy learning mathematics	3.80	0.83	High
	I feel prepared to face challenges in teaching mathematics	3.64	0.87	High
	I am confident in my ability to improve pupils' performance in mathematics	3.65	0.85	High
Mean for Confidence in Teaching Mathematics		3.59	0.71	High
Grand Mean Mathematics Attitude and Growth Mindset		3.77	0.56	High

Scale interpretation: 4.21–5.00 = Very High; 3.41–4.20 = High; 2.61–3.40 = Moderate; 1.81–2.60 = Low; 1.00–1.80 = Very Low.

The general finding in this objective manifested that the sampled Filipino preservice teachers showed a high level of knowledge, teaching skills and confidence in teaching primary mathematics. This indicates that teacher education programs are effectively preparing future teachers with both the conceptual understanding and practical skills needed for classroom instruction. The high levels of attitude and growth mindset may positively influence classroom performance and student learning outcomes, as teachers who are confident and skilled are more likely to implement effective teaching strategies and motivate pupils. However, the results also highlight the need for ongoing professional development, particularly in areas such as

addressing misconceptions and integrating advanced problem-solving strategies, to further strengthen teaching effectiveness.

Studies show that preservice teachers' attitudes toward mathematics are closely related to their knowledge, teaching skills, and confidence in classroom instruction (Magat, 2026, Caballero, 2026). The growth mindset theory of Carol S. Dweck emphasizes that abilities can be developed through effort and learning, which is essential in teaching mathematics. Similarly, Lee S. Shulman highlighted that effective teaching requires both strong subject knowledge and the ability to deliver concepts in ways learners can understand. In addition, the self-efficacy theory of Albert Bandura explains that teachers with higher confidence are more likely to apply

effective teaching strategies and motivate students, emphasizing the importance of developing knowledge, skills, and confidence among preservice mathematics teachers.

The findings of this study provide valuable insights into the mathematics attitude and growth mindset of Filipino preservice teachers in classroom-based learning. The preservice teachers demonstrated a high level of mathematics attitude and growth mindset, as evidenced by their strong performance across the three domains: knowledge in teaching primary mathematics, teaching skills, and confidence in teaching mathematics. This suggests that teacher education programs in the Philippines are effectively equipping future educators with foundational knowledge, pedagogical skills, and a sense of efficacy necessary for effective mathematics instruction. Among the three domains, knowledge in teaching primary mathematics obtained the highest mean, indicating that preservice teachers feel well-prepared in terms of understanding mathematical concepts and curriculum standards. Teaching skills followed closely, reflecting the ability of preservice teachers to apply instructional strategies, manage classrooms, and adapt lessons to diverse learners. Confidence in teaching mathematics, although slightly lower, still fell within the high range, suggesting that while preservice teachers are capable of instructing effectively,

opportunities to build greater self-efficacy may be beneficial, particularly through hands-on teaching experiences and guided practicum sessions.

Table 4. Test of Differences on the Classroom-Based Mathematics Attitude and Growth Mindset when Grouped according to Profile Variables (Non-Parametric Test)

Table 4 presents the Kruskal–Wallis H test result which was conducted to determine whether there were differences in the dimensions of the Classroom-Based Mathematics Attitude and Growth Mindset namely knowledge in teaching primary mathematics, teaching skills in mathematics, and confidence in teaching mathematics across different age groups of preservice teachers. The results revealed that there were no statistically significant differences in knowledge in teaching primary mathematics across age groups, $H(9) = 2.19, p = .988$. Similarly, no significant differences were found in teaching skills in mathematics, $H(9) = 11.63, p = .235$, and confidence in teaching mathematics, $H(9) = 7.05, p = .632$. Since all p-values were greater than the .05 significance level, the null hypothesis was not rejected. These findings indicate that the levels of knowledge, teaching skills, and confidence in teaching mathematics among the preservice teachers did not significantly vary according to their age.

Table 4 Kruskal–Wallis Test for Differences in Knowledge, Teaching Skills, and Confidence by Age

Variable	Kruskal–Wallis H	df	p-value	Interpretation
Knowledge in Teaching Primary Mathematics	2.185	9	.988	No significant difference across age groups
Teaching Skills in Mathematics	11.632	9	.235	No significant difference across age groups
Confidence in Teaching Mathematics	7.047	9	.632	No significant difference across age groups

Note. $N = 97; \alpha = .05$.

The absence of significant differences across age groups suggests that age may not be a

determining factor in shaping preservice teachers' mathematics attitudes and growth

mindset. Regardless of age, participants demonstrated relatively similar levels of knowledge, teaching skills, and confidence in teaching mathematics. This finding may be attributed to the standardized nature of teacher education programs, where preservice teachers receive similar training, coursework, and learning experiences during their preparation (Metu, Marban & Espina, 2025). Moreover, the result implies that the development of mathematical teaching competence and confidence is more strongly influenced by professional preparation, exposure to teaching practices, and pedagogical training rather than demographic factors such as age. Consequently, teacher education institutions may focus more on strengthening instructional experiences, practicum opportunities, and pedagogical training to further enhance preservice teachers' mathematics teaching competencies and confidence.

Studies suggest that professional preparation and training experiences play a more substantial role in shaping teachers' knowledge, skills, and confidence. According to Albert Bandura, teachers' self-efficacy develops primarily through mastery experiences and instructional practice rather than personal characteristics such as age. Similarly, Lee S. Shulman emphasized that teaching competence is largely formed through pedagogical training and the

development of pedagogical content knowledge. These perspectives suggest that preservice teachers who undergo similar educational preparation tend to demonstrate comparable levels of knowledge, teaching skills, and confidence regardless of their age.

Table 5 presents the Mann–Whitney U test which was conducted to examine whether there were significant differences in the dimensions of Classroom-Based Mathematics Attitude and Growth Mindset namely knowledge in teaching primary mathematics, teaching skills in mathematics, and confidence in teaching mathematics when preservice teachers were grouped according to sex. The results indicated that there was no statistically significant difference between male and female preservice teachers in knowledge in teaching primary mathematics, $U = 535.00$, $Z = -1.39$, $p = .166$. Similarly, no significant differences were found in teaching skills in mathematics, $U = 608.50$, $Z = -0.68$, $p = .496$, and confidence in teaching mathematics, $U = 587.50$, $Z = -0.88$, $p = .377$. Since all p-values were greater than the .05 level of significance, the null hypothesis was not rejected. These findings indicate that male and female preservice teachers demonstrated comparable levels of knowledge, teaching skills, and confidence in teaching primary mathematics (Chang et al, 2022).

Table 5. Mann–Whitney U Test for Differences in Knowledge, Teaching Skills, and Confidence by Sex

Variable	U	Z	p-value	Interpretation
Knowledge in Teaching Primary Mathematics	535.000	-1.386	.166	No significant difference between males and females
Teaching Skills in Mathematics	608.500	-0.681	.496	No significant difference between males and females
Confidence in Teaching Mathematics	587.500	-0.883	.377	No significant difference between males and females

Note. $N = 97$; 1 = Male, 2 = Female; $\alpha = .05$.

The findings suggest that sex does not significantly influence preservice teachers' mathematics attitude and growth mindset. Both male and female participants demonstrated

similar levels of knowledge, instructional skills, and confidence in teaching mathematics. This may indicate that teacher education programs provide equitable learning opportunities and

training experiences regardless of gender. The result also implies that the development of teaching competence in mathematics is more closely related to instructional preparation, exposure to teaching practice, and professional training rather than gender differences. The absence of significant differences between male and female preservice teachers is consistent with research indicating that gender does not necessarily determine teaching competence or attitudes toward mathematics when individuals receive similar training and learning experiences.

A **Kruskal–Wallis H test** was conducted to determine whether there were differences in the dimensions of Classroom-Based Mathematics Attitude and Growth Mindset specifically knowledge in teaching primary mathematics,

teaching skills in mathematics, and confidence in teaching mathematics when preservice teachers were grouped according to year level. The results revealed that there was no statistically significant difference in knowledge in teaching primary mathematics across year levels, $H(3) = 0.80, p = .851$. Similarly, no significant difference was found in confidence in teaching mathematics, $H(3) = 4.18, p = .242$. However, a statistically significant difference was observed in teaching skills in mathematics across year levels, $H(3) = 9.55, p = .023$. Since the p-value for teaching skills was less than the .05 level of significance, the null hypothesis was rejected for this variable. This indicates that preservice teachers' teaching skills in mathematics vary according to their year level.

Table 6. Kruskal–Wallis Test for Differences in Knowledge, Teaching Skills, and Confidence by Year Level

Variable	Kruskal–Wallis H	df	p-value	Interpretation
Knowledge in Teaching Primary Mathematics	0.795	3	.851	No significant difference across year levels
Teaching Skills in Mathematics	9.548	3	.023*	Significant difference across year levels
Confidence in Teaching Mathematics	4.182	3	.242	No significant difference across year levels

Note. N = 97; $\alpha = .05$. * $p < .05$.

The significant difference in teaching skills across year levels suggests that preservice teachers tend to develop stronger teaching competencies as they progress in their academic program. Students in higher year levels are likely exposed to more professional education courses, teaching demonstrations, and field-based experiences such as practicum or internship, which enhance their instructional abilities. In contrast, knowledge in teaching mathematics and confidence in teaching did not significantly differ across year levels, indicating that these aspects may be consistently developed throughout the teacher education program. The findings imply that practical teaching experiences and continuous pedagogical

training contribute to the improvement of preservice teachers' instructional skills over time.

The finding that teaching skills improve across year levels is supported by research emphasizing the importance of professional preparation and teaching experience in developing instructional competence. Lee S. Shulman highlighted that effective teaching develops through the integration of subject knowledge and pedagogical practice acquired during teacher training. Likewise, the theory of self-efficacy proposed by Albert Bandura suggests that repeated practice and mastery experiences strengthen individuals' perceived capabilities, which can explain why preservice teachers in

higher year levels demonstrate stronger teaching skills.

The absence of significant differences in mathematics attitude and growth mindset across age and sex aligns with previous research emphasizing that demographic factors do not necessarily determine teachers' instructional competence when standardized educational programs and professional preparation are in place. This finding underscores the importance of structured teacher training that provides equitable learning opportunities regardless of personal characteristics, ensuring all preservice teachers can develop the requisite knowledge, skills, and confidence.

However, the study found a significant difference in teaching skills across year levels, indicating that preservice teachers in higher academic years tend to demonstrate stronger instructional competencies. This outcome

highlights the cumulative effect of professional education courses, practicum experiences, and teaching exposure over time. It suggests that hands-on practice and progressive learning opportunities are critical for developing effective teaching strategies, supporting the notion that instructional competence grows through experience, as proposed by Shulman's pedagogical content knowledge framework and Bandura's self-efficacy theory.

Test of Relationship between Age, Year Level and Dimensions of Mathematics Attitude and Growth Mindset

Table 7 presents the Spearman's rho correlation which was conducted to examine the relationships between age, year level, and teachers' attitudes and growth mindset dimensions in teaching primary mathematics, including knowledge, teaching skills, and confidence.

Table 7. Test of Relationship between Age, Year Level and Dimensions of Mathematics Attitude and Growth Mindset

			Age	Year Level: 1st 2nd 3rd 4th	Knowledge in Teaching Primary Mathematics	Teaching Skills in Mathematics	Confidence in Teaching Mathematics
Spearman's rho	Age	Correlation Coefficient	1.000	.742**	.005	.151	.006
		Sig. (2-tailed)	.	.000	.958	.139	.956
		N	97	97	97	97	97
	Year Level: 1st 2nd 3rd 4th	Correlation Coefficient	.742**	1.000	.015	.311**	.099
		Sig. (2-tailed)	.000	.	.881	.002	.334
		N	97	97	97	97	97
	Mean for Knowledge in Teaching Primary Mathematics	Correlation Coefficient	.005	.015	1.000	.650**	.552**
		Sig. (2-tailed)	.958	.881	.	.000	.000
		N	97	97	97	97	97
	Teaching Skills in	Correlation Coefficient	.151	.311**	.650**	1.000	.683**

	Mathematics	Sig. (2-tailed)	.139	.002	.000	.	.000
		N	97	97	97	97	97
	Confidence in Teaching Mathematics	Correlation Coefficient	.006	.099	.552**	.683**	1.000
		Sig. (2-tailed)	.956	.334	.000	.000	.
		N	97	97	97	97	97
**. Correlation is significant at the 0.01 level (2-tailed).							

Perusing the data, Age was found to have no significant relationship with knowledge in teaching primary mathematics ($\rho = .005$, $p = .958$), teaching skills ($\rho = .151$, $p = .139$), or confidence in teaching mathematics ($\rho = .006$, $p = .956$). This suggests that age did not meaningfully influence these dimensions of teaching attitudes among the participants. In like manner, Year level was significantly positively correlated with teaching skills ($\rho = .311$, $p = .002$), indicating that students in higher year levels reported higher teaching skills in mathematics. However, year level was not significantly correlated with knowledge in teaching primary mathematics ($\rho = .015$, $p = .881$) or confidence in teaching mathematics ($\rho = .099$, $p = .334$).

All dimensions of teaching attitude were positively and significantly correlated with each other. Knowledge in teaching primary mathematics was strongly associated with teaching skills ($\rho = .650$, $p < .001$) and confidence in teaching mathematics ($\rho = .552$, $p < .001$). Similarly, teaching skills were strongly correlated with confidence in teaching mathematics ($\rho = .683$, $p < .001$). This indicates that higher knowledge in teaching mathematics is related to higher teaching skills and greater confidence in teaching, and that these dimensions tend to increase together.

Generally, the findings suggest that year level may influence teaching skills, but age does not significantly relate to knowledge, skills, or confidence. Moreover, the strong interrelationships among knowledge, skills, and confidence underscore the integrated nature of teaching attitudes and growth mindset in mathematics.

The positive relationship among knowledge, teaching skills, and confidence supports existing theories in teacher education. Lee S. Shulman emphasized that effective teaching requires the integration of subject knowledge and pedagogical skills, which together influence instructional competence. Similarly, the self-efficacy theory of Albert Bandura suggests that individuals who develop mastery in a particular domain tend to demonstrate higher confidence in performing related tasks. These perspectives imply that preservice teachers who possess stronger knowledge in mathematics are more likely to develop better teaching skills and greater confidence in teaching the subject.

Correlation analyses further revealed significant positive relationships among knowledge, teaching skills, and confidence in teaching mathematics. This interconnection demonstrates the integrated nature of teaching competence: stronger conceptual understanding reinforces instructional abilities, which in turn boosts confidence in classroom teaching. These findings affirm the theoretical foundations that knowledge, skills, and self-efficacy are mutually reinforcing, forming the core of an effective mathematics educator's profile.

Conclusion and Recommendations

This study examined the mathematics attitude and growth mindset of Filipino preservice teachers in classroom-based learning, focusing on their knowledge in teaching primary mathematics, teaching skills, and confidence in teaching mathematics. Findings revealed that preservice teachers generally possess high levels of mathematics attitude and a growth mindset, demonstrating strong conceptual understanding, effective teaching strategies, and considerable

instructional confidence. Among the domains, knowledge in teaching primary mathematics was highest, followed by teaching skills and confidence, indicating that while preservice teachers are well-prepared conceptually and practically, further support may enhance their teaching self-efficacy. The analysis also revealed that demographic factors such as age and sex did not significantly influence mathematics attitudes or growth mindset, highlighting the standardized and equitable nature of teacher education programs. However, a significant difference in teaching skills across year levels suggests that instructional competencies develop progressively with exposure to professional education courses, practicum experiences, and classroom practice. Correlation results further showed strong positive relationships among knowledge, teaching skills, and confidence, emphasizing the interdependent nature of these dimensions in shaping effective mathematics educators.

The findings underscore the importance of comprehensive teacher education that integrates content knowledge, pedagogical skills, and confidence-building experiences. The high mathematics attitude and growth mindset observed among preservice teachers provide a strong foundation for instructional effectiveness and learner engagement. These results offer empirical guidance for developing a Mathematics Teaching Enhancement Program designed to further strengthen preservice teachers' instructional competence, foster positive attitudes toward mathematics, and prepare future educators to deliver high-quality mathematics instruction that supports meaningful learning outcomes for primary pupils.

Implications and Inputs to a Mathematics Teaching Enhancement Program

The study highlights the crucial role of teacher education in fostering positive mathematics attitudes and a growth mindset among preservice teachers. By emphasizing the interconnected development of knowledge, skills, and confidence, educational institutions

can enhance instructional quality, strengthen preservice teachers' preparedness, and ultimately contribute to improved student learning outcomes in mathematics. The high levels of knowledge and skills suggest that current teacher education programs are effective, yet the slightly lower confidence scores indicate the need for structured interventions to further enhance preservice teachers' self-efficacy. Integrating targeted teaching simulations, microteaching exercises, and reflective practice activities may strengthen both confidence and instructional competence.

Given the positive relationship between year level and teaching skills, programs may benefit from scaffolded experiences where preservice teachers progressively engage in more complex instructional responsibilities as they advance in their studies. Early exposure to classroom teaching can accelerate skill acquisition and readiness for real-world teaching.

Ongoing training focused on problem-solving strategies, handling learner misconceptions, and integrating innovative teaching methodologies can maintain and enhance high mathematics attitudes and growth mindset. Workshops, peer mentoring, and collaborative lesson planning may also support continuous development.

The findings serve as empirical input for designing a Mathematics Teaching Enhancement Program aimed at reinforcing knowledge, refining teaching skills, and boosting confidence. Such programs can provide structured practice, feedback mechanisms, and pedagogical guidance to prepare preservice teachers for effective classroom instruction.

Future Research Directions

While this study provides valuable insights into the mathematics attitude and growth mindset of Filipino preservice teachers, several methodological limitations suggest directions for future research. First, the study employed a descriptive–correlational design, which limits the ability to establish causal relationships between variables. Future research could adopt experimental or quasi-experimental designs to determine the effectiveness of targeted

interventions on enhancing mathematics teaching skills and confidence. Second, the sample was drawn from a single state university and consisted of 97 preservice teachers, which may limit the generalizability of the findings. Expanding the study to multiple institutions across different regions in the Philippines could provide a more representative understanding of preservice teachers' attitudes and growth mindset. Third, data were collected using self-reported measures, which are susceptible to

social desirability bias. Future studies could incorporate classroom observations, teaching simulations, or performance-based assessments to obtain more objective indicators of teaching skills and confidence. Finally, longitudinal studies could explore how mathematics attitudes and growth mindset evolve over time throughout teacher education programs, offering insights for curriculum design and professional development.

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