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Problem-solving performance and subject preference: Math avoidance among Filipino elementary preservice teachers

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Abstract

Elementary preservice teachers (EPTs) substantially impact the quality of mathematics education, and their subject preference and problem-solving performance are essential indicators of their readiness to teach. The study described EPTs' subject preference and problem-solving performance. Through a sequential explanatory research design, the quantitative inquiry involved 125 random samples, while the qualitative inquiry was participated by 30 non-random samples. Data were obtained by using an online survey and conferencing. Quantitative data were analyzed through descriptive statistics and analysis of variance, whereas qualitative data were themed accordingly. The EPTs displayed unsatisfactory problem-solving performance and preferred to handle subjects other than math. Besides, the analysis found no significant performance differences with the EPTs' subject preferences. Further, the EPTs who preferred to teach mathematics expressed their confidence in mathematics. Meanwhile, the EPTs who preferred other subjects displayed math avoidance. The study revealed an alarming result indicating that the EPTs are unprepared for teaching. As agents in cultivating the nation's mathematics education status, these EPTs must be equipped with fundamental content knowledge. It is suggested that educational decision-makers take measures to address the issues identified concerning EPTs' readiness to teach mathematics successfully.

Keywords: Mathematics education, mixed-method study, teacher education

Introduction

Education worldwide is shaped by the 17 Sustainable Development Goals (SDGs) adopted by the United Nations and the challenges posed by Education 4.0. The fourth SDG, in particular, concerns universal, equitable, and quality basic to higher education (United Nations Development Programme, n.d.), while Education 4.0 emphasizes the integration of technological advancements in the curriculum and the teaching-learning process (James, 2019). In response, the Philippine government, through its Commission on Higher Education and Department of Education, has worked on policies and programs, and reforms to support students and teachers. These agencies ensured that relevant and affordable education was delivered to the students and sustained the training and development of in-service and preservice teachers. Continuous professional development is deemed to help in-service teachers build upon the emerging technological, pedagogical, and content knowledge specific to their specialization. However, this study underscored the concerns of preservice teacher preparation nowadays.

Preservice teacher training and preparation

Preservice teacher training and preparation are crucial in achieving the fourth SDG and Education 4.0. With this, there is a demand for teachers to acquire the information, dispositions, pedagogical abilities, and competencies required to address these concerns. Legislative and institutional frameworks primarily design teacher training frameworks. Still, teacher training is naturally contentious, with ideological disagreements on educational goals, historical dualities in the national system, political ramifications, and pressure from teachers' unions (Evagorou et al., 2015; Naylor et al., 2015). In addition, the literature argues for preservice teachers' preparedness for the teaching profession. Preservice training and preparation do not effectively prepare future teachers with limited knowledge, experiences, and exposure (Freeman et al., 2013; Nganga et al., 2020; Nwati & Thuthukile, 2021), and this hits teacher education institutions with various criticisms (Naylor et al., 2015). As such, it is imperative to look at the preservice teachers' preparation, especially in mathematical problem-solving, where limited local studies have been found. A few address math avoidance among these future teachers.

Preservice teachers' unpreparedness to teach mathematics

Preservice teachers need to prepare to teach mathematics. The Mathematics Teacher Education and Development Study participated by 17 countries reported that future elementary teachers in the Philippines recorded the lowest mathematical content knowledge mean score compared to other participating countries (Tatto, 2013). The Science Education Institute - Department of Science and Technology and the Philippine Council of Mathematics Teachers Educators, Inc. (SEI-DOST & MATHTED) both admitted that Philippine mathematics teacher education status is alarming (SEI-DOST & MATHTED, 2011). This was confirmed by several studies, which revealed that Filipino preservice teachers have incompetency in whole numbers and decimals, fractions, ratio and proportion, geometry, and measurement (Lee-Chua, 2012); poor achievement in both fundamental and contemporary mathematics (Andaya, 2014); competency indicators behind proficiency level (Roble & Bacabac, 2016); poor common and specialized mathematical content knowledge (Pelingon, 2019); low probability and correlational thinking (Domingo et al., 2021); weak conceptual knowledge of the five notions of fraction as part-whole, operator, measure, quotient, and ratio (Ibañez & Pentang, 2021); inadequate mathematical content knowledge and problem-solving

skill (Pentang, 2019); and lack problem-solving in statistics (Bacangallo et al., 2022). These findings indicate that Filipino preservice teachers have yet to develop mastery of various mathematical concepts and applications of different problem-solving strategies (Andrade & Pasia, 2020). In a recent study, Bacsal et al. (2022) wrote that math was among the most challenging classes for many elementary preservice teachers (EPTs).

Context of the study

The worldwide demand for high-quality education emphasizes preservice teachers' attributes (Nwati & Thuthukile, 2021). Despite being hopeful that EPTs will enter the profession with a positive attitude toward mathematics teaching and learning (Ibañez & Pentang, 2021; Ray & Herron, 2021), the reports above prompted this study on the problem-solving performance of EPTs. Since preservice teacher education programs play an essential role in the preparation of a highly qualified teaching workforce (Pentang, 2019) and problem-solving strategies significantly influence the academic achievement of preservice teachers (Gurat, 2018), the results will guide teacher education institutions in the training and preparation of the EPTs, particularly with mathematics and problem-solving. It would be beneficial to study how preservice teachers interact with the mathematical tasks they may one day lead with youngsters (Lloyd, 2018). Accordingly, this study was deemed necessary to assess the readiness of future elementary teachers of young Filipinos, who consequently attained math scores below the standard set by the Department of Education and poorly performed in international assessments such as the Trends in International Mathematics and Science Study and the Programme for International Student Assessment. Many preservice teachers report feeling unprepared to teach mathematical problem-solving, which might impact their ability to teach this subject effectively (Bacangallo et al., 2022; Mariano-Dolesh et al., 2022; Pentang, 2019). This is due to teacher education programs' lack of emphasis on problem-solving. Some preservice teachers may have bad attitudes and negative interests toward math, affecting their willingness to teach it and their ability to engage pupils (Bacsal et al., 2022; Dua et al., 2022; Ibañez & Pentang, 2021). This could be due to personal encounters with arithmetic or a misunderstanding of its significance in daily life. To address these issues, teacher preparation programs and educators must work together to provide preservice teachers with the information, skills, and support they need to teach problem-solving effectively.

The study further verified if these EPTs' subject preference has something to do with their problem-solving performance. Other than Pentang (2019), the subject preference of future elementary teachers, whether they prefer to teach mathematics or other subjects, and its relationship with problem-solving performance showed minimal available literature. Elementary teachers must be skilled in mathematical problem-solving because it is a fundamental component of the K-12 mathematics curriculum. Problem-solving skills are not only required for pupils to excel in math but are also essential life skills. Investigating EPTs' problem-solving abilities and topic preferences align with this purpose since it can provide insight into their degree of preparedness for teaching math and their attitudes about the subject. Teacher educators can better adjust their instruction to match the requirements of their students if they recognize their strengths and weaknesses in problem-solving. On top of that, by assessing topic choice, teacher educators can identify EPTs who may require additional math support and provide focused professional development to help them enhance their skills and confidence in this area. This can lead to improved outcomes for children, who will benefit from having informed and enthusiastic teachers about arithmetic. Besides, no studies have established math avoidance among EPTs, which may provide baseline data to assist the researchers in proposing a review and revision of the curriculum. To date, EPTs are generalists where a field of specialization is not offered in the institution. Parallel with Bacsal et al. (2022)

and Pentang (2019), this study hopes to inform policymakers and curriculum developers of the Bachelor of Elementary Education to adopt the specialization program applied to the Bachelor of Secondary Education program.

Research objectives

With this concern for mathematics teacher education, the study determined the EPTs' problem-solving performance and subject preference, which they would bring into their off-campus practice teaching and future teaching career. Specifically, this study aimed to:

1. describe the subject preference of the EPTs;
2. determine the EPTs' problem-solving performance in number sense, measurement, geometry, algebra, and probability;
3. distinguish differences in the EPTs' problem-solving performance in terms of subject preference; and
4. identify the reasons behind the EPTs' subject preference.

Methodology

Research design

This study utilized a mixed-method research design, combining quantitative and qualitative approaches. It is a research design that includes inquiry methodologies and philosophical assumptions that govern the direction of data collecting and analysis and the combination of qualitative and quantitative data in one or a series of studies (Creswell & Creswell, 2018). Using either quantitative or qualitative approaches alone is insufficient to address this complexity. The complexity of a given phenomenon cannot be adequately addressed or understood if only quantitative or qualitative methods are used (Magulod et al., 2021). Both techniques have advantages and disadvantages and may only provide partial knowledge of the phenomena or situation. As a result, employing both quantitative and qualitative approaches can provide a more complete and nuanced understanding of complicated events or situations. More insight can be gained from combining both quantitative and qualitative research than from either form alone. Ross and Onwuegbuzie (2012) studied the prevalence of mixed methods research in mathematics education, where topics involve mathematical thought processes, problem-solving, mental actions, behaviors, and other occurrences related to mathematical understanding. They concluded that qualitative and quantitative data complement and reveal relationships between observations and mathematical achievement.

In particular, the study employed a sequential explanatory mixed-method research design where quantitative data gathering and analysis were conducted first, followed by qualitative data gathering and analysis. In the latter presentation, quantitative results (EPTs' subject preference, EPTs' problem-solving performance, and subject preference difference in the EPTs' problem-solving performance) were presented first before qualitative results (EPTs prefer mathematics over other subjects, EPTs' math avoidance). The concluding paragraph in the Results and Discussion section offers a combination of ideas gained from the quantitative and qualitative inquiries.

Participants and sampling procedures

Participants of the quantitative inquiry were 125 elementary preservice teachers (second to fourth-year Bachelor of Elementary Education students) across three campuses of a teacher education institution in Western Philippines chosen using stratified random sampling. On the

other hand, the qualitative inquiry comprised 30 participants selected purposively (15 EPTs who preferred mathematics and another 15 who opted for different subjects, five from each campus, respectively). The participants for both inquiries were chosen from these institutions since these preservice teachers would soon be employed as primary educators in the different schools in the locality where low mathematics performance was prevalent among young learners (Aguhayon et al., 2023; Azucena et al., 2022; Pentang, 2021; Pentang et al., 2020). The school authorities' permission and anonymity for both institution and participants were established to conform to data privacy and confidentiality. The researchers ensured that all participants understood the purpose of the study. The informed consent form was voluntarily signed and collected from the participants.

Data collection procedure, tool, and analysis

Consistent with the research design by Creswell and Creswell (2018) with the insights from Magulod et al. (2021), the following data gathering procedures were employed: (1) collection and analysis of quantitative data; (2) identifying specific quantitative results that need additional explanation; (3) designing qualitative study based on quantitative results; (4) collection and analysis of qualitative data; and (5) interpreting combined results. With approval from authorities, the study was conducted from December 2021 to February 2022. An online survey was distributed to all 125 randomly selected EPTs to collect data for the study, and 30 non-randomly selected EPTs were invited to a conferencing session. The validity of the online survey and conferencing employed in this study can be assessed by verifying that the survey questions and subjects covered are consistent with the research objectives and are relevant to the study's participants. Meanwhile, reliability was ensured by verifying that the survey and conferencing methods were uniform and similar across all participants. This includes ensuring that the survey and conferencing methods are reliable and accurate assessments of the targeted components and use the same format, language, and instructions for all participants. The researchers ensured that the preservice teacher participants provided truthful information and refrained from responses subject to social desirability bias, which participants thought they had to give.

A problem-solving test on the fundamental competencies in mathematics was used to determine the participants' problem-solving performance in number sense, measurement, geometry, algebra, and probability. These items were patterned from the Department of Education (2016) and SEI-DOST and MATHTED (2011). Further, the test items were validated in the studies of Pentang et al. (2020) and Pentang (2021), considering high school learners, and Pentang (2019) involving elementary preservice teachers from a teacher education institution. The data collected and tabulated for the quantitative study were screened first to check for missing data, outliers, and normality. Frequency count and percentage were employed to illustrate the participants' subject preference, while arithmetic means and standard deviation (SD) were used for their problem-solving performance. Analysis of variance (ANOVA) was conducted to distinguish significant differences in problem-solving performance considering the participants' subject preferences. The ANOVA was performed at a .05 level of significance.

On the other hand, the qualitative study employed a focused group discussion (FGD) where the responses were transcribed and themed accordingly. The themes emerging from the FGD were validated during the triangulation conducted by the researchers. An external validator ensured the analysis's appropriateness and the results' correctness.

Findings and discussion

Elementary preservice teachers' subject preference

When asked if they would prefer mathematics over the other subjects, it can be gleaned from Table 1 that the EPTs would instead teach English, Filipino, MAPEH, Science, Social Studies, and Values Education. At the same time, only 15 (12%) had chosen mathematics. This finding displayed EPTs' math avoidance. Avoidance of this subject could be attributed to their anxiety and lack of self-efficacy in mathematics and teaching mathematics (Jaggernauth & Jameson-Charles, 2015), where negative experiences with mathematics were the root cause of math avoidance.

Akin to Pentang (2019), where fewer EPTs opted to teach math, this study confirms that the EPTs do not have the confidence to do mathematics. The ability to confidently complete mathematical tasks and activities might lead to a desire to learn or perform (Dua et al., 2022). While these EPTs have different backgrounds and experiences, their training and preparation to teach mathematics must be carefully monitored, and interventions to respond to their math avoidance. Choe et al. (2019) hypothesized that math anxiety, or unfavorable attitudes about mathematics, is linked to avoiding math-related activities, including enrolling in math courses and choosing a STEM job. With this result, teacher educators may also consider programs encouraging positive interest, attitude, and perception in mathematics among EPTs to reduce or permanently eliminate their dislike of mathematics.

Table 1

Elementary preservice teachers' subject preference

Subject	Frequency (n = 125)	Percentage	Rank
Mathematics	15	12	7
English	19	15	3
Filipino	16	13	5.5
Music, Arts, Physical Education, and Health (MAPEH)	20	16	2
Science	21	17	1
Social Studies	16	13	5.5
Values Education	18	14	4

Elementary preservice teachers' problem-solving performance

Generally, Table 2 presents that the EPTs performed unsatisfactorily (Mean = 1 .74, SD = 0.58), which denotes that these future elementary teachers do not have the fundamental competencies in mathematics. This is consonant with Pentang (2019), where EPTs from Northern Luzon have poor problem-solving performance. In particular, the EPTs have unsatisfactory problem-solving performance in measurement, geometry, and algebra. This conforms to Dede Salim Nahdi et al. (2021), who asserted that the ability to solve mathematical problems remains a challenge; even students in tertiary institutions continue to struggle with non-routine math problems. Even elementary mathematics teachers have median performance in solving problems involving the critical content areas in mathematics such as measurement, geometry, algebra, and data analysis and probability (Refugio et al., 2020).

Since the EPTs are generalists, with at most three math-related courses, it can be deduced that their training and preparation are lacking. Agreeing with Andrade and Pasia

(2020), Domingo et al. (2021), Pelingon (2019), and Pentang (2019), the result indicates that the EPTs were not adequately prepared to teach elementary mathematics and their mastery of content knowledge application remains developing. As such, they need to practice more to develop problem-solving heuristics required and expected from them as generalist elementary teachers. The findings do not agree with Duru et al. (2011), where EPTs could solve word problems with various problem-solving strategies. In response to this dismal result, there is a need to review the preparation of the EPTs with the five content areas and their practice in terms of conceptual understanding, procedural fluency, and problem-solving heuristics.

Table 2

Elementary preservice teachers' problem-solving performance

Content Area	Mean Score	Standard Deviation	Description
Number Sense	1.83	0.39	Satisfactory
Measurement	1.67	0.67	Unsatisfactory
Geometry	1.71	0.45	Unsatisfactory
Algebra	1.69	0.83	Unsatisfactory
Probability	1.78	0.55	Satisfactory
Overall Mean	1.74	0.58	Unsatisfactory

Note. Legend: 3.26-4.00 = Outstanding, 2.51-3.25 = Very Satisfactory, 1.76-2.50 = Satisfactory, 1.00-1.75 = Unsatisfactory

Subject preference differences in the elementary preservice teachers' problem-solving performance

Table 3 presents the analysis performed to distinguish differences in the EPTs' problem-solving performance regarding subject preference. Assumption testing was performed to verify for normality and homogeneity of variance, and no severe violation was noted. No statistical difference in the problem-solving performance of the EPTs concerning subject preference was found, $F_{(6,118)} = .42$, $p = .451$. The EPTs who preferred to teach mathematics ($M = 1.91$, $SD = \pm.41$) performed statistically the same as those who chose other subjects (English, Filipino, MAPEH, Science, Social Studies, and Values Education). This result denoted that the EPTs' subject preference does not influence their problem-solving performance.

Table 3

Subject preference differences in the elementary preservice teachers' problem-solving performance

Subject	**n**	**Mean**	**SD**	***F***	***p***
Mathematics	15	1.91	0.41		
English	19	1.84	0.56		
Filipino	16	1.56	0.62		
Music, Arts, Physical Education, and Health (MAPEH)	20	1.72	0.59	.42	.451
Science	21	1.89	0.49		
Social Studies	16	1.63	0.57		
Values Education	18	1.58	0.33		

Note. Legend: 3.26-4.00 = Outstanding, 2.51-3.25 = Very Satisfactory, 1.76-2.50 = Satisfactory, 1.00-1.75 = Unsatisfactory

This trivial finding opposes Pentang (2019), where EPTs who chose math performed significantly higher than those who had chosen other subjects. Nevertheless, it can be observed from the mean performances among groups that EPTs lack the desired competency as future elementary teachers, irrespective of their subject preferences. Since math topics are inter-disciplined with other subjects, it is still necessary for EPTs to prepare themselves with fundamental mathematical content knowledge and positive dispositions towards mathematics.

Elementary preservice teachers prefer mathematics over other subjects

During the focus group discussion, the 15 EPTs who preferred mathematics had unanimous reasons for choosing math over other subjects. The common theme arising was confidence and the love for teaching mathematics.

Confidence in mathematics. Participants M1, M3, M6, M7, M8, M10, and M14 mentioned that they prefer math since they are confident in their content knowledge which they can share with their future students.

> M1: "*I have mathematics knowledge and can solve word problems*."
> M3: "*Doing mathematics is fun and easy. With a little practice, I can get through this topic.*"
> M6: "*Mathematics may be challenging, but I can handle it and am willing to explore more*."
> M7: "*I know I am capable of mathematics and have the basic competencies to teach the subject*."
> M8: "*I can recall formulas and derive them from computing math problems*."
> M10: "*I am capable of manual and mental computations*."
> M14: "*Mathematics can be done easily; I can do it*."

These statements showing confidence in mathematics relate to EPTs' attitudes toward mathematics. Pentang (2019) states that these EPTs who showed confidence demonstrate their positive beliefs and attitudes toward mathematics and high self-efficacy in teaching mathematics. Still, the EPTs' confidence in mathematics did not guarantee a desirable problem-solving performance. This information indicates that EPTs' performance can be improved with their positivity towards mathematics. Following Sun (2018), and Kunny Kunhertanti and Rusgianto Heri Santosa (2018), a positive attitude and self-confidence are essential to improve mathematics achievement. Thus, the subject preference of teacher candidates may also be considered in designing the instructional plan, especially in teaching mathematics courses.

I love teaching mathematics. Meanwhile, participants M2, M4, M5, M9, M11, M12, M13, and M15 stated that they love to teach mathematics.

> M2: "*I love to teach math to young learners in and out of the school. I also volunteer to teach math in our community.*"
> M4: "*I always wanted to teach mathematics as I am learning while sharing what I am capable of*."
> M5: "*It is my passion to share my math knowledge with others, especially kids*."
> M9: "*Helping others to learn math is my advocacy*."
> M11: "*I dedicate myself to educating my students and will do everything to make them learn mathematics*."
> M12: "*I am a good asset for my students since I love to teach math and assure them that they will fall in love with mathematics too*."

M13: "*I love my future profession as a mathematics educator and will do my best to embrace the passion of teaching mathematics as my lifetime career*."
M15: "*I want to handle mathematics to serve as a role model for young Filipinos studying mathematics*."

The EPT's love to teach math may be related to their desire to teach a subject they excelled at in high school and that they subsequently came to love (Ilany, 2022). Despite their average problem-solving performance, the EPTs have expressed their ability and passion for teaching mathematics. Filipino learners must demonstrate an understanding and appreciation of critical concepts and principles of mathematics (Department of Education, 2016); thus, it can be deduced that these 15 EPTs can handle mathematics if their future teaching careers. However, EPTs must deepen their content knowledge and problem-solving abilities to teach mathematics better. Maher and Muir (2013) emphasized that strong mathematical content knowledge influences preservice teachers' adequate preparation.

Elementary preservice teachers' mathematics avoidance

The other EPTs who preferred other subjects have mutual reasons for preferring math. The theme that arose was *Math Avoidance*. The 15 participants have shared their points of view for not choosing mathematics to handle in their teaching career.

O1: "*I prefer other subjects than math since I tremble when facing numbers and word problems*."
O2: "*I feel uneasy with math subjects, especially with problem-solving. I feel more comfortable teaching Physical Education or Health than math*."
O3: "*I know math but am not confident about it. I am afraid I will teach the wrong concept*."
O4: "*I am not into teaching math, but I can teach other subjects*."
O5: "*I cannot teach math with my lacking knowledge. I am nervous every time a math-related task is assigned to me*."
O6: "*I might not teach math well. I may have high scores, but I am not into it. I will still prefer teaching other subjects like science*."
O7: "*I am not fluent in mathematical language and cannot comprehend problem-solving. I will choose to teach Filipino or Social Studies subject*."
O8: "*I can do the math, but I am more confident in teaching English. I find it easier to teach this than math*."
O9: "*My students might be in trouble if I am a math teacher. I should teach MAPEH*."
O10: "*Math has been very challenging since I started schooling. I bet I cannot do math in front of my students*."
O11: "*There are things I do not know yet about mathematics. I am not even confident to have the strategy to teach this to my students*."
O12: "*Math has been very challenging since I started schooling. I bet I cannot do math in front of my students*."
O13: "*I may not be able to teach my students effectively. I fear mathematics; I might transfer this to my students*."
O14: "*I always got poor scores in math. How can I teach this well? It takes me time to learn this concept again before I can teach*."

> O15: "*Considering math as a difficult discipline, I prefer to teach Values Education. It is also hard to teach math since students do not like this subject, making it more challenging*."

The EPTs who opted to teach other subjects avoided mathematics, having no confidence in their mathematical content knowledge and ability to teach mathematics. This finding is comparable with Bates et al. (2013), where childhood preservice teachers have fears about mathematics and teaching mathematics. Besides, these EPTs have shown math avoidance due to negative dispositions. Akin with Ibañez and Pentang (2021) and Ray and Herron (2021) indicate that the EPTs enrolled in the teacher education program negatively toward mathematics. Math avoidance may be attributed to the EPTs' mindset toward math and teaching math. This corroborates Cutler (2020), who asserted that preservice teachers have a mindset that they are not good at math. Since this can impede their preparation as future teachers, teacher education institutions may offer several approaches to develop positive beliefs and a healthy mindset (Mariano-Dolesh et al., 2022) to counter math avoidance among EPTs.

Online teaching tools to engage EPTs, especially during the pandemic, may be considered as it helps address math avoidance and poor math performance (Sams, 2022). Besides, the use of Khan Academy in mathematics instruction (Mariano-Dolesh et al., 2022) and the jigsaw strategy in an online classroom (Bacsal et al., 2022) can be applied to motivate EPTs to understand and appreciate mathematics. Engaging online tools to decrease the EPTs' math avoidance and increase their problem-solving performance conforms with Education 4.0 and is resilient to irrepressible occurrences like the pandemic.

Elementary preservice teachers' subject preference, problem-solving performance, and mathematics avoidance

The study's findings reveal that EPTs have low problem-solving abilities and prefer teaching areas other than mathematics. This shows that these pre-service teachers may lack the essential topic knowledge required to teach mathematics effectively. The discovery of poor problem-solving performance raises questions about these EPTs' capacity to teach problem-solving abilities to their students successfully. These findings underscore the need for improved teacher education programs to provide EPTs with essential topic knowledge and problem-solving skills. From this, it can be noted that the EPTs' dismal problem-solving performance is attributed to their math avoidance. Regardless of subject preference, the EPTs displayed a deficiency in solving word problems. Further implications, such as failing the board exam and quitting the teaching profession, may be addressed when these areas are closely monitored, and appropriate actions are taken. Indeed, the EPTs are not ready to serve their role in achieving the goals of the mathematics curriculum to develop problem-solving skills among Filipino learners. A continuous inquiry into math avoidance among EPTs is vital to determine the possible factors that may cause it with the solutions to address it.

Conclusions and recommendations

The study has enticing inferences for elementary teacher education. The EPTs must be prepared with several interventions and innovations in the teacher education program to address the lack of problem-solving performance and math avoidance. This measure is necessary to address the declining quality of Philippine mathematics education. In addition, elementary and mathematics teacher educators, with the curriculum developers, may work

collaboratively on recalibrating the curriculum and redefining the policies applied in the program to address the reported concerns.

Another vital point to consider is the background of the EPTs. Since the EPTs' poor problem-solving performance may result from poor preparation and negative experiences from primary education (elementary to high school), teacher educators must provide pre-assessment to guide them in delivering relevant curriculum and instruction for future elementary teachers. A refresher course may also be required for aspiring EPTs, while a problem-solving course may be considered in the elementary teacher education program. To date, only a few institutions added this to their curriculum. Specialization may be further required in the Bachelor of Elementary Education program to conform with the Bachelor of Secondary Education program, allowing EPTs to be experts in one field.

Other researchers may continually work on developing coursework that will help the EPTs develop both their mathematical and pedagogical content knowledge. Despite the heavy teaching and non-teaching workloads of the faculty members of the TEI considered in the study, they may still work on possible interventions, innovations, and strategies to help mentor and prepare the EPTs as future math teachers. With the limitations posed by the current study, these may be extended to other teacher education institutions and utilizing other non-routine word problems in determining the EPTs' problem-solving performance.

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Author's contribution

All authors contributed to the success of the manuscript. Author 1 conceptualized the study, analyzed the data, and wrote and reviewed the manuscript. Author 2 conceptualized the study, gathered and analyzed the data, and co-wrote the paper. Author 3 validated the instrument, analyzed the data, and co-wrote the paper. Author 4 validated the instrument, co-wrote the paper, and reviewed the manuscript. Author 5 gathered the data and co-wrote the paper.

Conflict of interest

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