

Elementary Student Teachers' Competence and Attitude in Teaching Mathematics

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Abstract - Mathematics is an indispensable subject of school curriculum and is important in daily living as well as in the study of other subjects. This study focused on the competence of elementary student teachers in teaching elementary mathematics. The respondents included Bachelor of Elementary Education Student Teachers. The Spearman rank correlation was used to test the hypothesis of significant relationship. Study revealed that the student teachers are proficient in most of the elementary math competencies, however, there is need to give more attention in their competence along ratios and proportional relationships and the geometry competencies. The student teachers have positive attitude in teaching elementary mathematics. The competence of the student teachers is not solely dependent on their attitude toward Math but there are other factors that are affecting their competence in Math. The most notable challenge was the need to know and experience mathematical inquiry and the practice of mathematics.

Keywords-Competence, attitude, teaching mathematics

INTRODUCTION

Effective mathematics teaching is based on multiple factors, but the most important factors are the competencies required to teach effectively. Teaching effectively is obtained through the efforts of well-qualified, competent, and effective teachers. This means, the preparation of soon-to-be teachers matters in their efficiency and effectiveness. Teacher effectiveness includes efficacy in strategies of instruction, student and classroom management, interpersonal relations, evaluation, and feedback. Teachers must show the willingness to design instruction that is fit for the purpose of teaching mathematics.

The term teaching competence denotes a set of professional skills and dispositions that teachers should possess in order to carry out their job effectively [1]. To possess mathematical competence means having a well-founded opinion about mathematics in a variety

of situations and contexts where mathematics plays or can play a role.

Teaching competence among elementary student teachers is dealt with an insight-based preparedness to purposefully and efficiently overcome a particular type of mathematical challenge in all situations [2]. Many elementary math student teachers have been and still are mathematically challenged [3]. In the same way, Numerous math educator assistants have been and still are math tested [4].

Mathematical competencies are composed of 10 constituents, these are counting and cardinality, operations and algebraic thinking, numbers and operations in base ten, numbers and operations – fractions, ratios and proportional relationships, the number systems, expressions and equations, measurement and data, geometry, and statistics and probability [5].

Literature reveals that math teachers must be competent in the world of mathematics teaching. For instance, if math students are to

develop mathematical proficiency, teachers must have a clear vision of the goals of instruction and what competencies are required for specific mathematical content must be possessed [6]. Teaching competencies serve as benchmarks on how teaching should be done within a specific scale of acceptable level. Competency of teachers reflects the quality and caliber of a teacher.

Ministries of Education around the world have set specific standards for teachers' competence in mathematics. The competency standards in the Philippine settings are incorporated in the National Competency-Based Teaching Standards (NCBTS) now known as the Philippine Professional Standard for Teachers (PPST). These competencies were created to set standards on a set of behaviors, attitudes, and skills that teachers must-have. These standards enable to continue professional development and advancement of teachers based on the principle of lifelong learning [7].

It is construing that teacher competence in teaching mathematics affects learners' performance. Evidence in Namibia indicates that teachers' incompetence in teaching mathematics negatively influences the learners' performance [8]. Research in Asia also reveals that most teachers are engaging and creative, but lack skills and competencies to handle complex topics in mathematics. Further study shows that beginning teacher or more commonly known as student teacher lacks competence in mathematics. Almost half of the student teachers was not able to reach the required level of competence [9].

Lack of competence of student teacher teaching mathematics is a problem of significant importance in the country. A study of 139 student teachers teaching mathematics found that many of them provided the incorrect solution to additive word problems due to incorrect interpretation of the solution in relation to the problem context. Similarly [10], Difficulties that elementary student teachers demonstrated in connecting the semantic features of the word problems and their

understanding of division to the procedures that they employed to divide [11]. There is also evidence which shows that there is a disparity between student teachers' real-world knowledge and the approaches they used to solve school word problems.

The desire to build up a society that is knowledgeable and the need to expand competitive education major graduates in teaching mathematics have called for a move to address the required competencies. A reformation to better prepare student teachers for the higher education is now a demand of the 21st century. However, the required competence in teaching mathematics has not been fully clarified. In this study, the researcher attempts to describe the key competencies that will lead to more intensive training for the preparation of student teacher program.

Competency takes more than skills and knowledge; it requires the right and appropriate attitude that eventually translates into behavior. It is a means to achieve the ends. Teachers attitude acts as an important part of teaching mathematics enthusiastically. The attitude of teachers is developed during their stay in schools, colleges, universities and especially in teacher training institutes. Teacher's attitude acts an important part for teachers to enter in class deliberately with competence. It encourages teachers to take responsibility for their work without feeling burden.

The relationship between the teachers' attitude and competency in teaching mathematics is a growing controversy and worthy of attention. While a teacher may have the competency to teach, it does not mean that they will have the desire to teach correctly [12]. In other words, competency gives the teachers the ability to teach, while attitude gives them the desire to teach well. Findings in some local literatures show a correlation between student teachers' attitude against competency. Further studies reveals a significant relationship between the attitudes and competencies of student teacher [13][14].

The indispensable role of attitude in teaching mathematics by student teachers is of importance in acquiring the key competencies. Literature is replete with empirical evidence on the relationship of attitude of student teachers and in the acquisition of competencies. The study is fashioned to unravel the affective aspect of attitude of student teacher and how it is interrelated in acquiring math competencies.

The Philippines being one of the countries that offer mathematics in Elementary education is supervised by the Department of Education. One of the mandates of the agency is to educate and to train student teachers in order to acquire the required competency. It is assumed that after the student teacher training, it is expected that they would have acquired the right competency especially in teaching mathematics; however, study reveals that not all student teachers acquire the required competency. According to National Teachers College (NTC) commissioned by the Math Teachers Association of the Philippines (MTAP), some student teachers are not fully competent in teaching mathematics. One of the main reasons for the lack of competency is due to the student teachers' poor attitude. It was discovered that one of the contributory factors acquiring the right competency is the poor attitude and lack of motivation of student teachers [15].

The teacher is the most important element inside a classroom. They have a key role in nourishing the minds of the students. Teacher's attitude plays a vital role in achieving the required competency for teaching mathematics. Therefore, it is necessary for teachers to gain the right attitude. Teacher trainee is taught various competencies without placing any attention towards their attitude. Recent attention towards this issue is placed due in part to the increasing interest shown in mathematics to improve instruction. This circumstance has urged the researcher to investigate further on this issue.

The major problems confronting the Department of Education are the scarcity of

mathematics teaching facilities, competent teachers, curriculum, administrative support, teacher training, funding and instructional materials. A study showed that 26 percent of the public elementary schools were not able to grasp a deep understanding of the Math lessons taught by the teachers. Weaknesses in these areas manifest in the poor performance of Elementary public school students in several standardized tests, including the national achievement test (NAT). The DepEd reports that the NAT mean percentage score (MPS) for elementary was 51.41 percent in 2014-2015, or 23.59 percentage points away from the target. The MPS in science was 41.35 percent and 46.83 percent in mathematics [16].

The study is directed towards identification of the key competencies in teaching mathematics and its relationship towards student teachers' attitude in acquiring such competencies. The findings of the study will redound to the benefit of the community considering that mathematics plays an important role in science and technologies today. The increasing demand for education graduates with mathematics background justifies the need for more effective life-changing teaching approaches. Thus, schools that will apply the recommended approach will improve the training program. Principals, department heads, coordinators and cooperating teacher will be guided on what should be emphasized to improve student teachership program. For the researcher, the study will help him uncover critical areas in the student teacher acquisition of competency and its link towards attitude.

STATEMENT OF THE PROBLEM

This study aimed to investigate the competence and attitude of elementary student teachers in teaching mathematics. Specifically, the researcher endeavored to answer the following questions:

1. What is the extent of capability of teaching the mathematical competencies among the elementary student teachers?

2. What is the extent of agreement towards attitude of elementary student teachers in mathematics?
3. What is the relationship between the extent of capability of teaching the mathematical competencies and extent of agreement towards attitude in mathematics?
4. What is the degree of seriousness of the challenges encountered by elementary student teachers in teaching mathematics?

METHODOLOGY

Research Design

This study employed the descriptive and correlational design of the quantitative method to attain the objectives raised in the study.

Respondents of the Study

The respondents of the study were elementary student teachers who were randomly picked through a lottery or fishbowl method. The fishbowl method were modified to allow participation in a discussion, where everyone can participate equally in the group.

Survey Instrument

The questionnaire used by the researcher was adopted from the Arkansas, USA Teacher Standards in the Elementary K-6 Teachers, the k-12 curriculum for the competencies and from Tapia's study entitled Attitudes toward Mathematics Inventory Instrument.

RESULTS AND DISCUSSION

Extent of Capability of Teaching the Mathematical Competencies among the Elementary Student Teachers

The Mathematical competencies considered in this study are related to counting and cardinality, operations and algebraic thinking, numbers and operations in base ten, numbers and operations – fractions, ratios and proportional relationships, the number systems, expressions and equations, measurement and data, geometry, and statistics and probability. The responses of the students are summarized in Table 2.

Findings show that the TIs are proficient in the identified mathematical competencies as shown in the computed over-all weighted mean of 2.82. This implies that the elementary student teachers attained the goal of mathematical competencies that is to provide meaningful learning and to be proficient in teaching mathematics. This is an ideal scenario in the teaching-learning environment. When TIs understand mathematics, they can use their knowledge flexibly. They are able to combine factual knowledge, procedural facility and conceptual understanding in meaningful ways. Learning the basics is important [17]. Among the identified mathematical competencies, the elementary student teachers are advanced only along counting and cardinality, (3.28). In descending order, TIs are proficient in terms of numbers and operations in base ten (3.21), operations and algebraic thinking (2.99), numbers and operations – fractions (2.58), the number systems (2.72), expressions and equations (2.80), measurement and data (2.59), and statistics and probability (3.15). Finally, they are developing in the competencies in ratios and proportional relationships (2.44) and in Geometry (2.45) respectively.

Table 2.
Extent of capability of teaching the mathematical competencies among the elementary student teachers

MATHEMATICS COMPETENCIES	WM	D.E.	RANK
1. Counting and Cardinality	3.28	Advanced	1
2. Operations and Algebraic Thinking	2.99	Proficient	4
3. Numbers and Operations in Base Ten	3.21	Proficient	2
4. Numbers and Operations – Fractions	2.58	Proficient	8
5. Ratios and Proportional Relationships	2.44	Developing	10
6. The Number Systems	2.72	Proficient	6
7. Expressions and Equations	2.80	Proficient	5
8. Measurement and Data	2.59	Proficient	7
9. Geometry	2.45	Developing	9
10. Statistics and Probability	3.15	Proficient	3
Mean	2.82	Proficient	

Legend:

3.25-4.00: Advanced (A)

2.50-3.24: Proficient (P)

1.75-2.49: Developing (D)

1.00-1.74: Does not demonstrate (ND)

Based on the over-all result, the competence of the elementary student teachers ranged from developing to proficient. This means that they have good understanding of the mathematical competencies and they can apply their understanding of the mathematical competencies most of the time. Only along counting and cardinality where they are advanced in competence. The result implies that while these student teachers are preparing to become professional teachers, their level of competence in mathematics is an indication that they are capable of teaching the subject. There is an assurance that their level of expertise throughout their professional life will be heightened as they practice the profession.

Mastery of mathematical competencies is directly related to the design of the curriculum [18]. As he explained in the old curriculum,

there are more foundation of math subject than in the new curriculum. He also mentioned that the more foundation areas, the more time is spent in studying these foundation areas, hence, there is a mastery.

From specific result, counting and cardinality ranks first based from the Basic Education Curriculum. This competency is learned from Kindergarten to Grade VI. In fact, as a standard to this lesson, the elementary learners should demonstrate, understand, and appreciate the key concept and skills involving numbers and number sense, i.e., whole numbers,

sets, and real numbers. This result indicates further that the TIs' have achieved the basic education outcomes in counting and cardinality that includes developing their skills in concepts of numbers, properties, operations, estimation, and their applications for mathematics.

This means that counting and cardinality is an essential skill. This skill is really important predictor of later abilities. Similarly, counting and cardinality appears to be the fundamental prerequisite for successive principles in mathematics [19]. Further studies suggest that counting and cardinality is an essential skills and are a really predictor of later abilities hence it is a common ground for student teachers to learn more advance topics in mathematics. When students understand the cardinality of numbers, they know what the numbers mean in terms of knowing how many things they refer to. Students who can count have the highest math skills in succeeding grade [20].

Another significant finding is that student teachers were proficient in numbers and operations in base ten, statistics and probability, operations and algebraic thinking, expressions and equations, the number systems, measurement and data, and numbers and operations – fraction. This implies that they have enough knowledge and skills to teach pertinent topics in the aforementioned competencies. Teaching these mathematical competencies entails more than knowing math for oneself. Student teachers need to be able to understand concepts correctly and perform procedures accurately. They also must be able to understand the conceptual foundation of those competencies. In the course of their work as student teachers, they must understand mathematics in ways that allow them to explain and unpack ideas in a more practical way. They need to deploy wide range of resources to support the acquisition of mathematical competencies. These resources keep the students engage in learning mathematics such that elementary student teachers must explore and employ resources like manipulative objects, measuring devices, calculators and computers, smart phones and tablet PCs, and the Internet.

Numbers and operations in base-ten system is a remarkably efficient and uniform system for systematically representing all numbers [21]. The TIs in this area are proficient because the number sense nurtured in this area

reflects the very core skills in mathematics which is addition, subtraction, multiplication and division - the very basis on how numbers can be operated. Understanding of base-ten concepts and operations is a stepping stone to more advanced math skills [22]. There is a mastery of the topic because the topic per se is taught in the basic education curriculum. The approach is also progressive since there is a continuity of the topic from Kindergarten to Grade V

Further studies reveals that most of the student teachers have a mastery of the mathematical basic operations in base ten [23]. A good conceptual understanding of operations in the base ten system supports the development of fluency computation. Such understanding also supports simplified but accurate flexible ways than many students ultimately achieve. It takes process to make a transition from novice to expert in acquiring competency. It takes proper transition over time, as this subject is taught from Kindergarten to Grade V and learning from the very fundamental concepts to recognizing obtained information in numbers and operations in base ten. Working on this topic in the early grades means developing an understanding of the base ten pattern and using it for arithmetic calculations of addition, subtraction, multiplication and division with increasingly large numbers.

Operations and algebraic thinking include recognizing and analyzing patterns, studying and representing relationships, making generalizations, and analyzing how things change [24]. The TIs in this area are proficient because it is easier for them to teach through visual representations like shapes, colors, letters and numbers which can be used as a pattern of grouping. Furthermore, it emphasizes their ability to think algebraically that might support a deeper and more useful knowledge and thinking which is required to successfully use mathematics. Research has documented that the visual and numerical supports provided for symbolic expressions by visual representations of pattern help students create meaning for

expressions and equations in ways difficult to manage in digitized learning [25].

Looking at what is the same and what is different among functions lies at the heart of understanding operations and algebraic thinking which makes it easier to teach as the technique requires visual appeal [26]. Student teachers value the support that visuals lend to classroom instruction because they encourage the learners to make associations between pieces of information.

Proficiency with the concepts of expressions and equations using representational activities involves conceptual understanding of the mathematical concepts, operations, and relations expressed in the verbal information. It also involves strategic competence to formulate and represent that information with algebraic equations and expressions. Expressions and Equations begin when students build from early work using letters for an unknown quantity and begin to work systematically with algebraic expressions. This implies that students are engaged in active processing, applying, and discussing information in a variety of ways to interpret expressions and to relate quantities in a situation to terms in an expression and begin to view expressions as objects.

It is easy to convey the concept, considering that an expression consists of a combination of numbers, operation symbols, and grouping symbols while an equation is a statement which shows that two expressions or values are equal that makes the topics easy to master [27].

Statistics and probability are often referred to as the study of data and chance. Given the result, it implies that there is enough knowledge and skills to teach the topic. It is likely that what is learned during the college years of the TIs is being applied hence, the mastery. Elementary student teachers teach this topic to students in understanding chance and to collect, organize, describe, and analyze numerical data. TIs must encourage students in learning the topic to help them judge the validity of an argument based on the data. Sometimes

the notions of mathematics and statistics are the same that often times they are considered as one of the most practical topics that can be applied in daily life.

Elementary student teachers have exposure to situation to establish the concept of statistics and probability [28]. In nature, people learn from relevant experiences in which statistics and probability are always being used in real life situation. It is a very fundamental topic that students apply in everyday living and its more concerned with how they handle data using different analysis techniques and collection methods.

A system of writing to express numbers is called a number system. It is the mathematical notation for representing numbers of a given set by using digits or other symbols in a consistent manner. It provides a unique representation of every number and represents the arithmetic and algebraic structure of the figures. It also allows an individual to operate arithmetic operations like addition, subtraction, multiplication and division [29]. This implies that elementary student teachers are proficient in this area because they explore interactive ways of developing their competence in numeracy across the curriculum. They provide learning experiences and opportunities that support the application of students' general mathematical knowledge and skills by using the language of numeracy in their teaching as appropriate. They allow learners to experience the number systems and helps them with sequencing the numbers.

Studying the number system enables the student to do mathematics like calculate, solve equations and represent measurements. It is a way to represent number and become abstract particularly as the student advances from grade to grade. As students advance through the grades, they apply and extend their understanding of the number system [30].

Measurement and data include nonstandard, customary and metric measurement, visual displays of quantitative data and fundamental counting techniques.

Competency among elementary student teachers are found to be proficient based on the results, this is so because it improves their analysis on the students graphing techniques and becomes more fluent in applying the metric system into real-world situations [31]. It focuses on attributes such as length, mass and weight, line plots, bar graphs, pie charts, permutations, combinations and tree diagrams [32]. The result of the study implies that the proficiency in such competency is the result of frequent use of measurement tools both for comparison and actualization or exact measurements of practical matters such as distance, weight, capacity, time, money, and temperature, as well as applications involving perimeter, area, surface area, volume, and angle measure

This means that students who are presented with the opportunity to use manipulatives report become more interested in measurement and data. Long-term interest in measurement and data translates to increased mathematical ability[33].

Proficiency with numbers and operations - fractions is an important foundation for learning more advanced mathematics [34]. Fractions are a student's first introduction to abstraction in mathematics and, as such, provide the best introduction to algebra in the elementary and middle school years. This implies that elementary student teachers are proficient in this area because time and emphasis are necessary for students to develop the links among fractions, decimals, and percent and to solve higher learning problems.

Providing concrete representations give students a platform to be more successful with fractions and they also develop a strong understanding of fraction concepts [35]. Many researchers say that students can only perform operations on fractions and will progress towards algebraic concepts once a strong foundation with fractions is made, therefore abstraction should be taught early. Problem solving provides contexts for students to use mathematical reasoning to determine whether

their answers make sense. They extend their understanding of fractions as part of a whole.

It is also notable from the result of the analysis that geometry and ratio and proportional relationships have the lowest forms of competency. This implies that there are challenges in these concepts that are still vague among the TIs to understand. There are topics or lessons in these competencies which have not yet been mastered among the TIs. It further means that this may be the least learned skills even among college learners.

Geometry organizes and clarifies visual experiences and provides visual models of mathematical concepts [36]. It has many practical uses in the everyday life. An understanding of geometry gives people more appreciation for the world they live in. It has become one of the pivotal things in life because geometry supports topics that require problem solving skills.

In-service mathematics teachers face challenges in understanding transformational geometry in view of the knowledge gap [37]. This implies that elementary student teachers are developing in geometry since it concentrates on problem calculations using formula and not much on analyzing and investigating figures, making conjectures about the properties of figures and testing them. Also, learning activities seem to be assessment oriented rather than practical oriented leading to poor evaluation techniques, lack of appropriate teaching methods and materials, student's weak pre-knowledge about geometry and poor geometrical background.

Ratios and proportions describe relationships between and among quantities. These are central to developing concepts and skills related to slope, constant rate of change and similar figures which are all fundamental to algebraic concepts and skills [38]

Ratio and proportion is one of the most difficult concept to teach to the students and even for some adults [39]. Student teachers struggle with ratios and proportional reasoning because of their students' misconceptions that

were established in earlier grades due to poor instruction. TIs must understand, recognize, and address these misconceptions so that student learning of ratios and proportional reasoning are not impaired.

This implies that elementary student teachers must understand, recognize, and address these misconceptions so that the student learning on ratios and proportional reasoning are not compromised.

Table 3.
Extent of Agreement Towards Attitude of Elementary Student teachers in Mathematics

CONFIDENCE INDICATORS	WM	D.E.
1. I am comfortable expressing my own ideas on how to look for solutions to a difficult problem in math.	2.49	D
2. I believe I am good at solving math problems.	2.43	D
3. I am comfortable answering questions in math class.	2.35	D
4. I am confident that I could learn advanced mathematics.	2.16	D
5. I am able to solve mathematics problems without too much difficulty.	2.14	D
6. I learn mathematics easily.	2.05	D
7. I have a lot of self-confidence when it comes to mathematics.	2.03	D
Average	2.24	Disagree

ANXIETY INDICATORS	WM	D.E.
1. Mathematics is one of the most dreaded subjects.	3.64	SA
2. Studying mathematics makes me feel nervous.	3.36	SA
3. My mind goes blank and I am unable to think clearly when working with mathematics.	3.07	A
4. Mathematics makes me feel uncomfortable.	2.90	A
5. It makes me nervous to even think about having to do a mathematics problem.	2.85	A
6. When I hear the word mathematics, I have a feeling of dislike.	2.78	A
7. I am always confused in my mathematics class.	2.78	A
8. I am always under a terrible strain in a math class.	2.62	A
9. I feel a sense of insecurity when attempting mathematics.	2.56	A
10. Mathematics does not scare me at all.	1.87	D
Average	2.84	Agree

VALUE INDICATORS	WM	D.E.
1. Mathematics is important in everyday life.	3.70	SA
2. Mathematics helps develop the mind and teaches a person to think.	3.60	SA

3. Mathematics is one of the most important subjects for people to study.	3.30	SA
4. Mathematics is a very worthwhile and necessary subject.	3.23	A
5. College math courses would be very helpful in practical way of life.	3.03	A
Average	3.37	Strongly Agree
ENJOYMENT INDICATORS		
	WM	D.E.
1. I get a great deal of satisfaction out of solving a mathematics problem.	3.30	SA
2. I like to solve new problems in mathematics.	2.68	A
3. Mathematics is a very interesting subject.	2.89	A
4. I really like mathematics.	2.60	A
5. I would prefer to do an assignment in math than to write an essay.	2.58	A
6. I have usually enjoyed studying mathematics in school.	2.55	A
7. Mathematics is dull and boring.	2.21	D
8. I am happier in a math class than in any other class.	2.08	D
Average	2.61	Agree
MOTIVATION INDICATORS		
	WM	D.E.
1. I want to develop my mathematical skills.	3.80	SA
2. I can think of many ways that I use math outside of school.	3.22	A
3. A strong math background could help me in my professional life.	3.16	A
4. The challenge of math appeals to me.	3.00	A
5. I plan to take as much mathematics as I can during my education.	2.27	D
6. I am willing to take more than the required amount of mathematics.	2.19	D
7. I would like to avoid using mathematics.	1.97	D
Average	2.80	Agree
PARENT/TEACHER EXPECTATIONS INDICATORS		
	WM	D.E.
1. I think studying advanced mathematics is useful.	3.31	SA
2. I believe studying math helps me with problem solving in other areas.	3.24	A
3. I expect to do fairly well in any math class I take.	2.75	A
Average	3.10	Agree

Legend:

3.25-4.00: Strongly Agree (SA)

2.50-3.24: Agree (A)

1.75-2.49: Disagree (D)

1.00-1.74: Strongly Disagree (SD)

The Attitudes Toward Mathematics Inventory (ATMI) was designed to investigate the underlying dimensions of attitudes toward mathematics. The 40 items of the ATMI were constructed in the domain of attitudes toward mathematics to address factors reported to be important in research. Items were constructed to assess confidence, anxiety, value, enjoyment, motivation, and parent/teacher expectations. This is presented in Table 3.

The confidence category is designed to measure students' confidence and self-concept of their performance in mathematics. Results reveal that the overall mean of the attitude of the student teachers towards mathematics is 2.24 interpreted as "disagree". Specifically, the student teachers disagreed on the following attitudes: solving math problems and learning advanced mathematics, comfortable answering questions and expressing ideas on how to look for solutions to difficult math problems, and able to solve math problems without too much difficulty.

Mathematical confidence reflects a growth mindset and includes a willingness to persevere a positive attitude toward mistakes, a willingness to take risks, and self-reliance [4]. Confidence of the teacher affects the confidence of the learners, hence, it is important for the teachers to recognize how they interact with the learners [41].

This implies that student teachers' confidence varied greatly depending on the specific mathematics they were attempting. The general agreement is that significant portions of student teachers at all stages have low levels of mathematical confidence and that confidence was related to personal depth of mathematical knowledge as well as prior experiences as a learner. It simply means that confidence to do and to teach mathematics was reasonably strongly correlated with competence.

As reflected in Table 3, one of the notable findings is that student teachers are not comfortable expressing their own ideas on how to look for solutions to a difficult problem in

math. Based on constructivist learning principles, students who started learning sessions have already possessed the ideas about topics that the teacher intends to discuss. Because of this principle, student teachers may have significant problem expressing their ideas on explaining solutions to difficult math problems as the student may already have predictions or hypotheses in mind. Also, research evidence suggests that students might understand such an explanation, but continue to believe their own pre-instructional conception [42]. Also, they disagree that they have a lot of self-confidence when it comes to mathematics. A study investigates self-beliefs and metacognition in mathematics [43]. They found that people who think they are good in math tend to perform well in explaining and solving math problems showing strong links between self-confidence and math performance.

As to anxiety, result shows that the TIs generally agree with the anxiety indicators as indicated in the overall mean of 2.84. Anxiety category is designed to measure feelings of anxiety and consequences of these feelings. Based on the result, it is noteworthy to mention that the student teachers strongly agree that mathematics is one of the most dreaded subjects. Math anxiety is usually linked to prior negative math experiences which includes being punished for failing to solve or understand concepts or having a low grade [44]. These prior negative experiences can continue when not corrected until they become adults. This implies that their anxiety is a result of their prior experiences during their school years.

It is also noticeable in table 3 that the student teachers disagree that mathematics does not scare them at all. People who have math anxiety believe that they are bad at math, this idea developed during childhood years when the learner experienced certain kinds of social situations that influenced the child's young thoughts or feelings [45]. This implies that the student teachers' emotions, opinions or behaviors are affected by things that other people say or do. Thus, it influences their

motivation and confidence in teaching mathematical competencies.

In terms of value, it reflects that the computed overall mean is 3.37 indicating that the TIs strongly agree how mathematics is of value. The value of mathematics category is designed to measure students' beliefs on the usefulness, relevance and worth of mathematics in their life now and in the future. Mathematics helps people to think analytically and have better reasoning abilities because it helps them to solve problems and look for better solutions. This implies that TIs believe that mathematics is of value because it can help them solve problems in their life and skills in framing the problems, identifying the knowns and unknowns and taking steps to solve the problem which is very applicable to all facets in life.

The over-all result implies that the demand to have a good understanding of mathematics is its applicability in the whole aspect of human life. Whether one is talking of nature, technology, business, building, and the rest of human activity, mathematics is utilized; hence, there was a strong agreement from the TIs. Furthermore, there was an indication that the TIs understand how the cognitive development is of value when they learn Math. With everyday life of finding solutions to problems, one sees how it affects one's ways of thinking, therefore it is important to study this subject. If mathematical problems are in coherence with their experiences, there is meaning and understanding and will stimulate their thinking. As McDonough (2017) pointed out, when teachers become aware of the connections between the tasks and its relevance to their lives, they tend to see the importance of mathematics. In like manner, Attard (2016) argues that when student teachers see the importance of mathematics in real lives, they feel engaged, confident, connected to their learning and tend to put more value on mathematics.

The enjoyment of mathematics category is designed to measure the degree to which students enjoy working mathematics and

mathematics classes. Based on the survey, it is evident that the TIs strongly agree that they get a great deal of satisfaction out of solving a mathematics problem. As stated by McWherter (2020), solving math problems provides certain degree of satisfaction and gives a feeling of accomplishment. This satisfaction encourages one to solve more problems then gradually it becomes one's habit to solve the questions to get the correct answer. On the other hand, the TIs disagree that they are happier in a math class than in any other class [46]. Mathematics teaches one logic skills which is required in certain jobs such as engineering, architecture and computing. Important as it may seem, language is a part of everything as it is used in all kinds of job, which justifies why more people find more happiness in studying language than mathematics [47].

The extent of agreement towards attitude of student teachers in mathematics under enjoyment category with overall mean of 2.61 means that they agree in general. The results reveal that TIs agree that they liked and enjoyed studying mathematics in school. In most of the responses, the student teachers agree that they prefer to do an assignment in math than to write an essay.

Enjoyment is the subjective feeling of pleasure associated with a particular activity or event. It is considered to arise from feelings of being in control over a situation that is also sufficiently valued and interesting [48]. Teachers' enjoyment in mathematics at the start of the school year was positively related to their enthusiasm for teaching math [49]. Teacher enjoyment in mathematics at the start of the year as measured by their level of enthusiasm was also positively related to their reported feelings of enjoyment for teaching math later in the year. Findings add to those of previous studies indicating that enjoyment of teaching mathematics can positively impact enjoyment of learning, energize TIs in their desire to improve the quality of their instruction, and protect them against burn-out and attrition [49]. In the context of the study, these findings suggest that student

teachers who enjoy teaching mathematics for instance, are more likely to seek out professional learning opportunities in that discipline than in other disciplines and are more likely to stay longer in the future profession.

The motivation category was designed to measure interest and desire to pursue studies in mathematics. The results show that the overall mean is 2.80 which means that the TIs agree on their attitude towards mathematics under motivation category. In most of the interview, the TIs agree that they can think of many ways to use math outside school which could help them in their professional life. This will prepare them for further education to which it may add the importance of understanding and appreciating mathematics. Math is often a skill that needs to be learned which only leads to a grade on a report card [50]. But this should not be the case teachers should implore to show to the students the true purpose of math and help them to understand and explain the world around them rather than confine them within the four corners of classroom. However, the TIs disagree that they would like to avoid using mathematics. Math is more than numbers and equations. It is a way of thinking and a method of solving problems and explaining arguments [51]. It is also a foundation upon which modern society is built and a structure in which nature is patterned, so in essence no one can avoid mathematics.

The parent/teacher expectations category was designed to measure the beliefs and expectations parents and teachers of the students' ability and performance in mathematics. The results show that the overall mean of attitude of student teachers towards mathematics under the parent/teacher expectations is 3.10 which means that they agree in general. In most of the interview, the TIs strongly agree that advanced mathematics is useful. They will be encouraged to develop an array of concrete experiences and problem-solving situations to help students understand the concepts involved in advanced mathematics. Applying these problems to everyday situations is just as important at the advanced levels of

mathematics as it is at basic levels, if learners are to become capable of using their mathematics skills in functional situations or as a foundation in their pursuit of even more advanced mathematical competencies. Learner attitudes toward mathematics were related to parent attitudes toward mathematics [52]. It appears that parent expectations for the learner's achievement influence both the learner's expectations and achievement. Developing parent expectations for learner academic success leads to an increase in the learner's achievement motivation and as a result, learner's achievement levels will increase [53]. In his study, he made an attempt to increase parent expectation through a series of training sessions. It has been suggested that learners make more progress when their parents are directly involved with their learning and instruction [54]. Further, the TIs agree that they expect to do fairly well in any math class they take. In an article written by Mathematics is very much like learning to read, everybody knows what to expect in math class. Learning to read alphabets is almost the same as knowing numbers, and more so, forming sentence is almost the same as that of performing the basic functions of mathematics.

Relationship Between the Extent of Capability of Teaching the Mathematical Competencies and Extent of Agreement towards Attitude in Mathematics

The relationship between the extent of capability of teaching mathematical competencies and extent of agreement towards attitude in mathematics is analyzed and presented in Table 4 using Spearman Rank Correlation. The overall data reveal that there is a moderate relationship between the capability of elementary student teachers in teaching mathematical competencies and their attitudes towards mathematics. The moderate relationship indicates that the competence of the student teachers does not solely depend on their attitudes toward mathematics. There are other factors affecting the competence of the student teachers

in their math competence. These factors associated with them are mathematical achievement, self-efficacy and self-concept and experiences at school. There are also factors associated with the school, teacher, and teaching such as teaching materials, classroom management, teacher knowledge, guidance, and beliefs. Finally, the factors from the home environment and society such as educational background.

Moreover, if the competence of the student teachers gets more proficient, their attitude towards mathematics becomes better. Many studies link attitude towards math to math learning and ultimately, math competency. Positive attitude has been associated with higher achievement, while negative attitude appears to relate to poor competence [56].

Table 4. Relationship between the extent of capability of teaching the mathematical competencies and extent of agreement towards their attitude in mathematics

COMPETENCIES		ATTITUDE	DEGREE
Counting and Cardinality	Correlation	.341**	Slight Relationship
	p - value	.000	
Operations and Algebraic Thinking	Correlation	.470**	Moderate Relationship
	p - value	.000	
Numbers and Operations in Base Ten	Correlation	.334**	Slight Relationship
	p - value	.000	
Numbers and Operations in Fractions	Correlation	.357**	Slight Relationship
	p - value	.000	
Ratios and Proportional Relationships	Correlation	.415**	Moderate Relationship
	p - value	.000	
The Number Systems	Correlation	.401**	Moderate Relationship
	p - value	.000	
Expressions and Equations	Correlation	.335**	Slight Relationship
	p - value	.000	
Measurement and Data	Correlation	.357**	Slight Relationship
	p - value	.000	
Geometry	Correlation	.305**	Slight Relationship
	p - value	.000	
Statistics and Probability	Correlation	.287**	Slight Relationship
	p - value	.000	
Over all Competencies	Correlation	.517**	Moderate Relationship
	p - value	.000	

** . Correlation is significant at the 0.01 level.

* . Correlation is significant at the 0.05 level.

Specifically, the mathematics competencies of the student teachers in terms of counting and cardinality, numbers and operations in base ten, numbers and operations in fractions, expressions and equations, measurement and data, geometry, and statistics and probability have slight relationship with their attitude towards mathematics which is highly significant at 0.05 level. Likewise, the competencies of the student teachers in terms of operations and algebraic thinking, ratios and proportional relationships, and the number systems have moderate relationship with their attitude towards math which is also highly significant at 0.05 level. This finding means that as the level of competence of the student teachers gets better, so does their attitude. Student teachers are more open in learning new skills. Having a great skill and attitude that goes along with positive thinking. Whereas, improving their competence in teaching mathematics affects their attitude towards mathematics. Similar study concludes that there was a positive and meaningful relationship between general teaching competency perceptions and attitudes towards the profession [57].

Degree of Seriousness of the Challenges Encountered by Elementary Teacher Interns in Teaching Mathematics

The Table 5 shows the degree of seriousness of the mathematics challenges encountered by the elementary student teachers using weighted mean and ranking. All of the challenges encountered by the student teachers are highly serious. The problems like need to know and experience mathematical inquiry and the “practice” of mathematics, lack of seminars and trainings in Mathematics among elementary student teachers, needed materials to use in the preparation of teaching of mathematics are lacking, there are difficult questions concerning whether prospective elementary teachers should learn mathematics in courses specially designed for teachers, and overlapping of competencies in

teaching mathematics are found out to be the most frequently encountered problems.

CHALLENGES	WEIGHTED MEAN	D.E.	RANK
1. Standards about mathematics content knowledge for prospective elementary student teachers do not exist.	2.74	Highly Serious	7
2. Need to know and experience mathematical inquiry and the "practice" of mathematics.	3.16	Highly Serious	1
3. Pre-service programs for elementary teachers are very crowded and allow little time for study of mathematics.	2.79	Highly Serious	6
4. There are difficult questions concerning whether prospective elementary teachers should learn mathematics in courses specially designed for teachers.	2.99	Highly Serious	4
5. The pre-service years and in-service transition into the profession is not enough for teacher preparation experience.	2.60	Highly Serious	8
6. Needed materials to use in the preparation of teaching of mathematics are lacking.	3.03	Highly Serious	3
7. Overlapping of competencies in teaching mathematics.	2.82	Highly Serious	5
8. Lack of seminars and trainings in mathematics among elementary student teachers.	3.10	Highly Serious	2

Legend:

3.25-4.00: Very Highly Serious (VS)

2.50-3.24: Highly Serious (HS)

1.75-2.49: Slightly Serious (SS)

1.00-1.74: Not Serious (NS)

From the result it is worth stating that the most encountered challenges in mathematics is the need to know and experience inquiry, and the practice of mathematics. Mathematical inquiry starts with a problem or question but with less emphasis on practical experimenting [58]. Yet, inquiry in mathematics still involves diverse forms of activity, including: articulating or elaborating questions, modelling, exploring, conjecturing, testing, explaining, reasoning, arguing and proving, defining and structuring, connecting, representing and communicating [59]. Teachers are not just seen to align with practice, but to look critically at that practice while aligning with it. Hence, teachers must engage in inquiry as a mode of practice to

develop their knowledge of practice. Mathematical tasks are meant to engage teachers in developing their understanding of pedagogical knowledge to inquiry teaching while, at the same time, becoming 'more analytic and critical readers of instructional materials' [60]

The result also shows that most of the elementary student teachers have lack of seminars and trainings in mathematics. In mathematics training, the competencies can be developed with tasks that involve managing the educational analysis. One of these tasks consists of posing problems and reflecting on them from a teaching perspective. We assume that problem posing is a process through which a new mathematical problem is obtained by varying a given problem or creating a new problem. This process is undertaken in response to a certain situation or a specific request of a mathematical or educational nature [61]. The TIs claimed that their main weakness was the lack of mathematical training. They also highlighted the problems like lack of teaching knowledge, shortage of strategies to teach how to create new problems, and inability to see mathematics in everyday situations.

Some of the student teachers believed they could learn how to create new problems in mathematics through courses on teaching resources. They considered that mathematical content should be provided and student teachers should be supported to help them to observe their environment in mathematical terms. Also, it is notable to mention that the least encountered challenge was that the pre-service years and in-service transition into the profession was not enough for the teacher preparation experience. As a course bridging theory and practice, field teaching practice and teacher preparation experience play important part in the teacher education programs because they have a significant role in the formation and development of teachers' professional identity. Elementary student teachers carry out mathematics teaching experiences and values from their own education, and are provided with opportunities to develop their insights as they

progress through reform-focused teacher training programs. Many in-service teachers have completed similar programs and had ample opportunities to improve their experiences through experience in the classroom along with textbooks, instructional manuals and reform-focused professional development events. Examining the differences in perspectives held by sustainability and in-service teachers could reveal which mathematics instruction perspectives require more help.

As to the common problem encountered, the lack of needed materials to use in the preparation of teaching mathematics was rated as highly serious. Effective teaching does not solely depend on the capability of the teacher to teach but that of the classroom materials as well [62]. The result implies that teaching materials for mathematics are often neglected resulting to lack tools and materials which are very pertinent to the subject matter.

CONCLUSION AND RECOMMENDATION

Based on the study the following conclusions are drawn, the student teachers are proficient in most of the Elementary math competencies; however, ratios and proportional relationships and the geometry competencies are lessons that need to be learned more by the student teachers. The attitude of TIs in teaching elementary mathematics reflects their confidence, anxiety, value, enjoyment, motivation and expectation levels when it comes to the subject. The attitude of elementary student teachers affects their competence in teaching mathematics. It also involves other factors such as mathematical achievement, self-efficacy and self-concept and experiences at school, teaching materials, classroom management, teacher knowledge, guidance, beliefs and educational background. Student teachers experience highly serious problems or challenges in teaching elementary mathematics. Based on the findings and conclusions of the study, Further, the following recommendations are hereby proposed: To

Regarding the challenges of pre-service programs for elementary teachers whether they are very crowded and allow little time for study of mathematics, the respondents considered it as highly serious. As such, TIs seldom develop mastery in mathematics because of so many preparations. This implies that due to multiple subjects handled by the elementary student teachers, mastery of a specific subject matter is seldom developed as the preparations are diverse consuming more time rather than focusing on one subject.

As to the challenges of the pre-service years and in-service transition into the profession which is not enough for teacher preparation experience, the respondents ranked it highly serious.. The result implies that the exposure of TIs to training is very short which is only one semester and the competency and skill acquired are not enough.

enrich the competence that requires further improvement in ratio and proportional relationships and geometry, peer mentoring and faculty coaching are recommended in a pre-deployment seminar to be conducted before the off-campus practice teaching. Interns may maximize their Math potentials and continuously polish their strength through formal informal learnings such as seminars and attending math tutorials. Instructors of higher education institutions are encouraged to integrate technology-based interactive pedagogy like android, ios, windows game applications, and web-based tutorials in teaching mathematics in order to stimulate audio-visual acuity of learners in the BEE curriculum. The present study deserves further enrichment by using other methods of research and other variables such as the profile of respondents that will be correlated to the problems and difficulties encountered to determine and analyze the relationship that occurs.

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