

# Teachers' Professional Preparations, Teaching Efficiency, and their Impact on Students Mathematics Performance

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**Abstract:** *The study determines the relationship among mathematics teachers' professional preparations, teaching efficiency, and student performance in mathematics subjects for the high school graduates 2010-2011 batch at Mindanao State University- Buug Laboratory High School, Buug, Zamboanga Sibugay. This study used descriptive research to evaluate the teachers' professional preparations, teaching efficiency, and students' mathematics performance. A set of questionnaires was used to gather data on teachers' professional preparations, while administrative records from the schools' secretary and registrar's office provided information on teachers' teaching efficiency and students' mathematics performance. The population of the students was subjected to a sampling process to determine the samples in assessing students' mathematics performance. A total of 90 sample -students out of 117 students who graduated were used in the study. The teachers' professional preparation was rated as average. The efficiency ratings for Math-I teachers were poor (74.27) and satisfactory (75.99); for Math-II, it was very satisfactory (86.12); for Math-III, very satisfactory (89.86); and for Math-IV, very satisfactory (88.05). Overall, the mathematics teachers' efficiency rating was satisfactory (82.2). Among 90 students, 38.89% had fair performance, 30% had poor performance, and only 2.22% had outstanding performance, with an overall GPA of 80.9 (fair performance). A significant relationship was found between teachers' professional preparation and students' performance ( $r = 0.7221, p = 0.0384$ ) and between teaching efficiency and students' performance ( $r = 0.8046, p = 0.0251$ ). The study concluded that enhancing teachers' professional preparation and teaching efficiency through upgraded qualifications and ongoing training significantly improves students' mathematics performance, requiring updated methods and instructional materials.*

**Keywords:** students' mathematics performance, teaching efficiency, teachers' professional preparations

## 1. Introduction

The most effective teachers have a thorough understanding of the task's complexity. They are willing to adjust their teaching style to accommodate the uniqueness of their students in a particular environment. An effective teacher possesses a professional knowledge base and demonstrates a strong understanding of the subject matter. Successful teachers utilize a wide range of instructional strategies and techniques, demonstrating their knowledge of the subject. The most skillful and knowledgeable teachers consciously reflect upon them, conceptualizing and applying understanding from one classroom experience to the next (Lardizabal, 2001).

Teachers with higher levels of professional preparation excel compared to those who do not pursue continuous professional growth and development in their field (Baguio, 2009). They plan a variety of academic and social goals for their students. Such a plan includes questioning techniques that require students to think critically about the information presented rather than recall facts (Connelly, 1998). To avoid the rut of routine and boredom, teachers should plan their professional careers to ensure continuous growth and job satisfaction. It zests for life and the desire to keep on improving. Studying, attending faculty meetings, conferences, and workshops, reading professional literature and materials of general interest, joining professional organizations, and seeing places are ways to achieve professional growth.

Saladan (2005) pointed out that, beyond arguments, the teacher is the critical "thread that ties" the learner to the lifelong search for knowledge. She possesses the essential teaching skills and is infused with a deep commitment to invest tireless efforts in fostering children's minds' continued sharpening and maturing. How she will perform depends mainly on who she is, her best ability, and how she can tactfully smother children with genuine love and care. Furthermore, to achieve effective teaching, a teacher must possess solid background knowledge of a particular subject area in the child's curriculum and be competent in deciding and implementing appropriate teaching methodologies capped with a compassionate and winsome nature. Teaching is described as "building relationships." It is based on a complete understanding of oneself and how one can relate to other children, peers, parents, and administrators. As such, it stresses the need to know growing children's interests, abilities, and past experiences.

On the side of the students, it was already heard and observed that many of them had difficulty getting an interest in their subjects, especially Mathematics. His low interest in the subject led them to perform poorly. To pass is just more than enough for them without knowing the great importance of this subject in the real sense of life. Both high school and college students generally barely pass their mathematics subjects, which sometimes leads to withdrawal or never bothering themselves at all if they have developed the necessary mathematical skills. They simply take mathematics for granted because some teachers do not bother to see whether the students have mastered one step before

proceeding to the next. Instead, they bring students to a higher stage and expect them to catch up. These are some reasons why many students become discouraged and lose interest in mathematics.

In Zamboanga Sibugay, MSU (Mindanao State University)-Buug Campus is one of the institutions whose mandate is to provide quality education. In delivering this mandate, the researcher noticed that most students' grades were low, especially in Mathematics, and the teachers were not worried about their performance. A passing grade of 75 is already enough for the students and teachers despite the reasons that the students of Mindanao State University- Buug Laboratory High School were 90 percent FEASE (Freshmen Entrance and Scholarship Examination) passers. Although most students are presumed to achieve good grades, the permanent records suggest their performance falls short of expectations.

In this scenario, the researcher wanted to determine if teachers' teaching experience and professional preparations affect students' mathematics performance at Mindanao State University—Buug Laboratory High School.

## 2. Statement of the Problem

The primary aim of this study was to determine the relationship among mathematics teachers' professional preparation, teaching efficiency, and performance in mathematics subjects of the high school graduates' batch 2010-2011 of the Mindanao State University-Buug Laboratory High School, Buug Zamboanga Sibugay. Specifically, the study sought to answer the following questions:

- 1) What are the professional preparations of mathematics teachers in terms of the following criteria:
  - a) Educational Qualification;
  - b) Eligibility;
  - c) Teaching Experience; and
  - d) In-Service Training/Seminars?
- 2) What is the level of teaching efficiency of mathematics teachers?
- 3) What is the level of mathematics performance of students at all year levels?
- 4) Are there any significant relationships between students' mathematics performance and the following variables:
  - a) Teachers' professional preparations; and
  - b) Teaching efficiency?
- 5) Based on the findings, what action plan will be developed to improve teachers' professional preparations, teaching efficiency, and students' mathematics performance?

## 3. Significance of the Study

The significance of this study lies in its potential to inform educational policies and teacher training programs by highlighting the importance of professional preparation and teaching efficiency in improving students' mathematics performance.

## 4. Related Literature and Studies

### 4.1 Teachers' Professional Preparations

An education degree is a requirement for practicing teaching. According to Woolfolk (2002), good teaching requires a rich store of well-organized knowledge about the many specific teaching situations. This includes knowledge about the subject taught, their students, general teaching strategies, curriculum materials, and education goals. This situation is possible through a degree in secondary education. A neophyte in the teaching profession needs to perform better than an experienced teacher. This is because the latter has acquired the self-confidence, mastery of the subject matter, classroom management and discipline skills, and others needed for effective teaching. In her study (2005), Saladagan emphasized that the teaching profession requires specific educational qualifications to fit the task the teacher aspires to. Teachers need specific skills and abilities and assurance of the effective development of the growing children, who must then be the future pillars of the nation. Anyone who wants to be registered as a professional teacher should pass the licensure examination, and the establishment of the licensure examination for teachers has made teaching a prestigious profession (Gines, 2006).

Beginning teachers regard maintaining classroom discipline, motivating students, accommodating student differences, evaluating student work, and dealing with parents. One source of difficulty for beginning teachers is that they need help to ease into their responsibilities. With experience, however, most teachers meet the complex challenges for beginners. They have more time to experiment with new methods or materials. Finally, seasoned teachers can focus on the student's needs as confidence grows. At this stage, teachers judge their success by their students' successes. More experienced teachers can move on to professional growth and effectiveness concerns with many students (Woolfolk, 2002). Training is a learning process whereby people acquire skills or knowledge to achieve goals. It provides employees with specific, identifiable knowledge and skills for their jobs. Developments focus on gaining new knowledge and skills that are valuable for present and future employment (Mathis & Jackson, 1999). They further stressed that working in an organization is a continual learning process, and learning is at the heart of all training activities. The constitution mandates the state to enhance teachers' right to academic advancement. The state shall provide teachers with extensive and comprehensive pre-service and in-service training programs and other incentives and emoluments (R.A. 4670, as cited by Duka 2004).

Teacher reflectivity has been advocated as a means of professional development and limitations. When limitations are recognized, teachers must demonstrate professional responsibility by taking the appropriate steps to advance their teaching skills (Austin, 1997). Meson (as quoted by Baguio, 2009) states that teachers who achieve a higher level of education and attend several kinds of workshops, seminars, conferences, professional assemblies, and other related activities excel highly compared to teachers who never take learning opportunities in sustaining their professional growth and development towards respective fields of specialization.

The study of Alag (cited by Laplap, 2000) discovered that the professional preparations of mathematics teachers had a direct bearing on students' achievement in mathematics tests. They found that teachers more experienced in teaching mathematics had better strategies for making students learn and acquire skills. They knew what to teach, which they acquired from experience and from seminars they attended. Askins (2002) also revealed that the teaching experience of beginning or experienced teachers has no significant difference in the selected competencies deemed necessary or requiring emphasis in a classroom.

Balajula (2000) found that teachers' level of professionalism in terms of dynamism and responsibility contributes to pupils' academic performance. They further concluded that teachers' preparation is not a determining factor in teachers' professionalism and pupils' academic performance. As Zulueta and Maglaya (2004) pointed out, quality education largely depends on the quality of teachings. They also revealed that faculty with teaching experience in the 1-10 years range perceived less emphasis on basic skills than those in the 26 or more range. Faculty in the 1 - 15 years older group perceived less emphasis on monitoring students than those in the 26- or more years range. There was also a significant relationship between students' achievement in Algebra and the teachers' professional preparations regarding educational Qualification, teaching experience, and in-service training.

#### **4.2 Teachers' Teaching Efficacy**

Teaching Efficiency refers to the teacher's ability and capacity to do their job to the maximum of their performance. Abao et al. (2023) and Argate et al. (2024), presented basic qualities that are related to teaching competence. The following attributes include mastery of the subject field one teaches, understanding of the learner, understanding of teaching principles and skills in using techniques for their implementation, and general understanding of other branches of knowledge. Mastery of the subject field one teaches. The first essential element of effective teaching is that the teacher thoroughly grasps the subject he teaches. Effective learning demands that the teacher possesses solid knowledge of the subject or field. To master one's field, one needs to keep learning more about it. Teachers cannot simply learn the rudiments of the subject, master them thoroughly, and then stop. Everyone is aware that there is an explosion of knowledge in every field. If a teacher is to keep up with the new developments in his area, he has to continue to learn. It follows that if a teacher is to continue learning his subject matter, he must like it. It is almost impossible for anyone to continue learning something they dislike.

Understanding of the Learner. It means understanding the basic principles of human growth and development. If a teacher expects to guide learning effectively, he must know how much children at various maturity levels can understand. He must know their interest and previous experience, which he can utilize in motivating them. e must develop the special skills needed to gather information about children. t is required, however, for a teacher to know the characteristics of children. Equally important is that he must

like them; one can only stimulate children's growth if he finds satisfaction in working with them. Only a teacher who has genuine and sincere love for children can imbue them with passion for learning. Understanding of Teaching Principles and Skills in the Use of Techniques for Implementation. To promote learning effectively, a teacher must know what (subject matter) and how (method) to teach the third essential of effective teaching is skill with teaching methods. Teaching methods involve an understanding of curriculum theory and practice, the nature and principles of learning, types of learning outcomes, and the psychology of motivation and individual differences, which are bases for selecting and organizing learning experiences. Teaching methods also involve skills in facilitating purposeful learning, such as discussion, questioning, group work, audio-visual materials, directed study, etc. They also include skills in classroom management techniques. These skills are what teacher educators aim to develop in prospective teachers.

General Understanding of Other Branches of Knowledge. Present-day teaching demands that a teacher possess a general understanding of other branches of knowledge. If a teacher expects to help children understand and appreciate the world they live in, he must understand the interrelation and interdependence of the various areas of knowledge. He must also be able to show how his subject relates to other fields, particularly in solving life's problems. Communicating ideas effectively, listening intelligently, and reading critically are essential to effective teaching. According to Equa (2003), successful teaching brings effective learning for authentic results. In other words, all good teaching helps the child to learn effectively. The quality of learning is intimately related to the quality of teaching done by the teacher. Better teaching will always bring better learning, and better learning should always show the way to better teaching. The only kind of results of teaching that should be judged are both lasting and usable, those that enter into the composition and personality of the learner so that they affect his actions, attitudes, choices, and behavior. She further pointed out that generally, the teachers' performance rating is related to students' academic achievement, and students' learning is dependent upon the teachers' performance. This implies that teachers with high-performance ratings can do an excellent job. Good quality in teaching produces good quality graduates.

Acero (2005) stated that a teacher is an exemplar. He serves as a model to his pupils. pils idolize teachers; they believe what the teacher says, especially if the teacher is kind, approachable, and sympathetic to their needs. A model, the teacher must look to his best all the time, master his lessons, show his interest in the children's welfare, show good behavior, and inculcate good work and attitudes, especially during trying moments inside the classroom; be fair in dealing with pupils; exhibits good judgment when the situation calls for it. Eroy (2005), in his study on "The Relationship of the Professional Profile and Teaching Efficiency Ratings of the Teachers of Mindanao State University-Buug Laboratory High School," revealed the following findings: that the teaching experience of the teacher participants has a significant relationship to their teaching efficiency ratings, while the participants' educational attainment has no significant relationship to their

teaching efficiency ratings. Bunagan (2000), in his study on the correlation between Demographic Profile and Performance Rating of the Intermediate Teachers in Buug District: Bases for Teaching Competencies, revealed the following findings: sex did not influence as far as the performance ratings are concerned, and performance ratings were not influenced by sex. e findings further suggest that effective teaching will always result in quality learning regardless of sex, the higher the person's age. He teaches better, and the teachers' performance rating is unrelated to educational Qualifications.

### 4.3 Mathematics Performance

High school mathematics covers many topics that deal with concepts and operations in arithmetic, algebra, geometry, and statistics. According to Ibe et al. (2005), the primary aim of high school mathematics is to expand the student's mathematical concepts, principles, and applications. It is developed to attain proficiency in communicating mathematical ideas, identifying and extending patterns, and using experiences and observations to formulate hypotheses and solve problems. Mathematics teaching is facilitated through relevant examples, illustrations, and exercises to provide adequate practice and drill. Innovative methods and strategies were continuously introduced, and instructional materials evolved. Despite all the efforts, the results could have been more rewarding.

However, Bautista (1999) suggests that the learner should be taught mathematical skills, possibly in the most interesting way, through varied strategies in teaching and learning situations where they should master the skills of the valuable meaning and have ready applications in everyday sessions. On the part of Zwaenepol (1999) pointed out that the failure of students in academic performance might attributed to the lack of competent faculty members, lack of educational resources, and mass promotion of students due to pressures, which are factors that affect the standard of education—further stressed that personal discipline, the interests of students, and their ambitions in life can make a difference in the students' performance.

In the study of pupils' performance in the 1997 NEAT conducted by Bobita (1999), it was found that pupils from both schools under study performed poorly in mathematics, with mean values of 1.25 and 1.8, respectively. Mathematics performance, on the other hand, was a significant indicator of students' performance in the high school curriculum. In a related study, Viroy (2001) noted that elementary pupils could not solve arithmetic problems because arithmetic computation ability had yet to develop among pupils fully. e added that early training in problem-solving must be started as early as elementary grades so pupils will enjoy problem-solving instead of hating it. e further emphasized that once pupils continue into the higher level of their education, problem-solving would no longer be novel to them. The above theories, insights, findings, and conclusions provided baseline information for interpreting data in this investigation.

## 5. Materials and Methods

### 5.1 Research Design

The researcher used a descriptive research method for this study. Questionnaires focused on the professional preparation of the mathematics teachers were distributed. Additionally, the teachers' efficiency ratings and the final grades of the graduates, obtained directly from school authorities, were analyzed and interpreted.

### 5.2 Research Environment

The study was conducted at the High School Department of Mindanao State University, Buug Campus, in Buug, Zamboanga Sibugay. The campus was established under BOR Resolution No. 1030 of 1971 as part of the Mindanao State University System, with its main campus in Marawi City. MSU-Buug is a newly established autonomous campus within the MSU system, bordered by Kumalarang, Zamboanga del Sur to the east; Diplahan, Zamboanga Sibugay to the west; Bayog, Zamboanga del Sur to the north; and Illana Bay and Malangas, Zamboanga Sibugay to the south."

### 5.3 Research Subject

The research subjects were the five (5) mathematics teachers and the one hundred seventeen (117) high school graduates of the Mindanao State University-Buug Laboratory High School for Academic Year 2010-2011. These graduates enrolled from the first to the fourth year at Mindanao State University-Buug Laboratory High School with final grades in Mathematics I, II, III, and IV. These graduates passed and never retained or failed in mathematics I or IV subjects. 122 questionnaires were given to all the participants and the response rate was 100%.

### 5.4 Sampling Technique

Simple random sampling was used in the study to identify the actual samples of student graduates. The sample size of the concerned graduates was determined using Slovin's Formula. The formula resulted in a sample size of 90 out of one hundred seventeen graduates. Respondents were identified by drawing lots to pick the actual samples. The researcher used the five mathematics teachers in the study, and there was no need to determine the sample size.

### 5.5 Research Instruments

A questionnaire was used to ask about the professional preparations of mathematics teachers using the personal profile sheet adopted from Ejercito (1992). The levels of professional preparation of teachers are categorized as follows: 4.21-5.00= highest level of preparation, 3.41-4.20 = high level of preparation, 2.61-3.40 = average level of preparation, 1.8-2.60 = low level of preparation, and 1.00-1.8 = very low level of preparation. The educational Qualification is set on a five-point scale: 5 = with doctoral units; 4 = with master's Degree; 3 = with master's units; 2 = BSED/A.B. major/ minor in math; and 1 = B4 with major/minor in math. Eligibility is set on a five-point scale:

5=LET; 4= Civil Service (Prof.); 3= Civil Service (Sub. Prof.); 2=PNP (entrance Test); 1=others. Experience as a math teacher is set on a five-point scale: 5=13 years or more; 4=10-12 years; 3=7-9 years; 2=4-6 years; and 1 = 1-3 years. Special training and seminars attended on teaching math are set on a five-point scale: 5=101 or more hours; 4=76-100 hours; 3=51-75 hours; 2=26-50 hours =25 hours or less.

**5.6 Data Gathering Procedure**

The researcher asked permission from the Registrar and Secretary of the MSU- -Buug College High School Department to give the researcher access to gather data from the Officials on file in their respective offices with the principal's approval. The researcher meticulously collected the mathematics teachers' efficiency ratings, which were rated by the students and stored in the Office of the school's Secretary. Additionally, the permanent records of the concerned graduates, containing their final grades in mathematics subjects from their first to fourth years, were obtained from the Registrar's Office. The concerned teachers were then respectfully asked to provide their professional preparations in a personal profile sheet. After collecting the data, they were assembled, analyzed, and interpreted.

**5.7 Statistical Treatment**

The statistical treatment of this study utilized descriptive statistics after obtaining the tallied and tabulated data to determine the frequency distribution. The arithmetic mean was employed to evaluate the professional preparation level among teachers and graduates' mathematics performance.

The Pearson Correlation Coefficient was used to determine the significant relationship between the teachers' professional preparations and mathematics performance and the significant relationship between teaching efficiency and mathematics performance. The data was processed on the computer using the Special Package for Social Sciences (SPSS) software for more accurate and reliable results.

**6. Results and Discussion**

**6.1 Teachers' Professional Preparations**

The teachers' professional preparation includes the following indicators: educational attainment, eligibility, teaching experience, and special training/seminars in teaching math. Educational Qualification. This indicator of teachers' professional preparations refers to the highest educational attainment of the teachers involved in the study. It further includes units of graduate study or post-graduate study the teachers have earned, if there are any. Table 1 presents the teachers' professional preparations in terms of educational attainment.

As shown in the table, the two teachers who handled the Math-I subject both have a low level of preparation since they only have an educational attainment of the mathematics major. The Math-II teacher shows an average level of preparation, having a major in mathematics and a master's unit. Math-III and IV teachers both have a high level of preparation since they obtained a master's Degree.

**Table 1: Level of Teachers' Professional Preparations in Terms of Educational Attainment**

Math Subject	No. of Teachers	Educational Attainment	Equivalent Weight	Interpretation
I	1	BSED-Math	2	Low Level
	1	BSED-Math	2	Low Level
II	1	BSED-Math+ Masters Units	3	Average Level
III	1	Masters' Degree	4	High Level
IV	1	Masters' Degree	4	High Level
Weighted Mean			3	Average Level

Legend:	Weights	Interpretation
Master's Degree + Doctoral Units	5	Very High
Masters degree	4	High
BSED + Masters Unit	3	Average
BSED + with major/ minor in math	2	Low
BSED with non-major/minor in math	1	Very Low

The findings indicated that the teachers who handled the mathematics subjects in Mindanao State University -Buug Laboratory High School met the minimum requirements to be a mathematics major. Master's Degree is an offshoot requiring the faculty to undergo educational development as

a requirement, especially in renewing service contracts. *Eligibility* is one component of teachers' preparations, and it refers to the examination given by the Professional Regulation Commission (PRC) and passed by the teachers involved in this study.

Table 2 presents the teacher's professional preparation in terms of eligibility. As stated in the table, four teachers are LET passers. Only one teacher is not eligible and is not a LET passer.

**Table 2: Level of Teachers' Professional Preparations in Terms of Eligibility**

Math Subject	No. of Teachers	Eligibility	Equivalent Weight	Interpretation
I	1	None	1	Very Low Level
	1	LET	5	Very High Level
II	1	LET	5	Very High Level
III	1	LET	5	Very High Level
IV	1	LET	5	Very High Level
Weighted Mean			4.2	High Level

Legend:	Weights	Interpretation
LET	5	Very High
Civil Service (Prof)	4	High
Civil Service (Sub Prof)	3	Average
PNP (Entrance Test)	2	Low
None	1	Very Low

The computed weighted mean of 4.2 reveals that the teachers have a high level of professional preparation regarding eligibility. Mindanao State University—Buug Laboratory High School's high level of professional preparation results

from the administration's hiring licensed teachers to teach in their academic curriculum.

Teaching Experience, as an indicator of teachers' professional preparations, refers to the years a teacher has taught high school mathematics. Table 3 presents the teachers' professional preparations in terms of teaching experience. As seen in the table, Math-I teachers have a very low level of preparation. Math-II teacher has the highest level of preparation, while Math-III and IV teachers have a high level of preparation.

**Table 3:** Level of Teachers' Professional Preparations in Terms of Teaching Experience

Math Subject	No. of Teachers	Educational Attainment	Equivalent Weight	Interpretation
I	1	2	1	Very Low Level
	1	3	1	Very Low Level
II	1	32	5	Very High Level
III	1	12	4	High Level
IV	1	12	4	High Level
Weighted Mean			3	Average Level

The compound weighted mean of 3 shows that the level of teachers' professional preparation and teaching experience in mathematics is average because most of the teachers in Mindanao State University-Buug Laboratory High School are still young in the service of their teaching profession.

4 presents the teachers' professional preparations in terms of training/seminars in teaching mathematics.

Training/Seminar in Teaching Math is a component of teachers' professional preparations and refers to the seminars, workshops, and training relevant to the mathematics teaching that the teachers involved in this study participated in. Table

As presented in the table, Math-I and Math-III teachers have no special training or seminars on teaching math. Similarly, teachers in Math II and IV attended training/seminars on teaching mathematics for 94 and 72 hours, respectively, with an equivalent professional preparation rating of high and low.

**Table 4:** Level of Teachers' Professional Preparations in Terms of Training/Seminars in Teaching Math

Math Subject	No. of Teachers	Educational Attainment	Equivalent Weight	Interpretation
I	1	None	1	Very Low Level
	1	None	1	Very Low Level
II	1	94	4	High Level
III	1	None	1	Very Low Level
IV	1	72	3	Average Level
Weighted Mean			1.4	Very Low Level

Legend:	Weights	Interpretation
101 hours or More	5	Very High
76-100 hours	4	High
51-75 hours	3	Average
26-50 hours	2	Low
0-25 hours	1	Very Low

The computed weighted mean of 1.4 shows that teachers' professional preparation in training/seminars in teaching math is very low. Some teachers at Mindanao State University -Buug Laboratory High School are not bothering themselves with upgrading their math teaching skills through training/seminars. The administration has yet to send teachers to attend training/seminars. Sending teachers to training/seminars is not part of the administration's yearly development program. However, as practiced, it is the prerogative of the teacher's concern whether they want to upgrade their field of specialization at their own expense. Table 5 summarizes data on the four criteria of teachers' professional preparation.

**Table 5:** Summary of the Level of Teachers' Professional Preparations

Criteria	Weighted Mean	Interpretation
1. Educational Qualification	3.0	Average
2. Eligibility	4.2	High
3. Teaching Experience	3.0	Average
4. training/Seminars Attended	1.4	Very Low
Over-all Weighted Mean	2.9	Average

Legend:
4.21 – 5.00 - (Highest level)
3.41 – 4.20 - (High level)
2.61– 3.40 - (Average level)
1.81 – 2.6 - (Low)
1.00 – 1.80 - (Very low level)

As shown in the table, teachers' professional preparations in terms of eligibility are at a high level, with a weighted mean of 4.2. Both educational qualification and teaching experience have a weighted mean of 3, which is at an average level. Training/seminars have a weighted mean of 1.4, which is a very low level of professional preparation. The overall weighted mean of teachers' professional preparation is 2.9, which shows that the teachers of MSU-

Buug Laboratory High School demonstrated an average level of professional preparation in mathematics teaching.

**6.2 Teachers’ Teaching Efficiency**

Teaching efficiency refers to the ability and capacity of the teacher to perform their duties and responsibilities in nurturing the students at their highest level. It is measured using a Teacher Performance Appraisal System designed to evaluate teaching efficiency.

This study is measured by rating the teachers by their students and how they perform such responsibilities. Table 6 presents the teaching efficiency of mathematics teachers in Mindanao State University- Buug Laboratory High School.

**Table 6:** Level of Teaching Efficiency Ratings of Mathematics Teachers

Subject	No. of Teachers	Numerical Rating	Interpretation
Math-I	I	74.27	Poor
	I	75.99	Satisfactory
Math-II	I	86.12	Very Satisfactory
Math-III	I	89.08	Very Satisfactory
Math-IV	I	88.05	Very Satisfactory
Over-all Numerical Rating		82.2	Satisfactory

Hypothetical Mean Range:

- 96 - 100 - Outstanding
- 90 - 95.9 - Very Good
- 83 - 89.99 - Very Satisfactory
- 75 - 82.99 - Satisfactory
- Below 75 - Poor

As seen in the table, of the five teachers in mathematics, three teachers handling Math II, III, and IV got an efficiency rating of very satisfactory, getting a numerical rating of 86.12, 89.08, and 88.05, respectively. Two teachers handling Math I got an efficiency rating of poor and satisfactory, getting a numerical rating of 74.27 and 75.99. The overall numerical rating of 82.2 shows that the teaching efficiency of Mindanao State University-Buug Laboratory junior high school teachers is at a satisfactory level in teaching mathematics.

The findings suggest that to achieve a satisfactory level, some teachers must enhance their methods, techniques, strategies, and motivational approaches to make lessons more precise, engaging, and suited to students' needs. According to Sumalinog (2018), the most effective teachers possess a deep understanding of the task's complexity and the flexibility to adapt their teaching style to accommodate the unique characteristics of their students within a specific environment. Teaching efficiency is crucial in improving student outcomes and narrowing achievement gaps. Effective teachers create interactive learning environments that enhance student learning. A well-designed appraisal system for teaching efficiency evaluates teachers' strengths

and areas for improvement, fostering professional growth and providing necessary support. By helping educators reach their full potential, this performance appraisal process is a key factor in achieving high levels of student performance (Nolan, 2006; Sumalinog et al. 2022).

**6.3 Students’ Mathematics Performance**

It refers to the mathematics performance of the academic year 2010-2011 high school graduates of Mindanao State University-Buug Laboratory Junior High School. The performance of the concerned graduates was based on the final grades of their Math I, Math II, Math III, and Math IV taken in their first year to the fourth year.

Table 7 presents the mathematics performance of Mindanao State University-Buug Laboratory High School students. As reflected in Table 7, data showed that about 35 out of 90 students constituted 38.89 percent with fair mathematics performance, and 27 out of 90, 30.0 percent had poor performance. About 20 out of 90 constituted 22.22 percent with satisfactory performance.

**Table 7:** Performance in Mathematics of the Academic Year 2010-2011 Graduated(All Levels, First Year to Fourth Year)

Grades	Frequency	Percentage
95 – 100 – Outstanding	2	2.22
89 – 94 – Very Satisfactory	6	6.67
83 – 88 – Satisfactory	20	22.22
77 – 82 – Fair	35	38.89
70 – 76 – Poor	27	30.00
Total	90	100
Overall Grade Point Average	80.9	
Interpretation	Fair	

And, out of 90 students who graduated, only 2, or 2.22 percent, of Mindanao State University-Buug Laboratory High School students in the academic year 2010-2011 obtained an outstanding rating. The students' overall performances in their mathematics subjects taken from the first year to the fourth year obtained an overall grade point average of 80.9 with fair performance. The results suggest that the MSU-Buug High School Department graduates from the Academic Year 2010-2011 had yet to fully develop their mathematical skills in Algebra, Geometry, Trigonometry, and Statistics. Despite this need for development, their performance was declining. Records indicate that 41 students in their fourth year fell into the poor performance category. It proves that passing is enough for them, and they never bother themselves about whether they have developed the necessary skills. They take mathematics for granted because some teachers are also okay with seeing whether they have mastered one step before proceeding to the next. Instead, they bring students to a higher stage and expect them to catch up.

**Table 8:** Test of Significant Relationship between Students’ Mathematics Performance and the following Independent Variables

Independent Variables	Pearson “r”	Probability Value	Decision of the Hypothesis	Interpretation
1. Teachers’ Professional Preparations	0.7221	0.0384	Accept	With Significant
2. Teachers’ Teaching Efficiency	0.8046	0.0251	Accept	With Significant

Professional preparation is described as the path teachers follow to carry out their duties and responsibilities. School systems and tertiary bodies are encouraged to promote personal and professional growth in the teaching profession. Teachers' motivation in these endeavors involves the energy and drive to learn, work effectively, and achieve potential in the process. It also plays a large part in the interest and enjoyment of the teachers and the students, especially in improving academic achievement (Bunghanoy & Sumalinog, 2023). The relationship between teachers' teaching efficiency and students' mathematics performance yielded Pearson's 'r' value of 0.8046 and a probability value of 0.0251, which is lower than the 0.05 level of significance, which accepted the hypothesis and established a significant relationship between teachers' teaching efficiency and students' mathematics performance. The result supports Equa's (2003) idea that teachers' performance ratings are generally related to the student's academic achievement, of which learning is dependent upon the teacher's performance. This implies that teachers with high-performance ratings can do an excellent job in teaching. Quality in education produces good-quality graduates.

The study's findings show an effect of teachers' professional preparations and teaching efficiency on students' mathematics performance. Action plan to improve the following areas: Teachers' professional preparations require training/seminars and workshops that can update teaching methodologies in math, and the school administrator recruits eligible, experienced, and well-trained teachers (Bargayo, 20024). Teachers apply new strategies that fit the present learning preferences of the students and standardize mathematics teaching. This makes mathematics exciting and highly motivated students. Teachers need to apply innovative teaching styles, techniques, and activities to increase their teaching efficiency and increase students' interest in math subjects. To improve their performance, students must adopt the "study group program." This program allows students to learn in their own way and removes their dependence on classroom instructions (Ibe 2005). The complete details of the plans are strategically described in Appendix E.

## 7. Conclusion

Teachers' professional preparation plays a crucial role in significantly impacting students' performance in mathematics. A well-prepared teacher can facilitate effective learning and enhance students' understanding of complex mathematical concepts. To improve students' outcomes in mathematics, it is essential to invest in the professional preparation of teachers. This can be achieved by advancing their educational qualifications and providing continuous opportunities for professional development, such as training and seminars. These initiatives help ensure that teachers remain updated with the latest trends and developments in mathematics instruction, allowing them to adapt their teaching strategies to meet the evolving needs of their students. In addition to professional preparation, teaching efficiency also has a substantial impact on students' mathematics performance. Teachers who can effectively apply the latest teaching methods and techniques create a more engaging and conducive learning environment. Utilizing modern instructional devices and providing

supplementary materials, such as handouts, can help clarify complex topics and make lessons more accessible and exciting for students. By making mathematics lessons more interactive and engaging, teachers can foster a deeper understanding of the subject matter. Therefore, investing in both the professional development and teaching efficiency of mathematics teachers is crucial for improving students' overall performance and fostering a lifelong appreciation for mathematics.

## 8. Recommendations

The researcher recommends the following, which is relative to the results of the investigations.

professional development and teaching efficiency of mathematics teachers is crucial for improving students' overall performance and fostering.

- 1) Encourage teachers to enroll in graduate schools that provide continuous training toward a higher degree and provide learning opportunities to sustain their professional growth and development in their respective fields of specialization.
- 2) Encourage the teacher who is not eligible to take and pass the Licensure Examination for Teachers (LET)
- 3) Recruit experienced and well-trained teachers to upgrade the standard of mathematics teaching at Mindanao State University-Buug Laboratory High School.
- 4) School administrators must seriously consider the teaching of mathematics at the secondary level and upgrade their teachers on the latest trends and developments in teaching through seminars and other forms of training.
- 5) Encourage the teachers to be very good, if not outstanding level, in teaching efficiency.
- 6) Students should only partially depend on their knowledge from classroom instruction. They should seriously consider that passing grades are not enough. They should strive hard to give their best to attain higher grades. They should also obtain a strong foundation in mathematics for their studies in higher mathematics subjects.
- 7) School administrators should implement a Group Study Program in math to maximize the learning of the students.
- 8) The researcher further recommends parallel studies to determine the status of mathematics teaching in the other areas of the province of Zamboanga Sibugay.

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