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CORRELATION BETWEEN MATHEMATICS TEACHERS' MOTIVATION AND STUDENTS' ACADEMIC ACHIEVEMENT IN SENIOR SECONDARY SCHOOL IN GWAGWALADA AREA COUNCIL ABUJA

BY

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Abstract

This study explores the correlation between mathematics teachers' motivation and students' academic achievement in senior secondary schools within the Gwagwalada Area Council of the Federal Capital Territory, Abuja. Seven research questions and hypotheses guided the investigation. Utilizing a correlational and ex-post facto research design, the sample comprised 351 students (167 males and 184 females) selected from a target population of 3,821 students. Data collection instruments included the Mathematics Teachers' Motivation Questionnaire (MTMQ), Students' Motivational Belief Questionnaire (SMBQ), and Students' Promotional Examination Result (SPER). The instruments were validated by experts from the Federal University of Technology Minna, FCT College of Education Zuba Abuja, and a secondary school mathematics teacher. Reliability coefficients for the MTMQ constructs ranged from 0.56 to 1.00, while the SMBQ constructs had reliability coefficients of 0.76 and 0.81, with average reliabilities of 0.83 for MTMQ and 0.76 for SMBQ, as determined by Cronbach's Alpha reliability statistics. Students' mathematics academic achievement was measured using their promotional examination scores. Mean and standard deviation with scatter plots were used to answer the research questions, and hypotheses were tested using Pearson Product Moment Correlation (PPMC) at a 0.05 significance level. The findings indicated a weak positive relationship between students' academic achievement and mathematics teachers' monthly remuneration, a weak positive relationship between teachers' continuous professional development and student achievement, and a moderately positive relationship between teachers' support by school authorities and student achievement. The study recommends continuous

training and professional development for mathematics teachers to enhance their teaching methods and improve student academic achievement.

Keywords: Mathematics, teachers, motivation, students, academic achievement.

Introduction

Mathematics is a field that encompasses a wide range of concepts and principles. It plays a crucial role in various aspects of our lives, from practical applications to theoretical explorations. Mathematics values accuracy and precision and provides a rigorous framework for logical reasoning, enabling clear and unambiguous communication. Mathematical statements and proofs are required to be precise and free from ambiguity. Mathematics serves as a universal language that transcends cultural and linguistic barrier and its symbols and notations allow mathematicians worldwide to communicate and collaborate effectively, regardless of their native languages. The subject is renowned for its problem-solving capabilities and equips individuals with logical thinking, critical reasoning, and analytical skills. The process of solving mathematical problems helps develop patience, perseverance, and creativity. Mathematics values logical rigor and proof and its arguments require clear, step-by-step reasoning that follows established rules of logic. The use of proofs provides certainty and establishes the truth or falsity of mathematical statements. Mathematics has practical applications in numerous fields, such as engineering, physics, finance, computer science, and more. It provides a foundation for modeling and analyzing real-world phenomena, enabling predictions, optimizations, and problem-solving in various disciplines. Mathematics is often admired for its inherent beauty and elegance.

According to Astrid and Rudiyanto (2018) mathematics is considered a difficult subject for students, including elementary school students. Rudyanto's (2018) revealed that 27.74% of respondents in his study described mathematics as a difficult subject. One contributing factor is that teachers of mathematics do not associate values of learning mathematics with everyday life so learning of mathematics seems to be meaningless though mathematics plays an important role in helping students to solve problems of daily life, for example to count yields, sell, and calculate discounts (Marchis, 2011). So, teacher's roles in teaching and learning process is to create meaningful learning environment for students to realize that mathematics is important to learn (Chapman, 2017). "Manthanein" is Arabic for "learning.""Techne" is defined as "an art (or) technique." Mathematics refers to the art of learning in relation to disciplines or resources. Mathematical definition: "It is the science of number or space." As a result, we might draw the conclusion that mathematics is a systematized, organized, and precise field of science. Additionally, mathematics is the study of quantity, measurement, and spatial relationships.

History of mathematics is a field of study that focuses largely on the origins of mathematical discoveries and, to a lesser extent, on historical notation and computation techniques. New mathematical innovations have only been documented in writing in a few places prior to the modern era and the global dissemination of information. Beginning in 3000 BC, the Mesopotamian states of Sumer, Akkad, and Assyria, closely followed by Ancient Egypt and the Levantine state of Ebla, began to learn arithmetic, algebra, and geometry for use in taxation, trade, and the study of natural patterns, astronomy, keeping time records, and creating calendars.The name "mathematics," which comes from the Greek word (mathema), which means "subject of instruction," was first used by the Pythagoreans in the sixth century BC to refer to the study of mathematics as a "demonstrative discipline." Greek mathematics considerably improved the techniques (particularly by introducing deductive reasoning and rigorous mathematical reasoning in proofs) and broadened the scope of mathematics. The ancient Romans employed applied mathematics in surveying, structural engineering, mechanical engineering, accountancy, the invention of lunar and solar calendars, and even arts and crafts, despite making essentially no contributions to theoretical mathematics. Early advancements in mathematics came from China, including the introduction of negative integers and a place value system (Berlinghoff & Gouvêa, 2021).

The term "motivation" comes from the Latin verb "movere," which meaning "to move." It is characterized as the procedure that starts, directs, and sustains goal-oriented behaviors. Whether it's drinking a drink of water to quench our thirst or reading a book to learn something new, motivation is what moves us to take action (Rodríguez, 2020). It takes into account the psychological, biological, social, economic, and cognitive elements that drive behavior. When describing a person's actions in daily life, the word "motivation" is commonly employed. Thus, motivation is the internal condition that drives behavior toward objectives and can be intrinsic or extrinsic. Extrinsic motivations are those that originate from outside of the individual and frequently involve rewards such as trophies, money, social recognition, or praise, whereas intrinsic motivations are those that originate from within the individual, such as completing a challenging crossword puzzle purely for the satisfaction of solving a problem (Rodríguez, 2020). Motivation is perhaps one of the most fascinating issues in the study of psychology since it plays a significant part in the development of an individual's psyche. As a driving factor, motivation propels a person toward their objectives. It is an individual's excitement and drive paired with a type of stimulus that allows them to endure in order to attain greater heights.

Goal- and objective-achieving behavior is influenced by motivation, which is crucial for both teams-based businesses and lone wolves alike. It is important for a company to foster and sustain high levels of motivation that lead to great

accomplishment in order to guarantee that the workplace objectives and values of its employees are in line with its purpose and vision. Increased levels of commitment, engagement, and motivation are crucial components of the way employees behave because they encourage them to put out high levels of effort, performance, and contribution while also helping to keep them on board. Good leadership demonstrates the way, offers direction, encouragement, and instructions. Effective principals may utilize this as one of their top motivational tactics in the classroom to inspire both instructors and students. According to Herzberg's idea, strong morale is challenging to achieve in large companies, but it is undoubtedly tied to instructors' motivation levels. In order for a business to succeed, employee success is crucial. It consists of what a person does or does not do. Quality, quantity, timeliness, collaboration, and the existence of work are all necessary for success (Gungor, 2011).

Today, motivation is a key factor in the achievement of employees as it enhances commitment and engagement to work. People do not like their jobs, work hard or are satisfied because of the mere existence of contracts, rules or procedures but rather because they feel motivated (Ngirwa, 2016). People need to have a clear picture or goal they are to achieve so as to determine whether they are progressing or not.

Statement of the Problem

Despite the recognized importance of teachers' motivation in influencing students' academic outcomes, there is a lack of comprehensive research investigating the correlation between mathematics teachers' motivation and students' academic achievement in mathematics. This study aims to examine the relationship between mathematics teachers' motivation and students' academic achievement in mathematics, with the goal of identifying the extent to which teachers' motivation influences students' academic achievement in this subject. By addressing this research problem, valuable insights can be gained to inform educational policies and practices aimed at improving mathematics instruction and student outcomes. Adeyemo, (2013) submits that one of the important factors in realizing educational aims and objectives in mathematics as a subject is the role of the teachers` motivation within the educational set up. Academic achievement of the students towards achieving educational goals is said to be very important in most societies today. The negative achievement of students towards educational aims and objectives could be associated to the low motivation of teachers especially in the area of mathematics. In order to enhance the standard of mathematics education and buck the present downward trend in mathematics proficiency, this study will examine the links between these mathematics teachers' factors and students' academic accomplishment.

Objectives of the Study

There are numerous researches conducted on teachers' motivation in different parts of the world, but little or no research has been done to investigate mathematics teachers' motivation towards teaching in Gwagwalada Area Council of Abuja. Therefore, this study seeks to investigate the correlation between Mathematics teachers' motivation and students' academic achievement in senior secondary school mathematics examination in Gwagwalada Area Council of FCT Abuja.

The study also aims to examine the following;

1. Investigate the relationship between monthly remuneration mathematics teachers and students' academic achievement in mathematics.
2. Explore how opportunities for continuous professional and career development opportunities motivate mathematics teachers towards teaching.
3. Analyze how supports from School authority motivate mathematics teachers towards teaching.

Research Questions

The study sought to find answers to the following questions:

1. What is the relationship between low, medium and high monthly remuneration mathematics teachers and students' academic achievement in mathematics?
2. Is there any relationship between mathematics teachers' continuous professional and career development opportunities and students' academic achievement in mathematics?
3. How justified is the relationship between mathematics teachers' support by school authority and students' academic achievement in mathematics?

Research hypotheses

The following null hypotheses were tested at a 0.05 level of significance:

HO_1: There is no significant relationship between monthly Remuneration of mathematics teachers' and students' academic achievement in mathematics.

HO_2: There is no significant relationship between mathematics teachers' continuous professional and career development opportunities and students' academic achievement in mathematics.

HO_3: There is no significant relationship between mathematics teachers' support by school authority and students' academic achievement in mathematics.

Methodology

The study adopts correlational and ex-post facto research designs since the researcher intends to investigate the relationships that exist between the variables under study. The design was selected because of the nature of the variables already at hand or present in the students; hence the study was not in any way attempt to manipulate them. The total population of the study comprised all the senior

secondary school students of 2022/2023 session in the thirteen (13) Senior Secondary Schools in Gwagwalada area council of FCT Abuja. Altogether, they make up a population of fourteen thousand, two hundred and eleven (14,211) students out of which six thousand nine hundred ninety-six (6,996) are male students while seven thousand two hundred and fifteen (7,215) are female students. The target population of the study consists of all the senior secondary school II (SS 2) students in Gwagwalada area council of FCT Abuja totaling five thousand, six hundred and eighty-two (5,682) out of which two thousand, six hundred and ninety-one (2,691) are male students and two thousand, eight hundred and twenty sixty are female students.Multi-stage sampling technique is adopted using purposive sampling technique to select sis (6) Schools from the total of thirteen (13) Senior Secondary Schools in Gwagwalada Area Council of Federal Capital Territory Abuja. Also, proportional stratified random sampling technique will be used to select the sample population based on krecjie and Morgan's table.

The instruments used for this study were researcher designed questionnaire titled "Mathematics Teachers Motivation Questionnaire (MTMQ)", "Student Motivational Belief Questionnaire (MBQ)" and promotional examination results of the students from the sampled schools. The instruments designed by the researcher contain twenty-two (22) items for the students and thirty-nine (41) items for mathematics teachers. The questionnaire is based on the four-point scale which include; Strongly Disagree (SD), Disagree (D), Agree (A), Strongly Agree (SA) and with four-point (4) for Strongly Agree, three (3) point for Agree, two (2) point for Disagree and one (1) point for Strongly Agree. The average reliability of the Instrument is 0.83 using Cronbach's Alpha reliability statistics. And 0.76 and 0.81 coefficient of reliability were obtained for the two constructs respectively Student Motivational Belief Questionnaire (SMBQ). The average reliability of the Instrument is 0.76 using Cronbach's Alpha reliability statistics. These show that the instruments are reliable. The data gathered from this study was analyzed using mean, standard deviation and Pearson Product Moment Correlation Coefficient.

Results

Research Question One: What is the relationship between monthly remunerations of mathematics teachers and students' academic achievement in mathematics?

Table 1

Summary of the Mean and Standard Deviation of monthly remunerations of mathematics teachers and students' academic achievement in mathematics

Variables	N	$\bar{x}$	SD	$\bar{x}$difference
Student Academic Achievement	351	54.91	12.47	42.28
Monthly Remuneration	40	12.63	2.95	

Table 1 shows the Mean score of 54.91 with Standard Deviation of 12.47 for students' academic achievement and Mean score of 12.63with standard deviation of 2.95 for monthly remunerations of mathematics teachers, this gives the Mean difference of 42.28 between the variables. This therefore, indicates a positive relationship between the variables. The descriptive statistics (Scatterplot) of the two groups is presented in figure 1.

Figure 1

Scatterplot relationship between monthly remunerations of mathematics Teachers and students' academic achievement in mathematics

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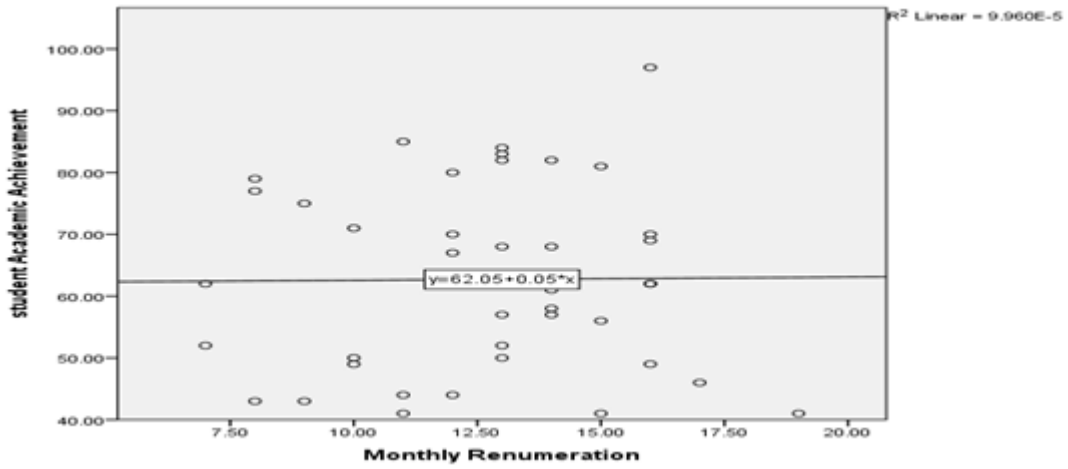


Figure 1 shows the Scatterplot of the relationship between monthly remunerations of mathematics teachers and students' academic achievement in mathematics, this indicates a positive relationship between the variables. The fitted line shows that as monthly remunerations of mathematics teachers' increase, the students' academic achievement in mathematics also tends to increases.

Research Question Two: What is the relationship between mathematics teachers' continuous professional and career development and students' academic achievement in mathematics?

Table 2

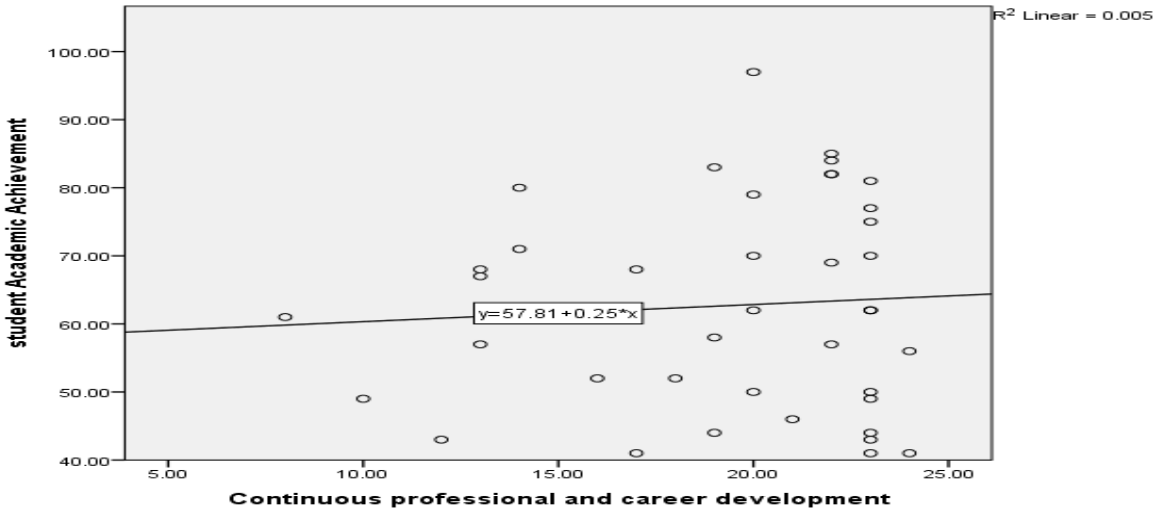
Summary of the Mean and Standard Deviation of mathematics teachers' continuous professional and career development and students' academic achievement in mathematics

Variables	N	$\bar{x}$	SD	$\bar{x}$difference
Student Academic Achievement	351	54.91	12.47	35.51
Continuous professional and career development	40	19.40	4.27	

Table 2 shows the Mean score of 54.91 with Standard Deviation of 12.47 for students' academic achievement and Mean score of 19.40with standard deviation of 4.27 for teachers' continuous professional and career development, this gives the Mean difference of 35.51 between the variables. This indicates a positive relationship between the variables. The descriptive statistics (Scatterplot) of the two groups is presented in figure 2

Figure 2

Scatterplot relationship between mathematics teachers' continuous Professional and career development and students' academic achievement in mathematics



For the mathematics teachers' continuous professional and career development and students' academic achievement in figure 2 above, the Scatterplot displays a positive relationship between the constructs. The trend line indicates that students'

academic achievement increases as mathematics teachers' continuous professional and career development increased.

Research Question Three: What is the relationship between mathematics teachers' support by school authority and students' academic achievement in mathematics?

Table 3

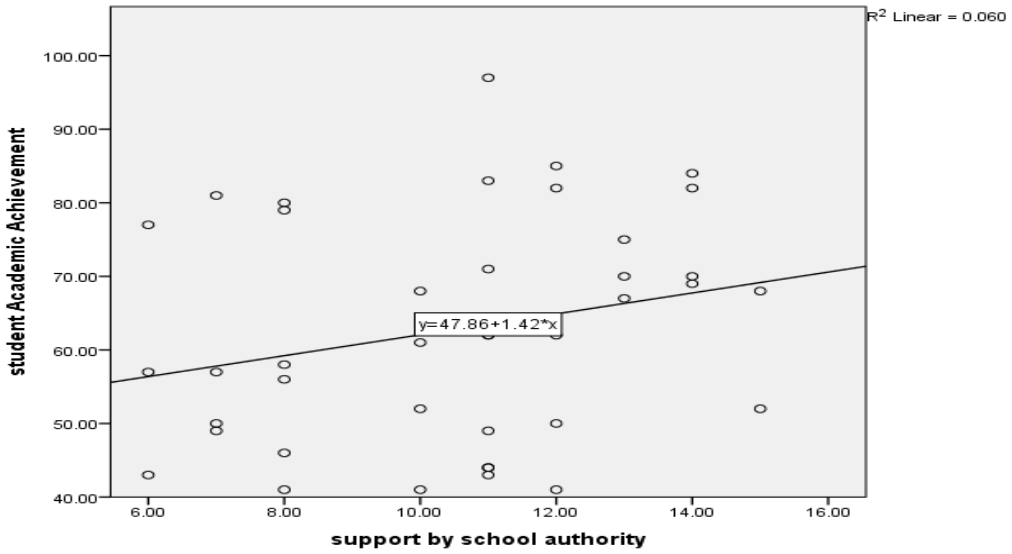
Summary of the Mean and Standard Deviation of mathematics teachers' support by school authority and students' academic achievement in mathematics

Variables	N	$\bar{x}$	SD	$\bar{x}$difference
students' academic achievement	351	54.91	12.47	44.46
Support by school authority	40	10.45	2.63	

Table 3 shows the Mean score of 54.91with Standard Deviation of 12.47 for students' academic achievement and Mean score of 10.45 with standard deviation of 2.63 for mathematics teachers' support by school authority, this gives the Mean difference of 44.46 between the variables. This therefore, indicates a positive relationship between the variables. The descriptive statistics (Scatterplot) of the two groups is presented in figure 3.

Figure 3

Scatterplot relationship between mathematics teachers' support by school authority and students' academic achievement in mathematics



From figure 3 above, the Scatterplot relationship between mathematics teachers' support by school authority and students' academic achievement in mathematics, shows a positive relationship between the variables. The fitted line shows that as school authorities support mathematics teachers, students' academic achievement in mathematics increases.

Testing Null Hypotheses

Hypothesis One (HO_1): There is no significant relationship between monthly remunerations of mathematics teachers and students' academic achievement in mathematics.

Table 4

Summary of Pearson Product Moment Correlation between monthly remunerations of mathematics teachers and students' academic achievement in mathematics

Variables	N	$\bar{x}$	SD	r_{-cal}	p_{-value}
SAA	351	54.91	12.47	0.26	0.01
MR	40	12.63	2.95		

Table 1 shows the Mean score of 54.91 with Standard Deviation of 12.47 for students' academic achievement and Mean score of 12.63with standard deviation of 2.95 for monthly remunerations of mathematics teachers also r is 0.26. Therefore, the null hypothesis one (HO_1) was rejected because p-value of 0.01 is less than 0.05alpha level. Hence, there was weak positive relationship between students' academic achievement and monthly remunerations of mathematics teachers.

Hypothesis Two (HO_2): There is no significant relationship between mathematics teachers' continuous professional and career development and students' academic achievement in mathematics.

Table 5

Summary of Pearson Product Moment Correlation between mathematics teachers' continuous professional and career development and students' academic achievement in mathematics.

Variables	N	$\bar{x}$	SD	r_{-cal}	p_{-value}
SAA	351	54.91	12.47	0.30	0.04
MTCPACD	40	19.40	4.27		

Table 5 shows the Mean score of 54.91 with Standard Deviation of 12.47 for students' academic achievement and Mean score of 19.40 with standard deviation of 4.27 for mathematics teachers' continuous professional and career development also r is 0.30. Therefore, the null hypothesis two (HO_2) was rejected because p-

value of 0.04 is less than 0.05alpha level. Hence, there was weak positive relationship between mathematics teachers' continuous professional and career development and students' academic achievement in mathematics.

Hypothesis Three (HO_3): There is no significant relationship between mathematics teachers' support by school authority and students' academic achievement in mathematics.

Table 6

Summary of Pearson Product Moment Correlation between mathematics teachers' support by school authority and students' academic achievement in mathematics.

Variables	N	$\bar{x}$	SD	r_{-cal}	p-value
SAA	351	54.91	12.47		
				0.42	0.01
MTSBSA	40	10.45	2.63		

Table 6 shows the Mean score of 54.91 with Standard Deviation of 12.47 for students' academic achievement and Mean score of 10.45 with standard deviation of 2.63 for mathematics teachers' support by school authority also r is 0.42. Therefore, the null hypothesis three (HO_3) was rejected because p-value of 0.01 is less than 0.05alpha level. Hence, there was moderately positive relationship between mathematics teachers' support by school authority and students' academic achievement in mathematics.

Discussion of Findings

First finding show that there was weak positive relationship between students' academic achievement and monthly remunerations of mathematics teachers. This supports the findings of Oko (2014) on the impact of teacher motivation on academic performance of students, who shows that teacher's low pay poses a very big hindrance in disposing their duties effectively and efficiently. This is in line with the study of Azaliwa and Casmir (2016) who revealed that provision of a reasonable salary to teachers have significantly contributed to motivating teachers which ultimately increased academic performance.

Second finding revealed that there was weak positive relationship between mathematics teachers' continuous professional and career development and students' academic achievement in mathematics. This finding is in agreement with work of Hewson *et al* (2014) who advocate that professional development should focus on knowledge of content, knowledge of students, and knowledge of instruction and assessment. However, the knowledge teachers are seeking when they choose to attend particular professional development are limited and demotivating.

Third finding shows that there was moderately positive relationship between mathematics teachers' support by school authority and students' academic achievement in mathematics. This supports the work of Deway (2013) that individual employees need is different and it therefore makes sense to relate the

benefit package to those needs by giving employees a menu of benefit to select from.

Conclusion

Based on the findings, the study concludes that;

Relationship between monthly remunerations of mathematics teachers and students' academic achievement in mathematics, this indicates a positive relationship between the variables. The fitted line shows that as monthly remunerations of mathematics teachers'increase, the students' academic achievement in mathematics also tends to increases. The mathematics teachers' continuous professional and career development and students' academic achievement show a positive relationship between the constructs. The trend line indicates that students' academic achievement increases as mathematics teachers' continuous professional and career development increased. Relationship between mathematics teachers' support by school authority and students' academic achievement in mathematics shows a positive relationship between the variables. The fitted line shows that as school authorities support mathematics teachers, students' academic achievement in mathematics increases.

Recommendations

This study recommends the following based on its findings of the study

1. Accommodation needs to be provided to the mathematics teachers to enable them live near schools since many of them living far away from their schools.
2. The study also recommended that the society and parents should be involved in the student's development. Students' academic achievement cannot be enhanced unless parents and society in general gets involved in a student's development goes hand in hand with teachers' perception which is motivating them toward enhancing good student academic achievement.
3. Mathematics Teachers should be given Training continuously. Moreover, Mathematics Teachers need to be given in service training and professional development within their career in order to keep in touch with their subjects and to obtain continuous support for the improvement on their teaching methods toward better achievement of students academically this will directly create and enhance the relationship of their motivation and the good achievement of students.

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