



# Influence of Motivation on Pre-service Primary Teachers' Performance in Mathematics

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## Abstract

This study investigated the influence of motivation on primary pre-service teachers' performance in mathematics at Emmanuel Alayande College of Education, Oyo, Oyo State. The study employed a correlational survey research design. Seventy (70) primary pre-service teachers who were randomly selected were involved in the study. Two research questions were raised in the study. A structured questionnaire, tagged "Motivation in Learning Mathematics Questionnaire" (MLMQ), was the main instrument used for data collection with a reliability coefficient of 0.81. Data generated were analyzed using inferential statistics of Pearson Product moment correlation coefficient. The findings revealed that intrinsic motivation has an influence on primary pre-service teachers' performance in Mathematics, as it is reflected in the performance of primary pre-service teachers ( $r = 0.81$ ,  $p = 0.001$ ), and there is also a significant relationship between extrinsic motivation and primary pre-service teachers' performance in mathematics ( $r = 0.82$ ,  $p = 0.001$ ). Based on the findings, it was recommended that teachers should employ strategies to involve students in academic activities that improve their motivation and consequently their grades in mathematics, and school management should put in place some external motivation mechanisms.

**Keywords:** Motivation, Intrinsic motivation, Extrinsic motivation, Pre-service teachers, Mathematics.

## Introduction

The teaching and learning of mathematics have been facing a lot of challenges, with students' poor performance at the top of the list. Several attempts have been made globally to alleviate these problems. Among the factors that have been shown empirically to improve students' performance in mathematics is the motivation to learn the subject, and effectively motivating students is one of the keys to improving student achievement. Motivation stands out as one of the critical factors that should be examined in human performance (Hafizul, Che, Mohd, and Khairulnauar, 2017).

Motivation, as one of the factors that influence academic performance, is the student's individual psychological characteristics and conditions. Motivation can be said to be a response to an action; that is, the goal which exists as part of one's goal structures, one's beliefs about what is important, and it determines whether or not one will engage in a given pursuit. Motivation arises from within humans, and it refers to students' willingness, need, desire, and compulsion to participate in and be successful in the learning process.

According to Fuqoha and Budiyo (2018), students' motivation comes when they work to gain experience from it. The existence of good motivation in learning will yield good results, while low learning motivation can hinder learning achievement, especially in mathematics. Motivation for learning is the effort a person puts in because of the learning objectives that concern a matter of necessity: the need to do something to learn, the need to achieve results after learning, and the need to overcome learning difficulties. Motivation for learning will manifest when learning is already considered a requirement.

Academic motivation in students is a primary factor in achieving a good level of academic performance (Gbollie and Keamu, 2017); (Gutiérrez and Tomás, 2018). Eggleton (2017) describes the importance of success as a motivational tool for students to persist in the face of cognitive obstacles and difficulties in mathematics. An individual who shows greater effort is considered to be motivated, while one who is motivated will also show greater effort. Ryan and Deci (2020) distinguished three forms of motivation based on the degree to which they can be considered self-determined, as follows:

(a) Intrinsic motivation: Intrinsic motivation to learn mathematics focuses on activities resulting from self-satisfaction rather than external incentives. Factors that are intrinsic are either rooted in the student herself or in the nature of mathematics. It is based on autonomy and competence and describes a situation in which one participates out of inherent interest and the satisfaction it generates. For instance, a student enjoys learning mathematics because of the satisfaction gained when mastering new concepts or because of the inherent interest and joy associated with learning. Activities such as playing and exploration exemplify intrinsically motivated behaviors since they do not depend on incentives or external pressures but rather provide their own satisfaction and joy.

(b) Extrinsic motivation focuses on external incentives to take an action. These are external rewards for a well-

implemented task. In terms of students' learning, extrinsic motivation, related to the person and the mathematical concepts, may arise from course grades, career aspirations, connections to other disciplines, and parental characteristics or promises. Extrinsic motivation is associated with the expected benefits of an action rather than enthusiasm. Individuals are committed to achieving some objective that is separate from the activity itself. It refers to behaviors performed for reasons other than their inherent satisfaction; for example, a person who wants to learn mathematics because they consider it useful for their professional life or to continue with the course that follows in the curriculum.

(c) Demotivation: It refers to what an individual feels, neither intrinsically nor extrinsically motivated to carry out an activity. It is pertinent to mention that it is impersonal and represents a lack of perceived competence and relevance, which causes generalized and long-term negative learning results.

The study by Yusuf and Barattucci (2021) submitted that motivation for learning mathematics is an essential factor in predicting performance. Students who are intrinsically or extrinsically motivated to learn mathematics generally demonstrate higher performance than others who are not motivated (Murayama, Pekrun, Lichtenfeld, and Vom Hofe, 2013). In the realm of mathematics learning, students with high motivation are generally assumed to outperform others with less motivation (Singh, Granville, and Dika, 2002). Therefore, students' motivation affects their learning processes and outcomes (Barattucci, Pagliaro, Cafagna, and Bosetto, 2017).

The relationship between motivation and academic performance of students cannot be underestimated. Researchers have closely studied issues related to motivation and mathematics learning. Studies have found that academic motivation is correlated with academic performance, and individual opinions on the matter differ. For instance, there are studies that obtained a positive association between academic motivation and educational attainment, such as Javed and Asghar (2017); Mercader, Miranda, Siegenthaler, and Rosel (2017); Subinas and Berciano (2019). Clark, Middleton, Nguyen, and Zwick (2014) did not find a correlation between internal motivation and students' academic performance. Specifically, in the subject of mathematics, there were also studies that analyzed the correlation between motivation and academic performance of students. Yarhands, Dogbe, and Asiedu-Addo (2022) found that among the university students sampled for the study, it was ascertained that mathematics learning motivation had a significant effect on the performance in mathematics of the first-year students. Habók et al. (2020) looked at the effect of motivation on performance in mathematics among grades 6 and 8 pupils, of which results indicated a significant positive effect. Bringula et al. (2017) also looked at the effects of mathematics learning motivation on students' mathematics performance of grade 7 students. They found out that feedback and motivation significantly predicted mathematics performance of these students. Froiland and Davison (2016) identified parent and student perceptions and motivation as determinants of performance in mathematics. Froiland and Davison (2016) conducted a longitudinal study on the effect of motivation and mathematics course-taking on high school performance in mathematics, among other things. They concluded that mathematics intrinsic motivation in 9th grade significantly influenced student performance in mathematics in 11th grade. Motivation contributes significantly not only to learning outcomes of secondary school students but also across childhood learning through adolescence (Tella, 2007). Anwar, Ivan, Jorge, Abad, Rafael, Sul, and Ferm (2022) discovered that the link between intrinsic motivation and academic performance is significant and positive.

Li et al. (2020) found that motivation, peer relationships, and self-efficacy are contributing factors to performance in mathematics. In the study of Prast et al. (2018), perceived competence was the only motivational variable found to influence high achievement in mathematics. Pitsia et al. (2017) also identified instrumental motivation, self-efficacy, anxiety, and attitudes towards mathematics as determinants of performance in mathematics. Gvendir (2016) confirmed that intrinsic motivation has a stronger relationship with academic performance. Abah, Ogugua, and Okoh (2022) highlighted in their study that a poor family environment generates in students the need to excel, thus creating internal motivation that drives them to learn and understand the importance of mathematics education, which leads to better academic performance. Clark et al. (2014) found that extrinsic motivation presented a slightly weaker relationship with academic performance in mathematics compared to intrinsic motivation.

Steinmayr, Weidinger, Schwinger, and Spinath (2019) found a significant and positive correlation between both types of motivation (intrinsic and extrinsic) and academic achievement. Bringula et al. (2017) found that motivation and the nature of feedback from mobile-assisted learning applications were significant determinants of performance in mathematics. Garca et al. (2016) found that affective-motivational variables distinguished between high and low performance in mathematics. Motivation, emotional support, and self-efficacy were also identified by Skaalvik et al. (2015) as determinants of performance in mathematics.

Despite the influence of motivation to learn on students' achievement in mathematics, assessments of past studies point out that motivation is the force that drives students to specific behaviors to achieve their academic goals. Therefore, this study identified factors that motivate students to learn mathematics and to persist when confronted with difficult mathematical concepts.

## Statement of the Problem

Mathematics is the bedrock of science and technology. Without its knowledge and application, society will suffer, but its wide applicability will bring development to the society. In spite of the importance of mathematics in national development, students' performance in this subject is not encouraging, as reported by examiners. Various attempts have been made to address the problem of failure in performance in mathematics among primary pre-service teachers, and several factors have been suggested to be responsible for this trend. There is a need to direct research work in mathematics education towards finding solutions to the factors responsible for students' failure in the subject. Much attention has not been placed on comparing motivation and achievement among primary pre-service teacher mathematics. This study, therefore, investigates the influence of motivation on the learning of mathematics among primary pre-service teachers.

## Research Questions

The following research questions were raised and tested in the study at the 0.05 level of significance:

1. What is the relationship between intrinsic motivation and mathematics performance?

## 2. What is the relationship between extrinsic motivation and mathematics performance?

### Methodology

The study employed a correlational survey research design. The population is the entire primary pre-service teachers at Emmanuel Alayande College of Education, Oyo. The sample, purposively selected, consisted of seventy (70) primary pre-service teachers from Emmanuel Alayande College of Education, Oyo. The questionnaire consisted of two sections. Section A measured the demographic characteristics of respondents. Section B consisted of items that measured respondents' attitudes towards motivation, rated on a four-point scale ranging from strongly agree, agree, disagree, and strongly disagree. Respondents were requested to tick the options that corresponded to their level of agreement with the statements. Data collected were analyzed using descriptive statistics and inferential statistics, specifically the Pearson Product Moment Correlation coefficient. The instrument was trial-tested on respondents other than the sample used. The reliability of the items was estimated using the Cronbach alpha technique to test the internal consistencies of the items, which gave an alpha of 0.81.

### Results

#### Research Question 1

What is the relationship between intrinsic motivation and mathematics performance?

**Table 1.** Pearson Product Moment Correlation of Intrinsic Motivation and performance in Mathematics of primary pre-service teachers.

	Intrinsic Motivation	Performance
Intrinsic Motivation	Pearson Correlation	1
	Sig. (2-tailed)	
	N	70
Performance	Pearson Correlation	.814
	Sig. (2-tailed)	.001
	N	70

Table 1 shows that the correlation between intrinsic motivation and performance in Mathematics gave a Pearson Correlation Coefficient ( $r$ ) value of 0.814, indicating a strong positive association between the two variables. Also, the  $p$ -value of the association was 0.001, indicating a highly correlated result. Therefore, there was a strong positive association between intrinsic motivation and performance in Mathematics of primary pre-service teachers ( $r = 0.814$ ,  $p = 0.001$ ).

## Research Question 2

What is the relationship between extrinsic motivation and mathematics performance?

<b>Table 2.</b> Pearson Product Moment Correlation of Extrinsic Motivation and performance in Mathematics of primary pre-service teachers		
	<b>Extrinsic Motivation</b>	<b>Performance</b>
Extrinsic Motivation	Pearson Correlation	1
	Sig. (2-tailed)	
	N	70
Performance	Pearson Correlation	.821
	Sig. (2-tailed)	.001
	N	70

Table 2 shows that the correlation between extrinsic motivation and performance in Mathematics gave a Pearson Correlation Coefficient ( $r$ ) value of 0.821, indicating a strong positive correlation between the two variables. Also, the  $p$ -value of the association was 0.001, indicating a highly correlated result. Therefore, there was a strong positive association between extrinsic motivation and performance in Mathematics of primary pre-service teachers ( $r = 0.821$ ,  $p = 0.001$ ).

## Discussion of Results

The findings in this study revealed that a strong positive association exists between intrinsic motivation and performance in Mathematics of primary pre-service teachers. In Table 1, the correlation coefficient is 0.814, which shows a high positive correlation between intrinsic motivation and performance in mathematics. The findings corroborate the study of Anwar et al. (2022), who discovered that the link between intrinsic motivation and academic performance is significant and positive. Also, the result is in line with that obtained by Güvendir (2016), who confirmed that intrinsic motivation has a stronger relationship with academic performance. Abah et al. (2022), for instance, highlighted in their study that a poor family environment generates in students the need to excel, thus creating an internal motivation that drives them to learn and understand the importance of mathematics education, which leads to better academic performance. Students should be allowed to engage in activities of playing and exploration to allow them to exemplify intrinsically motivated behaviors since they do not depend on incentives or external pressures but rather provide their own satisfaction and joys.

The study also indicates a strong positive correlation between extrinsic motivation and performance in mathematics. This is in agreement with the study of Clark et al. (2014), who found that extrinsic motivation presented a slightly weaker relationship with academic performance in mathematics compared to intrinsic motivation. Steinmayr, Weidinger, Schwinger, and Spinath (2019) found a significant and positive correlation between both types of motivation (intrinsic and

extrinsic) and academic achievement. Froiland and Davison (2016) conducted a longitudinal study on the effect of motivation and mathematics course-taking on high school performance in mathematics, among other things. They concluded that mathematics intrinsic motivation in 9th grade significantly influenced student performance in mathematics in 11th grade. Extrinsic motivation has been described as something that pertains to a wide variety of behaviors where the goals of action extend beyond those inherent in the activity itself.

## Conclusion

The study investigated the relationship between factors of motivation (intrinsic and extrinsic) and primary pre-service teachers' performance in mathematics. It was concluded that intrinsic motivation has a relationship with the performance in Mathematics of primary pre-service teachers. It also shows that extrinsic motivation influences performance in mathematics. There is also a significant and positive correlation between both types of motivation (intrinsic and extrinsic) and academic achievement. Based on the results of the analysis, the researcher concluded that primary pre-service teachers had motivation to study mathematics. So, as a conclusion, it can be said that there is a logical connection between intrinsic and extrinsic motivation and mathematics performance.

## Recommendation

Based on the findings, the following recommendations were put forward:

- Stakeholders should help the students to connect with their purpose of being in school so that they feel motivated by what they are doing.
- Management should also create the needed environment for learning and should also put in place some external motivation mechanisms, such as teacher feedback, positive attitude towards student errors, and caring teacher behavior.
- Government should invest more in monitoring students' motivation in learning mathematics in order to manage teaching methods, course approaches to learning, attitudes toward mathematics, and improve achievement.
- Teachers should take the necessary measures and provide simulation, make students use what they have previously learned, use simulation, minimize the attractiveness of competing motivational systems, and minimize any unpleasant consequences of student involvement to increase students' motivation.
- Teachers should employ strategies to involve students in academic activities that improve their motivation and, consequently, their grades in mathematics.
- Teachers should reserve part of the class time to conduct activities that would develop enthusiasm in mathematics, thus enhancing students' motivation in learning mathematics.

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