



The Relationship Between Emotional Intelligence and Mathematics Performance of Preservice Teachers in Minna, Niger State

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Abstract

This study aims to assess the relationship between emotional intelligence and mathematics performance among preservice teachers in Minna, Niger State. The study used a correlation survey design and included 150 participants who were studying for the Nigeria Certificate in Education (NCE). Two instruments, EIMQ and MAT, were developed by the researchers to collect data. The instruments were validated by experts and found to be reliable with an internal consistency of $r = 0.76$ and 0.85 , respectively. Descriptive statistics were used to answer the research questions, and the null hypothesis was analyzed using Pearson Product Moment Correlation (PPMC) at $\alpha = 0.005$ level of significance. The findings show that a significant relationship exists between emotional intelligence and mathematics performance as $r = 0.877$. Recommendations include educating preservice teachers on emotional intelligence, guiding and supporting learners to develop emotional intelligence, and incorporating emotional skills in the mathematics curriculum.

Keywords: Relationship, Emotional Intelligence, Mathematics Performance, Preservice Teachers

Introduction

The study of mathematics in Nigerian schools gives rise to competent individuals who possess exceptional skills in the application of mathematical knowledge to solve human problems. It is a core subject that encompasses logical development, comprising undefined terms and principles of logical conclusions that ensue from hypotheses (Ameen, 2018). Mathematics represents the study of indispensable knowledge required for cultivating a technologically proficient workforce that aligns with the developmental needs of the nation. Mathematics is described as a catalyst for other subjects, and consequently, it assumes a paramount role in the development of science, technology, culture, policies, and the economy (Adeniji, 2014). Mathematics remains the foundation of scientific and engineering courses, serving as essential knowledge that paves the way for successful learning in the fields of science, technology, and social sciences.

Notwithstanding its significance in addressing human and national needs, the inadequate performance of preservice teachers in mathematics courses during semester examinations has become a pressing concern for lecturers, college communities, and the wider public (Kayode & Lukman, 2021). They have reported that the poor performance of preservice teachers can be attributed to various factors, including interest, attitude, creativity, self-concept, tension, mathematics anxiety, gender, age, emotional intelligence, and other influences. Emotion and mood are occasionally used interchangeably, although emotion refers to a subjective state in which an individual expresses their feelings. Some scholars define emotion as changes in human behaviour, representing a subjective and intense affective state that arises in response to a personal experience. Emotion is considered to be a conscious and intentional phenomenon (Samson et al., 2021). Psychologists classify emotions as love, hate, fear, anxiety, joy, happiness, sorrow, fear, worry, and other states, as described in (Mohammed, 2017). Intelligence encompasses higher-level abilities such as abstract reasoning, mental representation, problem-solving, and decision-making, with the purpose of effectively and efficiently meeting societal needs. It can also be seen as a mental capacity that requires adaptation,

direction, and selection within various environmental contexts. Broadly speaking, mental capability includes the ability to think logically, plan effectively, engage in abstract thinking, learn quickly, and derive understanding from experience. According to certain psychologists and theories of intelligence, intelligence can be categorized into two types: crystallized and fluid intelligence. Crystallized intelligence pertains to the acquisition of knowledge and the retrieval of information as needed.

The concept of intelligence encompasses both crystallized and fluid intelligence. Crystallized intelligence involves the acquisition and application of knowledge, as well as the ability to remember and recall information. It is associated with learning and utilizing existing skills and expertise. On the other hand, fluid intelligence is characterized by the capacity to solve complex problems and perceive abstract relationships. It enables individuals to adapt to new situations, think creatively, and tackle novel challenges. In addition to these traditional views of intelligence, the Triarchic theory introduces three components: practical, creative, and analytical intelligence. Practical intelligence refers to the ability to apply knowledge and skills in real-life situations, utilizing experience-based knowledge to solve practical problems. Creative intelligence involves generating innovative ideas, thinking outside the box, and coming up with unique solutions. Analytical intelligence, similar to traditional notions of intelligence, focuses on logical reasoning, problem-solving, and analytical thinking. While emotional intelligence has been a topic of interest for a long time, the publication of Goleman's influential book on the subject in 1995 brought it into the mainstream. However, there is a proliferation of definitions and theories surrounding emotional intelligence, leading to some confusion within academia. This study aims to contribute to clarifying and addressing this issue.

Emotional Intelligence (EI) has emerged as a prominent concept in the field of positive psychology and research, demonstrating its association with academic performance. It has found potential applications in education and human resource management, including fostering collaborative work and cultivating positive relationships with others (Mohammed, 2017). Additionally, EI plays a role in promoting teamwork and positive relationships in politics, influencing decision-making, behaviour, and family dynamics. Emotional Intelligence refers to the capacity to generate positive outcomes and cultivate positive thinking, leading to happiness, quality relationships, and success in various domains of life, including school and other human activities. It involves being aware of and effectively expressing one's own emotions, as well as understanding and empathizing with the emotions of others. This ability enables individuals to differentiate between different emotions, label them appropriately, and utilize emotional information to guide their thinking and behaviour (Samson et al., 2021). Emotional experiences can range from pleasurable to unpleasurable, and they can vary in intensity. While everyone experiences emotions, not everyone possesses the cognitive ability to conceptualize their own emotional experiences or those of others. Emotional intelligence encompasses the ability to reason about emotions, enhancing one's thinking abilities. This includes accurately perceiving emotions, generating and managing emotions to facilitate thought, understanding emotions and emotional knowledge, and reflectively regulating emotions to foster intellectual growth (Obilor & Uchendu, 2020).

Mohammed (2017) suggests that individuals with higher emotional intelligence are better able to integrate emotional experiences into their thoughts and actions. They possess the ability to use emotions to aid their thinking and guide their actions, particularly about feeling capable and effective when approaching task-related activities. When learners have a strong foundation of knowledge and higher intelligence, they find it easier to understand, assimilate, and retain learning materials. Conversely, learners with average intelligence may experience slower learning and have lower retention abilities (Maciver & Kebbi, 2018). Numerous research studies have emphasized the significant role of emotional intelligence in academic performance and mental well-being. Kayode and Lukman (2021) have reported a significant relationship between emotional intelligence and academic performance. Moreover, recent research has highlighted the importance of intrapsychic factors, such as emotional management, in effectively coping with stress. These findings indicate that emotional intelligence plays a crucial role in academic tasks, serving as a predictor of academic performance and mental outcomes. The ability to understand and manage emotions is essential for effective learning, stress management, and overall well-being in educational settings.

Goleman (1995) pioneered the first theory of Emotional Intelligence (EI) in his book, emphasizing that EI comprises a collection of skills and competencies centred around five key components: self-awareness, self-regulation,

motivation, empathy, and social skills (Odukoya et al., 2020). These components serve as defining elements of emotional intelligence and hold immense significance, particularly in examining its wide range of practical applications, including its impact on academic achievement, especially in the field of mathematics. Self-awareness refers to an individual's capacity to introspect and recognize their thoughts and emotions, as well as their distinct identity separate from others and society at large. In the context of education, when students possess a high level of self-awareness, they can understand their emotional state, recognize their strengths and weaknesses, and utilize this awareness to enhance their academic performance. By acknowledging their areas of improvement, students can work on addressing their weaknesses, ultimately leading to improved outcomes in their academic tasks (Ferris, 2012). Self-awareness serves as a valuable tool for students, empowering them to take ownership of their learning and make informed decisions to optimize their educational experience. Self-regulation is the ability to control emotions and impulses, and express them appropriately. It involves managing unexpected or disruptive emotions. Learners who can self-regulate remain calm, think before acting and achieve better academic performance, including in mathematics (Obilor & Uchendu, 2020). Motivation is the internal drive that propels external actions. It determines an individual's direction and inclination towards certain behaviours, serving as a force behind their motives. Highly motivated learners demonstrate a willingness to delay immediate gratification for long-term success. They are productive, effective, and embrace challenges. Motivated learners tend to outperform those with low motivation academically. Their strong motivation fuels their focus on set goals and acts as a powerful driving force to achieve more. They also exhibit optimism, even in the face of unexpected challenges (Odukoya et al., 2020).

Empathy is the ability to respond to others based on their emotions, showing concern and understanding. It involves identifying with and comprehending the needs and viewpoints of others. Students with high empathy have positive academic motivation and perform better in tasks. Social skills are a key aspect of emotional intelligence that facilitates interaction and communication with others, encompassing both verbal and non-verbal modes of communication where social rules and relationships are established and maintained. These skills include active learning, effective verbal and non-verbal communication, and the ability to persuade others. Social intelligence skills are closely related to academic achievement, as low academic performance can be linked to social difficulties and emotional challenges faced by students, particularly in terms of utilizing social skills to seek support from teachers. Students who struggle to master social skills and establish positive relationships with their peers, often displaying inappropriate behaviour in their interactions, tend to experience poor academic outcomes. Social skills play a crucial role in fostering group dynamics, creating positive changes in the learning environment, and setting goals. They also facilitate interactions among learners from diverse backgrounds through improved communication. As one of the components of emotional intelligence, social skills contribute to academic success in mathematics and other subjects.

According to Kayode and Lukman (2021), emotional intelligence plays a significant role in interpersonal and intrapersonal relationships within various contexts such as home, school, and work. They emphasize that individuals with high emotional intelligence tend to progress more rapidly in acquiring and mastering structured abilities. Additionally, extensive research suggests that emotional intelligence is a predictor of academic performance and other cognitive outcomes (Maciver & Kebbi, 2018). Given its importance, emotional intelligence serves as a precursor to academic achievement and psychological well-being in an educational setting. In light of these findings, the researchers aim to investigate the relationship between emotional intelligence and the mathematics performance of preservice teachers. Academic performance, also known as academic achievement, refers to the level of success attained by a learner, instructor, or educational institution in meeting their educational goals, whether short-term or long-term. It is typically evaluated through examinations or continuous assessment methods. Academic achievement reflects the outcomes that demonstrate the extent to which an individual has accomplished specific objectives within the classroom, school, college, or university setting. Educational institutions commonly establish cognitive goals that apply across various disciplines or pertain to the acquisition of knowledge and understanding within a specific intellectual domain. Mathematics performance specifically refers to how well students are able to demonstrate their competence in mathematical tasks following classroom instruction. It assesses students' abilities in relation to a given mathematics curriculum, typically through testing and written responses to test items. Grades are then awarded as a measure of their performance in these abilities. Mathematics Performance is seen as displaying knowledge attained in mathematics subjects as shown in the test score. Ameen (2018) and Samson et al. (2021)

submitted that some factors are responsible for the unhealthy environments in schools or colleges, may include; individual study habits, self-regulation, self-control, delay of gratification, and impulse control.

Promoting healthy emotional intelligence and higher academic performance among preservice teachers is a priority for educational institutions. When preservice teachers focus on developing their emotional intelligence, they engage in self-reflection and may reassess their self-perception. This introspection can lead to a sense of dissatisfaction with themselves, prompting personal growth and a desire to improve. This has motivated the researchers to undertake a study to determine the relationship between emotional intelligence and mathematics performance among preservice teachers in Minna, Niger State.

Aim and Objectives of the Study

The study investigated the relationship between emotional intelligence and mathematics performance of preservice teachers in Minna, Niger State. Specifically, the objectives of the study are to:

1. determine how might we describe the emotional intelligence of pre-service mathematics teachers.
2. examine the relationship between emotional intelligence and mathematics performance of preservice teachers.

Research Questions

1. How might we describe the emotional intelligence of pre-service mathematics teachers?
2. What is the relationship between emotional intelligence and the mathematics performance of preservice teachers?

Hypothesis

H₀₁: there is no significant relationship between emotional intelligence and the mathematics performance of preservice teachers.

Methodology

This study employed a correlation survey design to investigate the relationship between emotional intelligence and mathematics performance. The target population consisted of all 256 N.C.E (Nigerian Certificate in Education) students across the seven subject combinations involving mathematics, namely Biology, Computer Science, Chemistry, Economics, Integrated Science, Geography, and Physics, at Niger State College of Education, Minna. A sample size of 150 students, comprising 85 males and 65 females, was selected using a simple random sampling technique. The selected sample aimed to represent the larger population and provide insights into the correlation between emotional intelligence and mathematics performance among N.C.E students across various subject combinations. Two instruments were utilized to collect data for this study: the Emotional Intelligence Mathematics Questionnaire (EIMQ) and the Mathematics Achievement Test (MAT). The EIMQ, developed by the researchers, comprises 20 items presented on a five-point Likert-type scale. Participants were asked to rate the extent to which each statement reflects their personal feelings using the numbers 1, 2, 3, 4, and 5. A rating of 5 indicates a high level of agreement or truthfulness, 4 represents a moderate level, 3 signifies a neutral or occasional level, 2 implies a slight or infrequent level, and 1 indicates a low or nonexistent level of agreement or truthfulness. The EIMQ consists of two sections: Section A includes introductory information and biodata, while Section B contains the statement items. A mean score of 3.00 and above is considered to indicate a high extent of agreement, while any mean score below 3.00 is regarded as a low extent of agreement. The Mathematics Achievement Test (MAT) was another instrument used in this study, although specific details about the test are not provided in the given information.

The study utilized the Emotional Intelligence Mathematics Questionnaire (EIMQ) and the Mathematics Achievement Test (MAT) to collect data on preservice teachers' emotional intelligence and academic performance in mathematics, respectively. The instruments were subjected to validation by experts in the relevant fields, resulting in modifications to ensure their validity. Reliability tests using Pearson's product-moment correlation analysis yielded satisfactory coefficients of 0.76 for the EIMQ and 0.85 for the MAT, indicating internal consistency. Descriptive statistics, such as mean and standard deviation, were employed to analyze the collected data, while Pearson's product-moment correlation was used to examine the relationships between variables. The null hypothesis was tested at a significance level of 0.05 to determine the presence of significant associations.

Results

Research Question 1: How might we describe the emotional intelligence of pre-service mathematics teachers?

To answer this research question, the data collected were analyzed using descriptive statistics: mean scores, standard deviations, and decisions.

Table 1: Mean and Standard Deviation on Description of Emotional Intelligence of Preservice Mathematics Teacher

| S/N | Statement | Mean | SD | Decision |
|-----------------------------------|--|-------------|-------------|----------|
| 1 | My emotions are well understood and do not hinder my performance in mathematics. | 3.99 | 1.03 | * |
| 2 | I am always bold and confident, never doubtful, while learning mathematics. | 3.01 | 1.09 | * |
| 3 | I am competent in understanding mathematical concepts. | 3.71 | 1.01 | * |
| 4 | I am confident enough to succeed in learning and solving mathematics problems. | 3.20 | 0.64 | * |
| 5 | In terms of quantity, I have the ability to calculate and compute in mathematics. | 3.22 | 0.78 | * |
| 6 | I avoid stress and regulate myself when solving mathematics in class. | 3.33 | 0.71 | * |
| 7 | I do not slack off before a mathematics test. | 3.42 | 0.89 | * |
| 8 | I always achieved good academic success in mathematics. | 3.15 | 0.82 | * |
| 9 | I spend more time when encountering difficulties in computation. | 3.1 | 0.88 | * |
| 10 | I am willing to defer immediate results for long-term success in mathematics. | 3.04 | 0.85 | * |
| 11 | I clearly articulate my goals in a mathematics classroom. | 3.19 | 0.64 | * |
| 12 | I have a strong belief in my mathematical ability to accomplish any mathematics task. | 3.67 | 0.52 | * |
| 13 | I am happy, peaceful, productive, and positive towards computations. | 3.19 | 0.64 | * |
| 14 | I enjoy studying mathematics in a cooperative and collaborative learning environment. | 3.37 | 0.62 | * |
| 15 | I respond to others' feelings and help solve their mathematical problems. | 3.14 | 0.82 | * |
| 16 | Empathetic understanding influences my performance. | 3.05 | 0.93 | * |
| 17 | I can communicate very well, which enables me to correct others during class instruction. | 3.01 | 0.90 | * |
| 18 | Social skills give me the opportunity to develop good relationships and perform successfully in mathematics. | 3.15 | 0.93 | * |
| 19 | I can sense and intuitively understand how to organize mathematical concepts. | 3.15 | 0.93 | * |
| 20 | Group work is very interesting to me. | 3.15 | 0.84 | * |
| Grand Total & Decision | | 3.26 | 0.78 | * |

Key: High Extent = *

Table 1 presents the results of a questionnaire consisting of twenty statements that aimed to assess the perception of emotional intelligence among pre-service mathematics teachers. The mean scores for all the items were found to be higher than the benchmark point of 3.00. This indicates that, overall, pre-service teachers agree that emotional intelligence is present and holds a significant impact on their academic performance in mathematics. Furthermore, Table 1 reveals that pre-service teachers obtained a grand mean score of 3.26 with a standard deviation of 0.78. These statistics suggest that emotional intelligence has a substantial influence on the mathematics performance of pre-service teachers, as evidenced by the relatively high mean score and the moderate dispersion of scores indicated by the standard deviation.

Research Question 2: What is the relationship between emotional intelligence and mathematics performance of preservice teachers?

H0₁: There is no significant relationship between emotional intelligence and the mathematics performance of preservice teachers.

Table 2 shows the answer to the research question and also the results of hypothesis testing.

Table 2: Pearson Product Correlation between Academic Performance and Emotional Intelligence

| Variables | N | Mean | SD | df | r | p-value | Remark |
|-------------------------|-----|-------|-------|-----|-------|---------|-------------|
| Mathematics Performance | 150 | 51.91 | 14.16 | 298 | 0.877 | 0.000 | Significant |
| Emotional Intelligence | 150 | 51.48 | 14.30 | | | | |

To address the research question, a comparison of the mean and standard deviation of mathematics performance and emotional intelligence was conducted. The detailed results can be found in Table 2. Moreover, inferential statistics were employed to confirm the strength of the relationship between the two variables, using a significance level of 0.5. The correlation between mathematics performance and emotional intelligence was examined, and the results indicated a significant relationship with an r-value of 0.877. Consequently, the null hypothesis was rejected, further supporting the existence of a meaningful association between mathematics performance and emotional intelligence.

Discussion

The study results provide evidence supporting a significant relationship between emotional intelligence and mathematics performance. The correlation index value of $r = 0.877$ suggests that emotional intelligence is a strong predictor of preservice teachers' academic performance in mathematics. The findings indicate a direct relationship between the two variables, indicating that higher emotional intelligence is associated with better academic performance, and vice versa. These results align with previous studies conducted by Mohammed (2017) and Samson et al. (2021), which also highlighted the dynamic nature of high emotional intelligence profiles and their growth potential. The researchers emphasized that high levels of emotional intelligence provide a solid foundation of knowledge that facilitates understanding, assimilation, and recall of learning content. In contrast, students with average intellectual abilities may experience slower learning and recall of information. The findings of this study indicate that emotional intelligence serves as a strong predictor of students' academic performance, consistent with the research conducted by (Maciver & Kebbi, 2018).

Conclusion

This study concludes that preservice teachers with high emotional intelligence demonstrate better academic performance. The findings emphasize the significance of comprehensive training in emotional skills, including self-awareness, self-regulation, empathy, social skills, and motivation. Such training can effectively enhance the development of emotional skills among preservice teachers in colleges of education. The benefits extend not only to the teachers themselves but also to the lecturers and other stakeholders in educational institutions. Providing this training is crucial as it can significantly improve academic performance, particularly in subjects like mathematics.

Recommendations

- i. Preservice teachers should understand and recognize their emotions and those of others.
- ii. Support from guidance counsellors, lecturers, and parents is important for enhancing preservice teachers' emotional intelligence, leading to improved academic performance, particularly in subjects like mathematics.
- iii. The school curriculum should emphasize the teaching of emotional skills to foster the development of emotional intelligence among students, including preservice teachers.

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