



ACADEMIC HARDINESS AS PREDICTOR OF PRE-SERVICE PRIMARY SCHOOL TEACHERS' LEARNING OUTCOMES IN MATHEMATICS IN SOUTH-WEST NIGERIA

BY

Mary Adejoke JESUTOKI Ph.D

Department of Primary and Early Childhood Education
Emmanuel Alayande University of Education, Oyo
adediranjoke@gmail.com | (+234) 806 644 5711

&

Prof. Mojeed Kolawole AKINSOLA

Department of Science and Technology Education,
University of Ibadan
(+234) 803 405 3352

Abstract

The study examined the relationship between academic hardiness and pre-service primary school teachers' achievement and interest in Mathematics in South-West Nigeria. The study was a survey research and the sample comprised of 234 pre-service primary school teachers. The instrument used for data collection was a questionnaire titled "Academic Hardiness Scale (AHS)" with a reliability coefficient of 0.91. Two research questions were raised and answered in this study. Data collected were analysed using Pearson's product moment correlation (PPMC). The result of the findings revealed that the relationship between academic hardiness and pre-service primary school teachers' achievement in Mathematics was not significant while academic hardiness has significant relationship with interest in Mathematics. Based on the findings, it was recommended that the primary school pre-service teachers should be encouraged to develop hardy attitude in the face of academic challenges and the school management should improve the academic hardiness of pre-service teachers in order to create more interest in Mathematics.

Keywords: Hardiness, Pre-service teacher, Mathematics, Learning Outcomes, Interest

Introduction

Mathematics is a discipline that has been gaining prominence in various areas, particularly scientific and technological development. It is relevant to fields of engineering, medicine, natural sciences and social sciences among others. Sengul and Dagistan (2018) demonstrated that mathematical concepts and abilities are indispensable for comprehending and elucidating scientific phenomena and models. Amao, Oladapo and Ajani (2020) has acknowledged that Mathematics is a fundamental analytical tool for a variety of theoretical postulates in various disciplines, particularly those that are scientific in nature. Cresswell and Speelman (2020) observed that the acquisition and mastery of Mathematics enhance the ability to weigh evidence with impartiality, as well as to engage in analytical and abstract thinking.

The subject provides students with the necessary skills to develop reasoning skills, consistency and accuracy, which are essential in all aspects of life. Matsayi, Adamu and Garba (2020) argue that students will be better prepared to navigate the evolving environment of our contemporary era of science and technology if they possess a solid

understanding of Mathematics. Therefore, the capacity to manage an increased amount of learning Mathematics enhances learners' prospects for social advancement.

While Mathematics equips students with the necessary skills to excel in a variety of disciplines, it is not only crucial for academic success but also for the efficient operation in daily life (Alenka, Janja, Gregor and Anja, 2020). Therefore, Mathematics is a prerequisite for pursuing higher education in the majority of professions, such as finance and programming (Yesuf, Kebede, Zewdu, and Gebru, 2023). The value of Mathematics is substantial and its applications are indispensable in all aspects of life (Acharya, 2017). Consequently, it is crucial that academic institutions prioritise and allocate sufficient attention to Mathematics education, beginning with primary school. This is due to the fact that Mathematics is a critical subject in primary schools and therefore, it is imperative that the teaching and learning of it be properly considered.

The primary school level of education is not only the foundation for subsequent levels of education; it is also considered the entryway to all higher levels of education, which are

necessary for the development of highly skilled professionals such as scientists, teachers and doctors, which are essential for the success of any nation, regardless of its size, wealth, or poverty (Ebolume, 2022). Intended to provide students with foundational literacy and numeracy abilities that are used in all subjects areas. The establishment of the cognitive, affective, and emotional development occurs during this stage of life (Owojori and Gbenga-Akanmu, 2021). The mathematical skills that pupils acquire in primary school are the foundational skills that underpin all higher-level Mathematics skills. They also contribute to the development of the concepts and reasoning strategies that are necessary for future learning (Phan, Trinh, Phuong, Cuong, Manh and Nguyen, 2021).

Given the significance of Mathematics education at the primary school level, it is imperative to allocate sufficient attention to the training of pre-service primary school teachers. This level of attentiveness result in personnel who are highly motivated and resourceful at the primary school level. The pre-service primary school teachers were expected to be prepared as generalists to work in primary schools by acquiring a basic understanding of all primary school subjects and the ability to effectively teach them. Therefore, pre-service primary school teachers education programmes should prioritize the development of teachers who could enhance the academic performance of their pupils. It is therefore imperative that teacher education programmes prioritize the improvement of pre-service primary school teachers' mathematical knowledge and abilities. Given that the quality of Mathematics education in primary schools is likely to be contingent upon the mathematical knowledge that the pre-service primary school teachers' obtained during pre-service training (Mapolelo and Akinsola, 2015). It is imperative to equip Nigeria College of Education students with the necessary knowledge and skills to effectively teach Mathematics in primary schools in order to enhance the quality of education in the field of primary school Mathematics (Kennedy and Odell, 2014). This is because the mathematical competencies of the pre-service primary school teachers are believed to be crucial in the process of identifying solutions to specific mathematical problems.

Despite the importance of Mathematics in schools for the social, economic, scientific, and technological advancement of a nation, students have encountered challenges in their achievement in this subject (Ayanwoye, Akinsola and Oyeniran, 2024 and Hughes,

2023). The weakness of pre-service primary school teachers in colleges of education training as generalists, as well as their absence of requisite skills and competence for teaching Mathematics has resulted in low achievement in Mathematics. Tonya, Lisa, Conoyer, Karyn and Lesley (2018) noted that pre-service primary school teachers have a limited comprehension of Mathematics and the necessary preparation to effectively teach it. Additionally, research has demonstrated that the performance of pre-service primary school teachers' in colleges of education was subpar in the field of Mathematics (Ji-won and MiYeon, 2021; Xinrong, Gabriele, Johannes and Sigrid 2020).

Furthermore, this investigation is equally concerned with the interest of pre-service primary school teachers in Mathematics. Owora and Chika (2019) defined interest as the desire to learn or understand a subject, person, or condition, as well as the inclination to become engrossed in an experience and to persist in it. According to Okeke, Egara, Orga, and Nzeadibe (2023), interest is the enthusiasm of students to focus on a subject from which they derive some enjoyment. A student who is interested in Mathematics may devote more time to the subject. According to Azmidar, Darhim and Dahlan (2017), students who demonstrate a strong interest in Mathematics are more inclined to engage actively in the learning process and exhibit a high level of curiosity. Consequently, it is imperative for educators to guarantee that students' interest for Mathematics is maintained, realizing that students' interest in Mathematics yields high academic performance and vice versa. According to Suhaizal, Ana, and Danakorn (2021), interest is a critical element in the teaching and learning process and has been identified as a factor associated with achievement in Mathematics.

Researchers in the field of Mathematics education have conducted a variety of studies to enhance the teaching and learning of Mathematics by investigating possible factors that influence the learning outcomes of students in Mathematics. For example, prior research has concentrated on student-related factors (Kumah and Wonu, 2022), school-related factors (Onderi, *et. al*, 2015), psychological factors (Fehintola and Oyama 2021; Amao, Oladapo and Ajani 2020). The factor selected in this study is of paramount significance, as it is likely to inform their future classroom practice in addition to the implications for the identified learning outcomes in Mathematics

Hardiness is the capacity to endure stressors and maintain a positive attitude in the face

of adversity. According to Lwin and Myo (2020), hardiness is the capacity to effortlessly adjust to unforeseen changes, as well as a sense of purpose in daily life and personal control over one's existence. Maddi (2013) posited that individuals who endure a high level of stress without developing illness possess a personality structure that distinguishes them from those who become sick as a result of stress. Academic hardiness is a personality trait that is indicative of students' capacity to cope with and respond to academic work that is taxing. The concept of academic hardiness is concerned with the students who maintain a relatively high level of health despite the significant amount of stressful academic labour they undergo. Students' responses to academic work, both personally and professionally, are indicative of academic hardiness. Students who exhibit high levels of academic hardiness are more likely to persevere in the face of adversity and accomplish their goals. Kamtsios and Bartone (2021) proposed that academic hardiness enables pre-service teachers to leverage their prior experiences to confront the challenges and obstacles they encounter in college, transforming them into opportunities for development, and to endure the stress that results from their studies. It is characterized by the tendency of pre-service teachers to be profoundly engaged, with a desire to learn from experience and a need to be in control, irrespective of the results.

Edgargo (2018) defines academic hardiness as the ability to cope with three indices, challenge, control, and commitment. A commitment is a demonstration of one's dedication to their task. Regardless of the level of stress, pre-service primary school teachers who are profoundly committed to and engaged in their studies decide to remain engaged rather than withdraw. Additionally, students who are adept at commitment, which is associated with academic discipline and diligent academic work, prioritize academics (Pratama, Ahman, Machmud, and Dahia, 2023). Control is the degree to which pre-service primary school teachers exert their influence on academic work to guarantee a positive outcome, regardless of the level of difficulty and tension involved. In an investigation of the correlation between Mathematics anxiety and performance in Mathematics, Zhang, Zhao and Kong (2019) discovered that academic hardiness was positively correlated with Mathematics achievement. Pratama, Ahman, Machmud and Dahia (2023) in their study 'academic hardiness, learning motivation, student learning outcomes in Indonesia' indicated that

students' performance was significantly influenced by their academic hardiness. Qian and Wenxiu (2023) examined influence of hardiness on academic achievement of university students. They found a robust correlation between the academic hardiness of university students and their academic success. Furthermore, Kamtsios and Bartone (2021) conducted a preliminary assessment of the psychometric properties of the "Hardiness-Resilience Gauge" on an undergraduate sample. The study's results indicate that academic hardiness, a personality trait, is associated with the academic performance of undergraduate and student populations.

Edgargo (2018) discovered in his research on Students' Motivational Beliefs, Values, and Goals as Related to Academic Hardiness: Implications for Mathematics Teaching and Learning that the identified motivational constructs and students' Academic Hardiness have a significant positive correlation. This highlights the respondents' interest in Mathematics and their recognition of the subject's significance in their preparation for lifelong learning. Kamtsios and Karagiannopoulou (2011) corroborates this assertion, asserting that students with academic hardiness possess personality traits that distinguish them from those who refrain from attempting difficult academic coursework. Learners who demonstrate a strong commitment to Mathematics can convert challenging learning scenarios into opportunities for development. In light of this, the primary objective of this study is to determine if academic hardiness predicts pre-service primary school teachers' achievement and interest in Mathematics.

Research Questions

1. What is the relationship between academic hardiness and pre-service primary school teachers' Achievement in Mathematics?
2. What is the relationship between academic hardiness and pre-service primary school teachers' Interest in Mathematics?

Methodology

The study adopted a descriptive survey research design. The population of the study comprised all 200 level pre-service primary school teachers in colleges of education in South-west Nigeria. The sample used for this study was two hundred and thirty four (234) pre-service primary school teachers using simple random sampling technique. The instrument used for data collection was the questionnaire titled

“Academic Hardiness Scale. The researchers personally administer the questionnaire to the students. Face and content validity of the instrument was ascertained by the experts while Cronbach Alpha used yielded a reliability coefficient 0.91. The data collected were analysed using the Pearson’s product moment correlation (PPMC).

Table 1: Relationship between Academic Hardiness and Pre-service Primary School Teachers Achievement in Mathematics

Variables	N	r	Sig	Remark
Academic Hardiness	234	-0.070	0.266	N. S.
Achievement in Mathematics	234			

N.S denotes not-significant at $p < 0.05$ level of significance

Table 1 indicates that the relationship between academic hardiness and pre-service primary school teachers achievement in Mathematics was negative, weak and not significant ($r = -0.070$; $p > 0.05$). This implies that academic hardiness is not related to pre-service primary school teachers achievement in Mathematics.

Table 2: Relationship between Academic Hardiness and Pre-service Primary School Teachers Interest in Mathematics

Variables	N	r	Sig	Remark
Academic Hardiness	234	0.242	0.000*	Sig.
Interest in Mathematics	234			

* denotes significant at $p < 0.05$

Table 2 indicates that the relationship between academic hardiness and pre-service primary school teachers interest in Mathematics was positive, not very weak and significant ($r = 0.242$; $p < 0.05$). This implies that as the academic hardiness of pre-service primary school teachers developed, there will be significant increase in their interest in Mathematics.

Discussion

The result indicated that academic hardiness had no significant relationship with achievement in Mathematics of pre-service primary school teachers. This means that academic hardiness changes do not reflect on the achievement in Mathematics. The findings of the study is consistence with Liao, Chen, Chang and Chan (2017) who found no relationship between academic hardiness and Mathematics achievement among middle school students in Taiwan. Also, Bansal and Pahwa (2015) found no relationship between academic hardiness and academic achievement of secondary school students in Chandigarh. On the contrary, it is not in line with the findings of Qian and Wenxiu (2023) who reported significant relationship between hardiness and academic achievement of university students. Pratama, Ahman,

Results

Research Question 1

What is the relationship between academic hardiness and pre-service primary school teachers’ Achievement in Mathematics?

Research Question 2

What is the relationship between academic hardiness and pre-service primary school teachers’ Interest in Mathematics?

Machmud and Dahia, (2023) found out that academic hardiness had a positive effect on student learning outcomes in Indonesia. Moreover, Kamtsios and Bartone (2021) study shows that academic hardiness is related with undergraduates’ performance. The findings indicated that the relationship between academic hardiness and interest in Mathematics is positive, not very weak and significant. This means that increasing academic hardiness would lead to a slight increase in interest in Mathematics. This finding is in agreement with Edgardo (2018) who found that students’ academic hardiness have significant positive correlation with interest in Mathematics. This acknowledge the importance of the subject in their preparation to life-long learning. Students who can influence their learning will be committed, arouse their interest, have competence in the subject, and also will be engaged and challenged in doing difficult mathematical tasks.

Conclusion

Pre-service primary school teachers possess academic hardiness. Academic hardiness contributed to interest in Mathematics. Also, the findings of the study enable the researcher to conclude that there is no

significant relationship between academic hardiness and pre-service primary school teachers achievement in Mathematics.

Recommendations

1. Pre-service primary school teachers should be encouraged to develop hardy attitude in the face of academic challenges.
2. The school management should help to improve the academic hardiness of pre-service primary school teachers in order to create their interest in Mathematics.
3. Stakeholders should design training programmes on hardiness for students in colleges of education such that lecturers support them in practising problem-solving coping so as to improve their achievement in Mathematics.

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