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SELF-EFFICACY AS A PREDICTOR OF STUDENTS' ACADEMIC PERFORMANCE IN MATHEMATICS IN NIGERIAN POLYTECHNIC

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ABSTRACT

Study investigated self-efficacy as predictor of students' academic performance in mathematics in Nigerian polytechnic. Correlational research design was adopted. Two research questions and hypotheses guided the study. Population of the study was 118 National Diploma I students. Sample of 92 students who completed the questionnaire was obtained using Krejcie and Morgan table. Instrument for data collection was a five points Likert scale Self-Efficacy Questionnaire. Validity of the instrument was ascertained by experts in Educational Psychology. Reliability coefficient of 0.78 was obtained using Cronbach's alpha. Data were analysed using Pearson correlation and multiple regression at 0.01 significant level. Findings revealed strong positive correlation $r = .84$ *between self-efficacy and performance in mathematics. R square value of* 0.708 *indicates* 70.8 *per cent variance on performance in mathematics is explained by self-efficacy and was found to be predictor of students' performance in mathematics. Study recommends encouraging students to developed high self-efficacy considering it positive impact on performance in mathematics.*

Keywords: Self-Efficacy, Performance and Mathematics.

Introduction

Students learning and enhance academic performance is based on proper understanding of concepts taught (Onyekwere, *et al*. 2018). Hayat, *et al*. (2020) states that academic performance is an important educational goals however there is a wide spread worry among stake holders and researchers alike on the continuous students poor performance in mathematics. Studies have attributed self-efficacy and motivation as variables influencing students' performance in mathematics (Naz & Majoka, 2016; Musa, 2020).

Yokoyama (2019) states that concept of self-efficacy was first coined from Bandura's from social cognitive theory. Self-efficacy refers to student's beliefs in his or her ability in successfully executing a task (Hayat, *et al.* 2020). Students who possess high self-efficacy are more diligent, participate actively in learning, anticipating higher goals and shows perseverance (Prabawanto, 2018).

Mathematics self-efficacy is the students' confidence and ability in solving problems in mathematics (Vukovic, *et al.* 2013). Students who possess high self-efficacy in mathematics display adaptive characteristics such as putting efforts in

study, actively involved in learning, recovering from failure more quickly, employing different learning strategies, attributing success to effort and failure to in-appropriate strategy (Ahmed, *et al.* 2015). Research has shown that self-efficacy influences students' performance in mathematics (Aldridge, Atari, & Fraser, 2015).

Self-efficacy triggers students' perception to execute task and serve as predictor of academic performance (Schunk, 2011). Roick and Rengeisen, (2018); Zakariya, *et al*. (2019) attributes self-efficacy as a major determinant of students performance in mathematics. Eduard, *et al.* (2018) stated that a relationship between self-efficacy and students performance in mathematics. The following researcher: Schunk (1991); Hodges (2008); Musa (2020); Wyk, *et al* (2020), in their various studies, found self-efficacy as a predictor of academic performance. In view of the role of self-efficacy on performance in mathematics the present study sought to determine the: -

i). relationship between self-efficacy and students performance in mathematics.

ii). extent to which self-efficacy predicts students' performance in mathematics.

Research Questions

i). What is the relationship between self-efficacy and students performance in mathematics?

ii). To what extent do self-efficacy predict students' performance in mathematics?

Hypotheses

H_{01}: There is no significant relationship between self-efficacy and students performance in mathematics

H_{02}: Self-efficacy does not significantly predict students' performance in mathematics.

Theoretical Framework

Self-efficacy theory is based on the frame work of social cognitive theory (Bandura, 1997). Bandura describes an individual's confidence in successfully completing a task by relating it to certain level of self-efficacy (Close & Solberg, 2008). Bandura (1991) stated that self-regulation operates within the frame work of self-monitoring and self-reactive. Cognitive theory indicates that an individual is imbued with certain capabilities to symbolize, plan alternative strategies and self-regulate (Graham & Weiner, 1996).

Bandura opined that symbols are vehicle of thought through which an individual solve problems and engage in self-direction, plan course of action and anticipate consequences of such action. Self-efficacy is prominent in educational research as scholars have stated that students who show high self-efficacy persevere in face of adversity and more optimistic of success (Maier & Curtin, 2003).

Bandura (1997) highlights sources of self-efficacy to include: - mastering experience, vicarious experience, social persuasions and psychological state. Pajeres (2006) states that mastering experience encapsulates interpretation of previous academic attainment. Vicarious experience relates to students interpretation of others experience, observing other who succeed in completing task is crucial to one's self-efficacy (Schunk, 2011). Pajares and Urdan, (2006) states that social persuasion

is the students' ability to maintain previous performance with persuading words. Linnenbrink and Pintrich (2003) posited self-efficacy plays a significant role within the domain of commitment, efforts and behaviour, students who shows self-confidence are likely to put more effort in fulfilling academic tasks.

Studies such as Brashi (2022) investigated self-efficacy as predictor of undergraduate students performance found self-efficacy as a significant predictor of academic performance. Ojeleye *et al.* (2022) in their study examined resilience and self-efficacy as predictor of students performance using a cross sectional survey research design finding reveals resilience and self-efficacy are predictors of students' performance.

Zakariya (2021) in investigating self-efficacy between previous and current undergraduate mathematics performance found significant effect of prior students' mathematics knowledge test on self-efficacy. Ahmadi (2020) in examining self-esteem, self-efficacy and achievement of undergraduate students at Urmia University found a relationship between academic Self-esteem and self-efficacy. Matovu (2020) in his study on relationship between self-efficacy and academic performance found a significant relationship between self-efficacy and academic performance. Ampofo (2019) investigates the relationship between pre-service teachers' self-efficacy and performance found a significant positive relationship between pre-service teachers' self-efficacy and their performance in mathematics. Achufusi *et al.* (2019) in a similar study on self-efficacy and motivation as correlate of performance found significant relationship between self-efficacy and performance in physics.

Olendo *et al.* (2019) examines the relationship between self-efficacy and academic performance among students in selected secondary school found self-efficacy as predictor of academic performance. Kanmani (2018) investigated the relationship between self-efficacy and performance and found no significant relationship between self-efficacy and academic performance. Gulista *et al.* (2017) study on relationship between teachers' self-efficacy and performance in mathematics found a significant positive relationship between self-efficacy and performance in mathematics. Meanwhile Abubakar *et al.* (2016) in their study on self-efficacy as predictor of undergraduate performance at Sultan Zainal found self-efficacy as a significant predictor of performance. Naz *et al.* (2016) in examining self-efficacy and academic performance in mathematics found significant difference between subscales of self-efficacy and academic performance.

Nilsson (2016) in investigating the impact of self-efficacy and motivation on students' performance in biology found significant relationship between self-efficacy and students performance in biology. Arbabisarjou *et al.* (2016) examines the relationship between self-efficacy and medical sciences students' academic performance finding reveals students with high self-efficacy shows optimal academic status compared to those with low self-efficacy and a significant positive relationship was found between self-efficacy and academic performance. Ali and Sepideh (2016) study on

relationship between self-efficacy and mathematics achievement using summative evaluation found significant positive relationship between self-efficacy and performance in mathematics.

Review indicated studies at secondary school, colleges of education and universities however not much is known self-efficacy and performance in mathematics at the polytechnics this necessitates the present research on self-efficacy as predictor of students performance in mathematics in Nigerian polytechnic.

Research Method

Correlational research design was adopted to determine the relationship between variables and the predictor outcomes. The study was conducted at Hussaini Adamu Federal Polytechnic Kazaure Jigawa State, North Western Nigeria. Population was 118 National Diploma One students offering Basic Mathematics course at the school of science and technology. Sample of 92 students who completed the questionnaire was obtained using Krejcie and Morgan table. Instrument for data collection was a five points Likert scale self-efficacy questionnaire. Validity of the instruments was ascertained by experts in Educational Psychology. Reliability coefficient of .78 was obtained using Cronbach's alpha. Data were analysed using Pearson correlation and multiple regression at 0.01 significant level. Students' performance was based on their scores in basic algebra course.

Decision rule for determining strength of correlation (r) is given as greater than 0.5 a strong positive or negative correlation, between 0.3-0.5 a moderate positive or negative correlation and 0.3 a weak positive or negative correlation (Schober *et al*. 2018). The null hypothesis H_0 is accepted when p-value is less than critical value however H_0 is rejected when p-value is greater than the critical value.

Presentation of Results

H_{01}: There is no significant relationship between self-efficacy and students performance in mathematics.

Table 1 : Correlation Matrix on Self-Efficacy and Students Performance in Mathematics

		Self-Efficacy	Performance in Mathematics
Self-Efficacy	Pearson Correlation	1	.843**
Performance in Mathematics	Sig. (2-tailed)		.000
	N		92
			1

**. Correlation is significant at 0.01 level.

Table 1 shows a strong positive correlation r =.84 between self-efficacy and performance in mathematics at .000 <0.01 indicates there is a significant relationship between self-efficacy and students' performance in mathematics. This implies as self-efficacy increases students' performance in mathematics increases and

a decrease in self-efficacy leads to a corresponding decrease on performance in mathematics.

H_{02}: Self-efficacy does not significantly predict students' performance in mathematics.

Table: 2 Regression Model on Self-Efficacy and Students Performance in Mathematics

Model	R	R Square	Adjusted R Square	Std. Error	F Change	df1	Sig.
1	.843[a]	.711	.708	.64699	221.114	1	.000

**Significant at 0.01 level.

Table 2 gives adjusted R square as .708 meaning self-efficacy accounts for 70.8 percent variance on performance in mathematics however 28.2 percent would be attributed to others factors.

Table 3: Coefficient Beta on Self-Efficacy and Performance in Mathematics

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.003	.153		.019	.985
	Self-Efficacy	.039	.003	.843	14.870	.000

Predictor constant Self-efficacy.
**Significant at 0.01 level.

Table 3 reveals self-efficacy significant predictor of performance in mathematics as shown by standardize coefficient 0.019 at $0.000 < 0.01$. Specifically for every one unit increase on self-efficacy students' performance in mathematics is increase by 0.039 unit holding other variables constant and the standardize coefficient beta of 0.843 indicates self-efficacy explains a substantial portion of academic performance in mathematics.

Discussion of Findings

There was a significant relationship between self-efficacy and students performance in mathematics this finding is consistent with studies of Abubakar *et al.* (2016); Ali and Sepideh (2016); Naz *et al.* (2016) who found a significant relationship between self-efficacy and academic performance. Kanmani (2018) in a divergent report found no significant relationship between self-efficacy and academic performance which contradicts the present finding. Self-efficacy significantly predicts students' performance in mathematics this finding agrees with studies of Nasir and Iqbal (2019); Odiri (2020); Negara *et al.* (2020); Brashi (2022) who found self-efficacy as predictor of performance in mathematics.

Conclusion

The research findings provide an over view on implication of self-efficacy on students' performance in mathematics. Findings of the study indicates a significant positive relationship between self-efficacy and students performance in mathematics our finding also showed that self-efficacy predicts students' performance in mathematics. This study was limited to a polytechnic in Nigeria however a further research is needed to expand if findings in other polytechnics.

Recommendation

Base on the findings the study recommends encouraging students in developing high self-efficacy considering it positive impact on performance in mathematics.

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