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NOTES ON CONTRIBUTORS

Abdul, A. Ph.D. Department of Educational Management, University of Ilorin, Ilorin, Nigeria

Abdulhafiz, A. I. is a Lecturer, Department of Islamic Studies, College of Education, Ilorin, Nigeria.

Abdulkadir, O. R. Ph.D. is a Lecturer, Educational Foundations Department, Faculty of Education, Federal University Dutsin-MA, Katsina, Nigeria

Abdullahi, M. A. Ph.D. is a Chief Lecturer, Department of Education, College of Arabic and Islamic Legal Studies Ilorin, Nigeria

Abdulraheem, I. O. Ilorin, Kwara

Abdulraheem, M. is a Lecturer, Department of Marketing, Faculty of Management Sciences, University of Ilorin, Ilorin

Abdulraheem, Y. O. is a Lecturer, Department of Human Kinetics Education, Faculty of Education, University of Ilorin

Abdussalam, O. I. is a Lecturer, Kwara State College of Education, (COED) Ilorin,

Abimbola, I. O. Ph.D. is a Lecturer, Department of Science Education, University of Ilorin, Ilorin, Nigeria

Abubakar, M. S. is a Lecturer, Department of Educational Psychology, School of Education, Department of Educational Psychology, School of Education

Adegunna, A. D. is a Research Student (Mathematics Education) Department of Science Education, Federal University of Technology, Minna, Nigeria

Adeyemi, W. A. is a Lecturer, Department of Arts and Social Sciences Education, Al-Hikmah University, Ilorin, Kwara

Agbonlahor A. A. is a Lecturer, Department of Educational Foundations & Management, School of Education, Federal College of Education, Abeokuta, Ogun State

Ahmed, M. A. Ph.D. is a Lecturer, Department of Science Education, University of Ilorin, Ilorin, Nigeria

Ajagbe, F. N. Ph.D. c/o. Mr. Ibrahim Oyedele Ajagbe, Michael Imohoudu National Institute for labour Studies, P.M.B. 1524, Ilorin, Kwara State, Nigeria.

Ajayi, I. G. is a Doctoral Student, Department of Educational Management, University of Ilorin, Kwara State

Ajeigbe, Y. I. is a Lecturer, Department of Human Kinetics, Health Education and Sports Administration, Kwara State University Malete

Akanmu, M. A. Ph.D. is a Lecturer, Department of Science Education, University of Ilorin, Ilorin, Nigeria

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STUDENTS' LEARNING STYLES AND TEACHERS' VARIABLES AS PREDICTORS OF STUDENTS' PERFORMANCE IN MATHEMATICS

M. A. AKANMU

Abstract

This study focused on determining the relationship between students' learning styles and teachers' variables in mathematics. Being a correlational study, data gathered based on research questions raised and formulated hypotheses was analyzed using frequency counts, Pearson product moment correlation and Robust Tests of Equality of Means. 270 ($m=116$, $f=154$) senior school mathematics students and 9 ($m=5$, $f=4$) mathematics teachers were the sample for the study. Findings revealed that, though weak, there is positive correlation between students' academic performance and teachers' years of experience. While there is a statistically significant difference in the performance of students taught by the three identified groups of teachers based on educational qualification. There is, however, no significant correlation between students' learning styles and their performance in mathematics ($r=0.056$, $p=0.0363$). Thus, recommendations were made based on the findings of the study which included harnessing teachers' educational qualification and years of experience with a view to improving the performance of students in mathematics.

Key words: Learning; Performance; Predictors; Styles; Teachers' Variables;

Introduction

Scholars across the globe continue to investigate learning styles and teachers' variables in order to ensure the actualization of intended learning outcome and provide empirical base for improving teaching and learning processes. This is particularly so because, of the vital role this twin academic indicators plays in grading and determining future intellectual performance of learners. According to Cassidy (2004), the manner in which individual choose to or are inclined to approach a learning situation has a whole lot of impact on the performance and general achievement with respect to learning outcomes. It is also defined as a consistent pattern of behaviour but with a certain range of individual variability (Cornett, 1983).

A learning style can also change according to experience. Different individuals adopt different learning styles and the effectiveness of the learning styles also varies among individuals. Components of learning styles are cognitive, affective and psycho motor elements, all of which may be strongly influenced by a person's cultural background, learning environment and mode of instruction. On the other hands, teachers' variables such as qualification, experience, attitude, methods of teaching and

motivation can contribute substantially to learners' sustained interest and achievement in the long run. This occurs across a wide spectrum of disciplines and research efforts on the relationship between the two, that is, students' learning styles and teachers' variables now spans over four decades. It implies that, for optimal learning to take place, single major factor is not sufficient as causes of low or high achievement are diverse and can be associated with many factors.

For instance, a growing number of scholars in the field of mathematics have argued that many of the problems of mathematics learning are the artifacts of discontinuities which are brought about by the separation of learning from real life functions and situations (Fagbemi, 2001). By extension, Aremu and Sokan (2003) noted that academic achievement in mathematics is associated to major factors which includes but not limited to motivational orientation, self-esteem / self efficacy, emotional problems, study habits, teacher consultation and poor interpersonal relationships. Each of these factors: Aptitude (Learning styles) - self esteem, interest, emotional problems, learning environment, study habit and, Treatment (Teachers' variables) - mode of instruction, teachers' motivation, teachers' teaching experience, teachers' qualifications may separately or collectively affect meaningful learning. In essence, issues relating to learning styles and teachers variables cannot be closed.

In Australia, the study conducted by Affrasca and Keeses (1999) revealed that teachers' factors cannot be underestimated in questioning low achievement of students in mathematics. The researchers submitted that although students background variables are essential intellectual performance indicator-school factors and teachers' variables contributed significantly. In Malaysia, Mumtaz (2013) examined the relationships between the learning style dimensions (environment, emotional, sociological, physiological and psychological) and students' academic performance. The researcher concluded that learning style dimensions (emotional) contributed a lot. This was followed by psychological, sociological and environmental factors.

In Nigeria, studies such as those of Ojo (2004), Ahikwo (2006), Ibebuike (2006) and, Daso (2013) lent credence to the pivotal role of teachers' variables on students achievement in mathematics. The scholars' submissions, though, different studies identified teachers' factors as one of the problems of mathematics teaching. Hence, this study, therefore, isolated among various factors considered as teachers' variables, the relationship among teachers' experience, qualifications and students' learning styles as predictors of students mathematics performance in selected schools in Oyo State, Nigeria

Objectives

The objective of this study was to determine the extent to which students' learning styles and teachers' variables predict students' mathematics performance. The study by extension, determined the relationship among teachers' experience, teachers' qualifications, students' learning styles and students' mathematics performance.

Research Questions

The following questions were raised to guide this study:

1. Is there any relationship between teachers' experience and students' mathematics performance?
2. To what extent do students' learning styles predict their mathematics performance?
3. To what extent do teachers' qualifications predict students' mathematics performance?

Research Hypotheses

In line with the research questions raised, the following hypotheses were formulated and tested in this study:

H_{01} : There is no significant correlation between teachers' experience and students' Mathematics performance.

H_{02} : There is no significant relationship between students' learning styles and their students' Mathematics performance.

H_{03} : *There is no significant difference in the performance of students based on their teachers' qualifications.*

Methods

The sample for the study were drawn from senior school mathematics teachers and students in Oyo State, Nigeria. 30 students and 1 teacher from SSS2 arm of senior school from three randomly selected schools from each of the three senatorial districts of Oyo State participated in the study. In all, 270 students and 9 teachers constituted the sample frame (Tables 1 and 2). The instruments used were a student-centred questionnaire that delves on self esteem/efficacy and learning environment; a pro-forma of already conducted mathematics test scores of students retrieved and used for analysis; and , a teacher-centred questionnaire to elicit relevant data on teachers' experience and qualifications.

In order to answer the research questions and test the hypotheses formulated, the study, being a correlational study adopted the use of frequency counts, Pearson product moment correlation and Robust Test of Equality of Means.

Data Analysis and Results

Table 1

Respondents Frame and Students' Profile

School	No	M	F	Age Range
A	30	10	20	
B	30	12	18	
C	30	15	15	
D	30	14	16	
E	30	07	23	12-20
F	30	15	15	
G	30	18	12	
H	30	15	15	
I	30	10	20	
Total	270	116	154	

Table 2

Respondents' Frame and Profile (Teachers)

No	Gender		Experience			Qualification			
	M	F	WE	ME	LE	Ph. D	M. Sc. /M.Ed.	B.Sc./B.Sc. (Ed)	Others
9	5	4	7	1	1	0	2	4	3

Key: M= Male; F= Female; WE= Well Experience (11yrs and above); ME= Moderately Experienced (6-10yrs); LE= Less Experienced (0- 5yrs)

H_0 : There is no significant correlation between teachers' experience and students' Mathematics performance.

Table 3

Relationship between the students' mathematics Performance and teachers' years of experience s

	Score	Expscore
Pearson Correlation	1	.073
Sig. (2-tailed)		.234
N	270	270
Pearson Correlation	.073	1
Sig. (2-tailed)	.234	
N	270	272

Table 3 reveals that the correlation coefficient between teachers' years of experience and students' academic performance in Mathematics ($r=0.073$, $p=0.234$). The result shows weak but positive correlation between students' academic performance and teachers' experience. Since the p-value is greater than 0.05, the hypothesis is not rejected. This implies that there is no significant correlation between teachers' experience and students' mathematics performance.

H_{02} : There is no significant relationship between students' learning styles and their students' Mathematics performance.

Table 4

Relationship between the students' learning styles and their Mathematics Performance

	Score	Stylescore
Pearson Correlation	1	.056
Sig. (2-tailed)		.363
N	270	270
Pearson Correlation	.056	1
Sig. (2-tailed)	.363	
N	270	270

From table 4, it can be seen that the correlation coefficient is ($r=0.056$, $p=0.363$) which means the relationship between students' learning styles and their mathematics performance is weak, though positive. With the p-value greater than 0.05, the hypothesis is upheld. The implication of this, is that the null hypotheses which states that there is no significant correlation between students' learning styles and their mathematics performance is valid.

H_{03} : There is no significant difference in the performance of students based on their teachers' qualifications.

Table 5

Robust Tests of Equality of Means

	Statistic ^a	df1	df2	Sig.
Welch	5.963	2	137.835	.003
Brown-Forsythe	5.813	2	202.112	.004

a. Asymptotically F distributed.

A one-way Analysis of Variance between-groups (Robust Tests of Equality of Means:- due to violation of one of the assumptions of ANOVA, that is, equality of variance) was conducted to explore the extent of the relationship between

teachers' qualifications and students' performance in mathematics. Respondents (teachers) were divided into three groups according to their qualifications (Group 1: HND; Group 2: Bsc/Ed; Group 3: M.Sc./M.Ed.). There was a statistically significant difference at the $p < 0.05$ level in students performance as taught by the three qualifications groups: $F(2, 202.11) = 5.813, p = .004$ using Brown-Forsythe Robust Tests of Equality of Means. Despite reaching statistical significance, the actual difference in mean scores between the groups were quite small. Hence, Post-hoc comparisons using the Games-Howell (corresponding post-hoc for Robust Test of Equality of Means) test indicated that the mean score for Group 1 ($M = 59.25, SD = 12.16$) was significantly different from Group 3 ($M = 50.18, SD = 16.46$) and means of Group 2 ($M = 56.83, SD = 18.43$) was significantly different from Group 3 ($M = 50.18, SD = 16.46$). However, Group 1 ($M = 59.25, SD = 12.16$) did not differ significantly from Group 2 ($M = 56.83, SD = 18.43$).

Conclusions

The findings emanating from the current study has shown that there is no significant relationship between students' learning styles and their academic performance in mathematics. The result, given the inclusive evidence between learning styles and academic performance as reported in existing literature (Phan, 2008) leaves no surprise and aligns with the findings of Warn (2009), where the researcher reported that students, though of the same academic programme, practice different learning style with different subjects. As such, students as categorized (Converger, Diverger, Assimilator and Accomodator) based on learning styles by Kolb (1976) differs between subjects of theoretical and computational based.

It was, however, found in this study that though weak, there is a positive correlation between teachers experience and students' academic performance. Statistically, significant difference in the performance of students taught by the three identified groups of teachers based on educational qualification was also established. These outcomes, on the variables of teachers' experience and qualification corroborate the works of Eraut (1994) and Abiodun (2013) where the researchers found that teachers' years of experience in relation to proficiency and academic qualification with respect to competence may be possible explanation for poor academic performance of students in mathematics. Thus, the scholars posited that the variables of experience and qualification could serve as determinants of students' academic achievements in mathematics

Recommendations

This study provides an empirical evidence that learning styles does not predict substantially academic performance of the students. This statement might not be ambiguous as learning styles is more of how learner perceives, interacts with, and responds to the learning environment whereas cognitive styles which are individual

characteristics of cognitive processing (conceptualization) may predict substantially students' academic performance. This, hopefully, would be another area of future research. On the account of these conclusions, the following recommendations are made:

- (i) Placement / posting of teachers for entry or terminal classes should take into cognizance teachers' experience and their academic qualifications;
- (ii) The variables of experience and qualification of teachers should be harnessed to the benefit of students. Hence, well experienced teachers should be motivated in terms of periodic training and emolument while additional academic qualification should be encouraged for better delivery; and,
- (iii) Rather than learning styles, cognitive styles should be placed at the centre of students' learning experience. This expectedly would advance information processing and ability for critical thinking among learners when faced with computational task.

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