

Learning Styles as Predictors of Students' Academic Achievement in Rivers State

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Abstract: The study investigated learning styles as predictors of students' academic achievement. Two research questions and corresponding hypotheses were formulated to guide the study. The participants in the study were 1,269 (males = 627, females = 642) students drawn from public secondary schools in Rivers State, Nigeria. A multi-stage sampling technique was used to draw the sample of the study. Two valid instruments tagged, Visual, Aural, Read/write and Kinesthetic (VARK) questionnaire and Mathematics and English Achievement Test (MEAT) were used for the collection of data in the study. The reliability of VARK questionnaire was determined using Cronbach alpha with coefficient values of 0.75, 0.74, 0.77 and 0.76 for visual, aural, read/write and kinesthetic learning styles respectively. The reliability for MEAT was determined using test-retest and coefficient value of 0.86 and 0.79 were obtained respectively. The research questions were answered using regression analysis (simple and multiple). The null hypotheses were tested at .05 alpha level. The result of the study revealed that learning styles are statistically significant predictors of academic achievement of students. Again, male and female students differ significantly in their learning styles. Based on the findings conclusions were drawn and recommendations made.

Keywords: learning styles, Predictors, academic achievement, VARK, students, Rivers state.

I. INTRODUCTION

Psychology and education theory has a long tradition of research into learning styles (Cassidy, 2004). Educators are of the view that there is the need to incorporate and embrace students' learning style in the learning environment and classrooms (Honigsfed & Dunn, 2006). This becomes obvious in view of the continued interest of researchers and educational psychologists, and the continued attention of government, policy makers and planners as well as the rising concerns pertaining mass failures of students in Senior School Certificate Examinations (SSCE). Currently, there has been continuous decline in the academic achievement of students especially in secondary schools despite academic achievement being largely associated to variety of factors or variables. This could be the reason why Joint Admission and Matriculation Board (JAMB) has on the 27th August 2017 reduce the minimum cut off mark to 120 to enter the Nigerian Universities as against 180 in the previous years. As for JAMB cut off mark for polytechnics and colleges the candidate must have minimum of 100 as against the minimum of 150 preciously.

Academic achievement as identified by Busari (2000) is the display of knowledge attained or skills developed or performed in the school subject. It is the extent to which a student, teacher or institution has achieved their educational goals. Similarly, Ogudokun and Adeyemo (2010) identified test scores or marks assigned by teachers as indicators of academic achievement. These marks or grades assigned by schools could either be high or low, which means that academic achievement, could either be good or bad.

The ideology of learning styles was adapted to incorporate multiple ways people think, respond, see, hear, touch, rationalized, and formulate knowledge or learning (Dunn & Dunn, 1993). Once an individual's learning style has been

identified and nurtured, the individual learner may have a better understanding on how to function effectively in the school environment and satisfy intellectual and emotional needs. The awareness of learning preferences and an understanding of individual learning styles can help educators develop instructions using multiple resources to ensure optimum learning.

Learning style is dispositional or trait concept in that it is about how someone usually approach learning – that is, how they learn. According to Dunn (1990, p.353) “learning style is a way in which individuals begin to concentrate on, process, internalize, and retain new and difficult information”. McLaughlin (1999) defined learning style as adopting a habitual and distinct mode of acquiring knowledge. Fleming (2001) who authored the VARK Model in like manner defined it as an individual’s characteristics and preferred ways of gathering, organizing, and thinking about information. In other words, it is the consistent pattern of behavior and performance by which an individual approaches educational experiences. It is the way an individual concentrate and his method in processing and obtaining information, knowledge, or experience. We each learn and process information in different ways. Individual learning styles in most cases depend on cognitive, emotional and environmental factors, as well as one’s prior experience. Many students don’t realize this because they may have attended schools where teachers delivered instruction in one way and never encouraged students to learn and understand their unique styles. Learning style is derived from cultural socialization and individual personality as well as from the broader influence of human development. There has been also argument on whether males and females learn differently. In other words, are there male and female preferences in learning styles? The answers to this question may dramatically alter or change the ways in which we teach and learn in our schools.

Learning style could be classified in form of visual (learning through seeing), auditory (learning through listening) and tactile or kinesthetic (learning by moving, doing, and touching etc.) learning styles (Messick 1994; Leite, Svinicki & Shi, 2009). Fleming (2001), added forth category “Read/Write learning style” by subdividing the visual mode into symbols (visual) and text (read-write) as part of his VARK model to the existing Visual, Auditory (Aural) and Kinesthetic (VAK) learning styles.

There are different forms and models of learning styles; however, this study is geared towards examining the different learning styles as identified by Fleming (2001) known as VARK (Visual, Aural, Read/write and Kinesthetic) learning style model. Fleming (2001) highlighted the following learning styles:

Visual learning style: the set of individuals or students with this learning style have preference for seen or observed things, including maps, diagrams, displays, graphs, charts, pictures, word pictures, flow charts, brochure, films, different colours etc. (Murphy, Gray, Straja & Bogert, 2004). They noted that visual learning style is a type of learning style in which ideas; concepts, data and other information are associated with images and techniques. The visual learners will use the phrases such as ‘show me’, ‘let me have a look at that’ etc. and they will perform well after watching someone else do it first. In other words, students predisposing visual learning style are likely to be provided with demonstration and description. Drago and Wagner (2004) observed that visual students are easy to be disturbed or change in focus by movements or actions, whereas noise usually does not bother them.

Aura (Auditory) learning style: this is a learning style in which a person learns through listening (Kostelnik, Soderman & Whiren, 2004). Someone with this learning style has preference for the transfer of information through listening; to spoken words, of self or others, of sounds and noises (Drago & Wagner, 2004). They like to discuss topics, use a tape recorder, attend lectures and discussion groups etc. They will use the phrases such as ‘tell me’, ‘let’s talk it over’, and will be best able to perform a new task after listening to instructions from an expert. Drago and Wagner (2004) observed that aural students are easily interrupted by noise. Miller (2001) also remarked that students with aural learning style can remember information through loud reading or mouthing when reading especially when learning new thing.

Read/Write learning style: Individuals with this learning style prefer the use of definitions, reports, textbooks, printed handout, readings, manual, web pages, taking notes etc. (Othman & Amiruddin, 2010). They will use the phrases such as ‘write them out’, ‘let me read for you’. They will perform well after reading and writing out instructions. Drago and Wagner (2004) also pointed out that read/write students are note takers. They study better through note taken from lecture or from difficult reading materials.

Kinesthetic learning style: the students with this learning style have preference for physical experience – touching, feeling, holding, doing, trial and error, field trip, laboratories etc.(Coffield, Moseley, Hall & Ecclestone, 2004). In other words, they learn best through hand-on approach. They will use the phrases such as ‘let me try’, ‘how do you feel’, and will be best able to perform a new task by going ahead and trying it out, learning as they go. Drago and Wagner (2004) described the characteristics of predisposing kinesthetic students as those who emphasize more in experience and practice in learning something and they usually have high energy and prefer to apply touch, movement and interaction to their environment. Armstrong (2004) stressed that students who possess kinesthetic learning style are fond to move and are active, quick in learning physical skills, fond to think while moving, perform well in athletic field, more likely use movements as an aid for remembering and having good coordination various cases. Wolfman and Bates (2005) attested to this by adding that kinesthetic learning style can increase students’ learning motivation.

Furthermore, Piping (2005) in his study also has proven that VARK learning style can enhance students’ understanding as well as raising learning motivation and interest among students.

To some extent, academic achievement over the years has attracted the attention of many researchers. The research conducted by Rasimah and Zurina (2008) and Sunan, Suntorapot and Jaruwan (2011) on learning style and academic achievement of students showed that learning style is a predictor of academic achievement. Rahmani (2012) also argued that learning styles are the best predictors of academic achievement based on his research study on learning styles and academic achievement: a case study of Iranian high school girls’ students. The finding diverged with that of Majid (2011) who asserted that learning styles are not predictors of academic achievement.

Again, students have specific learning style preferences, and these preferences may be different between male and female students. Some extant studies (Keri, 2002; Holley & Jenkins, 1993) are of the view that males and females learn differently contrary to the studies (Breckler, Joun, & Ngo, 2009; Halim, 2006) who believed that male and female do not differ in their learning. Also, the result of the study conducted by Choudhary, Dullo, Tandom (2011) on gender differences in learning style preferences of first year medical students indicated that there were statistical variations or differences in the learning styles of male and female students.

Another study which investigated the differences in learning styles between men and women by Philbin, Meier, Huffman, Boveri (1995) showed that men and women were found to have different learning styles, and in general, men seemed to find congruence between traditional education and their learning style while women did not.

Conversely, the result of study conducted by Slater, Lujan and Dicarlo (2007) on ‘does gender influence learning preferences of first-year medical students’ showed that female students had more preferences for visual, aural and read/write learning styles, while their male counterparts had more preferences for kinesthetic learning style, but there was no statistical difference between the male and female learning styles. The result was in line with the study outcome of Baxter (1992) on knowing and reasoning in college: gender related patterns in students’ intellectual development, San Francisco.

However, apart from the inconsistency of the results of the studies, the conduct of research on learning styles is quite rare among Nigerian researchers to the best of my knowledge.

It is therefore in the light of this background that the researcher was motivated to investigate whether learning styles are predictors of academic achievements of secondary school students in Rivers state, Nigeria and to what extent.

Aim and Objectives of the study:

The study aimed at ascertaining the extent to which learning styles predict academic achievement of students. In specific terms, the objectives of the study include the following:

1. Ascertain the extent to which the learning styles (visual, aural, read/write and kinesthetic) combined and on separate basis respectively, predict academic achievement of students.
2. Identify the dominant learning styles among the male and female students

Research Questions:

1. What is the extent to which the learning styles (visual, aural, read/write and kinesthetic) combined and on separate basis respectively, predict academic achievement of students?
2. What are the dominant learning styles among the male and female students?

Hypotheses:

The following null hypotheses were tested at .05 alpha levels to guide the decision making on the issues investigated.

1. Learning styles (visual, aural, read/write and kinesthetic) combined and on separate basis respectively, do not significantly predict academic achievement of students.
2. The male and female students do not differ significantly in their learning styles.

II. METHODOLOGY

The correlational research design was adopted in carrying out this research. The population for the study consisted of all the 42,624-Senior Secondary II (SS2) students in the 238 public secondary schools in Rivers State as at 2015/2016 session. The sample of the study consisted of 1,269 (males 627 and females 642) students drawn using multi-stage sampling technique. Two instruments were used for the study and they include -Visual, Aural, Read/write and Kinesthetic (VARK) Questionnaire and Mathematics and English Achievement Test (MEAT). VARK Questionnaire is a compound instrument with 48 items developed and designed to assess or measure learning styles namely – visual, aural, read/write and kinesthetic learning styles. It had four sections and each of the sections contains 12 items meant to elicit adequate information on visual, aural, read/write and kinesthetic learning styles respectively. The items on VARK Questionnaire were responded and scored on 4-point Likert scale of Strongly Agreed (4), Agreed (3), Disagreed (2), and Strongly Disagreed (1). On the other hand, the MEAT had 50 items with multiple choice options (A – E) designed to measure and assess academic achievement of students. It had two sections and one of the sections had 25 items in Mathematics, while the other section consisted of 25 items in English Language. Any item got right was scored 2 points for each of the sections.

The face and content validity of the instruments were conducted to ensure that the items of the VARK questionnaire and MEAT were clearly and specifically stated, relevant to the study and enough to measure the variables. The VARK questionnaire passed through two experts in Educational Psychology and one expert in Measurement and Evaluation. The MEAT also passed through three experts in Mathematics and English Language respectively.

The Cronbach Alpha and test-retest technique were used in determining the reliability coefficient value of VARK Questionnaire and MEAT. The Cronbach Alpha coefficient value for VARK Questionnaire using Cronbach Alpha were 0.75, 0.74, 0.77, and 0.76 for the four sections respectively. The coefficient values of MEAT using test re-test were 0.86 and 0.79 for the two sections.

The data collected were analyzed using multiple regression analysis as well as mean and standard deviation.

Table I: Multiple Regression Analysis between learning styles (predictor variables) and Academic achievement of students

R = 0.093 $R^2 = 0.009$ Adjusted $R^2 = 0.005$ Std. Error of Estimate = 12.22								
Model	Sum sq.	Df	Mean sq.	F	β	t	P-Val	Result
Regression	1633.95	4	408.48	2.733			0.028	Sig
Residual	188906.08	1264	149.451					
Total	190540.03	1268						

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Table I showed correlation coefficient (R-value) of 0.093 which indicated a positive relationship between learning styles (visual, aural, read/write and kinesthetic) and academic achievement. This implies that learning styles are predictors of academic achievement of students. The coefficient of determination (R squared) of 0.009 showed the proportion of variance in the academic achievement of students that is explained by learning styles. Furthermore, the table indicated F-ratio of $F(4, 1264) = 2.733$, and $P < .05$ which implies that learning styles statistically significantly predicted academic achievement of students. Therefore, we reject the null hypothesis that learning styles (visual, aural, read/write and kinesthetic) combined and on separate basis respectively, do not significantly predict academic achievement of students, and rather accept the alternative.

Table II: Relative contribution of each of learning styles (visual, aural, read/write and kinesthetic) to the prediction of academic achievement of students

Model		Unstandardized Coefficients		Standardized Coefficients	t	P-Val	Results
		β	Std. Error	Beta			
1	(Constant)	59.423	2.755		21.573	.000	
	Visual	-.014	.071	-.007	-.196	.845	Not Sig
	Aural	-.041	.075	-.019	-.544	.587	Not sig
	Read	-.007	.073	-.003	-.094	.925	Not sig
	Kinesthetic	-.159	.072	-.077	-2.204	.028	Sig.

Table II showed the individual learning style contribution to the prediction of academic achievements of students. It entails visual learning style ($\beta = -0.014$, $t = -0.196$, $P > 0.05$), aural learning style ($\beta = -0.041$, $t = -0.544$, $P > 0.05$), read/write learning style had ($\beta = -0.007$, $t = -0.094$, $P > .05$), and kinesthetic learning style ($\beta = -0.159$, $t = -2.204$, $P < .05$).

All the learning styles apart from kinesthetic learning style were not statistically significant at 0.05 alpha levels. Kinesthetic learning style with p-value of .028 was statistically significant at .05 alpha levels.

Table III: Mean and standard deviation analysis of learning styles (visual, aural, read/write and kinesthetic) of male and female students

Gender	N	Learning styles	Mean	Std. Deviation	Std. Error Mean
Male	627	Visual	33.364	5.957	0.237
		Aural	33.314	5.472	0.218
		Read//write	31.853	4.916	0.196
		Kinesthetic	33.108	5.841	0.233
Female	642	Visual	31.754	5.439	0.214
		Aural	32.608	5.748	0.226
		Read//write	32.017	5.360	0.212
		Kinesthetic	32.975	6.007	0.237

The result from the table III above indicated that the dominant learning styles among the male students include visual learning style followed by aural learning style, kinesthetic and read/write learning styles.

The result on the same table also showed that the dominant learning styles among the female students is kinesthetic learning style and then followed by aural style, read/write and lastly visual learning styles

Table IV: the summary of the t-test of the difference between the mean and standard deviation scores of male and female students' learning styles

		Levene's Test for Equality of variance		t-test for Equality of Means				
		F	Sig	t	df	Sig (2-tailed)	Mean Differ	Result
Visual	Equal variances assumed	11.577	0.001	5.029	1267	0.000	1.609	Sig
	Equal variances not assumed			5.023	1250.64	0.000	1.609	
Aural	Equal variances assumed	2.845	0.092	2.242	1267	0.025	0.706	Sig
	Equal variances not assumed			2.244	1266.17	0.025	0.706	
Read/write	Equal variances assumed	2.273	0.132	-.567	1267	0.571	-.163	Not Sig
	Equal variances not assumed			-.568	1262.06	0.570	-.163	
Kinesthetic	Equal variances assumed	0.087	0.767	0.401	1267	0.689	0.133	Not Sig
	Equal variances not assumed			0.401	1266.97	0.689	0.133	

The result on the table IV showed that male and female students significantly differ in their learning styles.

The result from table IV also indicated that there is a statistically significant difference between both the visual and aural learning styles of male students and that of female students (the significant values for their visual and aural learning styles are 0.000 and 0.025 respectively which are less than 0.05 i.e. $P < 0.05$). Though the opposite was the case in the read/write and kinesthetic learning style of male students and that of female students.

III. DISCUSSION

The result of the study indicated that learning styles are predictors of academic achievement of students. The results may not be surprising in that the study was consistent with the findings of Sunan *et al.* (2011) and Rahmani (2012).

Similarly, the study also showed that male and female students differ significantly in their learning styles. The finding of the present study is in consonance with the earlier findings of Alumran (2008), Dobson (2009), and Choudhary *et al.* (2011). They concluded from the result of their studies that there is a significant difference between the learning styles of male and female students.

Obviously, these results may not also be surprising because learning styles entail how individual concentrates, process and obtaining information, knowledge, or experience. Learning styles also have the potential to make an individual to be cognitively, affectively and physiologically active especially in processing of information and a germane to academic success or achievement.

IV. CONCLUSION

The study has revealed that learning styles are significant predictors of academic achievement of students. It is therefore necessary that teachers, parents, school authorities and students should develop greater awareness and understanding of the necessity of learning styles as an ingredient to academic achievement of students.

Similarly, teachers should be more strategic in their teaching as well as approaching teaching from different angles considering the existence of differences in students' learning styles especially in connection to gender. They must be encouraged to allow students work in groups on assignments since teamwork seems to appeal to the learning styles of both males and females. Teachers should also ensure that teaching style interweaves with instructional aids that match learning style preferences for each gender or students. Some students might need instruction presented to them more visually, while other others might require kinesthetic, aural or read/write type of instruction. School authorities should also be ready to make different instructional materials that match different learning styles available for teaching and learning. Parents should also procure different learning materials at home to aid students in their learning and give more attention to the student's learning style. In a nutshell, without adequate knowledge about students' or gender leaning style

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preferences, teachers and parents cannot systematically provide the needed instructional variety. Teachers must accept the fact that instructions need to combine both lectures and group exercises. Thus, a singular teaching approach can no longer be perceived as the only conduit for imparting knowledge.

V. CONTRIBUTION TO KNOWLEDGE

The study has successfully demonstrated with glaring evidence that male and female students differ in their learning styles beside learning styles contribution to academic achievement of students.

VI. RECOMMENDATIONS

1. Again, the study recommends that students should complete a learning style instrument early in their classes. This will enable the students to be aware of their learning styles as well as that of their class mate. It will also help teachers to be aware of the students learning styles and approach teaching differently or from different perspectives.
2. It is also recommended that the teachers and parents must understand that males and female are unique as far as their learning preferences are concerned. Males have preference for rational evaluation and logic through visual elements like pictures, maps, charts etc. while females use elaborative processing in which they try to seek personal relevance or individual and physical connection with the material being taught. The understanding of the uniqueness in gender learning style will enable teachers and parents to provide tailored learning strategies that will suit the individual gender and overcome the predisposition of many parents and teachers to treat all students in a similar way. So, parents and teachers are expected to be cognizant of differences in gender learning styles and broaden their range of presentation accordingly.

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