

# Cognitive Factors as Predictors of Undergraduate Students Academic Performance at Gombe State University

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**Abstract** *This study examined cognitive factors as predictors of undergraduates' students' academic performance of Gombe State University. The study adopted correlation design. The population used was 7166 out of which 365 students were sampled. Stratified random sampling was used. Two instruments were used for data collection namely: Learning style inventory and JAMB Use of English reading comprehension. Both instruments were validated and considered reliable with alpha value of  $\alpha = 0.873$ . Multiple regression was used to test the hypotheses. The result revealed that the combination of these factors studied were not significant and could not predict performance of students. Based on the findings it was recommended that researches should be conducted to investigate non cognitive factors. The researchers recommends that lecturers should form divergent questions so as to reduce the rate of rote learning among students. The researcher concludes that reading comprehension and learning style have little or no relative contribution to the academic performance of undergraduates' students.*

**Keywords:** *Academic achievement, reading comprehension and learning style*

## Introduction

There are a lot of public outcries concerning the low standard of Education in the country (Kenneth, 2017). As an example, the Vanguard (February 26, 2016) reported that the University of Ibadan withdrew ninety-seven (97) students in the 2014/15 academic session and three hundred and twenty-eight (328) students were equally withdrawn in the 2016/17 academic session. The Sun (April 11, 2017) in the same vein reported that the Federal University of Technology, Minna withdrew 700 students in the 2016/17 academic session. Also, the Premium Times (October 5<sup>th</sup>, 2018) reported that the Federal University Dutse (FUD) Jigawa State likewise expelled 485 students in the 2017/18 academic session. These are just reflections of what happens in other institutions of higher learning in Nigeria. The bulk of these expulsions were due to poor academic performance of students.

Gombe State University which is the second State University in the North Eastern Nigeria may have the same situation with its counterparts in the country; it appears that there is a decline in the academic performance of undergraduate students of Gombe State University. For instance, the rate at which students perform is not encouraging, as an example, in the 2017/2018 academic session, about 30% of the 100 level students were withdrawn and 15% were on probation in the Faculty of Education due to poor academic performance, 40% of students in the Faculty of Science were withdrawn and 15% were on probation, 35% of the students were

withdrawn and 12% were on probation in the faculty of

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arts and social science also due to poor academic performance (semester results scored sheet, 2018).

There are several plausible factors such as (thinking style, cognitive style and working memory) responsible for the low academic performance of undergraduate students. Literature revealed that such factors include but not limited to: reading comprehension, cognitive style, and many others (Macsinga, 2011, and Alhassan, 2011). These factors can be summarized as cognitive factors. Cognitive factors are list of variables that help an individual to process information and solve problem. Many authors have argued that cognitive factors are the strongest predictors of academic performance such cognitive factors include thinking styles; grades point average (GPA), or cumulative grade point average (CGPA), perceptual reasoning, cognitive styles, learning styles, verbal reasoning, quantitative reasoning, working memory, and reading comprehension (Adebayo 2008, Kuncel & Hezlett, 2010, Macsinga, 2011, Russel, 2016). All these factors have been reported to have both direct and indirect relationships and path in the predictors of universities students' academic performance as indicated by their cumulative grade point average (CGPA). As an example, Ahmed (2013) reported a significant relationship between reading comprehension and academic performance of the learners. Studies such as Adebayo, (2008); Ahmed, (2013) have found that there is a strong correlation between reading comprehension and academic success of students. Little wonder then that Menaka and Justin (2017) asserted that "reading comprehension is the most important skill a learner can develop; learning to read and comprehend is an important skill that enhances the academic performance of the learners.

Learning style had also been reported as a strong predictor of students' academic performance. For instance, studies by Chiason, Aligba, and Jimin, (2015) reported that learning style predicts academic performance of undergraduate students. Other studies by Oluwatomi and Ogbo (2014); Mohammed (2013) revealed that learning style failed to predict academic performance of students. From the foregoing, the present study was set to ascertain whether cognitive factors of reading comprehension and learning style could predicts undergraduate students' academic performance.

### **Statement of the Problem**

Previous studies show that there is a lot of public outcries concerning the poor academic performance of undergraduate students in Nigeria. Looking at the state in which many undergraduate students perform poorly in the Nigerian Universities which often lead to their probation, step down or withdraw from Gombe State University which is one of the State University in Nigeria has been withdrawing students over the years due to poor academic performance in all the Faculties and Departments in the University.

However, literature revealed that cognitive factors are predictors of poor academic performance of students. Hence, this study investigated the following cognitive factors of (reading comprehension and learning style) as predictors of the academic performance of undergraduate students' of Gombe State University.

### Objectives of the Study

The objectives of this study were:

1. To determine the relative contributions of each of the following cognitive factors:
  - a. Reading comprehension
  - b. Learning style to the prediction of the undergraduate students' academic performance.
2. To determine the composite contribution of the following cognitive factors:
  - a. Reading comprehension
  - b. Learning style to the prediction of undergraduate students' academic performance.

### Research Hypothesis

In order to achieve the objectives of this study, the following research hypotheses were raised:

1. There is no significant relative contributions of each of the following cognitive factors:
  - a. reading comprehension
  - b. learning style to the prediction of the undergraduate students' academic performance
2. There is no significant composite contribution of the following cognitive factors
  - a. reading comprehension
  - b. learning style to the prediction of undergraduate students' academic performance?

### Methodology

The study used correlation design. A correlation study is the type of research that attempts to determine whether there is a relationship between two or more variables and to what extent or degree the relationship exists (Uyenne, 2015). The population of this study consists of all 200, 300 and 400 level students of Gombe State University as of 2017/2018 academic session. The total number being seven thousand one hundred and sixty-six (7166). The table below show the population distribution based on Faculties, levels and programme.

Table: 1 Distribution of Gombe State University Students by levels, faculties, and programs as at 2018/2019 academic session

S/N	Faculties/Program	Level Two	Level Three	level Four	Total Population
1.	<b>Faculty of Education Program</b>				
	i. Biology Education	372	250	200	822
	ii. Chemistry Education	121	33	18	172
	iii. Geography Education	117	85	90	292
	iv. Mathematics Education	63	45	50	158
	v. Physics Education	77	27	35	139
	vi. C R S Education	26	20	25	71
	vii. English Education	41	35	45	121

	viii. History Education	26	28	42	96
	ix. I R S Education	69	52	60	181

2.	Faculty of Science Program	Level Two	Level Three	level Four	Total Population
	i. Mathematics	65	45	50	160
	ii. Statistics	47	22	25	94
	iii. Computer science	82	75	80	237
	iv. Geography	194	45	55	294
	v. Geology	115	38	18	171
	vi. Biological science	120	110	102	332
	vii. Botany	84	40	38	162
	viii. Zoology	74	35	28	137
	ix. Chemistry	66	41	32	139
	x. Physics	27	33	18	78
	xi. Biochemistry	85	70	75	230
	xii. Microbiology	95	80	75	250

3.	Faculty of Arts and Social Science	Level Two	Level Three	level Four	Total Population
	i. English Language	77	72	71	220
	ii. C R S	43	35	40	118
	iii. History	62	28	42	138
	iv. Sociology	100	87	141	328
	v. Political Science	100	75	82	257
	vi. Public Administration	92	82	72	246
	vii. Economics	125	81	98	304
	viii. Accounting	130	100	105	335
	ix. I R S	134	105	115	354

4.	Faculty of Pharmacy	Level Two	Level Three	level Four	Total Population
	i. Pharmacy	45	32	32	109

5.	Faculty of Medicine	Level Two	Level Three	level Four	Total Population
	i. Medicine and Surgery	40	28	30	98
	Total				7166

Source: Gombe State University Academic Division

Proportional stratified random sampling was used for this study. The faculties was stratified based on levels and programs (200L, 300L, and 400L Students) From each stratum, 5.1%

of the population of each level and program were selected at random, in all, the sample size was 365 (i.e 5.1% of 7166). The decision for the stated sample size was based on research advisors' (2006) table for the estimated sample size. According to the table, a study with a population of seven thousand one hundred and sixty-six (7166) students requires a sample of three hundred and sixty seven (365). The table below shows the sample distribution based on faculties, levels and program.

Table: 2 Distribution of the sample of Gombe State University students based on Faculties, Programs, and levels.

S/N	Faculties/Program	Level Two	level Three	level Four	Total population
1.	<b>Faculty of Education Program</b>				
	i. Biology Education	20	13	11	44
	ii. Chemistry Education	6	1	1	8
	iii. Geography Education	6	4	5	15
	iv. Mathematics Education	3	2	3	8
	v. Physics Education	4	1	2	7
	vi. C R S Education	1	1	2	4
	vii. English Education	2	2	2	6
	viii. History Education	1	1	3	5
	ix. I R S Education	3	3	2	9
2.	<b>Faculty of Science Programme</b>	<b>Level Two</b>	<b>level Three</b>	<b>level Four</b>	<b>Total population</b>
	i. Mathematics	3	2	3	8
	ii. Statistics	2	1	2	5
	iii. Computer science	4	4	5	9
	iv. Geography	10	2	3	15
	v. Geology	6	2	1	9
	vi. Biological science	6	6	5	17
	vii. Botany	4	2	2	8
	viii. Zoology	7	1	2	6
	ix. Chemistry	3	2	1	6
	x. Physics	1	1	1	3
	xi. Biochemistry	4	4	4	12
	xii. Microbiology	5	4	4	13
3.	<b>Faculty of Arts and Social Science</b>	<b>Level Two</b>	<b>level Three</b>	<b>level Four</b>	<b>Total population</b>
	i. English Language	4	3	4	11
	ii. C R S	2	2	2	6
	iii. History	3	1	2	6
	iv. Sociology	5	5	7	17

	v.	Political Science	5	4	5	14
	vi.	Public Administration	6	5	6	17
	vii.	Economics	6	4	5	15
	viii.	Accounting	7	5	6	18
	ix.	I R S	7	5	6	18

4.	<b>Faculty of Pharmacy</b>		<b>Level Two</b>	<b>level Three</b>	<b>level Four</b>	<b>Total population</b>
	i.	Pharmacy	2	2	1	5

5.	<b>Faculty of Medicine</b>		<b>Level Two</b>	<b>level Three</b>	<b>level Four</b>	<b>Total population</b>
	i.	Medicine and Surgery	2	1	2	5
	Total					365

Source: Field study, 2019

To collect data for this study, two adapted instruments were used namely: Barsch, learning styles inventory developed by Jeffery (1996) and the 2019 Joint Admission Matriculation (JAMB) Use of English Reading comprehension passage. Academic performance of the students was assessed using their CGPA during the first semester of the 2018/2019 academic session.

The Barsch Learning Style Inventory is an inventory developed by Jeffery Barsch in (1996), in Novato, United State of America. It is a self-reporting instrument that provides students with an indication of the relative strength and weaknesses through different sensory channels; auditory, visual and kinaesthetic. This inventory was adapted for this study. The amendment made includes the removal of item 23 which read “I hug someone while reading” which is not culturally appropriate and may not portray the actual intent. This item was changed to “I remember best by writing things down several times”. There are 24 items each of which has been assigned scores, 5 points for often, and 3 points for some time, and 1 point for seldom preferred. Barsch Learning Style Inventory was validated by its author Face, contents and construct validity were established. The reliability coefficient of the initial inventory was 0.54 for visual, 0.56, for auditory and 0.65 for kinaesthetic.

To ascertain the validity of the research instrument the researcher conducted an exploratory factor analysis on a (365) sample population of the study. A correlation matrix was used in checking the interrelationships between the items of the Barsch learning style inventory. It was found that most items have same correlation with each other ranging from  $r = .225$  to  $r = .500$  for items 1 to 24 this shows relatively high correlations among items. A pilot study was conducted on a small sample of 50 subjects that were not included in the final study. The decision of the sample size for pilot study was based on the suggestion by Bell, Whitehead, and Julious (2018) that sample size for pilot study should be between 10% to 15% of the sample population, the reliability coefficient index found was 0.63 for visual, 0.57 for auditory and 0.82 for kinaesthetic and reliability coefficient of all the three learning style level was 0.873 which shows that the instrument is still reliable.

Use of English comprehension passage extracted from the unified tertiary matriculation examination (2018) was used to assess undergraduate students reading comprehension ability. It

is a standardized exam question. It has five multiple choice questions under it. The instrument is confirmed to be validated by (Jamb, 2018) the test is one that was already accepted generally as valid. A test of reading comprehension does not need statistical validation if the participants do well in the test, then they clearly have comprehended the text. It has strong face validity.

The instrument is a standardized test which confirmed by the Joint Admission and Matriculation Examination (Jamb, 2018) to be reliable for usage in research.

In order to ascertain the reliability of the instrument test-retest was conducted by the researcher. The test was administered to 50 students who are not in the sample of the study. After two weeks the same test was administered to the same students. The result of the test was correlated using Pearson correlation coefficient. .092 was found which shows high correlation and ascertaining high reliable.

The two instruments were administered differently to the respondents by the researcher and six research assistants during the second semester of the 2018/19 academic session. Each of the research assistants and the researcher was given two instruments to a specific level and program, for example, the total sample to be given to Biology Education is 20 students, then 25 instruments were given to the research assistant for 200 level Biology Education only and the instrument was given more than the number required in case of the loss of any the extra five will complete the exact number required.

The same way was operating for other levels and program for a period of one month consecutively. The University Football field, commercial area, cafeteria, Hostel (for those residing in the University) weekend and lecture room in the night and other convenient places were used to collect the data from the students. The data collected for this study were statistically analyzed using SPSS. parametric test of standard multiple regressions was used to test research hypotheses.

## Results

Research hypotheses 1: There is no significant relative contributions of each of the following cognitive factors:

- c. reading comprehension
- d. Learning style to the prediction of the undergraduate students' academic performance

Table 3: the relative contribution of reading comprehension and learning style to the prediction of undergraduate academic performance.

Variable	Beta	T	Sig. T
Reading comprehension	.099	1.892	.059
Learning style	.093	1.794	.074

The raw standardized regression coefficient of the predictors together with their relatives' effects are shown in table 1, the table shows reading comprehension has the strongest effect with a relative contribution of 0.099 ( $\beta = .099$ ;  $t = 1.892$ ;  $sig. = .059$ ) followed by learning style with relative contribution of 0.093 ( $\beta = .093$ ;  $t = 1.794$ ;  $sig. = .074$ ) surprisingly none of this effect is statistically significant at 0.005.

Research hypothesis two: There is no significant composite contribution of the following cognitive factors:

a. Reading comprehension

b. Learning style to the prediction of undergraduate students' academic performance?

Table 4: Regression summary of cognitive factors to the prediction of undergraduate academic performance.

Model	R	R Square	Adjusted R Square	Std. Error of estimate
1	.137 <sup>a</sup>	.0019	.0013	.57239

As indicated in Table 4, the cognitive factors have a multiple correlation of 0.137 with the undergraduate students' academic performance. That is, there is a linear multiple correlation of 0.137 of the combination of cognitive factors on undergraduate students' academic performance. The R square value of 0.019 indicates that 1.9% (i.e  $R^2 \times 100$ ) of the variations in undergraduate students' academic performance can be accounted for by a combination of cognitive factors studied. The analysis of regression data as indicated in Table 2, indicates that the combination of the two factors have no significant effect on the prediction of undergraduate academic performance.

### Discussion of Findings

Reading comprehension and learning style were used in a standard multiple regression analysis to predict undergraduate students' academic performance. The correlation of the predictor variables is weak and not statistically significant. The prediction model was not statistically significant as all the predictors accounted for less than 2% of the variance of undergraduate students' academic performance. The findings of this study are not in line with that of Kuncel and Hezlet (2010) who found that reading comprehension predict academic performance of students. The findings in table 2 shows that learning style could not predict undergraduate academic performance. This finding however disagrees with the findings of Chiason, Aligba and Jimin (2015) who found learning style as a strong predictor of students' academic performance. In similar studies by Mohammed (2013) and Oluwatomi and Ogbo (2014) who in their separate studies found that learning style could not predicts academic performance of students which is in conformity with the findings of this study where learning style was found not predicting students' academic performance.

The finding in table 3, revealed statistically weak and insignificant relationship between reading comprehension and students' academic performance this finding disagrees with that of Adebayo (2008) and Ahmed (2013) who in their separate studies found significant relationship between reading comprehension and academic performance of students. This finding however is not in conformity with the finding of Menaka and Justin (2017) who in the same study found significant relationship between reading comprehension and academic performance of students. Table 4, also revealed weak and insignificant relationship between learning style and academic performance of undergraduate students of Gombe State University this result is contrary with the findings of Oluwatomi and Ogbo (2014) who found opposite of this finding.

The low insignificant levels of correlation of the two variables in this study and their weak correlation on the academic performance of undergraduate students of Gombe State University could be due to a number of factors such as memorization (cramming). As an example with regard to reading comprehension, it is quite surprising, because normally, reading comprehension should predict academic performance of students but in this study it failed to be significant, and perhaps, the reason is from the observation of the researcher and the comment from the students that most students are into cramming their notes and handouts instead of comprehending it based on that, students are likely to perform well in the exams even without comprehending what they have been taught. The second possible reason for this is that the scores used in the reading comprehension and learning style were self-reported by the students whereas the academic results and averages were obtained directly from the University records. It is known that subjects often distort the truth and respond according to what they think is expected by the researcher.

This research finding is contrary to the previous studies because of some plausible factors such as design used, participant setting or level, and perhaps distorted response from the participants. For example, research conducted by Justin and Menaka (2017) found opposite result of this finding, the reason perhaps because of difference in the use of design. In their study they used ex post factor design because their variable of interest involved gender and age which cannot be manipulated because of its natural dichotomy while this study used correlation design, based on this there is much likelihood that the findings could be different.

This finding also is similar to that of Oluwatomi and Ogbo (2014) because they use similar topic, design and even the level of the participants to this study thus, their findings were similar to present study. This study also used global learning style to predict undergraduate students' academic performance, ordinarily learning styles are classified into some branches for instance Keefe (1987) categorized learning style into three which include kinaesthetic, visual and auditory. Kolb (1985) also classified learning style into four which include converger, diverger, assimilator and accommodator. However, this study has not focused on these divisions. It merely used general learning style without focusing on the already classified learning style and that is the major limitation of this study.

## **Conclusion**

Based on the findings of the study, the researchers conclude that reading comprehension and learning style do not make statistically significant contributions to the predictions of the academic performance of Gombe State University undergraduate students. And that both these variables accounted for only 1.9% to the explanation of the variability of undergraduate students' academic performance. It thus implies that over 98.1% of the variability in the Gombe State University undergraduate students' performance resides in other factors outside these that were considered in this study.

## **Recommendations**

Based on the findings of the study, the following recommendations were made:

- 1) Based on the result of the findings that shown reading comprehension could not predict undergraduate academic performance. The researcher therefore recommends that

lecturers should form a divergent question in the examination that requires no rote or memorization of the content (cramming).

- 2) Since 98.1% of these factors cannot contribute to the explanation of the variability of the students' academic performance the researcher therefore recommends that researches should be conducted on the non-cognitive factors.

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