African Journal of Mathematics and Statistics Studies
ISSN: 2689-5323
Volume 5, Issue 3, 2022 (pp. 1-15)
www.abjournals.org

STATISTICAL ANALYSIS OF STUDENTS' READING HABITS AND THEIR ACADEMIC PERFORMANCE IN TERTIARY INSTITUTION: A CASE STUDY OF THE DEPARTMENTS IN SCHOOL OF APPLIED SCIENCES FEDERAL POLYTECHNIC, EKOWE BAYELSA STATE

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Cite this article:

Oti E.U., Willy N.O., Olusola M.O., Alvan W.K. (2022), Statistical Analysis of Students' Reading Habits and their Academic Performance in Tertiary Institution: A Case Study of the Departments in School of Applied Sciences Federal Polytechnic, Ekowe Bayelsa State. African Journal of Mathematics and Statistics Studies 5(3), 1-15. DOI: 10.52589/AJMSS-RB3IMWBB.

Manuscript History

Received: 11 June 2022

Accepted: 17 July 2022

Published: 9 Aug 2022

ABSTRACT: *Reading is seen as a process of looking at a written or printed word (or symbol) and getting meaning from them. For a student to have good academic performance, it is perceived that the students should have good reading habits which correlate to the fact that there is a relation between reading habits and academic performance. The test statistic used in this research is the chi-square test of independence, the data used is a primary data gotten through the use of questionnaire administered to the students in the School of Applied Sciences, Federal Polytechnic Ekowe, Bayelsa State. The questionnaire is based on students' reading habits and their academic performance, the result of the analysis was carried out at 5% level of significance which revealed that academic performance, grade point average, cumulative grade point average, and reading habits are independent of their departments.*

KEYWORDS: Academic Performance, Chi-Square test of independence, Departments, Knowledge, Reading.

Article DOI: 10.52589/AJMSS-RB3IMWBB
DOI URL: https://doi.org/10.52589/AJMSS-RB3IMWBB

INTRODUCTION

Reading is perceived as the process of taking in the sense or meaning of letters, symbols, documents, etc., especially by sight or touch. The perception of reading emphasizes the belief that whoever reads is acquiring knowledge, which is imperative to the aphorism "knowledge is power" signifying that the more one knows, the more one will be able to control events. The most vital skills students' need to acquire in order for them to succeed in their academics are good reading habits (Ghulam, 2013); reading is an essential process that helps the conception of ideas and knowledge in ones field of specialization (Chand, 2013; Ahmad et al., 2014; Egong, 2014).

Reading is not just an important professional skills, it is also a way to enjoy informative, creative and inspiring works of literature that enrich our life experiences (Liu, 2005). Reading requires a lot of concentration, and success in tertiary institution depends on ones reading ability; that is why reading represents the students' studying time and it is therefore expected of all students to improve on their reading capacity or ability to ensure a better academic performance (Ogbodo, 2010).

Reading habits are well-planed and deliberate pattern of study which has attained a form of consistency on the part of students towards understanding academic subjects and passing at examinations (Chettri and Rout, 2013). Sangkaeo (1999) defined reading habits to mean the behavior which express the likeness of reading of individual, which occur regularly of leisure reading approach, types of reading, tastes of reading, use of library services viewing on what they have read fixing on objectives of reading. Reading habits determine the academic performance of students to a great extent (Krashens, 1993; Deavers, 2000; Issa et al., 2012; Onovughe, 2012). Both reading habits and academic performance are interrelated and depends on each other (Palani, 2012).

Academic performance is the measurement of students' achievement across various academic subjects (Aremu, 2000; Akabuike and Asika, 2012; Egong, 2014). Teachers and perhaps educationalists measures academic achievement using classroom performance, graduation grades and results from standardized test (Bakare, 1977; Ogbodo, 2010). Also, academic performance could be expressed as the nucleus around which a whole lot of significant components of education system revolve, which is why the academic performance of students, specifically that belonging to higher education institutions, has been the area of interest among researchers, parents, and policy planners. Since a sound academic performance is considered as a pre-requisite for securing good jobs, a better career and subsequently a quality life (Karim and Hasan, 2007).

The purpose of this paper is to carry out a statistical analysis of students' reading habits and their academic performance using chi-squares test of independence at 5 percent level of significance

The rest of this paper is organized as follows: section 2 is centered on the review of related literature; section 3 discusses the materials and methods of the study, section 4 deals with data presentation and analysis, and section 5 concludes the paper.

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Related Work

Guthrie et al. (1986) emphasized that reading activities contribute to individual and social development according to qualitative studies. Hypotheses regarding the social contexts of reading activities were tested in two studies. Social context was operationalized in terms of educational environment, occupational category, and the settings of works and leisure. Significant three-way interactions were found between (a) education, setting, and the contents of reading $(p < 0.01)$; and (b) occupation, setting, and reading contents $(p < 0.001)$; because social contexts influence reading practices. Hence, they should be considered in educational planning.

Saumell et al. (1999) worked on the study that examined a broad spectrum of college students' understanding of reading to determine whether a distinct difference exists in the understanding between "underprepared" or "at- risk" students and other college students. The 102 college students fell into three categories: students enrolled in a community college skills-based reading course, students enrolled in a university strategy-based reading class, and successful upper division university students. Students responded in writing to 2 questions about reading, and their responses were analyzed using a qualitative approach. Students of lower ability characterized good readers as those who read quickly and often, and they characterized the reading process as a passive activity.

Scales and Rhee (2001) presented an analysis of 115 adult responses to a questionnaire about their reading habits and patterns. Specifically, it was hypothesized that when grouped with demographic variables, participants' responses about their reading habits and patterns would not differ. The t-test and chi-square analyses were used to test significance of differences between them. Differences were found between the groups for reading habits and for reading patterns. Pearson r values were calculated to determine relationships between participants' reading habits and patterns, both positive and negative relationships were found. Additionally, through multiple regression analysis, it was determined that gender race and education were predictors for participants' education and race were predictors for reading patterns.

Chen (2007) study was centered on data from two national surveys to investigate the amount of time Taiwaness college students spend on extracurricular reading. Findings were interpreted in relation to prior research on the reading habits of college students internationally. The study found that:

- Female students on average did not spend more time on extracurricular than males.
- Students from public institutions who generally have higher academic competence did not spend more time reading than students from private institutions.
- Education majors spent the least time on extracurricular reading.
- Newspapers, magazines, and bestsellers were the most popular reading materials but graphic novels had medium popularity.

Smith (2010) study explained that 84 adults were employed in a wide variety of occupations and participating in a study of reading skills development, completed questionnaires concerning their reading attitudes, reading habits, and perceptions about reading. Both adults

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with more education and adults employed in higher status occupations were found to have more positive attitudes toward reading and to spend more time reading. Adults with more education employ more sophisticated models of reading in considering how good and poor readers differ.

Tveit (2012) investigated the study of reading and library habits among teenagers in Oslo, Norway using qualitative interviews with four girls demonstrated individual variation in their library tastes and in the roles of reading they take on. The survey gives an overview of teenagers' library use and their literature preferences, and detects that girls and boys differ in preferences of reading media. The survey showed different patterns in reading frequency and reading materials in the sense that students from the schools with the closest connection to the public library read more, as well as in a broader range of reading materials than students from schools with no such connection.

Huang et al. (2014) employed a study with a convergent mixed method research design which investigates reading habits of American college students. A total of 1,265 (466 male and 799 female) college students voluntarily participated in the study by completing a self-reported survey. Twelve students participated in the semi-structured interviews and classroom observations. Descriptive analysis indicated that the hours students spent weekly on academic reading, extracurricular reading, and the internet were 7.72 hours, 4.24 hours, and 8.95 hours respectively. A multiple linear regression and a zero-order correlation statistical analysis indicated the internet and socializing with others were significant factors that college students devoted to conventional academic and extracurricular reading.

Duncan and Freeman (2020) presented the results of a national survey into whether, what, how, and why adults across Britain may read aloud rather than in silence. Analyzing data from 529 questionnaire responses, the article examines the frequency with which different text types are read aloud, the formations in which this is done-alone, with one other person or in a group and the purpose of reading aloud and being read to, with attention to different purposes across contexts and life domains, and that it has a significant relationship with aspects of the life course and with identity formation and performance.

MATERIALS AND METHODS

Research Design and Sample Population

The study adopted the use of survey design method in the conduct of the study. The choice of the survey design was to enable the researchers gather a wide range of relevant data adequate for the study. The source of data for this study is a primary data source which was collected through the use of a questionnaire in relation to students' reading habits and their academic performance in tertiary institution. In this study, 170 respondents were randomly selected amongst students from the three departments in School of Applied Sciences (SAS), Federal Polytechnic, Ekowe Bayelsa State which comprises of 50 respondents in Computer Science (CSc), 50 respondents in Statistics (Stat), and 70 respondents in Science Laboratory Technology (SLT).

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Method of Data Analysis

The method of data analysis used for this study is the chi-square test of independence which is used to determine if there is a significant relationship between two nominal or categorical variables.

Chi-Square Test of Independence

The chi-square distribution is used in testing the null hypothesis that two variables of classification are independent. That is, that the frequencies of occurrence of one variable is the same no matter the frequencies of occurrence of their variable (Oyeka, 2013). For example, we may be interested in testing the null hypothesis in a certain polytechnic if the reading habit of students' is independent of their departments. In such a study, the observed data are usually presented in a table called a contingency table, the levels of one of the variables represent the rows and the levels of the other variable represent the columns. A contingency table with r row and c columns is referred to as an $r \times c$ (read $r\ by\ c$) contingency table. The intersections of the rows and the columns are referred to as cells.

The decision as to whether the discrepancies are small or large is made on the basis of the size of the quantity calculated by using the test statistic.

$$X^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \tag{3.1}$$

Here, O_{ij} represents the observed frequency in the i^{th} row and j^{th}column of the contingency table of interest, while E_{ij} is the corresponding expected frequency. To calculate the expected frequencies, we first recall that if two events are independent, the probability of their joint occurrence is equal to the product of their individual probabilities. Hence, under the null hypothesis that the two variables of classification in a contingency table are independent, the probability of occurrence of the entry in the $(i, j)^{th}$ cell is calculated as.

$$P_{ij} = P_{i.}P_{.j} = \frac{n_{i.}}{n}\frac{n_{.j}}{n} \tag{3.2}$$

The corresponding expected frequency E_{ij}, under H_0, is then obtained by multiplying P_{ij} by the total frequency, n that is,

$$E_{ij} = np_{ij} = n\left(\frac{n_{i.}}{n}\frac{n_{.j}}{n}\right) = \frac{n_{i.}n_{.j}}{n} \tag{3.3}$$

Thus, the general formula for calculating the expected frequencies in a contingency table, when the null hypothesis of independence is true, is given by $E_{ij} = \frac{n_{i.}n_{.j}}{n}$

Decision Rule

If the calculated X^2 value is less than the tabulated (critical value) $X^2_{1-\alpha;}(r-1)(c-1)$, we do not reject but accept the null hypothesis of independence at the level of significance;

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otherwise the null hypothesis is rejected. Here, $(r-1)(c-1)$ is the degree of freedom and levels of significance are all gotten from the chi-square distribution table.

Research Hypotheses

In order to achieve the goal of the study, the following hypotheses are to be tested:

H_0: There is no significance difference of the students' reading habits and their academic performance.

H_1: There is significance difference of the students' reading habits and their academic performance.

DATA PRESENTATIONS AND ANALYSIS

The data presented below in a tabular form are sample results generated via questionnaire from students in the three departments of SAS, Federal Polytechnic, Ekowe Bayelsa State.

Table 4.1: Sample results of academic performance of students in the three departments of SAS

Academic performance	Departments		
	Stat	CSc	SLT
A's	4	5	7
AB's	6	4	9
B's	8	6	14
BC's	15	17	20
C and others	17	18	22

Table 4.2: Sample results of students' grape point average (GPA) in the 3 departments of SAS

Departments	Grade Point Average			
	Less than 2.50	2.50 – 2.99	3.00 – 3.49	3.50 and above
Stat	16	14	13	7
CSc	18	10	14	8
SLT	15	20	27	10

Table 4.3: Sample results of students' cumulative grade point average (CGPA) in the three departments of SAS

Departments	Cumulative Grade Point Average			
	Less than 2.50	2.50 – 2.99	3.00 – 3.49	3.50 and above
Stat	13	16	15	6
CSc	15	11	16	8
SLT	11	21	30	10

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www.abjournals.org

Table 4.4: Sample results of students' reading habits in relation to their departments

Departments	Reading Habits	
	Regularly	Occasionally
Stat	31	19
CSc	30	20
SLT	41	31

DATA ANALYSIS

Considering the data in table 4.1, we have to first sum the rows and columns before generating the expected values from the observed values which proceeds in the following way:

Academic Performance	Departments			Total
	Stat	CSc	SLT	
A's	4	5	7	16
AB's	6	4	9	19
B's	8	6	14	28
BC's	15	17	20	52
C and others	17	18	22	57
Total	50	50	72	172

The expected values of the chi-square independent are generated using the formula $E_{ij} = \frac{n_{i.}n_{.j}}{n}$ which implies that:

$$E_{11} = \frac{16 \times 50}{172} = 4.6512, \quad E_{12} = \frac{16 \times 50}{172} = 4.6512, \quad E_{13} = \frac{16 \times 72}{172} = 6.6977$$

$$E_{21} = \frac{19 \times 50}{172} = 5.5233, \quad E_{22} = \frac{19 \times 50}{172} = 5.5233, \quad E_{23} = \frac{19 \times 72}{172} = 7.9535$$

$$E_{31} = \frac{28 \times 50}{172} = 8.1395, \quad E_{32} = \frac{28 \times 50}{172} = 4.6512, \quad E_{33} = \frac{28 \times 72}{172} = 11.7209,$$

$$E_{41} = \frac{52 \times 50}{172} = 15.1163, \quad E_{42} = \frac{52 \times 50}{172} = 15.1163, \quad E_{43} = \frac{52 \times 72}{172} = 21.7674,$$

$$E_{51} = \frac{57 \times 50}{172} = 16.5698, \quad E_{52} = \frac{57 \times 50}{172} = 16.5698, \quad E_{53} = \frac{57 \times 72}{172} = 23.8605,$$

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ij	O_{ij}	E_{ij}	$O_{ij} - E_{ij}$	$(O_{ij} - E_{ij})^2$	$(O_{ij} - E_{ij})^2 / E_{ij}$
11	4	4.6512	- 0.6512	0.4241	0.0912
12	5	4.6512	0.3488	0.1217	0.0262
13	7	6.6977	0.3023	0.0914	0.0136
21	6	5.5233	0.4767	0.2272	0.0411
22	4	5.5233	- 1.5233	2.3204	0.4201
23	9	7.9535	1.0465	1.0952	0.1377
31	8	8.1395	- 0.1395	0.0195	0.00239
32	6	8.1395	- 2.1395	4.5775	0.5624
33	14	11.7209	2.2791	5.1943	0.4432
41	15	15.1163	- 0. 1163	0.0135	0.00089
42	17	15.1163	1.8837	3.5483	0.2347
43	20	21.7674	- 1.7674	3.1237	0.1435
51	17	16.5698	0.4302	0.1851	0.0112
52	18	16.5698	1.4302	2.0455	0.1234
53	22	23.8605	- 18605	3.4615	0.1451
$\sum_{i=1}^{r}\sum_{j=1}^{c}$	172	172			2.3967

Now, $\sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(O_{ij}-E_{ij})^2}{E_{ij}}$ = 2.3967 which is the test statistics value or calculated chi-square value, α = 0.05 and the chi-square tabulated which is also known as the critical value is written as X^2 critical $= X^2_{1-\alpha;}(r-1)(c-1) = X^2_{1-0.05;}(5-1)(3-1) = X^2_{0.95;}8 = 15.507$.

Since the test statistics value = 2.3967 < critical value = 15.507; we do not reject H_0 and therefore conclude that students' academic performance is independent of their department.

Also, summing the rows and columns of table 4.2 gives

Departments	Grade Point Average				Total
	< 2.50	2.50 – 2.99	3.00 – 3.49	> 3.50	
Stat	16	14	13	7	50
CSc	18	10	14	8	50
SLT	15	20	27	10	72
Total	49	44	54	25	172

The expected values of the chi-square independent are also generated using the formula $E_{ij} = \frac{\text{row total} \times \text{column total}}{\text{over all total}}$ this implies that:

$E_{11} = \frac{50 \times 49}{172} = 14.2442$, $E_{12} = \frac{50 \times 44}{172} = 12.7907$, $E_{13} = \frac{50 \times 54}{172} = 15.6977$,

$E_{14} = \frac{50 \times 25}{172} = 7.2674$,…, $E_{33} = \frac{72 \times 54}{172} = 22.6046$, $E_{34} = \frac{72 \times 25}{172} = 10.4651$

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Next, we find the test statistic value or calculated chi-square value using the formula $\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(O_{ij}-E_{ij})^2}{E_{ij}}$ that is

Ij	O_{ij}	E_{ij}	$O_{ij} - E_{ij}$	$(O_{ij} - E_{ij})^2$	$(O_{ij} - E_{ij})^2/E_{ij}$
11	16	14.2442	1.7558	3.0828	0.2164
12	14	12.7907	1.2093	1.4624	0.1143
13	13	15.6977	-2.6977	7.2776	0.4636
14	7	7.2674	-0.2674	0.0715	0.0098
21	18	14.2442	3.7558	14.1060	0.9903
22	10	12.7907	-2.7907	7.7880	0.6089
23	14	15.6977	-1.6977	2.8822	0.1836
24	8	7.2674	0.7326	0.5367	0.0739
31	15	20.5116	-5.516	30.4263	1.4834
32	20	18.4186	1.5814	2.5008	0.1358
33	27	22.6046	4.3954	19.3195	0.8547
34	10	10.4651	-0.4651	0.2163	0.0207
$\sum_{i=1}^{r}\sum_{j=1}^{c}$	172	172			5.1554

The test statistic value is 5.1554 and at $\alpha = 0.05$ the critical value which is X^2 critical $= X^2_{1-\alpha;}(r-1)(c-1) = X^2_{1-0.95;}\,6 = 12.592$

Also, since the test statistic value = 5.1554 < critical value = 12.592; we accept the null hypothesis H_0 and Conclude that the grade point average of the students is independent of their departments.

The totals and the observed values of table 4.3 are:

Departments	Cumulative Grade Point Average				Total
	< 2.50	2.50 – 2.99	3.00 – 3.49	> 3.50	
Stat	13	16	15	6	50
CSc	15	11	16	8	50
SLT	11	21	30	10	72
Total	39	48	61	24	172

The expected values are:

$E_{11} = \frac{50\times 39}{172} = 11.3372,\quad E_{12} = \frac{50\times 48}{172} = 13.9534,\quad E_{13} = \frac{50\times 61}{172} = 17.7326,\ldots,$

$E_{32} = \frac{72\times 48}{172} = 20.0930,\quad E_{33} = \frac{72\times 61}{172} = 25.5349,\quad E_{34} = \frac{72\times 24}{172} = 10.0465$

Calculating the chi-square value, we have:

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Ij	O_{ij}	E_{ij}	$O_{ij} - E_{ij}$	$(O_{ij} - E_{ij})^2$	$(O_{ij} - E_{ij})^2/E_{ij}$
11	13	11.3372	1.6628	2.7649	0.2439
12	16	13.9534	2.0466	4.1886	0.3002
13	15	17.7326	-2.7326	7.4671	0.4211
14	6	6.9767	-0.9767	0.9539	0.1367
21	15	11.3372	3.6628	13.4161	1.1834
22	11	13.9534	-2.9534	8.7226	0.6251
23	16	17.7326	-1.7326	3.0019	0.1693
24	8	6.9767	1.0233	1.0471	0.1501
31	11	16.3256	-5.3256	28.3620	1.7373
32	21	20.0930	0.907	0.8226	0.0409
33	30	25.5349	4.4651	19.9371	0.7808
34	10	10.0465	-0.0465	0.0022	0.0002
$\sum_{i=1}^{r}\sum_{j=1}^{c}$	172	172			5.789

The test statistic value is 5.789 at α = 0.05 and the critical value X^2 critical $= X^2_{1-\alpha;}(r-1)(c-1) = X^2_{0.95;}\,6 = 12.592$, since the test statistics value = 5.789 < critical value = 12.592; we do not reject the null hypothesis and conclude that the students' cumulative grade point average is also independent of their departments.

Finally, using table 4.4 to compute the total of the rows and columns and also the expected values we have:

Departments	Reading Habits		Total
	Regularly	Occasionally	
Stat	31	19	50
CSc	30	20	50
SLT	41	31	72
Total	102	70	172

$$E_{11} = \frac{50 \times 102}{172} = 29.6512, \quad E_{12} = \frac{50 \times 70}{172} = 20.3488, \quad E_{21} = \frac{50 \times 102}{172} = 29.6512,$$

$$E_{22} = \frac{50 \times 70}{172} = 20.3488, \quad E_{31} = \frac{72 \times 102}{172} = 42.6977, \quad E_{32} = \frac{72 \times 70}{172} = 29.3023$$

To find the chi-square value, we have

Ij	O_{ij}	E_{ij}	$O_{ij} - E_{ij}$	$(O_{ij} - E_{ij})^2$	$(O_{ij} - E_{ij})^2/E_{ij}$
11	31	29.6512	1.3488	1.8193	0.0614
12	19	20.3488	-1.3488	1.8193	0.0894
21	30	29.6512	0.3488	0.1217	0.0041

Article DOI: 10.52589/AJMSS-RB3IMWBB
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22	20	20.3488	-0.3488	0.1217	0.0060
31	41	42.6977	-1.6977	2.8822	0.0675
32	31	29.3023	1.6977	2.8822	0.0984
$\sum_{i=1}^{r}\sum_{j=1}^{c}$	172	172			0.3268

The test statistic value is 0.3268 at $\alpha = 0.05$ and the critical value is X^2 critical $= X^2_{1-\alpha;}(r-1)(c-1) = X^2_{0.95;}\,2 = 5.991$

Also, since the test statistic value which is 0.3268 < critical value = 5.991, we do not reject the null hypothesis H_o and conclude that the reading habit of the students are independent of their departments.

CONCLUSION

Based on the results of this study, it was observed that students' academic performance are independent of their departments, meaning that it does not depend on the departments for students to have good academic performance but rather on the individual students.

It was also observed that grade points average, cumulative grade point average and students' reading habits are independent of their departments, pointing to the fact that it depends on the individual students for the attainment of a successful grade point average, cumulative grade point average and a good (regularly) reading habits.

RECOMMENDATIONS

Based on the findings of this study, it is recommended that the polytechnics management and Federal government should ensure that students improve in their reading habits and communication skills by providing enabling environment at school such as electronic library well equipped with good materials, good classrooms, rich and varied space where risks are minimized and well managed and students are protected from harm and abuse.

It is further recommended that every lecturer should examine the students with classwork, quiz, and assignments after lecture hours and at least three term papers to summit before the end of every semester.

Finally, it is recommended that parents should help their children cultivate good reading habits and communication skills when they are young, so that it becomes part and parcel of their life style as they grow up.

Article DOI: 10.52589/AJMSS-RB3IMWBB
DOI URL: https://doi.org/10.52589/AJMSS-RB3IMWBB

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DOI URL: https://doi.org/10.52589/AJMSS-RB3IMWBB

African Journal of Mathematics and Statistics Studies
ISSN: 2689-5323
Volume 5, Issue 3, 2022 (pp. 1-15)

www.abjournals.org

APPENDIX

Questionnaire of students' reading habits and their academic performance in tertiary institution; answer the following questions below as sincere as you can to enable appropriate statistical analysis by filling necessary blank spaces or by ticking where necessary.

Note: Any information given will be treated as confidential.

SECTION A: Personal Data

1. Name ……. (optional)
2. Sex: (a) Male [ ] (b) Female [ ]
3. Marital Status: (a) Single [ ] (b) married [ ] (c) divorced [ ]
4. Department or course of study ……..
5. Age (Optional) ……
6. Level of program:(a) ND 1 [ ] (b) ND 2 [ ]

SECTION B: Reading Habits and Academic Performance of Students in Tertiary Institution.

7. How many days do you go for lectures in a week? (a) Once [ ] (b) Twice [ ] (c) Thrice [ ] (d) more …….
8. How many hours on the average do you read per week? (a) Three [ ] (b) Five [ ] (c) Seven [ ] (d) More [ ]
9. How can you rate your reading habits? (a) regularly [ ] (b) occasionally [ ]
10. How many lectures do you attend in a day? (a) Two [ ] (b) three [ ] (c) five [ ] (d) more …….
11. How many of the following grades did you have in the average last semester? (a) A's [ ] (b) AB's [ ] (c) B's [ ] (d) BC's [ ] (e) C's and below ……
12. How many courses did you offer last semester? (a) less than seven [ ] (b) between seven and ten [ ] (c) eleven and above [ ]
13. Which of your course do you enjoy most (indicate the title and code)…… ……
14. How often do you study? (a) regularly [ ] (b) occasionally [ ]

Article DOI: 10.52589/AJMSS-RB3IMWBB
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15. Can you attribute your academic performance to your reading habits? (a)Yes [ ] (b) No [ ]

16. How has your reading habits contributed to your C.G.P.A? (a) Increasing [ ] (b) decreasing [ ] (c) On the average [ ]

17. What was your grade point average in your last semester? (a) less than 2.00 [ ] (b) 2.00 - 2.49 [ ] (c) 2.50 - 2.99 [ ] (d) 3.00 - 3.49 [ ] (e) 3.50 - 4.00 [ ]

18. What was your cumulative grade point average? (a) less than 2.00 [ ] (b) 2.00 - 2.49 [ ] (c) 2.50 - 2.99 [ ] (d) 3.00 - 349 [ ] (e) 3.50 - 400 [ ]

Article DOI: 10.52589/AJMSS-RB3IMWBB
DOI URL: https://doi.org/10.52589/AJMSS-RB3IMWBB