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Full Length Research Paper

The influence of age and gender on class attendance plus the academic achievement of undergraduate Chemistry Education students at University of Calabar

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This article investigated the influence of age and gender on class attendance as well as Chemistry Education students' academic achievement in SED 281, at the University of Calabar. Descriptive survey research design was employed for the study. The target population was two hundred and twenty Chemistry Education students in the Department of Science Education, University of Calabar. A sample size of sixty-four (64) Chemistry Education students of 2018/2019 academic session was used for the study. Data were obtained from existing records for the research. These were: 2018/2019 first semester result of Secondary Chemistry Content 1 and students' register that had their ages. Results obtained showed that the mean score of the female students' class attendance was 83.76, which was greater than that of the males (67.2). The young and matured students had mean scores of 82.11 and 57.20, respectively. Independent t-test and analysis of variance (ANOVA) were used in the study. The null hypothesis that there is no significant difference in the academic performance of the students with regard to class attendance was not accepted. This paper recommends that class attendance should be made compulsory for all undergraduate students in Chemistry Education, University of Calabar.

Key words: Attendance, absent, chemistry, students, achievement.

INTRODUCTION

Society depends on science for economic development. Many scientists are committed to finding more efficient and effective ways to discover natural resources like petroleum and ore. Chemists that develop new chemical substances with potential technological applications and physicists that develop new phenomena like superconductivity develop knowledge that may spur economic development. In a situation where various countries of the world are engaged in economic competition, their support of science is to invest in their economic future (Science, 2011).

Science education is concerned with sharing of science content and process with individuals not traditionally considered part of the scientific community. The learners who are exposed to this scientific knowledge may be children, college students or adults (Wikipedia, 2019).

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The field teaches learners problem solving skill, manipulative skills as well as critical thinking skills. Science education has increasingly gained prominence in the world, especially in developing nations, because it is considered as a beacon for advancement. It is believed that education is a pivotal part of human development, and can positively influence standards of living, health and governance (Hamidu et al., 2014). More significantly, science education plays a key role in reshaping students' thought processes and patterns. It is apparent that since its inception in Nigeria, science education has brought a dramatic development in the area of education, science and technology as well as contributing immensely to the growth of the nation's economy. The overall importance of education in general and science education in particular to mankind cannot be over-emphasized. No nation can afford to neglect science education at any level of education and hope to thrive in any field of human endeavor. Science education is imperative for meaningful living in any society. It is at the centre of producing resources necessary for socio-economic, scientific and technological development needed for the advancement of any nation (Osuafor and Okonkwo, 2013).

If science is well taught at the primary, secondary and university level in Nigeria, it can propel the young generation into astonishing scientific discoveries. Fortunately, since Nigeria gained her independence in 1960, there has been a considerable national pursuit to increase scientific and technological capacity of the country. This is due to the fact that science is considered as a catalyst that enhances growth and development of a nation. Science and technology is considered as the pivot of any nation's development. The most important benefit of science has been the luxury it has brought to daily life. The mechanization of industrial processes has reduced human effort. Scientific discoveries have made life easy for man (Oak, 2018).

Chemistry and other natural science subjects like Physics and Biology are needed by students to study courses like Medicine/Surgery, Pharmacy, Engineering, Science Education, Science, Agriculture, etc., in tertiary institutions. According to the Joint Admission and Matriculation Board (JAMB) (2018/2019UME/D) in Nigeria, the mandatory subjects needed to study Medical/Pharmaceutical and Health Science and all courses in the sciences (Engineering/Environmental Technology, Agriculture, Education Science and Computer) in the university are English Language, Mathematics, Physics, Chemistry and Biology. Students are to have credit pass in all of them.

These subjects are very important for students' future career aspirations. Unfortunately, students perform poorly in these important subjects. Reports from West African Examination Council Chief Examiner in May/June for senior secondary school certificate examination in Chemistry indicated a persistent trend of students' poor

performance over the years (2014-2018).Their performance rates in Chemistry are 31.38, 25.20, 45.81, 49.18 and 46.12%, respectively.

This poor trend in external examinations as revealed by the earlier results indicates that Chemistry students did not have up to 50% credit pass in the five years under review. This is an indicator that Chemistry is not well taught in Nigerian schools.

Science education at all levels of education in Nigeria is in a deplorable state. A lot of assertions and empirical findings have been made for the reason for this poor performance. There are lack of science resources and this contributes to students' poor academic performance in Chemistry (Nbina and Obomanu, 2011; Neji et al., 2014).

A study done by Uzezi and Deya (2017) showed that there was significant difference in the academic achievement of students who belonged to a study group compared to their counterparts who did not belong to a study group. Purcell (2007) and Silvestri (2003) revealed that class attendance contributes immensely to academic outcomes of students.

Halpern (2007) investigated the relationship between class attendance and academic achievement of students using correlation analysis; there was a significant and moderate positive relationship between both (r=0.50, p<0.001). This supports the findings of Woodfield et al. (2006), that class attendance is a significant determinant of academic achievement. The study also found that entry qualifications based on 'A' level scores were also a significant factor of students' academic achievement. This suggests that students attending class are already predisposed to academic achievement.

Dey (2018)'s research on "Class attendance and academic performance: A subgroup analysis" suggested that attending class has a positive and significant effect on exam performance. Fadelelmoula (2018)'s research also had a positive relationship between class attendance and academic performance of students. A similar finding was observed by Khalid and Mehmood (2017).

Ahmed et al. (2013)'s study on "The effect of students' class attendance on their academic performance: A case study at Simad University Mogadishu" found a moderate relationship between class attendance and academic performance of students. Department for Education (2016) reported the link between absence and academic achievement. The findings showed that higher rate of absence leads to low level of academic performance. The report also revealed that female students miss fewer classes than male students. Kassarnig et al. (2017)'s research on "Class attendance, peer similarity, and students' academic performance" discovered that consistent class attendance strongly correlates with academic performance. Blad (2014) found out that students with poor class attendance had lower scores in test compared to their peers who never missed a class. It has been reported that increase in class attendance by

one standard deviation gave rise to increase in Mathematics performance (Njal, 2017). Halpern (2007)'s study on "Class attendance in higher education: Does it matter?" indicated that class attendance has a significant and moderate positive relationship with students' academic achievement.

In other studies that investigated gender effect, it was discovered that females perform better than males (Natasha, 2018). Alfan and Othman (2005), Woodfield et al. (2005), Smith (2004), Lee (2003) Nja et al. (2017) reported a non-joint effect of gender and class attendance on academic performance of Chemistry students. Some previous studies have suggested that females tend to attend class more than males. Woodfield et al. (2006), in a study of 650 students at Sussex University, found that class attendance of females with a mean of 88% was significantly higher than that of the males (84%). Kelly (2012), in a survey at University College Dublin, found that, for those who live on campus, there is a significant evidence (pp=0.004) that females have a higher rate. If a student does not attend at least 70% of the classes, he/she has a probability of two in three to receive a failing mark and a probability of 4 in 5 to have low grades. The 80% rule stated that if a student does not attend at least 80% of the classes, the probability to get failing grades is 50%, whereas the probability not to get high grades is 2 in 3.

In a study by Eisen et al. (2015), there was no statistically significant relationship between class attendance and students' performance after adjusting for control variables that included gender and age. Martin and Walker (2006), in their study on "Students' achievement and University Classes: Effect of Class Attendance, Peers and Teachers", showed that class attendance and class size do not significantly affect university students' learning outcome.

Majority of literature reviewed showed the importance of attending lectures on academic achievement of students; there were results that were at variance, though few. As there was no significant difference in the academic achievement of students who attended lectures and those who did not, this study sought to find out: if gender and age affect class attendance as well as Chemistry students' academic achievement.

Purpose of study

The purpose of this study is to investigate class attendance and its influence on the academic achievement of undergraduate Chemistry students.

Specifically, the study sought to find out:

(1) If age affects class attendance
(2) Influence of gender on class attendance.
(3) Influence of class attendance on academic achievement of undergraduate Chemistry students.

Research questions

The following research questions were used in the study.

(1) How does students' age influence class attendance?
(2) How does students' gender influence class attendance?
(3) What is the influence of class attendance on academic achievement of undergraduate Chemistry students?

Hypothesis

(1) The first null hypothesis stated that: there is no significant difference in class attendance with respect to age.
(2) Second null hypothesis stated that gender does not significantly influence class attendance of Chemistry Education in SED 281
(3) The third null hypothesis formulated that there is no significant difference in the academic achievement of Chemistry Education students in SED281 based on class attendance.

METHODOLOGY

Descriptive survey research design was employed for the study. The target population was two hundred and twenty Chemistry Education students in the Department of Science Education, University of Calabar. A total of sixty-four (64) Chemistry Education undergraduate students were chosen at random from the population. There were 35 males and 29 females. The existing records used were Secondary Chemistry Content 1 first semester result for 2018/2019 academic session and students' register that had their ages. Secondary Chemistry Content 1 first semester result provided the researcher with information on students' academic achievement. The students were classified in three groups based on the percentage of attendance: Group 1, students with low class attendance (50%-70%); Group 2, students with medium class attendance (70 - 85%); Group 3, students with high class attendance (over 85%). Groups 1, 2, and 3 consist of 20, 16 and 28 students, respectively.

RESULTS

Descriptive statistics of all variables by group (Table 1) showed that Group 3 had the highest examination mean of 71.5. This is the group with the highest class attendance mark of 100. The table also revealed that, young students had a higher class attendance mean of 82.11 compared to mature students that had a mean of 57.20. Females had a higher mean of 83.76 and males had a mean score of 67.2.

The t-calculated value of 13.98 was higher than the t-critical value of 2.20 at 62 degree of freedom and at 0.05 significant level. When the calculated value is higher than the critical value, the null hypothesis is not accepted as

Table 1. Descriptive statistics of all variables by group.

Variable unit	N	Min	Max	Mean	Standard deviation
Exam points					
Group 1	28	5	60	25.79	15.60
Group 2	20	23	68	41.1	14.59
Group 3	16	65	80	71.5	6.18
Total attendance 0-12 sessions (50-100)					
Group 1	28	50	70	57.8	8.44
Group 2	20	70	84	77.9	3.93
Group 3	16	85	100	87.38	1.86
Age (Years)		Attendance			
Young	36	15	21	82.11	5.72
Mature	28	21	40	57.20	8.47
Gender					
Male	35	-	-	67.2	12.30
Female	29	-	-	83.76	5.79
Age (Years)		Exams scores			
Young	34	70	90	54.64	19.15.
Mature	30	05	80	54.04	24.61
Gender					
Male	35	10	88	60.84	21.98
Female	29	05	90	83.76	5.79

there is significant difference in the result. This result therefore implies that there is a significant difference in the class attendance between (age) young and matured Chemistry students.

The t-calculated value of 6.66 was higher than the t-critical value of 2.20 at 62 degree of freedom and at 0.05 significant level. When the calculated value is higher than the critical value, the null hypothesis is not accepted as there is significant difference in the result. This result therefore implies that there was a significant difference in the class attendance between male and female Chemistry students.

The F -ratio value was 58.09922. If the obtained value of "F" is equal to or larger than this critical F-value, then the result is significant at that level of probability. In the result above, F-critical ratio was 3.14 with 63.2 degrees of freedom. In 2 columns and 63 rows on the F Table, the critical value of F is 3.14. Analysis obtained for F-ratio of 58.09922 was larger than the critical F-value of 3.14; as such, it was concluded that the result was significant at p<0.05. The null hypothesis which stated that there is no significant difference in the academic achievement of students with regard to class attendance was not accepted. Class attendance significantly influenced undergraduate   Chemistry   students'   academic achievement.

DISCUSSION

The first research question sought to find out if students' age influence class attendance. Table 1 showed that young students had a higher attendance mean of 82.11 compared to mature students that had a mean score of 57.20.

Table 2 was used to find out if the mean difference was statistically significant. The null hypothesis that stated that age does not significantly influence students' class attendance was not accepted. This was so as the t-calculated value of 13.98 was higher than the critical t-value of 2.20 at 62 degree of freedom and at 0.05 significant level. By conventional criteria, this difference is considered to be extremely statistically significant. This implies that students' ages influence their class attendance. This finding collaborated that of Sharon (2017) that younger students attend lectures more than matured students.

The second research question stated that does gender affect class attendance? This was answered in the affirmative as Table 1 shows that females had a higher

Table 2. Independent t-test of the influence of age on Undergraduates Chemistry students' class attendance (N=64).

Age	N	μ	SD	t-Cal
Young	36	82.1100	5.72	13.98
Matured	28	57.2700	8.47	-

*P-value ≤0.0001, t-critical 2.20, df=62.

Table 3. Independent t-test of the influence of gender on Undergraduate Chemistry students' class attendance (N=64).

Gender	N	μ	SD	t-Cal
Male	35	67.20	12.30	6.66
Female	29	83.76	5.79	-

*P-value ≤0.0001, t-critical 2.20, df =62.

Table 4. Mean, standard deviation and summary of analysis of variance (ANOVA) statistics of the effect of class on students' academic achievement.

Treatment	Low	Medium	High	Total
N	20	16	28	64
∑X	8`22	1144	722	2688
Mean	41.1	71.5	25.7857	42
∑X2	37826	82368	25186	145380
Std. Dev.	6.1752	15.5976	14.5851	22.7072

Source	SS	df	MS	
Between treatments	21301.4857	2	10650.742	F = 58.09922
Within treatments	11182.5143	61	183.3199	-
Total	32484	63	-	-

F-critical = 3.14, *P>0.05.

mean of 83.76 and male Chemistry students had a mean score of 67.2. Table 3 was used to find out if the mean difference was statistically significant. The null hypothesis that stated that gender does not significantly influence student's lecture attendance was not accepted. This was so as the t-calculated of 6.66 was higher than the critical t-value of 2.20 at 62 degree of freedom and at 0.05 significant level. By conventional criteria, this difference is considered to be extremely statistically significant. This implication of this result is that students' gender influence class attendance. This study collaborated that of Khan (2018) who discovered that on the average females attended class (81%) slightly more often than males (78%). In another study, it was discovered that there was a significant difference in the level of absenteeism between male and female students (tobs = 11.08; df = 198; p > 0.05) (Ojo et al., 2016).

The third null hypothesis stated that there is no significant difference in the academic achievement of Chemistry students with respect to class attendance. Table 4 shows that students with low class attendance had the lowest mean followed by students with medium class attendance while students with high class attendance rate had the highest academic achievement mean scores of 41.1, 71.5 and 25.7857, respectively. Analysis of variance (ANOVA) in Table 4 was used to find out if the observed mean scores difference was statistically significant. Analysis of variance revealed that the F value of = 58.09922 at 0.05 significant level was greater than the F-critical of 3.14, *P>0.05. When the calculated F-value is greater than the F-critical value, the result is statistically significant. The null hypothesis that stated that there is no significant difference between class attendance and the academic achievement of undergraduate Chemistry students was not accepted. This implies that class attendance significantly influenced students' academic achievement.

This work is in consonance with that of Dey (2018),

Fadelelmoula (2018), Khalid and Mehmood (2017), Ahmed et al. (2013) and Department for Education (2016) which revealed that low academic achievement is related to low class attendance. Based on measured attendance data of nearly 1,000 undergraduate students, "Kassarnig et al (2017) demonstrate that early and consistent class attendance strongly correlates with academic performance

Conclusion

The research indicated that class attendance is statistically significant in explaining class grade and overall performance of students. Students who miss class frequently significantly increase their chances of getting a poor grade in a given course. At the minimum, the research supports the idea that faculty should strongly encourage class attendance to increase students' examination grades.

Implication of the study to Basic Science and Biology teaching

This study has shown the importance of class attendance to academic performance in the Sciences. When pupils and Biology students attendance classes, they will have better understanding of concept taught that will pave way for improved academic achievement. Young learners are to be guided in the classroom to have maximum academic achievements.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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