Impact of the Use of Internet Resources on Undergraduate Student's Academic Achievement in Mathematics

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Key words: Internet resources, mathematics, gender and academic achievement

Abstract: This study was carried out to investigate the impact of the use of internet resources on undergraduate student's academic achievement in mathematics. The study employed descriptive survey research design and the area of the study is University of Nigeria, Nsukka. The study was guided by (2) research questions and (2) hypothesis. The population comprised of all undergraduate students in the Department of Mathematics and Department of Science Education in University of Nigeria, Nsukka. A sample of (100) undergraduate students was selected from the departments through simple random sampling technique. The sample comprised of 60 pure Mathematics students and 40 Mathematics education students. The Instrument used for data collection was Questionnaire on the Impact of the Use of Internet Resources on Academic Achievement in Mathematics (QIUIRAAM) structured on a four point Likert scale. The research instrument was face-validated by three experts. Cronbach Alpha technique was used to ascertain the internal consistency of the instrument and a reliability coefficient of 0.815 was obtained. The research questions were answered using mean and standard deviation while t-test was used to test the null hypothesis at 0.05 level of significance. The findings of the study revealed that academic oriented use of internet resource positively affects undergraduate student's achievement in Mathematics. The findings also showed that there is no significant difference in academic oriented use of internet resources for learning mathematics concepts between undergraduate student's in pure Mathematics and those in Mathematics education. The study also found that there is no significant influence of gender on undergraduate student's use of internet resources for learning Mathematics concepts. Based on the findings and implications of the study, it was recommended

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among others that internet resources should be made adequately available in Universities through collaborative efforts of the University authorities, policy makers, government and non-governmental organizations.

INTRODUCTION

Mathematics is a branch of science concerned with numbers, quantity and space, either as abstract concepts (pure Mathematics) or as applied to Physics, engineering and other subjects (applied Mathematics). Mathematics refers to the concept that studies about arithmetic, algebra, geometry and trigonometry. Mathematics is a broad subject that touches every facet of modern society. This is to say that mathematics is an indispensable and essential tool for scientific and technological development of a nation.

In recent years, it was observed that a higher percentage of undergraduate students perform relatively poor in Mathematics courses which may be due to the way the concepts are being presented or the complex nature of Mathematics concepts. Despite the importance placed on the subject, Mathematics courses are one of the most poorly taught, widely hated and abysmally understood in higher institutions. Agwagah[1] lamented that inspite of all the important roles Mathematics plays in the development of mankind, its achievement has been very poor at all levels of education. The researcher further revealed that even though the indispensability of mathematics in the development of our society has been universally acknowledged, the output of its teaching and learning is still not encouraging.

Also, Obodo[2] stated that throughout Nigeria, at all levels of education-primary, secondary and tertiary, the performance of pupils/students in mathematics is at a very poor state. This is evident as the result of students in mathematics at the graduating class of each level of education kept on deteriorating year in year out. This ill wind of poor achievement in mathematics is not only witnessed in Nigeria as Mathematical Association of America in their summary of student's academic achievement in mathematics revealed that 50% of university students do not pass calculus and analysis with a grade of C or above. This dishearten high failure rate in Mathematics at both pre-tertiary and tertiary levels has bothered the minds of many researchers, authors and Mathematics educators and even the government and attempts are being made to proffer some solutions. Hence, many researchers, Mathematics educators and concerned individuals have been considering ways and means of ensuring effective teaching and learning of mathematics in schools that can enhance student's achievement.

Achievement means to reach a required standard of performance and to carry out successfully a particular task. It involves the determination of the degree of attainment of individuals in tasks, courses or programmes to which the individuals were sufficiently exposed. Academic achievement has long been recognized as one of the important goals of education. Academic achievement refers to the average marks obtained by an individual in the final examination. According to Suthar and Tormizi[3] , high achievers usually possess high self-efficacy levels while the converse is true of low achievers. Schunk further stated that academic achievement is a product of a number of factors operating within the individual and outside him. Student's academic achievement entails successful academic progress attained through effort and skill. Academic achievement could be seen as the level of proficiency and knowledge demonstrated by an individual after learning has occurred.

Student's mathematics achievements in higher institutions may have an influential effect on their achievements in further studies and future careers. Having a solid background in mathematics helps students develop sophisticated perspectives and offers more career options. The importance of mathematical learning has repeatedly been emphasized by educators and policy makers[4]. Both teachers and parents have paid attention to student's achievement in mathematics and their progress every year. Educators have also called for improving student's overall performances and closing student's achievement gaps. Until teachers and parents recognize what factors that influence their undergraduate student's mathematics achievement and improvement, they will be unable to help them make substantial academic progress. Thus, Mathematics Educators have relied on many sources of information and focused on various factors that might affect student's mathematics achievements to include student's own backgrounds, peer environment, parental involvement, student's individual characteristics, student's use of internet resources, gender, age, collaborative learning, ethnicity, family characteristics, marital status and socio-economic status. Consequently, these students need a lot of active involvement in the teaching and learning process to cope with the subject. It is therefore within the benefit of education to introduce strategies that may be interesting to the student's learning such as learning through internet sources, especially now that internet has turned the whole world into a global village.

The Internet is an inseparable part of today's educational system. The academics increasingly depend on the Internet for educational purposes[5]. The internet is the transport vehicle for the information stored in files or documents on a computer. It carries together various

information and services such as electronic mail, online chat, file transfer, the interlinked Web pages and other documents of the World Wide Web (WWW) which can be used by undergraduate students in learning mathematics. In today's world, Internet plays a vital role in the teaching and learning of mathematics concepts, especially in the higher institutions. Updated and current information is well organized on the internet for easy search and has contributed significantly to student's academic laurels and achievement[6]. The use of the internet creates awareness of the importance of the world around the students.

The internet is the key information and communication technology that led to a worldwide revolutionary change in the information scenario[7]. The internet is a pool of knowledge in which any country that fails to provide her youth, especially the undergraduate students access to the use of internet resources is unseating the country from her throne of dignity among other dignitaries[8]. It is developed to serve as a platform for various activities for all students in a society. The availability of internet is almost everywhere and most undergraduate students have had access to internet on their cell phones[9].

However, despite the significance of internet usage to student's academic performance, its negative impacts are numerous. Some students use the internet for non-academic purposes such as gaming and social networking, thus culminating in loss of study schedules[10]. Besides, students use the internet for leisure rather than educational purposes[8] and this can lead to fallen academic standards. The topmost uses of the internet by university students is for charting, downloading of music, watching videos online, playing online games and online shopping. The internet can be a bad tool for higher academic achievement if only its usage is not controlled[11]. Researchers like Torres-Diaz *et al*.[12] found in their respective studies that a balanced use of the internet leads to greater academic success among students. This is true because if the students use the internet for non-academic purposes during their leisure or resting time only and then use it extensively for pure academic purposes in learning the contents of different subjects taught, their achievement may be beefed up.

Internet resources are the internet tools necessary in the effective performance of tasks and for the growth and development of human organizations. They are aids rendered to accomplish a goal or achieve. In other words, information is sourced from the Internet by utilizing its (Internet) resources. Internet resources in view of this study are referred to as the intangible/tangible activities/facilities/tools or equipment, software that can aid or help the users of the Internet to achieve benefits. These resources are therefore, the means through which

the Internet is accessed. The Internet has many resources that can be utilized for research by individuals. For the purpose of academic search, such resources include: Internet-enabled electronic devices; Internet Network facilities; Internet Browsers such as Google Chrome, Internet Explorer, Opera and Mozilla Firefox; Internet search engines; social network technologies or sites; services and electronic library resources[13]. The usefulness of internet resources in settling many academic cases and the fact that students perform relatively poor in mathematics at different levels of education is what prompted the researchers to investigate the impact of the use of internet resources on undergraduate student's academic achievement in mathematics.

Statement of the problem: Mathematics education in Nigeria appears to be in crisis as reflected in the poor achievement of students in undergraduate examinations. These failures in mathematics which also includes university students have a significant and serious impact on the educational advancement of students and nation at large. It impedes the achievement of the national objectives of science and technological development which depend tremendously on mathematics. Also, Poor access to internet resources, services and facilities for learning mathematics concepts may adversely affect their achievement.

Nevertheless, some factors like; lack of student's interaction and cooperation, inability of students to acquire learning materials, poor involvement of students on collaborative learning as well as inability of students to use the internet to procure relevant materials for solving a particular mathematical problem and inadequate use of multimedia in learning mathematics may also contribute to their achievement negatively and needs to be investigated. The problem of this study, therefore is to investigate the impact of the use of internet resources on undergraduate student's academic achievement in mathematics. Specifically, the study sought to investigate whether academic oriented use of internet resources affects undergraduate student's academic achievement in mathematics and to determine if there is any influence of gender on undergraduate student's use of internet for learning mathematics concepts in the universities.

Research questions: The following research questions have been posed to guide this study:

- What are the impacts of academic oriented use of internet resources on undergraduate students' academic achievement in Mathematics?
- What is the influence of gender on undergraduate student's use of internet resources for learning Mathematics concepts in the universities?

Hypothesis: The following null hypothesis were formulated by the researchers to guide the study and was tested at 0.05 level of significance:

- Ho_1: there is no significant difference in academic oriented use of internet resources for learning mathematics concepts between undergraduate student's in pure Mathematics and those in Mathematics education
- Ho_2: There is no significant influence of gender on undergraduate student's use of internet resources for learning Mathematics concepts

MATERIALS AND METHODS

This research employed descriptive survey research design. Descriptive survey research design is one which is aimed at collecting data and describing in a systematic manner the characteristics, features, or facts about a given population[14]. Descriptive survey research design is appropriate for this study because of the large population.The study was carried out in the University of Nigeria, Nsukka, due to the availability of internet resources and facilities such as Wi-Fi, Laptop in the school. It also provides constant power supply.

The population of the study comprised of all undergraduate students in the Department of Mathematics and Department of Science Education in the University of Nigeria, Nsukka. Purposive sampling technique was used to select Pure Mathematics and Mathematics Education unit of Science Education) from the two departments specified in the population. This was because their students offer related Mathematics courses from their first to fourth year in the university. The sample of this study consist of (100) pure Mathematics and Mathematics and Mathematics education undergraduate students (52 males and 48 females) of the University of Nigeria, Nsukka who were gotten through proportionate random sampling. This sample of 100 is made up of 60 pure Mathematics and 40 Mathematics education students. The Instrument used for data collection was Questionnaire on the Impact of the Use of Internet Resources on Academic Achievement in Mathematics (QIUIRAAM) structured on a four point Likert scale. The questionnaire was subjected to face and content validation by (3) expert of the University of Nigeria Nsukka. The reliability of the instrument was ascertained using Cronbach alpha with an index of 0.815.

The data were collected and analyzed through basic methods of both descriptive and inferential statistics. Specifically, the research questions were answered using means and standard deviations. The level of acceptance of the criterion mean is 2.50. Also t-test was used to test the hypothesis.

RESULTS

Data were analyzed, summarized and presented in the following tables below according to their respective research questions and hypothesis.

Research question one: What are the impacts of academic oriented use of internet resources on undergraduate student's academic achievement in Mathematics?

From Table 1, it can be seen that all the seven items 1-7 with their mean ranging from 3.29-3.67 were accepted it is above the 2.5 benchmark. The standard deviation of all the items which ranged from 0.54-0.68 shows that all the respondents are relatively not far from one another in their individual opinions. The cluster mean of 3.5171 and standard deviation of 0.3710, respectively indicated that academic oriented use of internet resources has positively affected undergraduate student's achievement in mathematics.

Research question two: What is the influence of gender on undergraduate student's use of internet resources for learning mathematics concepts in the universities?

The data in Table 2 revealed that items 8, 9, 10, 11, 12 and 14 were rejected since their mean were below 2.5 benchmark. However, item 13 with mean 2.5400 and standard deviation of 0.77094 was accepted as the mean was above the 2.5 criterion. The standard deviation of all the items which ranged from 0.71485-0.92611 implies that all the respondents have similar opinions on the influence of gender affect the use of internet resources for learning mathematics concepts. With the cluster mean of 2.3371, we can conclude that gender does not affect the use of internet resources for learning mathematics concepts:

- Ho_1: there is no significant difference in academic oriented use of internet resources for learning mathematics concepts between undergraduate student's in pure mathematics and those in mathematics education

Table 3: t-test on the Impact of Academic Oriented use of Internet Resources for Learning Mathematics concepts between undergraduate student's in pure Mathematics and students in Mathematics Education.

The data presented in the study shows that the aggregate mean responses of pure Mathematics and Mathematics education undergraduate students on academic oriented use of internet resources for learning mathematics concepts were 3.4714 and 3.5857 with a total number of 60 and 40, respectively. The corresponding standard deviations are 0.3590 and 0.3825.

Table 1: Descriptive statistics of the impacts of academic oriented use of internet resources on undergraduate student's academic achievement in Mathematics

Items	N	Mean	SD	Remarks
1. It provides relevant mathematics materials such as textbooks and electronic books to students at low cost	100	3.6300	0.59722	Accepted
2. It improve student's self-learning skills of abstract Mathematics concept	100	3.4300	0.68542	Accepted
3. It provide video clips that solve a given Mathematics problem	100	3.6400	0.54160	Accepted
4. It serve as a source of solution to students Mathematics assignment through the use of search engines	100	3.4100	0.57022	Accepted
5. It allows students to search for current information in online mathematics journals and articles	100	3.5800	0.55377	Accepted
6. It provides electronic software for career development of Mathematics students	100	3.2900	0.64042	Accepted
7. It is a sources of virtual Mathematics library which provides Mathematics document with portable document format (pdf) file extensions	100	3.6700	0.60394	Accepted
Grand mean		3.5771	0.37100	Accepted

Table 2: Descriptive statistics on the influence of gender on undergraduate students use of internet resources for learning Mathematics concepts

Items	N	Mean	SD	Remarks
8. Male Mathematics students are connected online mainly for social networking, e.g., face booking and chatting than female students	100	2.2300	0.81470	Rejected
9. Male Mathematics students uses internet resources for entertainment, e.g., playing of music than female Mathematics students	100	2.3100	0.73437	Rejected
10. Male Mathematics students engage on online activities for recreational purposes, e.g., online movies and online gaming than females	100	2.4500	0.89188	Rejected
11. Female Mathematics students use their e-mail for sending and receiving of relevant Mathematics textbooks and electronic books than the male Mathematics students	100	2.1500	0.80873	Rejected
12. Female Mathematics students uses internet mainly for online educational courses than their male counterpart	100	2.2100	0.71485	Rejected
13. Female Mathematics students do not use online chart rooms for solving Mathematical problems more than the male students	100	2.5400	0.77094	Accepted
14. Female Mathematics students uses internet resources to improve their self-learning skills than the male students	100	2.4700	0.92611	Rejected
Grand mean		2.3371	0.49799	Rejected

Table 3: t-test on the impact of academic oriented use of internet resources for learning mathematics concepts between undergraduate student's in pure Mathematics and students in Mathematics education

Students Department	N	Mean	SD	df	t-values	Sig(2-tailed)	Remarks
Pure Mathematics	60	3.4714	0.3590	98	-1.519	0.132	Not significant
Mathematics Education	40	3.5857	0.3825				

Table 4: t-test on the influence of gender on undergraduate student's use of internet resources for learning Mathematics concepts

Students Gender	N	Mean	SD	df	t-values	Sig(2-tailed)	Remarks
Male	52	2.2582	0.42907	98	-1.664	0.099	Not significant
Female	48	2.4226	0.5552				

The table reveals a t-value of -1.519 at a 98 degree of freedom with a (p = 0.132) greater than the criterion value (0.05). The null hypothesis is then accepted. Hence, there is no significant difference in academic oriented use of internet resources for learning Mathematics concepts between undergraduate student's in pure mathematics and those in Mathematics education:

- Ho$_2$: There is no significant influence of gender on undergraduate student's use of internet resources for learning mathematics concepts

The data presented in Table 4 shows that the aggregate mean responses of male and female respondents in both pure mathematics and mathematics education are 2.2582 and 2.4226 with a total number of 52 and 48, respectively. The corresponding aggregate values of standard deviations are 0.42907 and 0.5552. The table reveals a t = -1.664 at a 98 degree of freedom with a sig (2-tailed) or p = 0.099 greater than the criterion value (0.05). The hypothesis is then accepted. Hence, there is no significant influence of gender on undergraduate student's use of internet resources for learning mathematics concepts.

DISCUSSION

The result from Table 1 revealed that academic oriented use of internet resources has positive significant impacts on undergraduate student's academic achievement in mathematics. This means that academic oriented use of internet resources from item 1 through 7 can help in increasing the undergraduate student's achievement in mathematics. This is in agreement with the findings by Torres-Diaz et al.[12] who reported that a balanced use of the internet resources leads to greater

academic success among undergraduate students. However, Yebowaah[15] in a study of internet use and its impact on Senior High School students in the Wa Municipality reported that different uses of the internet among students do not influence their academic performance. The reason for the disagreement might be that the respondent of the researchers research are not up to university level.

The data presented in Table 3 revealed that the p-value is greater than the criterion value, thus, the null hypothesis is then accepted. Hence, there is no significant difference in academic oriented use of internet resources for learning mathematics concepts between undergraduate student's in pure Mathematics and those in Mathematics education. This is in line with the findings by Olatokun[8] who found no significant difference in the use of internet resources for research project.

Table 2 with the cluster mean of 2.3371 indicated that gender does not have any influence on the use of internet resources for learning Mathematics concepts which agreed with the findings of the hypothesis 2. The findings from the data presented in Table 4 showed that there is no significant influence of gender on undergraduate student's use of internet resources for learning mathematics concepts. This is in line with Mami and Hatami-Zad[11] who found no significant difference between male students and female students use of internet resources in universities with regards to internet addiction. However, the finding contradicts with Gross[16] whose result showed a significant gender difference in the usage of internet for research.

CONCLUSION

Academic oriented use of internet resources positively affects undergraduate student's achievement in mathematics. Therefore, it can be concluded that the use of internet resources for learning mathematics concepts significantly affect undergraduate student's academic achievement. As such, there is urgent need for lecturers to engage students in the use of internet resources for learning mathematics concepts. This could be made possible through the use electronic and computer-based method in teaching mathematics concepts.

RECOMMENDATIONS

The following recommendations have been made based on the findings of the study. Internet resources should be made adequately available in Nigeria Universities through collaborative efforts of the University authorities, government and non-governmental organizations.

Universities in collaborative effort with network providers and professional bodies should regularly organize seminar, workshops and training of mathematics educators as regards effective use of internet resources.

There should be orientation and re-orientation of Mathematics students on the use of Internet resources for learning mathematics concepts by authorities of educational institutions. Mathematics educators should engage students in computer assisted instruction through video conferencing use of e-Mail, electronic library and presentation software's.

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