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ENHANCING THE LEARNING OF BASIC CONCEPTS IN BIOLOGY WITH THE UTILIZATION OF MOBILE BIO-APPS AMONG BIOLOGY STUDENTS IN COLLEGE OF EDUCATION, IKERE, EKITI STATE, NIGERIA

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Abstract

The study examined the utilization of a mobile application that is biology-based in the learning of some basic concepts among NCE II students in the Department of Biology, College of Education, Ikere, Ekiti State, Nigeria. Among all the NCE Part II students which constituted the population, 60 students were purposively chosen and eventually randomly sampled into individualized Bio-Apps and collaborative Bio-Apps of 30 students each. These Bio-Apps groups have functional smart phones and their smartphones have biology dictionary downloaded on them. The third group of 30 students are of the traditional classroom and were randomly selected from the population. In all, 90 students formed the sample for this study. All the groups were exposed to the same instructional contents in BIO 214 (Plant Pathology). The individualized mobile Bio-Apps group was made to check basic concepts in plant pathology from the biology dictionary on their smart phones and participated as the classes progressed. The collaborative Bio-Apps group was made to check those basic concepts in plant pathology from their mobile Bio-Apps and collaborated among themselves in clusters while the classes progressed; while the traditional group was without mobile bio-apps and taken through traditional instructional strategy. Standardized Biology Achievement Test was administered on the three groups. Two research questions and two

hypotheses were raised and answered descriptively. The results from the analyses show that students in Mobile Bio-Apps groups performed better than their counterparts in traditional class. Meanwhile, students in the collaborative performed better than those in the individualized mobile bio-app. It was therefore recommended among others that, Mobile Bio-App should be integrated into students' learning of basic concepts in biology in a collaborative form so as to avoid distraction in using the mobile phones for something else other than learning while the teaching-learning lasted.

Keywords

Mobile Bio-Apps, Collaborative, Individualized

1. Introduction

Education remains the tool for meaningful citizens' engagements world-over; and the bedrock for national development. The ways and manners of handling information have changed in recent decades and this was not without its attendant effects on education. The much anticipated paradigm shift in instructional medium has never been this obvious as it is in recent decades.

Adedoja and Abimbade (2010) opined that “digital technologies may be forcing a change in the dominant paradigm of classroom-based education”. This posit is evidently obvious as the present day learners are “digital natives” whose level of versatility with mobile digital devices is without limitations. The incursion of mobile smart phones has contributed immensely to how information is being handled both in formal and informal setting. Jack (2017) puts it that “the rise of mobile devices has really brought significant changes to the way and how people live”. Meanwhile, David (2014) had cautioned that “the future of mobile learning in education and training holds much promises, but it also poses many challenges and dangers”. This notwithstanding, mobile learning, has obviously crept into teaching and learning as students rely heavily in surfing internet on mobile phones for assignments/homework especially in tertiary level of education.

Jorge, Amarolinda, Zanela, Angilberto and Eliane (2013) succinctly puts that smartphones and tablets computers, as well as other ultraportable devices, have already gained enough critical mass to be considered mainstream devices, being present in the daily lives of millions of higher education students. Though Traxler (2005), had argued that mobile learning is difficult to define, conceptualize and discuss; however, mobile learning is considered education via internet or network using personal mobile devices, such as tablets,

and smartphones to obtain learning materials through mobile apps, social interactions and online educational hubs (<http://igi-global.com>mobile>).

A mobile application, most referred to as an app, is a type of application software designed to run on a mobile device, such as a smartphone or tablet computer as espoused by Ryan (2019). Ellen (2014) had listed what was called “15 terrific science apps and games” which enhance the teaching and learning of science. Similarly, Jack (2017) had identified “the 23 best and free biology apps (android) for students and teachers. In a much related vein, Poonam (2017) had opined that among all the educational apps, biology dictionary has the ability to cement basics of biology. It was further submitted that “it is easy to navigate, simple to find terms and fun to learn from”. It should be noted that, Pahlifi and Nurcahyo (2019) while justifying the use of biology mobile apps remarked that, as important as biology dictionary are, students do not bring it into the school because the dictionary was large and heavy.

Atilla (2012) identified some difficult topics in biology and these include but not limited to matter cycle, endocrine system, and hormones, aerobic respiration, cell division etc. Gopi (2018) had adduced that, the study of pathology is challenging because it has different branches like mycology, fungal pathology, bacteriology, and virology. In essence, basic terms for all these branches must be well internalized by the beginners in order to learn better at the much complex stages. Meanwhile, Ozcan (2003) had posited that experiencing difficulties in biology negatively affects students’ motivation and achievement.

1.1 Statement of Problem

Giving the backdrop that the present day students are digital natives” with mobile phones taken along to all places- classroom inclusive. Students while in the biology classes take mobile phones with them and tend to check difficult concepts on their phones while the lecture lasted. This, has been frowned at considering inherent tendencies to distract students while the instruction lasted. It is however worrisome that, the quest for paradigm shift from traditional “teacher does it all” has not been giving needed attention in the classrooms. Lecture method is prevalent in most tertiary institutions in Nigeria. Hence, the inherent learning advantages in mobile devices are lost due to restrictions on the utilization of mobile devices during lecture method.

In the effect of the above problem and giving credence to the posit of Kukulska-helme (2010) that mobile learning needs to be understood as an emerging repertoire of learning and teaching practices rooted in the belief that interaction and collaboration within a traditional classroom are often not effective as they could be, hence, this present study was carried out.

1.2 Purpose of the Study

The general purpose of the study was to investigate into the means of enhancing the learning of Basic concepts in Biology with the utilization of mobile Bio Apps among Biology students in College of Education, Ikere, Ekiti State, Nigeria. Specifically, the study is set to;

- i. Examine the performance level of students taught using Mobile Bio Apps instructional strategies.
- ii. Examine the performance level of students taught in the traditional classroom.
- iii. Compare the learning outcomes of the two pedagogies and draw appropriate inference.

1.3 Research Questions

The following research questions were raised to guide the study:

1. Is there any significant difference in the learning outcomes of students taught with Mobile Bio Apps and those taught using traditional method?
2. Is there any significant difference in the learning outcomes of students taught using collaborative Mobile Bio Apps and those taught using individualized Mobile Bio Apps strategies?

1.4 Research Hypotheses

The following hypotheses were generated and tested for the study:

1. There is no significant difference in the learning outcomes of students taught with Mobile Bio Apps and those taught using traditional method
2. There is no significant difference in the learning outcomes of students taught using collaborative Mobile Bio Apps and those taught using individualized Mobile BioApps strategies

1.5 Scope of the Study

The scope of the study was limited to the students studying Biology related course in the College of Education, Ikere, Ekiti State, Nigeria. The students were appropriate because they have been taught topics in the syllabus during their first academic session. Meanwhile, Plant Pathology (BIO 214) which was used for this study is a 200 level course in the Nigeria Certificate in Education curriculum.

1.6 Significance of the Study

This study is significant in furtherance of the quest for a change from the traditional approach in teaching science in general and biology in particular. The study is also to serve as eye opener to biology teachers at tertiary education as to the necessity to integrate the use of

various and suitable “BioApps” into the teaching and learning of biology. This is more so that, smart phones are part and parcel of these students’ daily lives. It is also to further widen the horizons of the curriculum planners to continue to provide needed space to accommodate this nascent and inevitable shift in the instructional strategies.

2. Research Methodology

The study employed a descriptive survey design. A descriptive survey design was used due to the fact that it enables information to be obtained from a representative sample of a targeted population in order to describe situations as they exist. The investigation elucidated the means of enhancing the learning of basic concepts in Biology with the utilization of mobile Bio App among Biology students in College of Education, Ikere, Ekiti State, Nigeria.

2.1 Research Population

The targeted population for the study was all the students studying Biology related courses in College of Education, Ikere, Ekiti State.

2.2 Sampling Techniques

The experimental group for the study was made up of two sub-groups of individualized Mobile Bio Apps and Collaborative Mobile Bio Apps of 30 students each. The control group of 30 students were taken through traditional strategy. The Mobile Bio Apps is a Biology Dictionary downloaded by the experimental groups into their smartphones. A total of 90 students studying Biology related courses served as the sample for the study.

2.3 Research Instrument

The instrument for the study was performance test carefully structured by the researcher based on students’ knowledge and utilization of mobile Bio Apps on effective learning of basic concept in Biology in College of Education, Ikere. This test item, was administered to the comparison groups, the students were pretested before undergoing any kind of treatment by the researcher. The post-test was administered after the experimental and control group underwent their respective treatments. The outcomes of the various encounter in the form of the test scores were then subjected to appropriate statistical analysis to determine cause and effect relationship between the variables.

2.4 Procedure for Data Collection

The performance test was directly administered by the researcher to the subjects with the assistance of the research assistant. This, was done after the two groups have been taught using their respective strategies. The test papers were collected back by the researcher immediately after completion by students for collation and analysis.

2.5 Data Analysis Techniques

The data collected were analysed by using descriptive inferential statistics. For analysis of data, the researcher used descriptive statistical tools of frequency counts, simple percentage, mean and standard deviation to answer the two (2) research questions raised for the study while *t*- test of independence was used to test for the two (2) research hypotheses formulated at 0.05 level of significance.

3. Results and Discussion

The results of the analyses are presented are presented hereunder:

3.1 Research Question 1

Is there any significant difference in the learning outcomes of students taught with Mobile Bio Apps and those taught using traditional method?

Table 1: Responses to Difference in the Learning Outcomes of Students Taught with Mobile Bio Apps and those Taught using Traditional Method

Group	No (%)	Mean	SD
Mobile Bio Apps	60 (66.67)	3.57	.587
Traditional Method	30 (33.33)	2.08	.442

Table 1 above revealed the mean and standard deviation of the scores of students in Experimental group and Control group. It was shown that the score of students taught using mobile Bio Apps has a mean of (3.57) and standard deviation of (.587). This implies that the average performance of students that took part in the test was well above overall average performance.

Also, the scores of students taught using traditional method has a mean of (2.08) and standard deviation of (.442). This implies that average performance of students in Control group was marginally below overall average performance. This implies that significant difference existed in the learning outcomes of students taught with Mobile Bio Apps and those taught using traditional method.

3.2 Research Question 2

Is there any significant difference in the learning outcomes of students taught using collaborative Mobile Bio Apps and those taught using individualized Mobile Bio Apps strategies?

Table 2: Responses to Difference in the Learning Outcomes of Students Taught using Collaborative Mobile Bio Apps and those taught using Individualized Mobile Bio Apps Strategies

Group	No (%)	Mean	SD
Collaborative Mobile Bio Apps	30 (50.0)	3.02	.503
Individualized Mobile Bio Apps	30 (50.0)	2.97	.471

Table 2 above revealed the mean and standard deviation of the scores of students in the two Experimental groups. It was shown that the score of students using collaborative mobile Bio-Apps has a mean of (3.02) and standard deviation of (.503). This implies that the average performance of students that took part in the test was above overall average performance.

Also, the scores of students using individualized mobile Bio Apps has a mean of (2.97) and standard deviation of (.471). This implies that average performance of students in the individualized mobile Bio-App was marginally above overall average performance. This implies that even though there was an obvious difference in the learning outcomes of students taught with collaborative Mobile Bio Apps and those taught using individualized Mobile Bio Apps, the difference was not significant.

3.3 Hypotheses Testing

The two null hypotheses generated for the study were tested using independent sample t-test statistic at 0.05 alpha level of significance.

3.4 Hypothesis 1

There is no significant difference in the learning outcomes of students taught with Mobile Bio Apps and those taught using traditional method

Table 3: T-test Analysis on the difference in the Learning Outcomes of Students Taught with Mobile Bio Apps and those Taught using Traditional Method

Group N	Mean	SD	df	t-cal	t-tab	Decision	
Exp.	60	3.57	.587	88	6.20	1.96	S
Cont.	30	2.08	.442				

The independent sample t-test statistic on table 3 revealed that the mean score of experimental group (3.57) was higher than the mean score of students in control group (2.08) with mean difference of (1.49). The measure of variability (standard deviation) has a difference of (.145). The table also showed that t-calculated value (6.20) is higher than the

critical value (1.96) at 0.05 level of significance. This indicated that there was a significant difference in the learning outcomes of students taught with Mobile Bio Apps and those taught using traditional method. Hence, the null hypothesis was not upheld.

3.5 Hypothesis 2

There is no significant difference in the learning outcomes of students taught using collaborative Mobile Bio Apps and those taught using individualized Mobile BioApps strategies

Table 4: *T-test Analysis on the Difference in the Learning Outcomes of Students Taught using Collaborative Mobile Bio Apps and those taught using Individualized Mobile BioApps Strategies*

Group N	Mean	SD	df	t-cal	t-tab	Decision	
Collab.	3.02	.503	58	2.09	6.20	1.96	S
Indivi.	2.97	.471					

Table 4 revealed that the mean score of collaborative group (3.02) was slightly higher than the mean score of students in individualized group (2.97) with mean difference of (0.05) which is very marginal. The measure of variability (standard deviation) has a difference of (.032). The table also showed that t-calculated value (2.09) is slightly higher than the critical value (1.96) at 0.05 level of significance. This indicated that there was a significant difference in the learning outcomes of students taught using collaborative Mobile Bio Apps and those taught using individualized Mobile BioApps strategies, however marginal. Hence, the null hypothesis was not upheld.

4. Discussion of Findings

The overall finding of this study is that, students taught with Mobile Bio-App perform better than those taught using the traditional method. The use of biology dictionary was advocated by Poonan (2017) when he submitted that Biology dictionary has lots of pictorial presentations of all terms and many more things for quick and easy learning. The fact that students were able to link and interact with the basic pathological concepts through mobile phone flexibility- a unique feature of mobile phones as remarked by Adedoja and Abimbade (2010) might have contributed to their better performance than the traditional group. Previous study by Lai and Mao (2014) has found out that self-efficacy of mobile learning of undergraduate students is very high. Hence, their ability to use mobile Apps devices is not in doubt. Several studies by Kuo-Hua (2010); Butcher and Murphy (2010); Ghaviferkr and

Rosdy (2015); Yao-Ting and Tzu-Chien (2016); and Mustami, Syamsudduhu and Ismail (2019) have corroborated the above findings of this present study.

5. Conclusion and Recommendations

It is instrumental to posit that, one of the successes of learning is determined by the success of the teacher in selection of learning strategies. The selection of appropriate learning strategies should be premised on students' interests on one hand as well as availability and utilization of learning materials on the other hand. Mobile Learning Technology (MLT) is unavoidably providing the needed support for effective learning in this age by the arrays of applications embedded therein. The presence of mobile applications is already with us in the classrooms, hence, the need to continually opening up frontiers to engender its integration into teaching and learning process. Concerted efforts by curriculum planners is much required in achieving this; with honest supports from government at all levels; as well as from various stakeholders in education. Students and teachers alike should be exposed regularly to updates in the parlance of educational mobile apps to constantly ensure acquaint them with ever changing knowledge world.

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