

PROSPECTS OF LEARNING CHEMISTRY THROUGH MOBILE DIGITAL DEVICES

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ABSTRACT: *The aim of this study was to conduct an assessment of the knowledge of mobile digital devices in the learning of Chemistry in Nigeria tertiary institutions. To achieve this purpose, three research questions were generated, these are: what is the percentage of Chemistry students who have access to mobile digital devices in Nigeria tertiary institutions?; to what extent have mobile digital devices improve the teaching and learning of Chemistry in Nigeria tertiary institutions?; does the use of mobile digital devices motivate students to learn Chemistry in Nigeria tertiary institutions?. This study adopted descriptive survey design. Stratified random sampling method was used to select 300 students from Osun state tertiary institutions, data was collected using checklists. Data generated were analyzed using frequency counts, simple percentages and relative importance index. The findings of this study revealed that minority of students have access to the following digital mobile devices; smart phones, notebooks, internet, while majority of students don't have access to the following digital devices: desktop computer, laptops, touch screen tablets, I pad, cameras, recorders and android devices. Based on the findings of this study, recommendations were made.*

KEYWORDS: Mobile Devices, Smart Phones, Notebooks, Laptops, Touch Screen Tablets.

INTRODUCTION & LITERATURE REVIEW

Science is an intellectual and practical endeavour which encompasses the systematic study of the behaviour and structure of the natural and physical world by way of observation and experiment. Science seeks to make advance logical understanding, it gives meaningful and reasonable explanation of natural occurrence as well, which enables man to have a better understanding of nature. Science assists man to prepare for what may happen, and since life depends on science so much, it is clear that the study of science is sensitive and precision is required. After students have acquired the scientific attitude to study any of the basic science, they become equipped with basic knowledge and get prepared to solve life problems. In human life also, science has played so many vital roles in ensuring longevity of man in the course of his existence.

Bryson (2000) suggests that there are various ways in which teachers can associate science with students' everyday lives, both inside and outside the classroom, and creative approaches can be extremely effective in this regard, which enable students to approach science from fresh perspectives. Moreover, cross- curricular approaches to science teaching can be highly motivational for both teachers and students, this is however often constrained by national curricula, there is no requirement for subjects to be taught discretely, and they can be grouped or taught through projects.

Bryson (2000) reported that science is poorly integrated with other curricula areas. Considering the essential value of history in bringing science to life, his study demonstrated that only few teachers brought history into teaching of science. Open-ended investigation in

secondary school science provides perhaps the most important opportunity for children to grow scientific thinking and manipulative skills, a lack of real open-ended investigative work is considered by many to be a major reason science fails to catch students' interest in tertiary institutions.

Science is the study of natural things while Chemistry is one of the basic sciences which study the properties as well as the chemical composition of matter. It is worth paying attention to that every existing entity in the universe is made up of matter. Chemistry also deals with the study of properties of substances as well as the nature and properties of matter. Chemistry is not only a branch of science that deals with the practical and experimental understanding of natural phenomena, but also one of the fundamental ingredients of technology. The study of Chemistry follows from the simple to a more complex. Chemistry is therefore said to be more of a process than a product. A very important aspect in Chemistry delivery is the materials and methods employed in knowledge transmission. This implies that, like every other science subject, the teaching and learning of Chemistry can only be effective by the use of learning resources. Learning resources include texts, audios, videos, softwares and other materials employed by the teacher to assist students meet their expectations in the course of learning in order to make learning more effective, by increasing the rate at which learning takes place as well as to enhance the quality of content learned. Learning resources include a wide variety of materials and software used for learning. However, most of these resources are not adequately available in many Nigerian schools, where they may be available; they might have been underused or not used at all by the teachers for teaching Chemistry.

Mobile digital devices have impact at different levels of the society especially toward enhancing learning. The usage of mobile digital devices in schools is grossly abused. Mobile digital devices come into being as new instruments for which a wide variety of development is sure. There is a link between mobile digital devices and development, a positive association also exists between both variables. Therefore, investment in mobile digital devices is considered as an important investment (United Nations Educational Scientific and Cultural Organization, 2002).

The term mobile digital device includes micro and mini computers, ancillary equipment, software, firm ware and similar procedures, services including support services and related sources. Fadare (2008) highlighted that the computer with its enormous power and speed has acted as a great catalyst to scientific discovery. It has become an amplifier of human thinking, the reposition for huge quantities of the world's data, information and knowledge. We are in an age in which the amount of knowledge accumulated doubles itself every ten years (Fadare, 2008). It is therefore desirable to investigate the prospect of mobile digital devices in the learning of Chemistry in Nigeria tertiary institutions.

Mobile digital devices are increasingly providing us with greater mobility and connectivity, resulting in unplumbed changes in the way we live our daily lives, consume news and information, do business, and even the way we are governed. Mobile digital devices are being embraced by stakeholders in every sector to offer services responsive to customer demand. For example, construction companies track the utilization of equipment, materials, and receipts in real-time, which allows for quick modification and thus gain efficiency; educators deliver content to students, provide in-context learning and enter student grades through mobile digital devices; healthcare providers provide health education, emergency medical alerts and mobile-health aid; public administrators alert citizens of natural disasters, energy

blackouts and other emergencies, they also coordinate real-time location-based data for emergency responses. There are so many other examples of such: transportation authority's provide mobile ticketing and disseminate flight or public transportation alerts via mobile; the retail sector provides real-time information on clearance sales, parking space availability, and respond to clients' request and needs; the banking industry has facilitated mobile transactions in recent times with the aid of mobile banking; employment agencies engage in job postings and offer job-matching services using mobile technologies; fishermen use real-time updates on river flows, hot spots, tides and hatches; farmers access market prices, seeds, and fertilizers-related updates using mobile technologies.

Business paradigms have changed overwhelmingly over the past several years, and there is a need for the present generation of youths to undergird their endeavours by moving along with time. Existing limitations in spectrum capacity, network, video resolution, frequencies, device memory, bandwidth, processor, battery life and data input are fizzling out fast. Nowadays, mobile digital devices have transformed so many values. The distribution of content in digital form such as software, music, video, books or news have altered those value chains significantly. Mobile devices are an integral part of all these aforementioned changes and cellular subscriptions outnumber wired internet connections in growing and developed economies alike.

No doubt, mobile devices provide an exciting way of interacting with technology, especially, when they are touch screen enabled. The immediacy and intimacy of the personal screen as well as the intuitive design and ease of use of modern touch screen operating systems eases user fears greatly and facilitates user adoption. This ease of use is exciting educators and technologists, both of whom are thinking of new ways to use technology like the mobile devices in educational systems of the developing world.

Purpose of the Study

The purpose of this study is to conduct prospect evaluation on the knowledge of mobile digital devices in learning Chemistry in Nigeria tertiary institutions using Evaluation Questionnaire. Specifically, the study seeks to:

- I. Examine the percentage of students that have access to mobile digital devices in learning of chemistry in Nigeria tertiary institutions.
- II. Examine whether digital mobile devices have improved the teaching and learning of Chemistry in Nigeria tertiary institutions.
- III. Find out if the use of digital mobile devices will motivate students to learn Chemistry in Nigeria tertiary institutions.

Research Questions

1. What is the percentage of the Chemistry students who have access to mobile digital devices in Nigeria tertiary institutions?
2. To what extent have mobile digital devices improve the teaching and learning of Chemistry in Nigeria tertiary institutions?
3. Does the use of mobile digital devices (smart phones, touch screen tablets) motivate students to learn Chemistry in Nigeria tertiary institutions?

METHODOLOGY

Research Type

This study adopted descriptive survey research. In this type of research, information is collected concerning a problem from a representative sample of the groups and based on the information collected, conclusion can be drawn about the behaviour of the entire population. The design is appropriate and deemed fit because this study examines prospects of mobile digital devices in the learning of Chemistry in Nigeria tertiary institutions.

Sample and Sampling Technique

The target population consisted of all students in Osun state tertiary institutions. The accessible population will consist of some selected students in Osun state tertiary institutions which consist of a college of education, a polytechnic, and a university. The research adopted random sampling method to select a college of education, a polytechnic, and a university. The sample comprises three hundred (300) of these randomly selected students' from Osun State Tertiary Institutions, which is representative of the population.

Research Instruments

Two major instruments were used in this study:

1. Prospects of mobile digital device in the learning of Chemistry accessibility checklist was employed to elicit information on the accessibility of Chemistry students to mobile digital devices.
2. The instrument used for data collection itself was a self-designed checklist tagged: Perception of Students on Prospects of Digital Mobile Device in the Learning of Chemistry (PSPDMLE). The Checklist is divided into three sections which are: demographic information about the respondents; Checklist on percentage of students that have access to digital mobile devices; and perception of Nigeria tertiary institution students on prospects of mobile digital devices in learning Chemistry. The demographic section reveals information about the respondents, such as age, gender and grade. The second section revealed the percentage of students that have access to mobile digital devices in the learning of Chemistry and the third section revealed students perception of mobile digital devices in the learning of Chemistry in Nigeria tertiary institutions, and how these devices have influenced students learning attitude and academics performance in Chemistry.

Validity and Reliability of the Instrument

In order to ascertain the suitability of the instruments for the study, the instruments for data collection were subjected to the vetting of two experienced tests and measurement experts who checked and corrected the instruments. To ensure the reliability of the instruments, a test-retest method was employed, after which Pearson product moment correlation was employed for data analysis.

Procedure for Data Collection

The researcher personally visited the tertiary institutions used for this study, in order to enlighten the students on how to respond to before administering the instruments to students

with the assistance of some lecturers in the tertiary institutions visited, this ensured a hitch free administration. Every respondent was given ample time to react to the items and help was provided where a respondent asked for explanations when required.

Method of Data Analysis

Data collected for the study was analyzed using statistical methods of frequency count and simple percentages, as well as relative importance index.

RESULTS AND DISCUSSION

The result of the analysis on the prospects of mobile digital devices in the learning of Chemistry in Nigeria Tertiary Institutions is hereby presented. The research questions are as stated.

Research Questions

What is the percentage of Chemistry students who have access to mobile digital devices in Nigeria Tertiary Institutions?

The items that measure students' access to mobile digital devices were subjected to descriptive statistics and the result is thus shown in Table 1. A stands for Agree, SA- Strongly Agree, U represents Undecided, while SD connotes Strongly Disagree.

Table 1: Percentage of the Chemistry Students Access to Mobile Digital Devices

S/N	Digital Devices	A	SA	U	SD
1.	Smart phones	153 (51.0%)	88 (29.3%)	31 (10.2%)	28 (9.4%)
2.	Desktop computer	88 (29.3%)	116 (38.6%)	41 (13.7%)	55 (18.4%)
3.	Laptops	89 (29.7%)	132 (44.0%)	33 (11.0%)	14 (4.6)
4.	Notebooks	201 (67.0%)	59 (19.7%)	25 (8.3%)	15 (5.0%)
5.	Touch screen tablets	83 (27.7%)	137 (45.7%)	32 (10.7%)	30 (10.0%)
6.	Internet	143 (47.8%)	90 (30.1%)	37 (12.4%)	29 (9.7%)
7.	I pad	58 (19.3%)	162 (54.0%)	40 (13.3%)	40 (13.3%)
8.	Cameras	122 (40.7%)	114 (38.0%)	24 (8.0%)	40 (13.4%)
9.	Recorders	119 (39.7%)	125 (41.7%)	22 (7.3%)	34 (11.3%)
10.	Android devices	126 (42.0%)	118 (39.3%)	31 (10.3%)	25 (8.3%)

Table 1 showed the percentage of students' access to mobile digital devices; 51.0% accessed smart phones 29.3% accessed desktop computer, 29.7% accessed laptops, 67.0% accessed notebooks, 27.7% accessed touch screen tablets, 47.8% accessed internet, 19.3% accessed I pad, 40.7% accessed cameras, 39.7% accessed recorders and 42.0% accessed android devices.

To what extent have mobile digital devices improve the teaching and learning of Chemistry in Nigeria Tertiary Institutions.

The items that measure the extent to which mobile digital devices had improved teaching and learning of Chemistry in Nigeria tertiary institutions were subjected to Relative Importance

Index (RII) and the result is shown in Table 2. A stands for Agree, D- Disagree, while U represents Undecided.

Table 2: Extent of Mobile Digital Devices on Teaching and Learning Method

S/N	Statement	A	D	U	RII	P
1.	Digital devices expand students learning in Chemistry beyond four wall of classroom.	225	56	19	0.90	3 rd
2.	Mobile phones connected student's lesson content to prior knowledge and correct misconceptions.	178	82	40	0.82	6 th
3.	Mobile digital has made the learning of Chemistry to be less boring and less hard.	165	108	27	0.82	6 th
4.	Mobile digital devices enable Chemistry students to search for difficult Chemistry concept.	239	48	13	0.92	1 st
5.	The use of digital devices broadens the thinking and reason of Chemistry students in classroom.	205	60	35	0.86	5 th
6.	The use of mobile devices had made the use of statistical analysis to be easy to calculate.	237	43	20	0.91	2 nd
7.	Students prefer the use of digital devices (projector, laptops) in learning Chemistry	217	59	24	0.88	4 th
8.	Digital devices enable Chemistry students to search on line for difficult Chemistry concept.	243	39	18	0.92	1 st

Table 2 shows the extent to which mobile digital devices had improved teaching and learning method; mobile digital devices enable Chemistry students to search on line for difficult Chemistry concept was the first (92.0%) followed by the use of mobile devices had made the use of statistical analysis to be easy to calculate (91.0%), digital devices expand students learning in Chemistry beyond four wall of classroom (90.0%), students prefer the use of digital devices (projector, laptops) in learning Chemistry (88.0%), the use of digital devices broaden the thinking and reason of Chemistry students in classroom (86.0%), mobile phones connected students lesson content to prior knowledge and correct misconceptions (82.0%) and mobile digital has make the learning of Chemistry to be less boring and less hard (82.0%). All these show the extent to which mobile digital devices had improved teaching and learning method.

Does the use of mobile digital devices (smart phones, touch screen tablets) motivate students to learn Chemistry in Nigeria tertiary institutions?

The item that measures the use of mobile digital device as motivator to learning in the

Classroom was subjected to descriptive statistic and the result is indicated in Table 3. A stands for Agree, D- Disagree, while U represents Undecided.

Table 3: Mobile Digital Devices as Motivator

Item	A	D	U
Mobile digital devices improve my motivation to learn Chemistry	217 (72.3%)	54 (18.0%)	29 (9.7%)

Table 3 shows the mobile digital devices being a motivator to classroom learning as 72.3% agreed that mobile digital devices improve their motivation to learn Chemistry in the classroom.

Summary of Findings

The purpose of this study was to examine the prospects of mobile digital devices in the learning of Chemistry among Nigeria Tertiary Institutions. The following findings were generated.

The minority of students had access to the following digital mobile devices: smart phones, notebooks, and internet. While majority of students don't have access to the following digital devices: desktop computer, laptops, touch screen tablets, I pad, cameras, recorders and android devices.

The use of mobile digital devices had improved teaching and learning method of Chemistry; it enabled Chemistry students to search on line for difficult Chemistry concepts. Mobile devices had made the use of statistical analysis to be easy to calculate, digital devices expand students learning in Chemistry beyond four walls of classroom, the use of digital devices broaden the thinking and reason of Chemistry students in classrooms. Finally use of mobile digital devices had being a motivator to classroom learning in Chemistry.

CONCLUSION

This study revealed that use of digital devices was effective in enhancing motivation, the conduct of meaningful course-related interactions, active exploration of online information, and participation rates. Nevertheless, even for those who acknowledged the benefits of use of digital devices in class, some of them reported not to have access to the following digital devices: desktop computer, laptops, touch screen tablets, I pads, cameras, recorders and android devices.

RECOMMENDATIONS

The use of mobile digital devices has not been fully incorporated into the study of Chemistry education in Nigeria tertiary institution. The following recommendations can therefore be considered for effective incorporation of digital mobile devices into Chemistry education in Nigeria:

1. Chemistry education should be re-positioned to excessively launch the present students into the orbit at which they can respond to the challenges of the 21st century and this will enable them to contribute meaningfully to national development.

2. Policy makers and curriculum planners of Chemistry education programmes in Nigeria needs to incorporate into Chemistry curriculum the use of digital mobile devices, an innovation which have made the 21st century unique.
3. Proper attention should be given to tertiary institution education by the government in line with the global concern for eradication of illiteracy in Nigeria.
4. Special training, workshops and seminars should be organized for the students and their tutors on the use of mobile phones for instruction delivery and how to handle problems that may arise when using the mobile digital devices.

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