Short Communication

Assessing technology-based learning: a case of "*Opon-Imo*" use for agricultural subjects in senior secondary schools of Osun State, Nigeria

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Abstract

The study assessed using an e-learning device, '*Opon-Imo*' for agricultural subjects among secondary school students and teachers in Osun State, Nigeria. It determined the teachers' and students' extent of use of '*Opon-Imo*' for agricultural subjects, ascertained their perception towards its value as a learning/teaching aid, and the challenges faced with its use. A multi-stage sampling technique was employed to select 150 students and corresponding 12 teachers instructing them on the agricultural subject(s) to give a total of 162 respondents sampled. Data were collected with a validated questionnaire and analysed using descriptive statistics. The results revealed that students occasionally used '*Opon-Imo*' as reference material to seek answers to assignments ($\bar{x}$ = 3.1 ± 0.9) just as the teachers often utilised the modules as a reference point while explaining class notes to the students ($\bar{x}$ = 3.5 ± 0.8). (Most (58%) of the students were indifferent about the values of '*Opon-Imo*' as a learning aid for agricultural subjects, whereas most of the teachers (58.3%) had a favourable disposition towards it for their teaching activities. As a challenge, teachers noted students' misuse of the device for entertainment purposes instead of use as a learning aid ($\bar{x}$ = 3.16). It was concluded that teachers validly used '*Opon-Imo*' to a greater extent for agricultural educational purposes and were more positively inclined to its educative usefulness than the students. As such, effective measures have to be developed to make the students aware of the value of this learning aid for their career in agriculture.

Keywords: agriculture; education; learning; '*Opon-Imo*'; teaching; ICT; secondary school

INTRODUCTION

Technological advancements have greatly impacted the developmental progression in diverse sectors of human endeavours. The drive towards making every citizen relevant in the global system has led to the adoption of technology-based learning at various educational levels across the world (Fakokunde and Abidoye, 2016). Accordingly, the use of Information and Communication Technologies (ICT) has been an innovative means of augmenting the quality of education at all levels (Chirashree and Haridas, 2012;

Saxena N. 2017; Saravanakumar, 2018). The rate at which a nation develops depends on the population's degree of education which is in turn impacted using ICT (Gidadawa and Dogondaji, 2014). Therefore, competing favourably in today's knowledge economy necessitates a rethink of educating the upcoming generation (Lane, 2012).

In the agriculture-dependent economy as Osun State, representative of most of the Nigerian States, the education system had been in dire need of strategic improvements. This is to address critical problems such

as poor teacher morale, dilapidated infrastructures, and poor learning outcomes among others (Atolagbe et al., 2018). The recognition of their effects on the development of the state prompted a series of reforms embarked upon by the State's government from the year 2011. The reforms were capacitated with state-wide school infrastructural development, policy change, and projects, including *'Opon-Imo'* Technology Enhanced Learning (OTELS) project. For this, government school senior students (SS1-3) across the states were given a device each with its power cord for recharging with electricity at their convenience (at home or in school) (osun.gov.ng/achievements/). Schools' copies were equally allotted to the schools' management for teachers' utilisation during school hours. This was deemed by the government as a strategic stride for redressing the highlighted issues facing the state's educational system in general.

Considering the importance of agriculture to the economy and development of the state as highlighted by Adenomon and Oyejola (2013), the deployment of *'Opon-Imo'* for agricultural education in the state could herald a double-edged dynamic step in educational and agricultural development for the state's overall development. Basically, *'Opon-Imo'* are Android tablets on which reference texts, relevant multimedia as well as practice questions were downloaded, collated and organised into subject modules (Tijani, 2014; Fakokunde and Abidoye, 2016). Among these are two modules for agricultural subjects, namely agricultural science and animal husbandry/fishery modules. This capacity-building technology availed to the facilitation of agricultural subjects learning/teaching processes would be justified with empirical evaluation ascertaining the impact, identifying weaknesses for further development, and defining further opportunities.

In view of this, some studies have assessed the usability of *'Opon-Imo'*, the effects on students' overall academic performance, and the acceptability by teachers and students, among others (Tijani, 2014; Fakokunde and Abidoye, 2016; Kareem and Babayemi, 2017; Adeniyi, 2019). However, a dearth of information exists on the project's contribution to facilitating agricultural subjects' teaching/learning processes. This study was conceived to generate information on the teachers' and students' use of *'Opon-Imo'* for the respective teaching/learning processes in agricultural subjects. The study's specific objectives were to describe the extent of use of *'Opon-Imo'* by the agricultural students and teachers, assess the respondents' perception of *'Opon-Imo'* as

a learning/teaching aid, and describe the challenges encountered with the use of *'Opon-Imo'*.

MATERIALS AND METHODS

The study area is Osun State in the southwestern region of Nigeria. The state is estimated to be populated by 4,705,589 people, primarily domiciled in rural areas characterised by inadequate infrastructural facilities and poor access to quality education (Adelabu, 2008; Nigeria Bureau of Statistics (NBS), 2017).

A multi-stage sampling procedure was used for the selection of respondents. Using simple random sampling, one fifth (two) of the Local Government Areas (LGAs) in each of the three Senatorial Districts of the State were selected. Then, two foremost schools under the project in each of the six LGAs were chosen. With permission from the schools' management, students offered agricultural subjects were organised in a class and briefed on the intent of the data collection exercise and the instrument's content. On average, 13 willing students per school were guided through interpretation to native Yoruba language for them to fill the questionnaires personally. A total of 150 returned questionnaires were sufficiently filled for analysis. All 12 agricultural teachers completed a questionnaire designed to investigate teachers' use and perspectives of *'Opon-Imo'* for teaching activities separately from students learning activities. This gave a total of 162 respondents from whom data were collected for this study.

Data were collected on the extent of teachers and students' use of *'Opon-Imo'*, their perception towards its value as agricultural subjects' teaching/learning aid, and challenges faced with the use. The extent of use was measured on a 4-point scale comprising 'often' scored 3, 'occasionally' 2, 'rarely' 1, and 'never' 0. The perception was measured on a 5-point Likert scale of 'strongly agree' 5, 'agree' 4, 'undecided' 3, 'disagree' 2, and 'strongly disagree' 1. The aggregate score from this was categorised into three levels, namely favourable, indifferent, and unfavourable perception using mean ± standard deviation. Challenges were operationalised on a 4-point scale comprising 'highly severe', 'severe', 'partly severe' and 'not severe', scored 3, 2, 1, and 0, respectively. Descriptive tools employed were frequency counts, percentages, and means and standard deviation for summarising responses following the measurement scales. The data entry, processing, and analysis were done with Statistical Package for Social Sciences (SPSS) version 20.

Table 1. Distribution of students based on the extent of use of '*Opon-Imo*' for agricultural learning activities (n = 150)

Learning activities in agricultural subjects	Levels of use for each learning activity				Mean ± SD	Rank
	Often %	Occasionally %	Rarely %	Never %		
Checking through of topics in the agricultural science module on *Opon-Imo*	38.7	31.3	27.3	2.7	3.1 ± 0.8	1st
Referring to the agricultural science module to proffer solution to assignments	47.3	26.7	22.0	4.0	3.1 ± 0.9	1st
Utilising the past questions on agricultural science modules	49.3	20.0	26.0	4.7	3.0 ± 0.9	2nd
Reading the agricultural text in place of class notes	40.7	24.7	28.0	6.7	3.0 ± 0.9	2nd
Reading topics in the agricultural science module	33.3	30.7	25.3	10.7	2.9 ± 1.0	3rd
Familiarising with agricultural science career options in the module	36.0	29.3	25.3	9.3	2.9 ± 0.9	3rd
Utilisation of virtual classroom on the device to get an understanding of agricultural topics discussed in the class	36.0	30.7	25.3	8.0	2.9 ± 0.9	3rd
Perusal of topics in the animal husbandry/fisheries	30.0	37.3	22.0	10.7	2.9 ± 0.9	3rd
Referring to the animal husbandry/fisheries modules to proffer solution to assignments	30.0	30.7	25.3	14.0	2.8 ± 1.0	4th
Utilising the past questions on animal husbandry/fisheries modules	28.7	33.3	22.7	15.3	2.7 ± 1.1	5th
Familiarising with animal husbandry/fisheries modules	32.7	27.3	22.0	18.0	2.7 ± 1.1	5th
Checking practical examinations on agricultural science	36.7	21.3	16.7	25.3	2.7 ± 1.2	5th
Harnessing agricultural science alternative to practical questions	26.0	32.7	21.3	20.0	2.6 ± 1.1	6th
Harnessing animal husbandry/fisheries alternative to practical questions	26.0	26.7	26.7	20.7	2.6 ± 1.1	6th

Source: Field survey, 2017

RESULTS AND DISCUSSION

The extent of use of '*Opon-Imo*' by the students and the agricultural subjects' teachers

The results presented in Table 1 show that highest proportion of the students often used '*Opon-Imo*' for checking through topics in the agricultural science module ($\bar{x}$ = 3.1 ± 0.8), reading discussions of the topics ($\bar{x}$ = 2.9 ± 1.0), referring to the module to seek answers to assignments ($\bar{x}$ = 3.1 ± 0.9), and reading the text of the modules in place of class note ($\bar{x}$ = 2.9 ± 0.9) among others. These demonstrate that the students used '*Opon-Imo*' for agricultural learning activities. As such, provisioned accessibility to reference materials for agricultural subjects could enhance students' learning in agriculture. Aside from this, it was indicated that the students also used '*Opon-Imo*' for non-educational purposes, especially for relaxation and entertainment purposes. The grand mean ($\bar{x}$ = 2.62 ± 0.68) summarises students' overall use of '*Opon-Imo*' for the two agricultural subjects as occasional use. This indicated that the listed learning activities were occasionally served with the use of '*Opon-Imo*'. Given the high expectation that '*Opon-Imo*' would bridge the problem of accessibility to reference/instructional materials deemed as the main constraint for all aspects of public schools' learning processes in the state, [1]this finding affirmed that the students were yet to fully optimise the contents of agricultural science and animal husbandry modules on the tablets.

Evidence in Table 2 showed that majority of the teachers often utilise the agricultural science modules as reference material while explaining class notes to students ($\bar{x}$ = 3.5 ± 0.8), drawing examination questions ($\bar{x}$ = 3.5 ± 0.9) and guiding the formation of practical examination questions ($\bar{x}$ = 3.2 ± 0.7) and lesson notes ($\bar{x}$ = 3.0 ± 1.1). The teaching processes for which '*Opon-Imo*' was used occasionally by most of the teachers include preparing guides for students agricultural practical ($\bar{x}$ = 3.0 ± 0.7) and as teaching guide for classes ($\bar{x}$ = 2.9 ± 0.8). With this, it is shown that the teachers validly used '*Opon-Imo*' to a greater extent

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1 For more information on '*Opon-Imo*' project of Osun State, Nigeria visits the official page: https://osun.gov.ng/achievements/150000-e-learning-tablets-opon-imo-tablet-of-knowledge-provided-for-senior-secondary-schools/; or osun.gov.ng/achievements/

Table 2. Agricultural teachers' extent of use of '*Opon-Imo*' (n = 12)

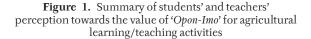| Teaching activities in agricultural subjects	Levels of use for each teaching activity				Mean ± SD	Rank
	Often %	Occasionally %	Rarely %	Never %		
Giving a thorough explanation to the students	66.7	16.7	16.7	-	3.5 ± 0.8	1st
Making use of the questions in the tablets for examining students	58.3	33.3	8.3	-	3.5 ± 0.9	1st
Accessing practical examination guides on the agricultural science module	50.0	33.3	8.3	8.3	3.2 ± 0.9	2nd
Utilising the agricultural science module during agricultural practical classes	25.0	50.0	25.0	-	3.0 ± 0.7	3rd
Using the agricultural science module to form lesson notes	41.7	33.3	8.3	16.7	3.0 ± 1.1	3rd
Making use of the books in the tablets as notes for students' reference	25.0	50.0	25.0	-	3.9 ± 0.7	3rd
Use as a teaching guide	25.0	41.7	33.3	-	2.9 ± 0.8	4th
Use for preparing teaching plans	33.3	25.0	33.3	8.3	2.8 ± 1.0	5th

Source: Field survey, 2017

for agricultural educational purposes than the students. This might represent a gradual change of agricultural teaching processes to the global directive noted by Ghavifekr and Rosdy (2015) for the replacement of traditional teaching methods with technological teaching/learning tools and facilities.

Perception of students and agricultural teachers on the use of *Opon-Imo*

The summary of the results of students' and teachers' perception of '*Opon-Imo*' is presented in Figure 1. It was shown that many of the students were indifferent to the use of '*Opon-Imo*' for their agricultural subjects' learning activities. While only about a tenth had unfavourable perception, close to a third favourably perceived using '*Opon-Imo*' as a learning enhancement

Figure 1. Summary of students' and teachers' perception towards the value of '*Opon-Imo*' for agricultural learning/teaching activities

tool for agricultural science and animal husbandry. This indicates that many of the students were not affirmatively convinced to uphold the device's usefulness for facilitating lerning of agricultural subjects. Possibly, '*Opon-Imo*' virtual alternative to practical did not adequately capture the agricultural subjects' real-time practical sessions, which are of immense importance in motivating students' interest in such science-based subjects. This explanation could be likened with Jegede et al. (2015), which indicated that some illustrations in '*Opon-Imo*' were grossly exaggerated and inappropriate, especially for the science subjects. On the other hand, higher proportion of the teachers had favourable perception about the use of '*Opon-Imo*' in aiding their teaching activities, while some were indifferent in the same respect. This indicates a more positive inclination of teachers to the use of '*Opon-Imo*' for teaching agricultural subjects. This corroborates the finding of Abubakar (2016), who revealed teacher's optimism towards ICT potentials for educational development.

Challenges faced with the use of '*Opon-Imo*' by students and their agricultural teachers

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Results presented in Table 3 showed that many students consented that time wastage through playing games or films on '*Opon-Imo*' (49.4%), the fear of theft of the device (48%), abstinence from class with motive to read on '*Opon-Imo*' (42.7%), erratic power supply (42%), and impermanent access to the device (40.7%) were highly severe challenges mitigating their use of the device for agricultural learning activities. More so, about one third (31.3%) and 21.3% noted high severity of

Table 3. Challenges facing students and teachers' use of '*Opon-Imo*' for learning/teaching agricultural subjects

Challenges	Students				Teachers			
	Not Severe (%)	Partly Severe (%)	Severe (%)	Highly Severe (%)	Not Severe (%)	Partly Severe (%)	Severe (%)	Highly Severe (%)
Erratic power supply	15.3	21.3	21.3	42	0	0	50	50
Opon-Imo is complex to operate	24.7	18	21.3	36	58.3	16.7	25	0
Technical barrier and malfunctioning	18	18.7	23.3	40	25	41.7	16.7	16.7
Special training required for use	31.3	12	26.7	30	25	41.7	8.3	25
Distractions from installed games	23.3	19.3	18.7	38.7	33.3	33.3	16.7	16.7
Incomprehensive agricultural modules	32.7	25.3	20.7	21.3	25	33.3	16.7	25
Installed textbook differs from curriculum	29.3	25.3	14	31.3	41.7	41.7	0	16.7
Students abscond classes to read on their own on the device	12.7	23.3	21.3	42.7	33.3	16.7	0	58.3
Complexity of practice questions	20.7	22	21.3	36	75	8.3	16.7	0
Short duration of students' access to the device	16	24	19.3	40.7	0	50	25	25
Time wastage through playing games/films on the device	23.3	13.3	14	49.4	0	25	33.3	41.7
The device is too fragile	30	22.7	15.3	32	33.3	41.7	0	25
The device can easily be stolen	20.7	12.7	18.7	48	8.3	41.7	0	50

Source: Field survey, 2017

difference of installed textbooks on the device from the school curriculum and incomprehensive agricultural modules, respectively. The results reveal that the most prominent of the challenges limiting students' use of '*Opon-Imo*' are due to social and technical issues identified by Ogbomo (2011) as challenges for ICT use in education. The nation's inadequate power supply has been identified as one of the obstacles limiting ICT use in educational institutions in Nigeria (Gadanya, 2015; Musa et al., 2018).

From the teachers, the prominent challenges identified as highly severe include students' reliance on the modules and basis for absconding from classes (58%), erratic power supply (50%), fear that the device could be stolen (50%) and students' time wastage through playing of games or films on the device (41.7%) among others. This showed that the most rated challenge by the teachers has to do with students' misuse of the device for entertainment purposes alongside associated class disruptions and absconding from classes. Relatedly, Jegede et al. (2015) found that students end up doing other things that distract their attention while reading on '*Opon-Imo*'.

CONCLUSION AND RECOMMENDATIONS

The findings of this study show that the students have not optimally explored the contents of agricultural science and animal husbandry/fishery modules on '*Opon-Imo*' as instructional materials for enhancing their knowledge and capability in the subjects despite their teachers' exploration of the modules for the teaching activities. The teachers were more positively disposed to using agricultural modules on '*Opon-Imo*' as relevant aids and instructional materials for teaching/learning activities. In conclusion, teachers validly used '*Opon-Imo*' to a greater extent for agricultural educational purposes and were more positively inclined to its educative usefulness than the students.

As such, effective measures have to be developed to make the students aware of the value of this learning aid for their career in agriculture. Also, an alternative power supply for charging the device should be provided at schools and in students' homes. Devices applications and features should be reviewed to provide students with access to only relevant educational materials. The agricultural teachers' class notes should not repeat the content in '*Opon-Imo*'.

Finally, further research on how best to encourage students to use '*Opon-Imo*' in tandem with their class notes should be conducted to elicit inputs from students and teachers to revise agricultural science and animal husbandry modules, illustrations, charts, or diagrams.

CONFLICT OF INTEREST

The authors declared no conflicts of interest with respect to research, authorship and publication of this article.

ETHICAL COMPLIANCE

The authors have followed the ethical standards in conducting the research and preparing the manuscript.

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