

TECHNOLOGICAL INNOVATION AND IMPLEMENTATION OF ENVIRONMENTAL EDUCATION AT THE UNIVERSITY OF CALABAR, CROSS RIVER STATE, NIGERIA

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Abstract

The study was examined technological innovation and implementation of environmental education at the University of Calabar, Cross River State, Nigeria. To achieve this purpose, two null hypotheses were formulated and tested at 0.05 level of significance. Literature was reviewed in accordance with the variables of the study. Survey research design was considered most suitable for the study. The population of the study comprised all academic staff in environmental education-related departments. Census sampling approach was adopted to select the respondents used for the study because the number is not too large and all subjects can be covered by the researchers. A sample of one hundred and thirty eight (138) academic staff was selected from four departments in the University of Calabar. Google Classroom Questionnaire (GCQ) and Environmental Education Questionnaire (EEQ) were the instruments used for data collection. The instruments were validated by relevant authorities. Cronbach alpha method was utilized to ensure internal consistency of the two instruments. GCQ showed a reliability coefficient of 0.82 and that of EEQ was 0.73. Simple linear regression statistical tool was used for data analysis. The result obtained from analysis of data and testing of hypotheses in the study revealed that there was a significant influence of Google classroom and internet services utilization on implementation of environmental education in the University of Calabar. Based on these findings it was partly recommended that the university management should continue to provide internet services that would ensure the effective utilization of technology in the implementation of environmental education.

Key words: Technological innovation, google classroom, internet services, environmental education

Introduction

The attention given to environmental issues in the last two decades has continued to increase due to the growing consequences of human activities on the quality of the environment and human wellbeing. Environmental consequences such as pollution, climate change, excessive utilization of natural resources, loss of biodiversity and the extinction of biodiversity, the depletion of the ozone layer, deforestation, desertification, drought, rise in sea level and flooding, population surge and the unsustainable use of environmental resources are some of the issues which have had and continue to have negative effect on the environment. The 21st century is characterized with continued global population growth, technological advancement and increased consumption. These pose serious constraints to the world's natural resources. The need to urgently address these consequences informed the introduction of environmental education. Asu (2022) asserted that Environmental education is concerned with teaching conceptual knowledge and skills for monitoring and measuring environmental quality, and also the development of values and attributes, which will motivate and empower individuals and groups to work and promote the sustainability of natural and social environments. Thus, the important attributes of environmental education include the creation of environmental

awareness, strong concern for the environment and active participation in promoting environmental conservation.

The multidisciplinary approach, the approach in which Environmental Education is taught in two or more disciplines expressed in terms of interrelationship regarding environmental education issues, has been adopted for the teaching of environmental education. This is usually with modification of the subject matters in the traditional school subjects' in line with the scope, aims, objectives, strategies and guiding principles of environmental education (Barth, 2020). The international conference on environmental education (1975) in Belgrade and the intergovernmental environmental education conference (1977) in Tbilisi recommended that environmental education should be taught using the multidisciplinary approach. Over the last decade, there had been a paradigm shift in the way teaching is being conducted in the university. Teaching and learning are the major activities carried out in any formal educational setting. Teaching principally is the deliberate attempt to impart knowledge, skills and values to a learner by a trained person (Mbakwem & Ike, 2019). It can be done using different means, methods and materials. Currently, the emphasis is on integrating technology in teaching, especially at the university level of education. Technology is the alternative to analogue way of doing things. Technology is described by Redmann and Kotrlik (2018) as the making, modification, usage, and knowledge of tools, machines, techniques, crafts, systems and methods of organization in order to solve a problem, improve a pre-existing solution to a problem, achieve a goal, handle an applied input or output relation or perform a specific function. Integrating technology in teaching involves the use of digital technologies during teaching of courses in schools.

There are numerous technological tools that can be integrated for effective implementation of environmental education. Google classroom is a technological tool that could be utilized in the implementation of environmental education in universities. Agim (2023) stated that utilizing Google Classroom for teaching environmental education in the university can streamline course management, assignment distribution, and grading. Lecturers can create classes, share resources, and communicate with students seamlessly. It also facilitates collaboration among students and provides a centralized platform for course materials and discussions. Additionally, utilizing Google Classroom for teaching environmental education in the university systems can enhance the attainment of the goals and objectives of environmental education. Internet services are also technological aids for effective implementation of environmental education programmes. Elijah (2021) maintained that utilizing internet services for teaching environmental education can streamline academic programmes by offering online registration, course materials, and communication platforms. It promotes efficiency, accessibility, and collaboration among students and faculty. Additionally, it enables remote learning, research, and administrative tasks, fostering a more connected and dynamic educational environment.

The problem of this study is that Environmental education curriculum was designed to raise a citizenry that is aware of and capable of participating actively both individually and in groups in solving current environmental problems and preventing the occurrence of new ones. To achieve this goal, students of environmental education are expected to acquire relevant knowledge, skills, develop positive attitude and commitment towards the environment. It has been observed that since the commencement of the implementation of environmental education at the University of Calabar in 1992, students of the programme are yet to portray the goals of the programme (Eneji et al., 2023). This has become a source of concern to various stakeholders in environmental education including policy makers, advocates, curriculum designers and sometimes students, who have partly attributed this

shortcoming in implementation of environmental education in the university to analogue methods of teaching. These stakeholders seem to closely associate with the lack of appropriate technology for the implementation of Environmental Education at the University Calabar as it concerned students.

Students are expected to offer various courses in each semester and lecturers are also expected to make this expectation become possible. In most cases, lecturers are unwilling or unable to go for lectures due to various reasons. On the other hand, students in most cases also refuse to attend lectures as stipulated in the time table. This situation affects the smooth implementation and completion of course outlines. Again, there are inadequate spaces to accommodate students who are willing to learn. This has affected the implementation of environmental education in the university. The ever increasing workload of most academic staff has also contributed to their inability to meet up with planned lecture time. As a result, it is believed that the use of technological tools could help provide solution to these challenges facing the implementation of environmental education in the university. This motivated the researchers to investigate technological innovation and implementation of environmental education in the University of Calabar, Cross River State, Nigeria.

Purpose of the study

The purpose of this study was to assess technological innovation and implementation of environmental education at the University of Calabar. Specifically, the study sought to;

1. Examine the influence of Google classroom on implementation of environmental education
2. Ascertain how internet services influence implementation of environmental education

Research Questions

1. What is the influence of Google classroom on implementation of environmental education
2. To what extent can internet services influence implementation of environmental education

Hypotheses

H₀₁: Google classroom does not significantly influence implementation of environmental education

H₀₂: Internet services has no significant influence on implementation of environmental education

Literature Review

Google Classroom is an online Learning Management System (LMS) developed by Google that allows teachers and students to communicate and collaborate. It is designed to streamline the management of classroom communication, assignments, and grading. It is a web-based learning management system designed for schools with the aim to simplify the creation, distribution and grading of assignments. It integrates well with other Google tools such as Docs, Sheets and Slides. Google describes Google Classroom as "mission control for your classroom," which might be the easiest way to think about it. The use of Google classroom as a digital approach to teaching/learning has been very effective in the implementation of various curriculum across several academic programmes (Odok et al., 2023). Classroom teaching can do wonders with the implementation and usage of technology since the modern world is in need of it. Technology infuses classrooms with digital learning tools, such as computers and hand held devices, expands course offerings, experiences, and learning

materials, builds 21st century skills, increases student engagement and motivation, and accelerates learning to help them improve their own instruction and personalize learning (Ekum, 2022). Technology can increase student engagement which is significant to obtain the desired learning objectives.

Google works with educationalists all over the world to create Google Classroom. It is a streamlined, easy-to-use tool that helps teachers manage coursework. With Google Classroom, educators can create classes, distribute assignments, grade and send feedback, and see everything in one place. It restructures the process of sharing files between teachers and students. It interlaces together Google Docs, Drive and Gmail to help teachers in improving communication inside and outside of class in real time. The idea of a classroom has evolved over time and ever since the advent of online classrooms, the transformations have been fast-paced. The number of available tools, platforms, software and programmes, and the possibilities they present can at the same time be challenging and rewarding in the school system. One of such technological innovations is Google Classroom, a free web service that can be used as a Learning Management System (LMS). This online platform has contributed enormously to effective teaching and learning at various levels of education (Odok et al., 2023). The internet facilitates communication between teachers, students, and parents. Platforms like email, messaging apps, and educational forums allow for quick and efficient communication, fostering a collaborative learning environment. Online courses, webinars, and educational conferences provide opportunities for teachers to continue their professional development. They can learn new teaching strategies, stay updated on educational trends, and improve their subject knowledge. The internet enables efficient management of administrative tasks such as grading, attendance tracking, and lesson planning through various educational management systems. This allows teachers to focus more on instruction and less on paperwork. Incorporating internet-based tools and resources can make lessons more engaging and interactive for students. Tools like educational games, virtual labs, and multimedia presentations can enhance student participation and interest in the subject matter (Tijani, 2023).

The use of the internet facilitates e-learning within the educational system. The internet relay chat includes some components that have been used to communicate globally such as Zoom, Skype, Google Meet, and Microsoft Team. Some other internet tools which allow people to exchange ideas with each other through the internet are e- portfolios, cyber infrastructures, digital libraries, and online learning object repositories, etc. There are also e-modules which are written and could be converted and stored into a digital version and transferred into a computer using word processor accessible by the user through the internet. All these technologies are tools that are deployed now in education. They are also used in teleconferencing, audio conferencing which involves a live exchange of voice messages over a telephone network and still images such as graphs, diagrams, or pictures (Louis, 2022). In another development, Brown (2021) asserted that there is also video conferencing which makes it possible for showing moving images as well as voice and graphs. Video conferencing technology does not use telephone lines but either satellite link or telephone network. The next one is web-based conferencing and it is as the name implies the transmission of text and graphic, audio and visual media through the internet. It requires the use of a computer attached to a browser and communication can both be synchronous and asynchronous. All these technologies play a greater role in education by improving the quality of education.

The internet has many benefits in the academic cycle, including the provision of access to a wide variety of services and resources globally and the ability to discuss and share

the experience with other colleagues around the world. According to Festus (2022), Internet services and resources available and accessible for use by the lecturers in tertiary institutions are; e-mail, search engines, chatting, World Wide Web (WWW), discussion groups, Frequently Ask Questions (FAQ), conference proceedings, database, e-books, reference works. The academic community uses e-journals, technical reports, theses, and dissertations for education, research, publication, communication or collaboration, and other activities. Internet services and resources are used for communication, education, research, collaboration, recreation, and entertainment, among others, by lecturers in Nigerian tertiary institutions and world at large. Hence, the gap this study want to fill is the use of technological innovation through the implementation of environmental education at the University of Calabar, Cross River State, Nigeria

Methods

The descriptive survey research design was considered as the most appropriate for the study. This design investigates a situation as it exist at the time of an investigation. The population of the study comprised all academic staff in Environmental education, Biology education, Chemistry education, and Health education at the University of Calabar. Census sampling approach was adopted to select the one hundred and thirty eight (138) respondents used for the study. The instruments for data collection were the “Google Classroom Questionnaire” (GCQ) and “Environmental Education Questionnaire” (EEQ) with a structured of twenty two item of four point rating scale. The instruments was validated by lecturers in Environmental Education and Test and Measurement at the University of Calabar. Cronbach alpha method was used to establish the reliability of the two instruments. GCQ has a reliability coefficient of 0.82 and that of EEQ was 0.73 respectively. Data was obtained directly from respondents through the use of the instruments. To test the hypotheses formulated for the study, simple linear regression statistical tool was employed for analysis of data.

Results

The results of this study is presented according to the hypotheses that guided the study
Hypothesis one

Google classroom does not significantly influence implementation of environmental education at the University of Calabar. The independent variable in this hypothesis is Google Classroom while the dependent variable is implementation of environmental education. Simple linear regression statistical tool was utilized for data analysis. The result of this analysis is presented in

Table 1: Simple linear regression analysis of the influence of Google Classroom on implementation of environmental education in the University of Calabar, Cross River State (N = 138)

Model	Unstandardized Coefficients B	Standardized Coefficients Beta	t	Sig.
1 (Constant)	19.413		14.568	.000
Google Classroom	.485	.474	6.275	.000

a. Dependent Variable: Implementation of environmental education

Note: R = .474; R² .225; F (1, 136) = 39.378; P = 0.000

The result of analysis of data presented in Table 1 shows that the independent or predictor variable (Google Classroom) has a significant influence on the dependent or predicted variable (implementation of environmental education) in the University of Calabar, Cross River State. This implied that Google Classroom accounted for 22.5% of implementation of environmental education in the study area. Secondly, the result of regression ANOVA presented in Table 1 revealed that there was a significant influence of Google Classroom on implementation of environmental education, $F(1, 136) = 39.378$; $p < .05$. The result of this analysis indicated that there is moderate contribution of Google Classroom to implementation of environmental education. This showed that Google Classroom is positively influencing implementation of environmental education in the study area. The regression coefficient shows that the independent or predictor variable Google Classroom ($\beta = .474$; $t = 6.275$; $p < .05$) is significantly influencing implementation of environmental education in the University of Calabar, Cross River State.

Hypothesis 2: Internet services have no significant influence on implementation of environmental education at the University of Calabar. The independent variable in this hypothesis is Internet services while the dependent variable is implementation of environmental education. Simple linear regression statistical tool was utilized for data analysis. The result of this analysis is presented in

Table 2: Simple linear regression analysis of the influence of internet services on implementation of environmental education at the University of Calabar, Cross River State (N = 138)

Model		Unstandardized	Standardized	t	Sig.
		Coefficients B	Coefficients Beta		
1	(Constant)	9.300		3.667	.000
	Internet services	1.096	.529	7.278	.000

a. Dependent Variable: Implementation of environmental education

Note: $R = .529$; $R^2 = .280$; $F(1, 137) = 52.962$; $P = 0.000$

The result of analysis of data presented in Table 2 shows that the independent or predictor variable (internet services) has a significant influence on the dependent or predicted variable (implementation of environmental education) in the University of Calabar, Cross River State. This implied that internet services accounted for 28.0% of implementation of environmental education in the study area. Secondly, the result of regression ANOVA presented in Table 2 revealed that there was a significant influence of internet services on implementation of environmental education, $F(1, 136) = 52.962$; $p < .05$. The result of this analysis indicated that there is moderate contribution of internet services to implementation of environmental education. This showed that internet services are positively influencing implementation of environmental education in the study area. The regression coefficient shows that the independent or predictor variable internet services ($\beta = .529$; $t = 7.278$; $p < .05$) is significantly influencing implementation of environmental education at the University of Calabar, Cross River State.

Discussion

The finding obtained from analysis of data and testing of hypothesis one in the study revealed that the null hypothesis was rejected. The implication of this finding is that there was a significant influence of Google Classroom on implementation of environmental education in the University of Calabar, Cross River State. The reason for this finding could be that the

post-COVID-19 era has witnessed a significant rise in the use of online instructional delivery. The use of Google Classroom has enabled the smooth implementation of environmental education. This platform has enabled students and lecturers to communicate effectively in line with the course content without having to meet physically in the classroom. This has reduced the incidence of cancelled classes and afforded lecturers and students a seamless platform to implement course contents and meet up with the course contract. The finding of this study is in agreement with that of Ekum (2022) who reported that Classroom teaching can do wonders with the implementation and usage of technology since the modern world is in need of it. Technology infuses classrooms with digital learning tools, such as computers and hand held devices, expands course offerings, experiences, and learning materials, builds 21st century skills, increases student engagement and motivation, and accelerates learning to help them improve their own instruction and personalize learning (Ekum, 2022). Technology can increase student engagement which is significant to obtain the desired learning objectives.

The finding of this study also supported that of Odok et al., (2023) who revealed that Google works with educationalists all over the world to create Google Classroom. It is a streamlined, easy-to-use tool that helps teachers manage coursework. With Google Classroom, educators can create classes, distribute assignments, grade and send feedback, and see everything in one place. It restructures the process of sharing files between teachers and students. It interlaces together Google Docs, Drive and Gmail to help teachers in improving communication inside and outside of class in real time. The idea of a classroom has evolved over time and ever since the advent of online classrooms, the transformations have been fast-paced. The number of available tools, platforms, software and programmes, and the possibilities they present can at the same time be challenging and rewarding in the school system. One of such technological innovation is Google Classroom, a free web service that can be used as a Learning Management System (LMS). This online platform has contributed enormously to effective teaching and learning at various levels of education (Odok et al., 2023). The finding obtained from the analysis of data and testing of hypothesis two in the study revealed that the null hypothesis was rejected. The implication of this finding is that there was a significant influence of internet services on implementation of environmental education at the University of Calabar, Cross River State. The reason for this finding could be that environmental issues are multifaceted and require a wide range of coverage across various locations. This has been a very difficult task in the past due to the absence of modern technology. The availability of internet services has contributed significantly to addressing this challenge. This can be attributed to the fact that both lecturers and students can easily access relevant environment-related information through various websites with the help of internet services. This has contributed positively to the implementation of environmental education.

This finding agrees with that of Tijani (2023) who reported that the internet facilitates communication between teachers, students, and parents. Platforms like email, messaging apps, and educational forums allow for quick and efficient communication, fostering a collaborative learning environment. Online courses, webinars, and educational conferences provide opportunities for teachers to continue their professional development. They can learn new teaching strategies, stay updated on educational trends, and improve their subject knowledge. The internet enables efficient management of administrative tasks such as grading, attendance tracking, and lesson planning through various educational management systems. This allows teachers to focus more on instruction and less on paperwork. Incorporating internet-based tools and resources can make lessons more engaging and

interactive for students. Tools like educational games, virtual labs, and multimedia presentations can enhance student participation and interest in the subject matter (Tijani, 2023). The finding of this study also supports that of Louis (2022) who revealed that the use of the internet facilitates e-learning within the educational system. The internet relay chat includes some components that have been used to communicate globally such as Zoom, Skype, Google Meet, and Microsoft Team. Some other internet tools which allow people to exchange ideas with each other through the internet are e- portfolios, cyber infrastructures, digital libraries, and online learning object repositories, etc. There are also e-modules which are written and could be converted and stored into a digital version and transferred into a computer using word processor accessible by the user through the internet.

Conclusion

The essence of this study was to examine and present findings on technological innovation and implementation of environmental education in the University of Calabar, Cross River State, Nigeria. The findings obtained from analysis of data and testing of hypotheses in the study revealed that there was a significant influence of Google Classroom and internet services on implementation of environmental education in the study area. This indicated that technological innovation is contributing positively to the implementation of environmental education at the University of Calabar.

Recommendations

Based on the findings obtained in the study, the researcher makes the following recommendations;

1. The administrators of environmental education should ensure an expansion and consolidation of the use of Google Classroom among its lecturers in order to provide access to relevant information online for the smooth implementation of environmental education
2. The university management should continue to provide internet services that would ensure the effective utilization of technology in the implementation of environmental education

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