**CHALLENGES OF USING GOOGLE CLASSROOM IN TEACHING AND LEARNING OF BIOLOGY IN GOVERNMENT OWNED COLLEGES OF EDUCATION IN ENUGU STATE.**

**ABSTRACT**

***Aims****: This study was designed to investigate the Challenges of using Google classroom in teaching and learning of biology.* ***Study design:*** *The study adopted a descriptive survey design.* ***Place and duration of study:*** *The research was carried out at government owned colleges of education in Enugu State. Enugu state has two government owned colleges of education which includes federal college of education Eha-amufu and Enugu state college of education Technical, Enugu. This research was carried out between August 2024 and April, 2025.* ***Methodology:*** *The researchers administered 100 questionnaires to 10 teachers and 90 students randomly selected through balloting from a population of 645 students in the two government owned colleges of Education in Enugu State. The data collected was analyzed using mean.* ***Results:*** *Based on the data collected and analyzed, the findings from the research shows that respondents acknowledged that limited Internet access, lack of technical infrastructure/devices, and the need for training are basic tools needed for effectively use Google Classroom. However, they rejected the idea that not all Biology students and lecturers have access to a reliable internet connection. Respondents accepted the presence of frequent power outages and acknowledged alternative measures taken by the College to address power supply challenges during the use of Google Classroom in biology classes at Colleges of Education in Enugu state.* ***Conclusion:*** *The study recommended that the school management as a matter of necessity should conduct a* Comparative analysis to explore the challenges of using Google Classroom in teaching and learning biology across multiple educational institutions. This would provide a broader perspective and help identify common challenges and potential solutions.

Key words: Google, Classroom, Biology, Colleges, Education, Enugu.

1. **INTRODUCTION**

The digital transformation of education systems at all levels has allowed the incorporation of a new teaching–learning ecosystem called e-learning. Recall, that COVID-19 pandemic caused the closing of classrooms all over the world and forced 1.5 billion students and 63 million educators (UNESCO, 2020; Cucinotta, and Vanelli, 2020) to suddenly modify their face-to-face academic practices, wherever possible. This situation showed the strengths and weaknesses of education systems facing the challenge of digitalization. The digital breach is still a reality. According to data provided by the World Bank (World Bank, 2020b), in the year 2018, 84% of the citizens of member states of the European Union had access to the Internet, compared to 66% in Latin America and 18% in the least developed countries (LDC). Bates (Bates, 2020) states that COVID-19 has demonstrated the current inequalities in the system and the need for universal and low-cost access to the Internet for education. This failure cannot be attributed to e-learning itself, but to the fact that the potential of this teaching method has been underestimated and excluded from the digital education projects of educational organizations.

Information and Communication Technology (ICT) is vital to all aspects of everyday life in general and in education in particular. For its crucial role in creating an effective learning process and enhancing the role of learning, many educational institutions have adopted the use of ICT to continue with the process of educational communication. This transition from a traditional classroom to e-learning has also led to the emergence of new concepts within the world of education such as e-learning, education through the internet, e-books, virtual university, e-library, and other electronic media to allow the learner to learn according to personal preferences ((Noor-ul-Amin, 2013)). Learners can decide where and when they want to learn. They can prefer to learn without the commitment to attend classroom teaching at specific times. With the supply and accessibility of such modern technology in educational institutions, integrated education using this technology has been designed and termed generally as e-learning.

Pusvyta (2015) describes e-learning (online learning) as any form of pedagogy delivered using digital technology. Such methods incorporate visual graphics, text, animations, videos, and audio. In addition, e-learning pedagogy can also facilitate group learning and the assistance of instructors within specific fields. Online learning also refers to the teaching and learning process between teachers and pupils that involves various digital mediums, such as 'Whatsapp', 'Zoom', and 'Google Classroom'. In addition, online learning does not refer to direct learning alone. Any assignments or activities, provided by the teacher online, are considered part of online learning.

In E-learning, participants can save time and effort living in distant places from universities where they are registered, it can be easily managed, and the learner can easily access the teachers and teaching materials, it also helps to reduce the effort and travel expenses and other expenses that accompany traditional learning, it reduces significantly the administrative effort, preparation and lectures recording, attendance, and leaving classes. Teachers, as well as students, see that online learning methods encourage pursuing lessons from anywhere and in difficult circumstances that prevent them from reaching institutions of learning. It aids students becomes self-directed learners and learning simultaneously and asynchronously at any time (Gautam, 2020; Mukhtar et al. 2020).

Google Classroom is a free web service developed by Google for schools that aims to simplify creating, distributing, and grading assignments (Okmawati, 2020). Google Classroom education is one of the features provided by Google Apps for Education (GAFE) which was released to the public on August 12, 2014. It is an application that allows the creation of classrooms in cyberspace. It is used as a means of communication between students and lecturers, in organizing classes, especially when students and lecturers cannot do face-to-face learning (Izenstark& Leahy, 2015). The primary purpose of Google Classroom is to streamline the process of sharing files between teachers and students. Contrarily, there are many problems with e-learning, the most important of which is getting knowledge only on a theoretical basis and when it comes to using everything that learners have learned without applying practical skills. The face-to-face learning experience is missing, which may interest many learners and educators. Other problems are related to the online assessments, which may be limited to objective questions. Issues related to the security of online learning programs and user reliability is among the challenges of e-learning in addition to other difficulties that are always related to the misuse of technology (Gautam, 2020; Mukhtar et al. 2020).

Compared to developed countries, it was found that developing countries face many challenges in applying e-learning, including poor internet connection, insufficient knowledge about the use of information and communication technology, and weak content development (Aung & Khaing, 2015). The provision of content such as video and advanced applications is still a new thing for many educators, even at the higher education level in developing countries (Aljawarneh, 2020).

Google Classroom has been widely criticized as well as other kinds of e-learning platforms due to its inability to handle practical classes, especially in the field of Biology. It generally appears that Google Classroom is specialized in getting knowledge only on a theoretical basis. Some students have also complained that the face-to-face learning experience is missing. Most institutions especially in underdeveloped and developing countries have limited access to online instructional materials due to poor network systems. It has also been observed that evaluation in most online classrooms is limited to objective questions. To the best of our knowledge, there is a dearth of literature on the specific challenges of using Google Classroom in teaching and learning of Biology in Colleges of Education especially Colleges of Education in Enugu state Nigeria. Therefore, the present study is designed to investigate the challenges of using google classroom in teaching and learning biology. A case study of government owned Colleges of Education in Enugu State.

**2. MATERIAL AND METHODS**

**2.1 Research Design.**

The researcher adopted a descriptive survey design and the reason for this choice was because the study is aimed at collecting data from lecturers and students considered representative of a population in investigating the challenges of using goggle classroom in teaching and learning biology. Nworgu, (2020) describes it as public opinion survey. It deals with the purpose perception or feelings as direct contact is made with the unit of study hence giving room for deep and thorough understanding of a given social order. The design is a survey type which is obtaining data from the respondents without manipulating the variables.

**2.2 Area of the Study**

This research was carried out in government owned Colleges of Education in Enugu State. Both N.C.E. and Degree programs were used as participants. Enugu state has two government owned colleges of education which are Federal college of education Eha-amufu and Enugu state college of education technical, Enugu. The schools are within the reach of the researchers thereby making it possible for through and extensive study.

**2.3 Population of the Study**

The population of the study is made up of all the 40 biology lecturers and 645 students from the two government owned colleges of education (Federal College Education, Eha-Amufu and Enugu State College of Education Technical). This figure comprises of Nigeria Certificate Education (N.C.E) – 316 (NCE I – 76, II – 112, NCE III – 128) & Degree – 329 (D I – 54, D II – 97, D III – 106, D IV - 72)).

**2.4 Sample and Sampling Technique**

A random sample of 10 biology lecturers and 90 randomly selected (balloting) students were used for the research from the two government owned colleges of education (Federal College Education, Eha-Amufu and Enugu State College of Education Technical).This figure was obtained using Taro Yamen’s formula as outlined in Ezugwu *et al,* (2025).

**2.5 Instrument for Data Collection**

The instrument that was used for data collection is structured questionnaire called Biology Lecturers’\Students’ Google Classroom Challenges (BLSGCC). Questionnaire items will be constructed to afford an answer to the research questions formulated to guide the study. It is design and developed by the researcher to deal with personal data. The questionnaire consists of four sections. Section A sought information on whether there is limited Internet access. Section B sought information on the lack of technical infrastructure/needed devices. Section C sought information on lecturers’ and students’ level of training for online teaching and learning. Section D sought information on limited access to electricity. The researcher used questionnaire as an instrument for data collection in this study because they offer a fast efficient and inexpensive mean of gathering large amount of information from sizable volume. These tools are particularly effective for measuring subject behaviour, preference, intention, attitude and opinion. The use of open and close question enables the researchers to obtain both qualitative and quantitative data resulting in more comprehensive result. There were the uses of four alternative response column specifying the alternative option agreement of student in accordance with the four-point Likert scale type as, Agree (A) = 4 Points, Strongly Agree (SA) = 3points, Disagree (D) = 2Point, Strongly Disagree (SD) = 1point

**2.6 Validation and reliability of the Instrument**

The research instrument was subjected to face validation by giving it to two experts from Biology Education and another from Measurement and Evaluation, all in the Federal College of Education, Eha-Amufu. They were asked to validate the instrument concerning the appropriateness of language used in terms of clarity of statement and adequacy of items of the instrument. The experts also checked whether the instrument is capable of answering the questions. Based on the experts, corrections, comments, observations, suggestions, and amendments were made to the instruments before a final copy was produced for the study.

The instrument was tried on a sample of twenty (20) Degree III Education Biology students, in Peace Land College of Education, Enugu which is not part of the sampled college for the study. The data obtained from the respondents were subjected to the Cronbach Alpha formula because the instrument was non-dichotomously scored. A reliability coefficient of 0.086 was obtained for the computation which shows that the instrument is reliable

**2.7 Method of Data Analysis**

The researchers visited the sampled colleges to distribute and collect the data for the study. During the course of the visit, copies of the instrument were administered to the students and lecturers by the researchers. The administration of the instrument was done once in each school and retrieval of the achievement test was on the spot. Data collected from the respondents were keyed into a Microsoft Excel sheet, and analyses of mean was carried out. A four-point scale of Strongly Disagree (SD), Disagree (D), Agree (ASD), and Strongly Agree (SA). The scaling statement and the nominal values are SD= 1; D= 2; A= 3; SA= 4. Therefore, mean = 4+3+2+1 divided by 4 = 2.50. Therefore, 2.50 was the cut-off point for deciding on each item. Any item whose weighted mean was 2.50 and above was considered as agreement while any item that was less than 2.50 was regarded as disagreement. The researchers therefore devised that mean for every analysis using the formula below:

$X=\frac{∑X}{N}$ , Where x= mean, Ɛ= summation, and N= Number, $\frac{4+3+2+1}{4}+\frac{10}{4}=2.50$

**3. Results**

The presentation and analysis of data obtained from the Administration of the instrument (questionnaire) of the study. The data were organized into three tables in relevance to the three research questions.

**3.1 Effect of limited Internet access on the use of Google classroom.**

The mean scores of five items in the Table 1 were above the benchmark for acceptance except for items 1 and 4 which fell below the 2.5 mean benchmark. This implies that respondents revealed that they accepted that there is limited Internet access as shown in items 2, 3, and 5. Contrarily, the majority of responses on items 1 and 4 showed that respondents rejected the question that states “Not all Biology students and lecturers have access to a reliable internet connection”.

**3.2 Availability of technical infrastructure/needed devices for google classroom engagement.**

The mean scores of all items in the Table 1 were above the benchmark for acceptance except for item 10 which fell below the 2.5 mean benchmark. This implies that respondents revealed that they accepted that there is a lack of technical infrastructure/needed devices as shown in items 6, 7, 8, and 9.

**3.3 Sufficiency training for lecturers and students for online teaching and learning in Google classroom.**

The mean scores of all items in the Table 3 were above the benchmark for acceptance except item 14 which fell below the benchmark. The responses to item 14 showed that respondents rejected the question that stated that they do not need to be trained before they can use Google Classroom effectively for teaching and learning purposes

**3.4 Steady power supply for online teaching and learning through google classroom.**

The mean scores of all items in the Table 4 were above the benchmark for acceptance. Responses on steady power supply showed that respondents accepted that frequent power outages and inconsistent or unstable power supply during teaching or learning activities. Their responses also revealed that they accepted that the College is making alternative measures to mitigate the challenges caused by the inconsistent power supply when using Google Classroom in biology classes at Federal College of Education, Eha-Amufu and ESCET.

**Table 1: Mean rating on the effect of limited Internet access**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS** | **SD** | **D** | **A** | **SA** | **N** | **MEAN** | **REMARKS** |
| 1. | Not all Biology students and lecturers have access to a reliable internet connection. | 40 | 30 | 15 | 15 | 100 | 2.05 | Rejected |
| 2. | Biology students and lecturers have access to the College’s free Wifi. | 20 | 25 | 25 | 30 | 100 | 2.65 | Accepted |
| 3. | Are there strong service providers in your college location? | 18 | 23 | 25 | 34 | 100 | 2.75 | Accepted |
| 4. | Location is a major factor contributing to limited internet access in your college. | 35 | 25 | 27 | 13 | 100 | 2.18 | Rejected |
| 5. | limited access to the internet is capable of frustrating the use of Google Class ROOM for teaching and learning Biology in our college. | 14 | 12 | 30 | 44 | 100 | 3.03 | Accepted |

Grand mean = $\frac{Ɛx}{N}$, Where Ɛx =12.66, N=5, Therefore X=12.66/5, X=2.53

Grand mean =2.53 Accepted

1. **Is there a Table 2:Mean rating on lack of technical infrastructure/needed devices**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS** | **SD** | **D** | **A** | **SA** | **N** | **MEAN** | **REMARKS** |
|  |  |  |  |  |  |  |  |  |
| 6. | Many students and lecturers do not have reliable or affordable access to the internet  | 15 | 10 | 35 | 40 | 100 | 2.99 | Accepted |
| 7. | There are sufficient necessary devices such as laptops, tablets, or smart phones for teaching and learning in your department.  | 25 | 20 | 30 | 25 | 100 | 2.54 | Accepted |
| 8. | There are varying levels of technological proficiency among students and lecturers.  | 15 | 21 | 37 | 27 | 100 | 2.73 | Accepted |
| 9. | Lecturers and students are regularly provided with proper training on how to effectively navigate and utilize Google Classroom.  | 19 | 15 | 32 | 34 | 100 | 2.78 | Accepted |
| 10. | The colleges lack the necessary funds to invest in the required technical infrastructure or devices.  | 37 | 20 | 28 | 15 | 100 | 2.18 | Rejected |
|  |  |  |  |  |  |  |  |  |

**Grand mean =** $\frac{Ɛx}{N}$**, Where Ɛx =13.22, N=5, Therefore X=13.22/5, X=2.64**

**Grand mean =2.64 Accepted**

**Table 3: Mean rating on training for online teaching and learning**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS** | **SD** | **D** | **A** | **SA** | **N** | **MEAN** | **REMARKS** |
| 11. | The colleges has organized training for lecturers on the use of Google Classroom for teaching and learning Biology  | 19 | 18 | 30 | 33 | 100 | 2.78 | Accepted |
| 12. | The colleges have organized training for students on the use of Google Classroom for teaching and learning Biology  | 15 | 15 | 41 | 29 | 100 | 2.81 | Accepted |
| 13. | We have been trained on how to manage Google Classroom to avoid compromising the quality of instruction and student engagement in biology classes.  | 16 | 17 | 31 | 36 | 100 | 2.79 | Accepted |
| 14. | I don’t need to be trained before I can use Google Classroom effectively for teaching and learning.  | 51 | 17 | 15 | 17 | 100 | 1.98 | Rejected |
|  |  |  |  |  |  |  |  |  |

Grand mean = $\frac{Ɛx}{N}$, Where Ɛx =10.86, N=4, Therefore X=10.36/4, X=2.59

Grand mean =2.59 Accepted

**Table 4:** **Mean rating on the steady power supply**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S/N** | **ITEMS** | **SD** | **D** | **A** | **SA** | **N** | **MEAN** | **REMARKS** |
| 15. | I do experience frequent power outages during your teaching or learning activities in the biology classes at the Federal College of Education, Eha-Amufu. | 20 | 22 | 33 | 25 | 100 | 2.60 | Accepted |
| 16. | I have encountered any difficulties in using Google Classroom due to an inconsistent or unstable power supply at the Federal College of Education, Eha-Amufu?  | 25 | 20 | 30 | 25 | 100 | 2.52 | Accepted |
| 17. | The lack of a steady power supply disrupts the effectiveness and efficiency of using Google Classroom for teaching and learning biology at the Federal College of Education, Eha-Amufu.  | 15 | 10 | 35 | 40 | 100 | 2.95 | Accepted |
| 18. | The College is making alternative measures to mitigate the challenges caused by the inconsistent power supply when using Google Classroom in biology classes at Federal College of Education, ESCET. | 13 | 19 | 32 | 36 | 100 | 2.90 | Accepted |
| 19 | Is it very important to have a reliable and uninterrupted power supply for the successful implementation of Google Classroom in teaching and learning biology at the Federal Colleges of Education, Eha-Amufu? | 10 | 14 | 36 | 40 | 100 | 3.03 | Accepted |
|  | Grand mean = $\frac{Ɛx}{N}$, Where Ɛx =14.00, N=5, Therefore X=14.00/5, X=2.80Grand mean =2.80 AcceptedKeySA - Strongly agreeA - AgreeD - DisagreeSD – Strongly disagreeX - Mean |  |  |  |  |  |  |  |

**4. Discussion**

The rapid advancement of technology has revolutionized the education landscape, leading to the transformation of traditional classrooms into digital learning environments (Jones and Kessler 2020). Google Classroom, a widely used platform, has gained popularity among teachers and students due to its diverse functionalities (Brown, et al., 2018). However, incorporating such technology into specific subject areas, including biology, poses unique challenges (White, 2022).

The present study, titled "Challenges of using Google Classroom in Teaching and learning biology: A case study of government owned Colleges of Education in Enugu State, "aims to explore the practical experiences and obstacles encountered by educators when utilizing Google Classroom in the context of biology instruction. Through an examination of the perspectives and insights of both teachers and students, this research was geared towards providing valuable insights into the complexities encountered, offering guidance for educators and stakeholders striving to optimize the use of technology in biology education.

Our finding on the limited Internet access showed that respondents revealed that they accepted that there is limited Internet access. This implies that respondents revealed that they accepted that there is limited Internet access as shown in items 2, 3, and 5. Contrarily, the majority of responses on items 1 and 4 showed that respondents rejected the question that states “Not all Biology students and lecturers have access to a reliable internet connection” due to their practical experiences. This finding is consonant with Odo, Solomon Ikechukwu, Asogwa Lilian Obinna, Egbe Christian Ikechukwu, & Ezugwu Kingley Chijindu, 2024.

Investigation into the technical infrastructure/needed devices revealed that respondents accepted that there is a lack of technical infrastructure/needed devices. This finding is consonant with Odo, Solomon Ikechukwu, Asogwa Lilian Obinna, Egbe Christian Ikechukwu, & Ezugwu Kingley Chijindu, 2024.

Investigation into training showed that respondents accepted that they need training in practical terms before they can effectively engage with Google Class Room for the purposes of teaching and learning. This finding is consonant with Odo, Solomon Ikechukwu, Asogwa Lilian Obinna, Egbe Christian Ikechukwu, & Ezugwu Kingley Chijindu, 2024.

Our finding on power supply showed that respondents accepted that frequent power outages and inconsistent or unstable power supply and lack of technicians that can practically work on it during teaching or learning activities. Their responses also revealed that they accepted that the College is making alternative measures to mitigate the challenges caused by the inconsistent power supply when using Google Classroom by students and technicians to apply their practical activity knowledge in biology classes at Colleges of Education in Enugu State. This finding is consonant with Odo, Solomon Ikechukwu, Asogwa Lilian Obinna, Egbe Christian Ikechukwu, & Ezugwu Kingley Chijindu, 2024.

**Conclusion**

The findings indicate that respondents acknowledged the limited Internet access, lack of technical infrastructure/devices, and the need for training to effectively use Google Classroom. However, they rejected the idea that not all Biology students and lecturers have access to a reliable internet connection. Respondents accepted the presence of frequent power outages and acknowledged alternative measures taken by the College to address power supply challenges during the use of Google Classroom in biology classes at government owned Colleges of Education in Enugu State.

**Recommendations**

1. Comparative analysis: Conduct a comparative study to explore the challenges of using Google Classroom in teaching and learning biology across multiple educational institutions. This would provide a broader perspective and help identify common challenges and potential solutions.

2. Student perceptions and experiences: Investigate the perceptions and experiences of students regarding the use of Google Classroom in biology education. This qualitative study can provide valuable insights into how students perceive the challenges and benefits of using this platform and offer suggestions for improvement.

3. Pedagogical strategies: Explore the implementation of effective pedagogical strategies within Google Classroom for biology education. This study can focus on identifying innovative teaching methods, instructional design techniques, and interactive activities that can enhance student engagement and learning outcomes.

4. Teacher training and professional development: Investigate the impact of teacher training and professional development programs on the effective utilization of Google Classroom for biology instruction. This study can explore the specific needs and challenges faced by teachers and suggest strategies to enhance their digital literacy and instructional skills in using this platform.

5. Technology infrastructure and support: Assess the adequacy of technology infrastructure and support systems in the Government owned Colleges of Education in Enugu State, to facilitate the seamless integration of Google Classroom into biology teaching and learning. This study can identify potential barriers, such as internet connectivity issues.

**Educational Implication of the Study**

1. Poor Internet Connectivity: unstable or unlimited internet access hinders students and lecturers from fully engaging with biology contents on Google classroom, leading to gaps in knowledge and reduced academic performance.

2. Inadequate Access to Digital Devices: many students lack access to Smartphones, tablets, or laptops, which creates inequality in learning opportunities and limits their participation in online biology lessons.

3. Low Digital Competence: Limited ICT skills among both teachers and students affect the effective use of Google Classroom, resulting in poorly delivered lessons and reduced comprehension of biology concepts.

4. Resistance to Technological Change: Some educators and learners are reluctant to embrace digital tools, which can hinder the integration of Google Classroom into biology instruction and limit its potential benefits.

5. Insufficient Practical Application: The absence of hands-on lab activities in Google Classroom weakens students’ understanding of practical biology, which can diminish their interest and curiosity in the subject.

**Disclaimer (artificial intelligence)**

Author(s) hereby declares that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during writing or editing of this manuscript

**Consent**

Not applicable.

**Ethical approval**

Not applicable.

**COMPETING INTERESTS DISCLAIMER:**

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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