



Original Research

DIGITAL REVOLUTION IN HIGHER EDUCATION: UNVEILING THE IMPACT OF ONLINE LEARNING VERSUS TRADITIONAL CLASSROOM INSTRUCTION IN A GHANAIAN UNIVERSITY, WEST AFRICA

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ABSTRACT

The research explores the perceptions, attitudes, and experiences of University of Ghana students regarding online and traditional classroom learning. Through qualitative interviews, the study reveals diverse viewpoints, some favoring conventional methods while others appreciate the flexibility of online platforms. Attendance tracking, teacher assistance, and network dependability are some variables that impact students' delight and involvement in Online Learning. Recommendations include providing advanced course materials, enhancing network infrastructure, and providing instructor training. The study contributes to higher education discussions by emphasizing the need for technology integration while prioritizing student engagement and offering insights for shaping effective online learning environments in line with evolving educational landscapes.

Keywords: Blended Learning, Cognitive load theory, Online Learning, Synchronous online Learning, Traditional classroom learning

INTRODUCTION

Many new and creative teaching approaches have recently entered the educational scene, adding to its richness. Project-based Learning, inquiry-based Learning, teamwork, and integrating technology into the classroom are some of the most effective approaches. A fascinating approach to education is project-based learning, which involves students in real-world projects that promote the investigation and application of academic ideas. A study by Helle et al. (2006) underlines the potential of project-based learning to elevate student engagement and motivation and facilitate deeper learning. In inquiry-based learning, students are empowered to foster their understanding of educational principles through the formulation of inquiries, the design of experiments, and the execution of investigations. As substantiated by Akerson et al. (2018), this approach has been demonstrated to enhance student comprehension of educational ideas while nurturing critical thinking and adept problem-solving skills (Mohammed & Amponsah, 2021a; Mohammed & Amponsah, 2021b). The Media and their wide-ranging effects have been around ever since humanity started organizing into tribes and developing methods of communication (Mensah et al., 2020).

Collaboration within the educational sphere envisions a synergistic alliance, uniting educators, students, and professionals in a dynamic ecosystem. As highlighted by Kozleski, Mainzer and Deshler (2013), this collaborative ethos creates fertile ground for exchanging ideas and knowledge. Vygotsky's research (1978) further underscores how collaborative learning cultivates higher-order cognitive skills such as critical analysis, problem-solving, and decision-making. The infusion of technology into the educational sphere catalyzes more engaging and interactive educational learning experiences. Notably, virtual, and augmented reality can transport students into immersive educational environments. Keengwe et al. (2008) reveal that technology's integration into education holds the potential to elevate student motivation and engagement. In summation, inventive educational teaching methodologies have reinvigorated the educational landscape. Project-based and inquiry-based learning amplifies engagement and deepens understanding, while collaboration fosters a dynamic exchange of ideas. Moreover, the infusion of technology can invigorate education, offering immersive and captivating experiences. These innovative approaches collectively bear the promise of nurturing well-rounded, critically thinking, and motivated learners.

Online learning has become a significant factor in the evolution of education, as it allows individuals to pursue their goals without the need for traditional classes (Dhawan et al., 2020). Various factors have contributed to its rise, such as the increasing number of learners. Considering these benefits, deliberate policies are necessary to facilitate the deployment of Wi-Fi technology in educational institutions (Kyeremeh et al., 2024). Online learning is more cost-effective than traditional methods (Jena, 2020). The accessibility of online learning is one of the main factors contributing to its growth. Due to the technological advancements in the field and the availability of various educational resources online, learners can now access them from anywhere in the world. This eliminates the need for people to relocate or go to a physical school. Online learning also allows individuals to take advantage of programs and courses unavailable in their local schools. This unavailability provides them with the opportunity to pursue different specializations and subjects. Unlike traditional methods, which typically require students to attend classes at a specific schedule, it allows them to study at their own pace (Fynn et al., 2021). This allowance eliminates the need to maintain a rigid schedule and allows them to balance their professional and personal lives. This flexibility can be especially beneficial for working individuals and parents, allowing them to pursue their goals without disrupting their schedules (Mensah et al., 2023). Students

increasingly recognize social media as a potent tool for their academic development (Asafo-Adjei et al., 2023).

Online and traditional classroom learning are two distinct pedagogical approaches that have gained prominence in education. Student engagement is crucial in effective Learning (Khan et al., 2017). In traditional classroom settings, face-to-face interactions between students and teachers create a dynamic learning environment (Paul & Jefferson, 2019). The physical presence of instructors and peers promotes immediate feedback, social connections, and collaborative activities. On the other hand, online learning relies on digital platforms and asynchronous communication (Paul & Jefferson, 2019). Students engage with course materials through videos, online discussions, and interactive modules, allowing learning pace and scheduling flexibility. However, the absence of real-time interaction may require students to be self-disciplined and motivated to stay engaged. Interaction is another crucial aspect to consider.

Students may participate in group activities, ask questions, and have in-person conversations in typical classroom settings, which helps to build community and fosters collective Learning (Oteng et al., 2023a; Oteng et al., 2023b). The ability to communicate directly with classmates and teachers allows for the development of critical thinking abilities as well as quick feedback and explanation. Discussion boards, video conferencing, and online collaborations are just a few digital platforms used for interactions during online learning. Although these technologies encourage participation and communication, they need to have the spontaneity and in-person connection of in-person encounters, which could make some students feel alone. Traditional classes frequently adhere to a defined curriculum with specific learning objectives regarding information acquisition. Teachers teach classes through lectures, practical exercises, and demonstrations to support understanding and skill development. Online education, on the other hand, offers a more customized and adaptable approach (Mensah, 2020). Numerous tools, multimedia information, and interactive tests catered to each student's requirements are available. Students may review material, investigate further resources, and go at their own pace in this self-paced learning environment.

STATEMENT OF THE PROBLEM

Ghanaian universities have started adopting online Learning more often due to the COVID-19 epidemic (Agormedah et al., 2020; Edumadze et al., 2022). Increased affordability, flexibility, and accessibility have been the main drivers of this educational transition towards online courses. However, the efficiency of online learning compared to traditional classroom learning has yet to be well studied, particularly in the context of Ghanaian institutions. While some international studies provide insights (Furió et al., 2015; Mukhta et al., 2020; Hodges et al., 2020), there is a need to understand the unique factors that influence online learning outcomes at the University of Ghana, such as cultural context, infrastructure limitations, and pedagogical approaches. Despite the growing popularity of online learning in universities in Ghana, several research gaps remain. Firstly, there is limited empirical evidence on whether online Learning in Ghana yields learning outcomes comparable to traditional classroom learning. It is unclear whether students in online learning programs in universities across Ghana achieve similar academic performance, critical thinking abilities, knowledge retention, and skill development as their counterparts in traditional classrooms. Secondly, additional research is necessary to determine the elements that impact students' happiness and engagement with online learning, particularly in the university setting. Understanding the drivers, obstacles, and strategies for increasing student involvement in online courses at the University of Ghana is critical for maximizing the learning process. Lastly, more

research needs to be conducted to examine the specific modifications needed in pedagogical approaches to suit Ghanaian higher education in online learning environments.

Failing to address these research gaps can significantly affect education in Ghanaian universities. With a thorough grasp of how successful online learning is compared to traditional classroom learning, educational policymakers and institutions may make informed decisions regarding implementing and integrating online learning. This could result in missed opportunities to leverage the benefits of online learning or ineffective utilization of resources. Additionally, teachers may find it challenging to design engaging online courses that live up to the expectations and demands of Ghanaian university students if they need to be made aware of the elements affecting student engagement. Effective learning results may be hampered by the failure to consider adjustments and alterations ingrained in pedagogical techniques for Online Learning in Ghanaian colleges. This might result in a rift between teaching practices and cultural norms. In general, filling in these research gaps is essential to making well-informed decisions and successfully implementing online Learning in Ghana's educational system.

RESEARCH OBJECTIVES

1. To explore students' experiences at the University of Ghana toward online and traditional classroom learning.
2. Examine the elements influencing the University of Ghana students' participation in Online Learning.
3. To identify the modifications needed in pedagogical approaches for effective online learning at the University of Ghana.

CONCEPTUAL REVIEW

This study's conceptual review or framework section elucidates key terminologies critical to understanding the research context. "Online learning"—including synchronous and asynchronous models—is defined out of these. Real-time virtual exchanges between teachers and students, frequently via video conferencing software, that encourage instantaneous engagement are called synchronous online learning. Students can learn quickly using prerecorded lectures and resources through asynchronous online learning. Additionally, the section defines "traditional classroom learning" as the conventional mode of education, where teachers and learners gather in a physical classroom for face-to-face interactions, fostering immediate discussions and reactions. These definitions and other relevant conceptual underpinnings pave the way for a comprehensive exploration of students' perceptions and experiences within the diverse educational landscapes of online and traditional learning settings.

Online Learning

Through diverse media, including emails, chat groups, and online forums, teachers and students may connect through Online Learning, which improves the efficacy of teaching and learning. The terms e-learning and web-based education are used interchangeably. An online learning session involves using the internet or a computer to provide students with a synchronous environment wherein they can interact with other learners and teachers (Singh & Thurman, 2019). Participants are not required to be present in person.

Online learning can take various forms, including:

- Synchronous Learning: This is a form of online learning that occurs in real-time, where students and teachers interact simultaneously (Warden et al., 2013; Zhang et al., 2023).
- Asynchronous Learning: This method of online learning allows learners to access prerecorded lectures, video lessons, or other learning materials at their convenience. They can also engage in discussions, complete assignments, and interact with peers and instructors through online platforms or discussion boards.
- Blended learning relates to combining in-person education with online learning. It integrates traditional classroom activities with online components, allowing students a more accessible and personalized learning experience (Morton et al., 2016). For example, learners may attend lectures online and participate in in-person discussions or practical activities.
- Online learning offers several advantages.

The first advantage is flexibility (Dhawa, 2020). Learners can choose when and where to study, accommodating their personal and professional commitments. Another advantage is accessibility (Mukhtar et al., 2020). Online learning eliminates geographic barriers and enables individuals from different locations to access education. It provides opportunities for learners with limited access to traditional educational institutions or specific courses. The third advantage is personalization (Panigrahi et al., 2018). Online learning can be tailored to individual learning needs and preferences. Learners can navigate through content quickly, review materials as needed, and engage in personalized assessments or adaptive learning pathways. Online learning also offers interactivity and collaboration (Kent et al., 2016). Online learning platforms frequently provide interactive exercises, teamwork, and communication capabilities. Students may participate in group projects, have conversations, and get feedback from classmates and teachers, which promotes community building and active learning. Lastly, online offers the advantage of resource availability (Kör et al., 2014). Online learning offers various digital resources, including multimedia materials, e-books, simulations, and online libraries. Learners can access a wealth of information and diverse learning materials to enhance their understanding and explore different perspectives.

Traditional classroom learning

Traditional learning is also classroom-based or face-to-face instruction (Baker & Unni, 2018; Amirul et al., 2013). It is still extensively used in schools, colleges, and universities worldwide as the primary educational method for centuries. In traditional learning, students typically gather in a designated location at specific times and follow a structured curriculum led by a teacher or instructor. The teacher delivers lessons, explains concepts, and engages students through lectures, discussions, and demonstrations. Students experience in-person interactions with their colleagues, facilitating instant feedback and social networking.

Critical characteristics of traditional learning: Critical characteristics of traditional learning include Physical Classroom Environment: Traditional Learning occurs in a physical classroom setting, such as a school or university, where students and teachers come together for instruction.

Direct Teacher-Student Interaction: In traditional learning, teachers play a central role in delivering instruction and facilitating learning. They provide explanations, answer questions, and guide students through learning.

Peer Interaction: In a traditional classroom setting, students can engage in group projects, conversations, and cooperative learning. This social interaction fosters teamwork, communication skills, and exchanging ideas.

Fixed Schedule: Traditional Learning follows a fixed schedule, with classes at specific times and durations. Students are expected to attend classes regularly and adhere to a structured timetable.

Printed Learning Materials: In traditional learning, textbooks, printed handouts, and other physical resources are commonly used to provide learning materials. These resources can be distributed in class or accessed through school libraries.

Immediate Feedback: Traditional Learning often provides immediate feedback as teachers can assess student understanding through class discussions, quizzes, tests, and assignments. This timely feedback allows students to gauge their progress and promptly address misconceptions.

Theoretical framework

The theoretical framework is Cognitive Load Theory. It proposes that learners have limited cognitive potential for processing information, and when the cognitive load exceeds their capacity, it can hinder learning. The theory provides insights into instructional design principles to optimize Learning by managing cognitive load effectively (Mensah et al., 2020). The theory assumes that working memory has limited capacity, meaning it can only handle a certain amount of information simultaneously. This limited capacity can be overwhelmed when learners are presented with complex or excessive information.

Three Types of Cognitive Load: The theory distinguishes three categories of cognitive load— intrinsic, external, and germane. Because of the intricacy of the material being learned, there is an intrinsic cognitive load that cannot be changed. The extra mental strain caused by instructional design components that do not directly support learning is extraneous cognitive load. Germane cognitive load is the mental effort that contributes to learning and schema construction.

Cognitive Load and Learning: The theory suggests that when instructional materials or methods exceed learners' working memory capacity, it can lead to cognitive overload, resulting in reduced learning outcomes. On the other hand, learning can be enhanced if the cognitive load is managed effectively by reducing extraneous load and promoting germane load.

Reducing Extraneous Load: The theory emphasizes the importance of instructional design in minimizing extraneous cognitive load. By eliminating or simplifying unnecessary and distracting elements in learning materials or activities, learners can allocate more cognitive resources to understanding and integrating essential information.

Promoting Germane Load: The theory highlights the importance of engaging learners in activities that promote schema construction and a deeper understanding of the subject matter. By designing instructional materials and activities that require learners to process and integrate information actively, the germane load can be increased, leading to improved learning outcomes.

Application of the Cognitive Load Theory to this study

Using the Cognitive Load Theory (CLT) in the study offers a strong framework for analysing the effectiveness of online learning in comparison to traditional classroom learning (Sweller, 1988). Researchers can examine different instructional tactics and learning environments to determine their effect on students' cognitive load and subsequent performance by knowing how cognitive load influences learning outcomes (Paas et al., 2003). This theory is also useful for evaluating the cognitive demands that are specific to the online setting, like managing self-paced learning, interacting with multimedia presentations, and navigating digital resources (Kirschner et al., 2006).

Researchers can investigate, for example, the effects of varying multimedia combinations and quantities on cognitive load in online learning by contrasting text-only and video-based modules (Mayer & Moreno, 2003). Furthermore, the differentiation made by the CLT between intrinsic, extraneous, and relevant cognitive load provides a framework for evaluating the intricacy of online learning resources and recognising any potential benefits or drawbacks in comparison to traditional classroom materials (Leahy et al., 2003).

Researchers can also investigate how interactive aspects encourage germane load and deeper learning, and how well-designed online courses minimise unnecessary load through clear organisation and straightforward navigation (Van Merriënboer & Sweller, 2005). Van Merriënboer & Ayres (2005) suggest that analysing instructional tactics such as scaffolding and feedback systems can provide additional insight into their effects on cognitive load and learning outcomes in the online setting.

Moreover, adaptive technologies and customised interventions in online learning platforms can lessen cognitive load and enhance learning outcomes for diverse learners, according to the CLT, which emphasises the significance of taking individual differences in cognitive ability and prior knowledge into account (Ayres & Sweller, 2005). In general, researchers can obtain crucial insights into improving the efficacy of learning through the optimisation of online learning experiences using the concepts of the CLT (Sweller, 1994).

Empirical review

The empirical framework underpinning this research is designed to rigorously investigate the diverse facets of students' experiences in online and traditional classroom learning within the Ghanaian context. In alignment with the research objectives, this framework delves into the nuanced realms of experience. Moreover, it scrutinizes the multifaceted determinants of student engagement and satisfaction while exploring the indispensable pedagogical adaptations for effective online learning. This framework draws upon an array of seminal research studies in this pursuit, encompassing a rich tapestry of perspectives and insights that inform the research methodology and analysis (Amponsah et al., 2022). Previous studies have effectively utilized qualitative research designs to examine educational experiences and perceptions. For instance, to find out how undergraduate students felt about online learning during the COVID-19 epidemic, Unger and Meiran (2020) conducted qualitative research. They thematically analyzed the data after using semi-structured interviews as their data-gathering technique. The survey produced insightful information on students' difficulties and problems with online learning. A study by Lee and Wu (2012), as cited in (Mensah et al., 2023) on the impact of individual differences in the inner and outer states of ICT on participation in online reading activities and PISA 2009 reading literacy found the following: When examining the relationship between traditional and digital literacy, it

was suggested that using ICT effectively allows students to have greater control over their education and fosters cognitive processes that aid in the development of learning abilities like communication, critical thinking, problem-solving, and self-assurance (Adjei et al., 2023).

Notable Findings from Previous Investigations

Several studies conducted within Ghana have yielded notable findings regarding student experiences with online learning. Rotar (2022) provides a framework for integrating support interventions into the online learning cycle that considers the unique requirements of Ghanaian students. Furthermore, research by Unger and Meiran (2020) explored student attitudes toward virtual learning during the Coronavirus pandemic, providing insights into the experiences of Ghanaian students during this challenging period. These studies collectively offer an understanding of students' experiences with online learning, particularly within the Ghanaian context. As Objective I outlines, they form an essential foundation for assessing whether online learning aligns with students' needs and expectations. Exploring student experiences in online learning is a vital component of Objective I. It enables a comprehensive evaluation of students' experiences in Ghana regarding online and traditional classroom learning.

Insights from Prior Research Highlighting Key Determinants

Previous research in Ghana has provided insight into the variables influencing students' participation in online learning. In Unger and Meiran (2020), student attitudes regarding online learning during the COVID-19 epidemic were investigated. This research provided insights into engagement experiences in the Ghanaian environment. In order to improve student engagement through online Learning, Rotar (2022) created a framework that offers workable ways for integrating support interventions. These studies support Objective II by offering insightful information about the elements that influence students' participation in online learning, particularly in Ghana's distinct culture and environment.

METHOD

Research Design

The research design chosen for this study is qualitative research, which focuses on understanding and interpreting social phenomena through the perspectives and experiences of the individuals involved (Creswell, 2018). This qualitative approach thoroughly explores students' perceptions, attitudes, and experiences in Ghana regarding online and traditional classroom learning. Using a qualitative research design is particularly appropriate for this study because it allows researchers to delve deeply into the complexities and multiple dimensions of the research topic. Using qualitative methods, the study aims to capture the richness and depth of individual experiences, providing profound insights into the effectiveness of online learning compared to traditional classroom learning in Ghana. Qualitative research provides a flexible framework for an iterative and dynamic research process. It also allows for adapting the research design based on emerging findings and exploring unexpected aspects of the topic. This design enables an in-depth exploration of participants' perspectives, allowing them to express their thoughts, beliefs, and experiences in their own words.

Considering the research questions and the necessity for a comprehensive understanding of student's perceptions and experiences, a qualitative research design is relevant to this study. It allows for data collection and analysis flexibility, enabling the researchers to capture the intricate and nuanced aspects of virtual classes and conventional learning within the Ghanaian context.

The data collection method chosen for this study is interviews, which offer a comprehensive and detailed source of data, enabling a thorough exploration of participants' perspectives, attitudes, and experiences (Qu & Dumay, 2011). Based on participants' preferences and logistical considerations, the interviews were conducted in person or online, using platforms like Zoom or social media platforms such as WhatsApp. Interviews are the primary data collection method, which aligns with the qualitative research design, allowing for interactive and in-depth conversations with participants. Interviews facilitate probing and clarification, enabling a deeper understanding of participants' viewpoints. By conducting interviews, the researchers will be able to capture the lived experiences, perceptions, and attitudes of students in Ghana regarding online and traditional classroom learning in a comprehensive and nuanced manner.

Research Approach

The research approach delineates the methodical strategy for carrying out the investigation and accomplishing its goals. The present study utilized a qualitative research approach to investigate students' perspectives and encounters with online and traditional classroom learning within the Ghanaian environment. Semi-structured interviews were used in the study's single technique design to collect participants' rich and varied viewpoints.

Population

This study's population consists of 243 students enrolled at the Department of Teacher Education of the University of Ghana who have experience with both online and traditional classroom learning. The choice of this population was driven by the researcher's focus on exploring students' experiences regarding these two learning modes within the context of the Department of Teacher Education at the University of Ghana. Focusing on the Department of Teacher Education offers several advantages.

Firstly, while students from other departments may have experienced online and traditional classroom learning methods, the Department of Teacher Education represents a specific group directly involved in the education sector, providing valuable insights into the challenges and opportunities of transitioning between different learning modes. Secondly, as a department specializing in training future educators, its students are uniquely positioned to offer insights into teaching methods' effectiveness, aligning closely with the study's goals. Thirdly, narrowing the sample to one department enhances feasibility, streamlining data collection and analysis within time and resource constraints. Lastly, as the youngest department within the University of Ghana's School of Education and Leadership, focusing on Teacher Education provides a current overview of trends and practices in teacher training, offering pertinent insights for educational policymakers and practitioners. This sample was chosen to capture various viewpoints and experiences regarding traditional classroom instruction and online learning. The participants may vary in age, gender, prior educational experiences, and geographical locations within Ghana to understand the nuances of students' preferences, challenges, and perceptions.

Sample and Sampling Technique

The study's sample, chosen on purpose, comprises ten male and fifteen female students from the University of Ghana's Department of Teacher Education. These students are qualified to offer insightful responses to the research questions since they have experience with traditional classroom instruction and online learning. Data saturation was used to establish the sample size, guaranteeing that the information gathered would be sufficiently rich, varied, and thorough to meet

the study's goals. A purposive sample strategy was used to choose individuals with prior experience in traditional classroom instruction and online learning. Data saturation, or the point at which fresh topics and information from the interviews cease to emerge, indicates that enough data was collected to answer the research questions adequately. To achieve a diverse and comprehensive sample, the following criteria have guided participant selection:

Students: The study included undergraduate and graduate students who have experienced online and traditional classroom learning. Participants from various academic disciplines and programs were chosen to capture a broad range of experiences and perspectives.

Experience: Participants were selected based on their active online and traditional classroom learning engagement. This criterion ensures that participants have firsthand experience and insights into each mode of instruction's benefits, challenges, and preferences.

Diversity: Efforts were made to include participants from diverse backgrounds, including age groups, genders, ethnicities, and socioeconomic statuses. This approach aimed to comprehensively understand experiences and perspectives across various demographic groups. The sample size was determined based on data saturation, where new information and themes no longer emerge from the data (Saunders *et al.*, 2017). The aim is to achieve sufficient representation to capture a range of perspectives and data saturation without overwhelming the analysis process.

Participants were recruited through various channels, such as online platforms, department databases, and personal contacts. Prospective participants received comprehensive information regarding the study's goals, methods, and participant rights. Before being included in the study, each participant gave their informed permission, confirming that they were aware of the goals and processes and that their participation was voluntary.

Instrumentation

The instrumentation for this study involved designing and developing a semi-structured interview guide (DiCicco-Bloom & Crabtree, 2006). This approach allowed participants to share their experiences, perceptions, and insights in their own words while ensuring that specific research questions were addressed. The interview guide was carefully constructed to cover critical themes related to participants' experiences with online and traditional classroom learning.

The research questions and study objectives were the foundation for developing the interview guide. It consisted of open-ended questions and prompts meant to delve into participants' opinions, difficulties, preferences, and suggestions on traditional classroom instruction and online learning. The discussion flow was allowed to occur naturally while simultaneously eliciting thoughtful and nuanced answers from participants.

Data Collection

Qualitative interviews served as the primary method of data collection for this research, as they are well-suited to explore participants' experiences and insights in depth (DiCicco-Bloom & Crabtree, 2006). Through one-on-one interviews, the researchers will be able to fully explore the research issue by delving deeply into participants' experiences with both traditional classroom learning and online learning.

The purpose of the interviews was to elicit complex and nuanced answers from participants. Open-ended questions were employed to get people to think back on their experiences, give examples, and express their opinions. The interview questions were developed based on the research objectives. They will cover participants' experiences with online and traditional classroom learning, factors influencing their engagement and satisfaction, and modifications needed for practical learning experiences.

The conversational and encouraging atmosphere the qualitative interviews will foster will allow participants to share their ideas and experiences openly. When appropriate, the researchers followed up with questions to get further information or clarity while using active listening techniques. Participants' distinct perspectives were recorded through this interactive process, and a greater comprehension of the efficiency of online learning compared to traditional classroom learning will be attained.

It is essential to remember that the researchers gave ethical issues top priority when conducting the interviews. Every participant was asked to provide informed permission, guaranteeing their voluntary involvement and comprehension of the study's goals and methods. Every participant was able to leave the research at any time without facing any repercussions. Confidentiality and anonymity have been maintained, with participant identities kept strictly confidential during data analysis and reporting.

The interviews for this research were in-person and online, based on the participants' preferences and availability. In-person interviews took place in a suitable and private location within the university premises to ensure confidentiality and minimize external distractions. On the other hand, online interviews were conducted using video conferencing platforms such as Zoom and social media platforms like WhatsApp. The choice of platform depended on the participants' familiarity and convenience. Each participant gave their informed consent before the interviews, guaranteeing their voluntary involvement and comprehension of the goals and methods of the research. Every participant was free to leave the research without facing any repercussions.

With the participants' permission, audio recordings were played back throughout the interviews to guarantee that their comments were accurately captured. This allowed the researchers to thoroughly analyze the data and record the interviews verbatim. Detailed field notes were recorded both during and after each interview, in addition to the audio recording.

These field notes captured nonverbal cues, observations, and contextual information that may not be captured through audio recording alone. Each interview was estimated to last 20 to 30 minutes, allowing for a thorough exploration of participants' experiences. The researchers established rapport with the participants, created a safe and supportive environment, and encouraged open and honest dialogue. The aim was to facilitate a comfortable and engaging interview experience that elicited rich and insightful participant responses.

Methods for data analysis

The data analysis process for this research followed the principles of thematic analysis as outlined by Braun and Clarke (2006). The first step in the analysis process involved transcribing the recorded interviews and organizing the data. The transcripts and field notes were imported into qualitative analysis software, aiding data management and organization. Once the data was prepared, the analysis proceeded through a coding process. Finding and labeling significant data units connected to the study's goals was the first step in the coding process. This coding process was guided by the patterns and themes that emerged from the findings. The codes were reviewed, refined, and grouped to form preliminary themes. The analysis progressed through an iterative

process of constant comparison and data immersion. This involves comparing codes and themes across the dataset and identifying connections, variations, and relationships. The research team engaged in regular discussions and peer debriefing to ensure rigor, consistency, and credibility in the interpretation of the data. Memos were created to document the thought process, analytical decisions, and emerging insights, providing a record of the analytical journey.

Two methods will be used to improve the validity and reliability of the results. First, the participants will be informed of the preliminary results so that they can undertake member verification. This approach allows participants to check the interpretations and offer input, guaranteeing the veracity and correctness of the results. Second, the trustworthiness of the results was increased using triangulation. Data from various sources, including field notes, interviews, and pertinent literature, were cross-referenced to confirm and corroborate the developing themes and patterns.

The data analysis procedure was carried out according to accepted qualitative research procedures in an organized and exacting manner. The objectives were to make significant discoveries, recognize important themes, and offer a thorough grasp of the research issue.

FINDINGS

Experiences of Online Learning versus Traditional Classroom Learning

In response to Research Question 1 ("What are the experiences of students at the University of Ghana towards online learning and traditional classroom learning?"), Participants provided valuable insights into their experiences with both modes of learning. The analysis revealed distinct themes that shed light on the advantages and challenges associated with each approach.

Theme 1: Convenience and Flexibility

Participants highlighted the convenience of online learning, emphasizing its flexibility in terms of time and location. They appreciated the ability to access course materials and lectures at their own pace. Some participants, particularly those between 18-20, appreciated the convenience and flexibility offered by online learning, aligning with their familiarity with technology. Female participants valued the ability to balance household responsibilities and academics. One participant stated,

"Online learning allows me to balance my studies with other commitments."(Liz, female, age 23, personal communication, 5th August 2023).

Theme 2: Interaction and Engagement

Traditional classroom learning was praised for its interactive nature. Participants expressed that those face-to-face interactions with instructors and peers fostered a sense of engagement and active participation. This was more pronounced among students pursuing programs with science-based subjects. It was observed that female participants preferred traditional classrooms due to the value they place on direct interactions. One participant noted,

"In the traditional classroom, discussions are more dynamic and immediate"(Miles, female, age 21, personal communication, 3rd August 2023).

Theme 3: Technical Challenges

Online learning was challenging. Participants mentioned technical issues such as poor network connectivity and difficulty accessing online platforms. These challenges sometimes hindered their ability to engage in online classes fully and were more prevalent among undergraduate students. To support these findings, Fontaine and Cook (2014) emphasized the convenience of online learning for students managing multiple responsibilities. Conversely, Gray and Melanie (2016) highlighted the importance of in-person interactions for engagement and motivation in traditional classroom settings.

Factors Influencing Student Engagement in Online Learning

Research Question 2 ("What factors influence student engagement in online learning at the University of Ghana?") prompted an exploration of the critical determinants shaping students' experiences in the online learning environment. The analysis yielded significant themes that provided valuable insights into the factors impacting student engagement and satisfaction.

Theme 1: Instructor Support and Interaction

Participants emphasized the crucial role of instructor support in enhancing engagement. They valued instructors who effectively facilitated discussions, provided prompt feedback, and encouraged active participation. Students, especially those who have been studying for 3-4 years, emphasized the pivotal role of instructor support in enhancing engagement. One Participant stated,

"A supportive instructor motivates me to participate"(Micky, Male, age 25, personal communication, 3rd August 2023).

Theme 2: Technological Infrastructure

The quality of technological infrastructure emerged as a vital factor influencing online learning experiences. Participants identified stable internet connectivity, access to reliable devices, and user-friendly online platforms as essential for a satisfactory learning experience. This was especially evident among participants pursuing programs in science and education, where understanding complex concepts demanded a reliable digital environment.

Theme 3: Peer Interaction and Collaboration

Peer interactions also influenced engagement. Participants appreciated group discussions and collaborative activities, highlighting their role in fostering community and shared learning. The results match the findings of Martin and Bolliger (2018), who stressed the value of peer connection and teacher assistance in fostering student engagement and happiness in online learning settings.

Modifications for Effective Online Learning

To address Research Question 3 ("What modifications are needed in pedagogical approaches for effective online learning at the University of Ghana?"), participants provided insightful recommendations for enhancing the quality of online learning experiences.

The analysis revealed important insights into potential adaptations and modifications.

Theme 1: Instructor Training and Development

The participants emphasized the necessity of instructor training to improve their technological competence and pedagogical abilities in an online environment. They suggested that proficient instructors could create engaging and effective online learning environments.

Theme 2: Accessible Resources

Participants emphasized the importance of providing accessible resources, such as free Wi-Fi and electronic gadgets, to support seamless online learning for all students, regardless of their geographical location.

Theme 3: Clear Communication and Expectations

Clear communication of course expectations, guidelines, and assessment criteria was highlighted as crucial for effective online learning. Participants emphasized that transparent communication helps students navigate online learning more effectively.

This theme was prominent among participants aged 18-20, emphasizing their preference for structured guidelines in the digital learning environment.

These findings resonate with the suggestions of Rotar (2022), who advocates for instructor training and providing accessible resources to improve online learning experiences.

DISCUSSION

The study offers critical new perspectives on how University of Ghana students perceive traditional and online classroom learning. The study aligns with previous research highlighting the convenience and flexibility of online Learning (Dhawan, 2020; Mukhtar et al., 2020), as participants appreciated the ability to access course materials at their own pace and balance academic and personal responsibilities. This flexibility is particularly valued by female participants, which resonates with literature on the advantages of online learning for underrepresented groups (Edumadze et al., 2022).

However, the findings also echo existing research on the importance of interaction and engagement in traditional classroom settings (Paul & Jefferson, 2019; Khan et al., 2017). Participants preferred face-to-face interactions, which foster active participation and a sense of community, particularly in science-based programs. This aligns with studies highlighting the benefits of collaborative learning and the importance of social connections in the learning process. The study also identified technical challenges, such as poor network connectivity and accessibility issues, as barriers to effective online learning. This finding resonates with previous research on the digital divide and the need for robust technological infrastructure in Ghana (Edumadze et al., 2022; Amir et al., 2020).

Regarding factors influencing student engagement in online learning, the findings reinforce the crucial role of instructor support and interaction, as highlighted in existing literature (Rotar, 2022; Unger & Meiran, 2020). Participants emphasized the importance of effective facilitation, prompt feedback, and instructor encouragement, which aligns with research on the significance of instructor presence and support in online learning environments (Khan et al., 2017; Morton et al., 2016).

The study also revealed the impact of technological infrastructure and peer interaction on student engagement, consistent with previous research on the importance of reliable digital environments and collaborative activities (Kent et al., 2016). In terms of modifications for effective online learning, the findings suggest the need for instructor training and development, accessible resources, and clear communication, which aligns with existing literature on practical pedagogical approaches for Online Learning (Helle et al., 2006; Kör et al., 2014). Participants' emphasis on structured guidelines and transparent communication resonates with the literature on the importance of clear expectations and support mechanisms for online learners (Rotar, 2022; Unger

& Meiran, 2020). The study's conclusions add to the body of research already available on traditional classroom and online learning while offering insightful information about the unique circumstances of the University of Ghana. The study underlines how crucial it is to address pedagogical modifications, teacher assistance, and technology infrastructure to improve the efficacy of online Learning in Ghanaian universities.

CONCLUSION

The University of Ghana students' experiences with online and traditional classroom learning were documented in this study. Consistent with earlier studies on the topic, the findings highlighted the advantages and disadvantages of every learning style. Participants balancing work and personal commitments appreciated how convenient and flexible online learning was. As a result, technological issues, and the lack of an in-person connection hindered practical online learning experiences. These results support earlier research's findings that technology infrastructure must be addressed and that student materials should be easily accessible. The study highlighted the critical roles that peer contact, dependable technology infrastructure, and teacher support have in determining student participation in online learning. These results are consistent with previous research on the benefits of strong digital environments, collaborative activities, and instructor presence in promoting student engagement. The study also found that to improve online learning, pedagogical practices needed to be modified. Critical factors that emerged were instructor preparation, resource accessibility, and clear communication; these points were also echoed by earlier studies on successful online teaching techniques. The results of this study add to the expanding corpus of information on traditional classroom instruction and online learning in Ghanaian universities. This study offers a basis for well-informed decision-making and useful tactics to maximize online learning experiences in Ghana's educational environment by addressing and matching the research objectives with the body of existing literature. Ghanaian educational institutions and legislators need to consider the distinct cultural and contextual elements affecting students' experiences as online learning continues to grow in popularity. Ghanaian institutions can make use of the advantages of online learning while reducing potential drawbacks by putting into practice the necessary pedagogical adjustments, improving technology infrastructure, and creating a welcoming online learning environment. In the end, our research adds significantly to the current conversation about incorporating online learning into higher education by providing insightful information unique to Ghana. To guarantee that online learning stays a useful and inclusive educational strategy that enables students to meet their academic objectives while navigating the constantly changing digital ecosystem, stakeholders must collaborate and do ongoing research.

RECOMMENDATIONS FOR PRACTICE

Based on the research findings, several recommendations can be made for the University of Ghana and similar institutions.

Enhanced Instructor Training: Provide instructors with training in online teaching methods, including strategies for facilitating interaction and engagement in virtual classrooms.

Network Infrastructure Improvement: Invest in a strong and easily available network infrastructure to guarantee dependable and consistent online learning experiences for all students, regardless of location.

Advance Course Materials: Make course materials available to students before online sessions to enable better preparation and engagement during virtual classes.

Attendance Monitoring: Implement attendance monitoring mechanisms during online sessions to encourage active participation and discourage absenteeism.

IMPLICATIONS AND SIGNIFICANCE

The results of this study add to the expanding corpus of information about students' perspectives and experiences with online learning in higher education. By understanding the factors influencing student engagement and satisfaction, educational institutions can tailor their online learning approaches to meet student needs better. The study also highlights the need for infrastructure improvements, such as reliable Wi-Fi, to ensure a seamless online learning experience.

LIMITATIONS AND FUTURE RESEARCH

It is essential to recognize the study's limitations. The research focused on a specific context, the University of Ghana, and relied on a relatively small sample size. Future research could expand the study to include a more extensive and diverse participant pool from various universities and regions. Additionally, further investigation could explore the impact of socioeconomic factors on student engagement in online learning.

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Conflict of interest: None

Ethical Considerations

Many ethical issues were considered during the study to safeguard the participants' rights, confidentiality, and privacy. These have been outlined below.

Informed Consent

Prior to their involvement in the research, each participant was given a thorough description of the study's goals, methods, possible risks and benefits, and participant rights. Each participant provided informed permission, guaranteeing that they had freely chosen to take part and were aware of their right to withdraw at any moment without incurring any penalties. If applicable, the participants or their legal guardians prepared and signed written consent forms.

Confidentiality and Anonymity

The confidentiality of the participants was rigorously preserved throughout the investigation. All the information gathered, such as transcripts, audio recordings, and field notes, was safely kept, and only the study team had access to it. Participants' identities were protected using pseudonyms or participant codes in any publications or presentations resulting from the research. Confidentiality was maintained unless there was a legal obligation to disclose information or if participants provided explicit consent to share their identities.

Data Security

Appropriate steps were implemented to guarantee the confidentiality and accuracy of the gathered information. Encrypted storage systems and password-protected devices are used to store

electronic data. Transcripts, field notes, and consent forms are kept in hard copy in secured file cabinets in a safe place. The data will only be accessible to those approved by the study team.

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