Online Learning Innovations in Accounting Education: A Study of Students' Engagement and Learning Outcome

OYEDAYO S. OLUSEYI-SOWUNMI, RUTH EZINNE SAMUEL
Department of Accounting, Covenant University,
Ota, Ogun State,
NIGERIA

Abstract: - This study explored online learning innovations in accounting education to x-ray the effect of students' engagement on their learning outcome. It was motivated by the need to ensure that accounting students can continuously access adequate knowledge and develop skills to meet the demands of today's workplace. A Survey research design was used because the study's source of data was primary. A simple random sampling technique was adopted, and 101 questionnaires were randomly distributed to the respondents in the final year accounting departmental Telegram group for administration. Student's Cumulative Grade Point Average (CGPA) was used to measure learning outcomes while proxies for the independent variables were used (Interactive Learning Activities, Environmental Support Features, Feedback, and Support Mechanisms). Using SPSS 21 software, the data was analyzed using multiple regression analysis. The study's findings revealed that the online learning outcome of students in accounting courses during the study period was not significantly influenced by interactive learning activities while Environmental Support Features and Feedback & Support Mechanisms significantly influenced learning outcomes. The study therefore concludes that the integration of interactive learning activities, environmental support features, and feedback and support mechanisms significantly enhanced students' online learning. The study recommends that educational planners should incorporate multimedia tools to foster interaction among students and take into consideration the state of environmental support features in online accounting courses. The feedback and support mechanism and the technical support services should be swift in responding to students' questions and the technical challenges they encounter while learning.

Key-Words: - Accounting Education, COVID-19, Digitalization, e-learning, Learning outcome, Learning Innovations, Online learning, Student engagement.

Received: April 9, 2024. Revised: October 7, 2024. Accepted: November 19, 2024. Available online: December 21, 2024.

1 Introduction

As we enter the Fourth Industrial Revolution, the learning process is changing at a rate never seen before due to the many opportunities presented by digital technology—a concept known as Education 4.0, [1]. In Nigeria, it is observable that most postgraduate learners are self-funded unlike in the developed countries where access to scholarships and grants are readily available to support advanced learning. The challenge therefore arises when professionals in pursuit of current and relevant knowledge needed to meet the demands of today's workplace are expected to leave work or are unable to acquire certain knowledge due to limiting factors like distance, cost, and so on. Gone are the days when only the rich or a representative of the family is selected to acquire formal education. The complexity of the industry calls for greater knowledge and skills to handle the rising challenges in the workplace, [2]. This has caused the demand for advanced learning to be on the rise over the past years. In developing countries and Nigeria in particular, a huge percentage of the workforce is faced with the dilemma of updating one's skills to remain productive or risk being retrenched.

The event of covid-19 has no doubt brought a twist to man's activities and ushered in the era of what is termed 'the new normal', [3]. The pandemic which led to a compulsory shutdown of systems led many organizations and institutions to adopt other non-physical means of rendering services. The world has become a global village, and it has been proven that business activities no longer require physical contact to take place, likewise learning. Learning is a continuous cycle that affects all spheres of life to remain relevant more so in our fast-paced world where technology is fast influencing how things are done. The accounting profession is not left out in this constant

change as we have seen it evolve from the conventional analog method of debit and credit to a more digitalized and robust process with the use of accounting software and applications. The need to pursue personal development has placed a demand on acquiring more knowledge. With the unfolding of the 4th industrial revolution, this can be achieved in a more convenient manner than before.

The realities of the post-COVID era-digitalization of processes has enlarged the scope at which services can be rendered with little or no limitation as regards distance. This has prompted the restructuring of several organizations to be more flexible in operations for maximum productivity. The digitalization of accounting processes in the business world further underscores the relevance of online learning in accounting education. As accounting professionals increasingly rely on digital tools and platforms for financial analysis, reporting, and auditing, students benefit from exposure to similar technologies during their educational journey. Online learning ensures that accounting students are not only well-versed in traditional accounting principles but are also equipped with the technological proficiency required in contemporary accounting practices, [4]. In developed countries, the field of accounting education has undergone a significant transformation with the integration of online learning methods. As technology continues to advance, the traditional model of accounting education, characterized by face-to-face lectures and physical classrooms, has given way to innovative and flexible approaches that leverage the capabilities of digital platforms.

Online learning has been increasingly adopted in accounting education in recent years. It has brought flexibility in both time and geographical location, as students are able to learn at their own pace and in their own time and have access to educational materials at any time from any place with an internet connection. The integration of technology in accounting education goes beyond simple content delivery. As we know, the primary purpose of using technology in education is to improve student learning. Therefore, a well-organized and effective system of learning, which encompasses the way it is being delivered and its content, is seen as a critical factor in determining its success. Hence, it is important to identify factors which can help to improve student's learning in online learning and implement them in the online learning system.

Online platforms offer a range of interactive tools, simulations, and virtual environments that simulate real-world accounting scenarios. These resources allow students to apply theoretical concepts in practical settings, fostering a deeper understanding of accounting principles and enhancing critical thinking skills. Moreover, the use of multimedia elements, such as video lectures and interactive presentations, can make complex accounting topics more accessible and engaging. Online learning in accounting education is reshaping how aspiring accountants acquire knowledge, develop skills, and navigate the complexities of the modern financial landscape. In pursuit of this, it becomes necessary to adopt online learning alongside the physical learning process to enable learning institutions in Nigeria to provide knowledge in a flexible, convenient, and wider scope of coverage. This is because online learning possesses the capacity to connect potential students with sought-after academics in areas of interest.

Accounting is no longer done only by traditional methods; instead, accountants are required in a variety of fields that call for the use of technology, such as control, web-based accounting, e-commercial accounting, system analysis, financial analysis, financial planning, financial reporting, tax consulting, and strategic consulting, [5]. To produce highly trained and qualified accountants who are equipped with the skills needed to meet the demands of today's workplace will require quality education. One of the challenges that has plagued the accounting profession in Nigeria is the inability to access quality education, [6], [7]. The classroom experience poses several challenges such as overcrowded classrooms which make it difficult for teachers to give individual attention to students and hinder effective classroom interaction; inadequate infrastructure characterized by Poorly maintained buildings, lack of proper furniture, and limited access to technology that can create a demotivating learning environment; lack of real-world learning experience as the traditional accounting instruction may not provide enough opportunities for students to apply their knowledge to real-world scenarios. This can make it difficult for students to see the relevance of the material and stay motivated.

The traditional methods of accounting education are facing challenges in keeping pace with the rapidly evolving digital landscape, [8]. The integration of digital technologies into accounting education is a complex process that requires addressing various issues and concerns to bridge the gap that currently exists. This study aims to investigate the current state of accounting education, identify obstacles hindering effective

digitalization, and explore potential solutions to ensure a seamless transition towards a digitally enhanced learning environment. Key issues to be examined include the adequacy of existing infrastructure, the relevance and effectiveness of digital tools, and the impact of digitalization on learning outcomes and professional readiness in the field of accounting. Through a comprehensive analysis of these challenges, this research seeks to contribute valuable insights for educators, policymakers, and stakeholders in advancing the digitalization of accounting education.

1.1 Objectives of the Study

The broad objective of this study is to determine the impact of accounting students' engagement with online learning innovations on their learning outcomes. The study's particular goals are as follows:

i. To determine the effect of interactive learning activities of online accounting courses on the learning outcome of students.
ii. To determine the effect of environmental support features affecting online engagement in accounting courses on the learning outcome in accounting courses.
iii. To determine the impact of feedback and support mechanisms of online resources on the learning outcome of students in accounting courses.

2 Literature Review

The advent of the internet and multimedia technology changed the nature of distance education with the transition to online learning. Online learning is a method of instruction that is delivered electronically, with students accessing learning materials from a computer, [9]. This method presents increased flexibility in the delivery of instruction and widens access to education by removing the constraints of time and location, [10]. The transition to online learning can be likened to a transformation from traditional correspondence education to an electronic education era, representing a continuation of distance education rather than an entirely new approach. While there are differences in platform and technology, both are instructional methods that aim to convey knowledge and support learning through guided student-instructor interaction, [11].

In the early years of online learning, distance education was primarily conducted using print materials, and the delivery systems were slow to evolve, [11]. In the 1970s, a near-revolution occurred in the delivery system of distance education with the use of broadcast technology, and in the 1980s and 1990s, the field was impacted using telecommunication technology, such as teleconferencing and satellite transmission, [12], [13]. Accounting education was slow to adopt these electronic delivery systems, with a survey of American accounting faculty revealing only 11.7% had ever taught a distance education course in 1995, [14]. A major factor contributing to the late adoption was a lack of understanding about the nature of distance education, and skepticism about its comparability to traditional instruction. This skepticism was linked to the perception of distance education as a method of independent learning, rather than a method of guided learning, which is a critical distinction for professional programs that are regulated by accrediting bodies, [15].

2.1 Importance of Online Learning in Accounting Education

Online learning has become an increasingly important factor in education curricula, particularly within professional courses such as accounting. Skills in this area are associated with using computer software to solve problems, perform analysis of data, create visual models and reports, construct hypotheses to test these models using computational methods and ultimately make decisions in the business environment. These are all skills that are highly transferable to the online environment, and therefore accounting education is well suited to the online delivery method. Furthermore, accounting professionals are required to continue learning throughout their careers to ensure they are aware of current economic and business-related issues. Lifelong learning is essential for both accounting professionals and educators, particularly as technology continues to evolve. Online learning provides a convenient and often self-paced mode of education that is particularly appealing to adult learners who are often juggling work, family, and other commitments. It allows the learner to fit study around their schedule and location, thereby providing a global classroom open 24 hours a day, 7 days a week. This in turn brings cultural diversity to the classroom, particularly important in today's global business environment. The mobility of online education also reduces the opportunity cost of study in that it is less likely the learner will have to forgo employment to undertake study. For those already in the accounting profession, learning

online can provide valuable experience in the online environment that they can take into their own professional lives. This is an added benefit given the demand for accountants who can work from home, telecommute, or work in virtual teams.

2.2 Growth and Development of Online Learning Platforms

However, there are still many concerns about the effectiveness of online learning compared to traditional classroom learning. One major issue with online distance education is the relatively low retention rates, and it is expected that students need to be more self-sufficient in online courses. Another important issue is that online education provider's credibility is hard to judge, and many students/employers are skeptical about the quality of online learning provided compared to traditional higher education. This heavily influences the value put into actual qualifications gained from online courses. This also relates to public opinion about public and private accounting institutions, as it has been suggested that there is a stigma attached to the quality of education and the resulting suitability of graduates from private schools in comparison to those from public institutions.

Online learning has had a particularly complicated history than most education scholars anticipated. The evolution of technology has dynamically reshaped the nature of education and led to the rise of online learning platforms. The advent of personal computers in the 1980s set the stage for relatively primitive forms of online learning, particularly using standalone accounting education software. However, with the widespread popularity of Internet access in the 1990s, there was a significant shift in the way online learning was both offered and perceived. Many colleges and universities began to offer online courses to complement their traditional classroom-based courses, and various for-profit organizations began offering online learning to students around the world. This is very much in line with Moore's theory on the three generations of distance education, whereby in the third generation, education technology is used to improve interaction between students and between students and instructors.

2.3 Online Interactive Activities and Students' Learning Outcomes

Online interactive activities provide opportunities for students to engage with digital resources, peers, and instructors, fostering a collaborative and dynamic learning environment. Several studies suggest that online interactive activities have a positive impact on students' learning outcomes, including academic achievement, engagement, higher-order thinking skills, social presence, and self-efficacy, [16], [17], [18]. Educators and instructional designers can harness the potential of online interactive activities to create dynamic and effective learning experiences.

2.4 Environmental Support Features

Environmental support features in online learning refer to the tools, resources, and design elements within digital learning platforms that facilitate an effective and supportive learning environment for students. The dimension of environmental support features of online learning includes cognitive, emotional, and management support, [19]. [20] identified seven domains of support including affective support, human resource support, gender support, reflective support, cognitive support, systemic support, and wellness support.

2.5 Feedback and Support Mechanisms

Feedback and support mechanisms are crucial components of online learning environments that help students stay engaged, motivated, and on track with their studies. The dimensions of feedback in online learning are realism, cognitive challenge, affective challenge, evaluative judgment, and enactment of feedback, [21].

Success in any learning context, including the online environment, is closely related to the effectiveness of the feedback mechanism, [22]. [23], suggests that to support and regulate learning, online students need performance information that is provided by the assessment that feeds into high-quality formative feedback. Given the flexibility of the online environment, feedback has an even more significant role in guiding learning as online students are often working in relative isolation and have to act as their own regulators of learning, [24]. Effective feedback should be:

- **Formative:** Provide feedback that goes beyond grading, focusing on progress, identifying areas for improvement, and offering specific suggestions for moving forward, [23].
- **Timely:** Deliver feedback promptly so students can use it to improve their work in subsequent assignments, [25].
- **Clear and Specific:** Avoid vague comments and instead offer concrete suggestions for improvement, [25].

By implementing these feedback and support mechanisms, educators can create a more

supportive online learning environment. This can lead to several benefits for students including, Improved understanding of course material, Enhanced critical thinking and problem-solving skills, Increased self-confidence and motivation, and Development of self-regulation skills.

By prioritizing effective feedback and providing a supportive online learning environment, educators can empower students to take ownership of their learning and achieve academic success.

2.6 Future Trends and Innovations in Online Learning for Accounting Education

Furthermore, with systems being able to self-improve in their task execution combined with further development of natural language processing, there exists the potential to receive teaching from devoted AI 'chatbot' tutors to provide the learning experience with improved availability and customization on an individual basis.

As AI refers to the process of machines carrying out tasks that would normally require human intervention, and Machine Learning provides the ability for a system to learn and improve from experience without further programming, these technologies first and foremost provide automation in tasks spanning across teaching and assessment with the aim to improve efficiency and accuracy. This could apply to anything from marking a multiple-choice quiz automatically to providing instant feedback on accounting exercises and improved grading of written reports, benefitting both students and educators in identifying learning progress and subject understanding.

Artificial intelligence (AI) and machine learning (ML) are two concepts that have taken over the digital age and made possible what seemed impossible.

2.7 Artificial Intelligence and Machine Learning Applications

In the field of accounting, it is imperative to be able to aggregate and interpret data to formulate solutions to complex business problems. This is a skill that is traditionally cultivated through years of experience. However, rapid advancements in data science technologies, pose the risk that accounting education may become outdated. AI and machine learning are at the forefront of this technological wave. This is of great importance to accounting educators and to professionals who rely on the accuracy and forward-looking capabilities of accounting models and their accountants. For better or worse, AI will make this traditional knowledge less valuable. As an example, consider the stereotype of an accountant as one who keeps records of financial transactions and generates reports. This is a task that has already been automated by various accounting software. AI will continue to expand its reach to more complex accounting tasks such as predicting financial trends, making insightful inferences on large sets of data, and detailed risk assessment. This has many implications for accounting education. Firstly, it will require educators to shift their focus from teaching students how to perform these tasks to teaching students how to evaluate and interpret the output of AI. This will mean teaching students more complex data analysis and interpretation skills. Another implication is that the demand for accountants to possess higher-level technical skills will increase. Traditionally, the accounting industry has not required employees to possess high-level technical skills. As accounting software continues to become more advanced, and AI continues to encroach on tasks that were traditionally performed by accountants, it will create a divide between those who develop and maintain the accounting systems and those who use them. This could potentially change the career path for accounting graduates, taking them into software development and data analysis, rather than the traditional accounting roles.

2.8 Technology Acceptance Model (TAM) Theory

The Technology Acceptance Model (TAM) is a general theoretical framework proposed by Davis to explain the mechanism of users' acceptance of an information system technology, [26]. TAM posits that perceived usefulness and perceived ease of use are the key determinants of user acceptance of information technology. According to the TAM, if a user perceives a specific system as useful, he or she will believe that using the system will enhance his or her job performance. The user will then intend to use the system. The second key determinant of usage intention is the perceived ease of use - the degree to which a person believes that using a particular system would be free of effort, [26]. A third factor, attitude toward using, is suggested to mediate the effects of perceived usefulness and ease of use on system usage. High perceived usefulness is said to result in a positive attitude toward using a system, whereas perceived ease of use has a direct effect on intention, but not

on actual usage. The model concludes with behavioral intention, which is a function of attitude and perceived ease of use, leading to user acceptance, [27].

Perception of online innovations. Online innovations in accounting education can be considered as an optional tool that can provide advantages for certain users to enhance their jobs. It is a new experience for some accounting educators who have never tried any online tools in teaching. They might consider it as something complex and time-consuming, which can lead to less effective teaching. It will create a kind of discomfort for them. According to TAM, perceived characteristics of innovation are one of the external variables that can determine users' beliefs, attitudes, and intentions to use the new technology. It consists of relative advantage, complexity, compatibility, trialability, and observability. Using the internet and online tools in accounting education, it can provide several advantages for accounting educators due to the fact that online tool-based learning can be done without any limitation of time and space. Students can learn the materials and do the tasks given by the educator anytime and anywhere. Compared to conventional teaching, it can be considered as a relative advantage of using online tools. However, the educator might have a different perception of whether online tools and the internet can be useful tools for delivering materials and teaching accounting. The perception can be affected by the complexity and compatibility of the tools. If the educator considers that it is too difficult to prepare or use the tools for teaching accounting and feels that it is not suitable for the subject, then it will affect their intention to not use the online tool.

The Technology Acceptance Model (TAM) also offers valuable insights into how technology influences student engagement and learning outcomes in accounting education. The factor of perceived ease of use implies that if students find the online accounting platform easy to navigate and use, they're more likely to be actively involved (engaged) in learning activities, discussions, and assignments. Also, a user-friendly platform reduces frustration and allows students to focus on the accounting concepts rather than struggling with the technology. This can lead to better understanding and retention of material. In the same vein, the factor of perceived usefulness suggests that when students believe online learning tools can enhance their understanding and problem-solving skills in accounting, they're more motivated to participate and utilize the resources available. If students perceive online tools as valuable in improving their accounting knowledge and preparing them for future careers, they're more likely to put in the effort to learn and achieve better outcomes.

With the development of computers, network technologies, and the internet, e-learning has become increasingly popular in accounting education. There is a wealth of evidence in accounting education literature supporting this field of study, particularly in industrialized nations. Nigeria has recently attempted to integrate e-learning through the National Universities Commission (NUC), although there have been difficulties. It is still challenging for many institutions to fully conceptualize and carry out this program on a local level, [28].

3 Methodology

This study adopted a survey research design. The reason for choosing the survey research design was to elicit the opinion of respondents on the effectiveness of online learning innovations in accounting education: a study of student engagement and learning outcomes. This was done using the questionnaire.

The population of this study consisted of all 120 final-year students of the 2023/2024 academic session in the accounting department at Covenant University, Ota. This was because they are the only students who have had the experience of both online and conventional learning. It should be noted that online teaching was adopted by Covenant University during the Covid-19 lockdown in 2020. The inclusion criteria for this study were all the final-year accounting students who were members of the final-year accounting departmental Telegram group, were online during the study period, and were willing to participate in this research. The exclusion criteria for this study were the final-year accounting students who were not members of the final-year accounting departmental Telegram group, those who were members but were not online during the study period, and those who were not willing to participate in this study. This study adopted a simple random sampling technique, using Yaro Yamane's formula, sample size was determined as 101 students. Consequently, 101 questionnaires were randomly distributed to the respondents in the final year accounting departmental Telegram group for administration.

3.1 Model Specification

In this study, the multiple regression model was utilized. Factor analysis was applied to hypotheses; one, two, and three using Principal Component Analysis (PCA), [29], [30], [31].

$$Y = \beta0 + \beta1X1 + \beta2X2 + \beta3X3 + \mu i \quad (1)$$

Where;
Y= Learning Outcomes (LO)
β1 = coefficient of Interactive Learning Activities (ILA)
β2 = coefficient of Environmental Support Features (ESF)
β3 = coefficient of Feedback and Support Mechanisms (FSM)
β0 = the intercept of the regression line,
μi = the error term

$$Y = \beta0 + \beta1[ILA] + \beta2[ESF] + \beta3[FSM] + \mu i \quad (2)$$

4 Result And Discussion

4.1 Regression Analysis Result

Table 1. Regression Result

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.291[a]	.085	.056	.20183	.085	2.959	3	96	0.036	2.255

[48]
a. Predictors: (Constant), Interactive Learning Activities, Environmental Support Features, Feedback and Support Mechanisms,
b. Dependent Variable: Learning Outcomes

Table 1 shows the model summary for the explanatory variables Interactive Learning Activities (ILA), Environmental Support Features (ESF), and Feedback and Support Mechanisms (FSM), which are regressed against a common dependent variable, Learning Outcomes (LO). As revealed in Table 1, the value of R stood at 0.291. The R-value measures the relationship between the dependent and independent variables. Thus, their value of 29.1% indicates that there exists a relationship between the dependent and the independent variables.

Table 1 also reflects the R^2 value of 0.085. R^2, which is the coefficient of determination, measures the percentage of the total change in the dependent variable, learning Outcomes (LO), that can be explained by the independent or explanatory variables: Interactive Learning Activities (ILA), Environmental Support Features (ESF), and Feedback and Support Mechanisms (FSM). Thus, the R^2 value of 0.085 indicates that ILA, ESF, and FSM accounted for 8.5% of the total variation in the dependent variable (LO) of 2023/2024 session final-year accounting students at Covenant University, while the remaining 91.5% (100 – 8.5) of the variation could be explained by other variables not considered in this model.

The difference between R^2 and adjusted R^2 as shown in Table 1 reflects a value of 0.029% (0.085 – 0.056), indicating that if the entire population is considered in this model, the result will deviate by 0.029%. The significant F change as revealed in Table 1 reflects a value of 0.036, indicating that the entire model is statistically significant at a 5% level.

Table 2. Results of Regression Coefficients for the Study Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.018	.111		-.159	.874
	ILA	-.013	.053	-.033	-.247	.805
	ESF	-.127	.062	-.336	-2.049	.043
	FSM	.160	.054	.461	2.939	.004

[48]
a. Dependent Variable: LO

Table 2 presents the model coefficients concerning the independent variables, Interactive Learning Activities (ILA), Environmental Support Features (ESF), and Feedback and Support Mechanisms (FSM). The regression results presented in Table 2 to determine the effect of ILA, ESF, and FSM revealed that when all the predictor variables are held stationary, Learning Outcomes (LO) are estimated at -.018. Table 2 further predicts the dependent variable LO using the independent

variables ILA, ESF, and FSM, such that a unit change in ILA, ESF, and FSM will bring about a change in the LO by -.013, -.127, and .160, respectively. The information presented in Table 2 further analyzed the study's hypotheses as discussed below.

4.2 Test of Hypotheses

Hypotheses one, two, and three formulated in this study were tested in this section using the regression coefficient significant levels (Table 2). The level of significance for the study is 5% (two-tailed test) ($p<.05$), and the critical value for t is ±1.96 ($t=\pm1.96$). The decision rule for this test is to accept (or reject) the null hypothesis if the critical value is greater (or less) than the calculated t-value and the significance level. These hypotheses were tested as follows:

4.2.1 Hypothesis One

Ho: *Online interactive learning activities have no significant effect on the learning outcomes of students in accounting courses.*

Table 2 provides results for the testing of the null hypothesis (Ho) above. The result showed that the calculated t-value for Interactive Learning Activities (ILA) is -.247 ($t = -.247$, $\beta = -.033$, $p > .05$). Therefore, the critical value (±1.96) is greater than the calculated value of t for ILA, as shown in Table 2. Thus, the null hypothesis (Ho) is accepted, and the conclusion is that the online learning outcome of students in accounting courses during the study period was not significantly influenced by interactive learning activities (ILA). This position is also confirmed when the level of significance for this study ($p<.05$) is compared with the calculated significant level (sig) for ILA (0.874), as shown in Table 2.

This study contradicts the studies conducted by [32]. They discovered that interactive classes were strong predictors of student involvement; thus, competent instructor materials are the only method to ensure students' long-term online learning success. [33], revealed that online education significantly influenced learning outcomes and effectiveness. Numerous facets of the importance of student participation have been shown by [34], [35]. They revealed that higher rates of course completion and better academic achievement are attained by motivated and persistent students.

According to [18], satisfaction with online education is significantly impacted by interactions between students and instructors, as well as between students and content. [17], revealed that students who viewed more recorded video lectures were more likely to take an active role in synchronous educational activities and received higher semester grades; additionally, students' comprehension of the learning concepts was enhanced by higher completion rates of asynchronous learning activities. [36], observed that overall interaction was somewhat above the scale's midpoint and identified a substantial correlation between the different types of interaction and satisfaction with online learning. [37], found that student-zoom interaction did not significantly affect learning outcomes, but all three interaction factors – content, teaching, and platform did.

According to [16], student-to-student interaction has a stronger effect on learning outcomes, and students who engaged with the course's learning activities successfully performed better. Also, an educator plays a critical role in this type of collaborative learning by creating and facilitating interactions, [38]. In China, [39], discovered that interaction and student satisfaction were significantly correlated. They went on to say that students who engage in peer interaction during the teaching and learning process typically report a higher level of satisfaction than those who do not.

4.2.2 Hypothesis Two

Ho: *Environmental support features affecting online engagement have no significant effect on the learning outcome of students in accounting courses.*

Table 2 provides results for the testing of the null hypothesis (Ho2) above. The result showed that the calculated t-value for Environmental Support Features (ESF) is -2.049 ($t = -2.049$, $\beta = -.336$, $p < .05$). Therefore, the critical value (±1.96) is less than the calculated value of t for ESF, as shown in Table 2. Thus, the null hypothesis (Ho) is rejected, and the conclusion is that the online learning outcome of students in accounting courses during the study period was significantly influenced by Environmental Support Features (ESF). This position is also confirmed when the level of significance for this study ($p<.05$) is compared with the calculated significant level (sig) for ESF (0.043), as shown in Table 2.

This study agrees with the findings of [40] conducted in Nigeria (2022). They discovered that during COVID-19, students' happiness with virtual learning experiences was influenced by the tutor's guidance and help. In a similar vein, [19] discovered that university students' learning satisfaction was positively associated with elements of the online learning environment (cognitive,

emotional, and managerial support services). They recommended that to address individual learning needs, enhance service quality, and encourage online learning, learning support services should concentrate on the cognitive, emotional, and management components of e-learning. Similarly, [41] found that student characteristics (attitudes and self-regulation) and blended learning design components (technology quality, online tools, and face-to-face support) predicted student satisfaction as an outcome. [42], found that virtual learning environmental factors and the assistance provided by instructors to students predicted learning satisfaction.

4.2.3 Hypothesis Three

Ho: *Feedback and support mechanisms of online resources have no significant impact on the learning outcome of students in accounting courses.*

Table 2 provides results for the testing of the null hypothesis (Ho3) above. The result showed that the calculated t-value for Feedback and Support Mechanisms (FSM) is 2.939 ($t = 2.939$, $\beta = -.004$, $p < .05$). Therefore, the critical value (±1.96) is less than the calculated value of t for FSM, as shown in Table 2. Thus, the null hypothesis (Ho) is rejected, and the conclusion is that the online learning outcome of students in accounting courses during the study period was significantly influenced by Feedback and Support Mechanisms (FSM). This position is also confirmed when the level of significance for this study ($p<.05$) is compared with the calculated significant level (sig) for FMS (0.004), as shown in Table 2.

This study is consistent with the research carried out by [43]. They discovered that students who used Votepoint+ to get personalized feedback improved their grades and demonstrated greater motivation. They went on to say that they felt better capable of handling assignments involving the course content. [44], discovered that the kinds of feedback in an e-learning environment had a substantial impact on students' learning results using the IT curriculum for eighth-grade students. They also found that students' exposure to different kinds of feedback in the IT curriculum had a favorable impact and considerably raised their motivation, with interpretive feedback being especially well-liked.

[45], discovered that students who received positive feedback and a performance gap received a greater whole-letter grade compared to students who received only performance gap input. [46], found a significant relationship between feedback types (corrective and interpretative) and students' learning outcomes. Also, [47], revealed that the two types of feedback (corrective and interpretative) had a significant relationship with student learning outcomes in a flipped classroom environment.

5 Conclusion

The integration of interactive learning activities does not significantly enhance students' learning outcomes while environmental support features, and feedback and support mechanisms significantly enhance students' online learning outcomes. However, Interactive learning activities fostered engagement and active participation, which are crucial for deep learning and knowledge retention. The provision of timely and constructive feedback helped students understand their progress, identify areas for improvement, and stay motivated. Additionally, robust support mechanisms, including academic and technical assistance, reduced barriers to learning and promoted a sense of community, which is vital for sustaining motivation and persistence in an online learning environment. Collectively, these elements created a more dynamic, responsive, and supportive learning experience that can effectively meet the diverse needs of students and lead to improved educational outcomes. The outcomes of this study revealed that there is a significant relationship between students' engagement with online learning innovations and their learning outcomes. The findings established that students' learning outcomes improved with the right environmental features such as having a serene room, stable power supply, and internet in place. Prompt and personalized feedback and support mechanisms helped to maintain student's enthusiasm toward learning thereby boosting the overall learning outcome.

5.1 Recommendations

Given the discoveries of the review and end drawn over, the accompanying suggestions were made:

i. Educational planners should incorporate multimedia tools such as videos and implement group projects, discussion forums, and peer-to-peer activities to foster interaction among students. They should also schedule regular live classes or Q&A sessions to facilitate real-time interaction between instructors and students to improve their online learning experience.
ii. Educational planners should take into consideration the state of environmental

support features in online accounting courses such as network, power supply, lighting, temperature, and space should be suitable. Furthermore, the app should be user-friendly so the students can easily locate and access course materials.

iii. The feedback and support mechanism and the technical support services should be swift in responding to student's questions and the technical challenges they encounter while learning.

There should be interactive content such as quizzes and polls, info-graphs, animations, badges, a leadership board, and shorter sessions to prevent fatigue and boredom.

5.2 Contribution

This study significantly contributes to the understanding of how specific online learning innovations impact student engagement in accounting education. By analyzing student engagement and learning outcomes, the study identified which innovations are most successful in the context of accounting education.

The research explored how online learning innovations influenced student motivation, participation, and overall learning experience in accounting courses.

The findings also offered valuable insights and practical recommendations for accounting educators to integrate effective online learning innovations into their curriculum, fostering a more engaging and successful learning environment.

5.3 Suggestion for Further Studies

Future researchers could expand the scope of the study by increasing the sample size to include students in related courses such as economics, marketing, and business management. Further studies could combine both the instructor's and the student's perspectives.

Declaration of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this work the authors used Gemini and QuillBot in order to paraphrase, improve the readability and language of the manuscript. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

References:

[1] Feldman, P. (2018) The Potential of Education 4.0 Is Huge – The UK Must Take the Lead, Now. AvailableAt, [Online]. https://www.Jisc.Ac.Uk/Blog/The-Potential-Of-Education-4-Is-HugeThe-Uk-Must-Take-The-Lead-Now-12-Sep-2018# (Accessed Date: August 24, 2024).

[2] Orr, D., Luebcke, M., Schmidt, J. P., Ebner, M., Wannemacher, K., Ebner, M. (2020). *From Lines of Development to Scenarios. In Higher Education Landscape 2030: A Trend Analysis Based on The AHEAD International Horizon Scanning (pp. 5–24).* Cham: Springer International Publishing.

[3] Dubey, P. & Pandey, D. (2020). Distance learning in higher education during pandemic: challenges and opportunities. *International Journal of Indian Psychology, 8(2), 43-46.* DIP:18.01.204/20200802, https://doi.org/10.25215/0802.204.

[4] OECD. (2019). *Going digital: Shaping policies, improving lives.* In Paris: OECD Publishing.

[5] Sevim, A., (2005), Dijital Uygulamaların Muhasebe Eğitimi Üzerine Etkileri, XXIV. *Türkiye Muhasebe Eğitimi Sempozyumu, Muğla, Turkey,* pp.89-105, 2005.

[6] Ugwu, I. V., Ezeabii, I.C., Ugwunwoti, P.E. (2020). Challenges of Teaching and Learning of Accounting Education in Tertiary Institutions in Enugu State of Nigeria. *International Journal of Vocational and Technical Education Research*, Vol.6, No.2, pp.1-10.

[7] Mahabub, M.G. (2014). The Challenges of Access to University Education in Nigeria. *International Conference on Economics, Education and Humanities (ICEEH'14,)* Dec. 10-11. http://dx.doi.org/10.15242/ICEHM.ED1214104.

[8] Tavares, M.C., Azevedo, G., Marques, R.P., & Bastos, M.A. (2023). Challenges of Education in the Accounting Profession in The Era 5.0: A Systematic Review. *Cogent Business & Management* (2023), 10: 2220198. https://doi.org/10.1080/23311975.2023.2220198.

[9] Maddison T., Doi C., Lucky S., & Kumaran M. (2017). Literature Review of Online Learning in Academic Libraries. *Pedagogy and Technology in Online Information Literacy Instruction* 2017, pp.13-46.

https://doi.org/10.1016/B978-0-08-100598-9.00002-7.

[10] Dhull K., and Dhull H. (2022). Advantages and Disadvantages of Online Learning. *Bhartiyam International Journal of Education & Research. Volume 11, Issue II, March 2022*, ISSN: 2277-1255.

[11] Zhang, D., Zhao, J. L., Zhou, L., & Li, J. (2018). A historical review of online learning research: Development, trends, and areas for future inquiry. *Computers in Human Behavior*, 82, 137-147.

[12] Barone, D., & Eisensmith, J. A. (2008). Online and blended learning in higher education: Theories, practices, and challenges. *Educational Technology Research and Development Review*, 56(1), 7-24.

[13] Larson, M., & Sung, Y. (2009). An investigation of student engagement in a web-based accounting course. *Journal of Educational Technology Development and Exchange (JETDE)*, 2(1), 1-12.

[14] Witmer, D. W., Williams, R. L., & Willis, R. C. (1996). A survey of accounting faculty attitudes toward distance education. *Issues in Accounting Education*, 11(1), 71-87.

[15] Merriman, J. D., & Crampton, J. A. (2008). Distance education in accounting: A critical review of the literature. *Issues in Accounting Education*, 23(4), 599-624.

[16] Nguyen, V. A. (2017). The impact of online learning activities on student learning outcome in blended learning course. *Journal of Information & Knowledge Management*, 16(04), 1750040.

[17] Lin, L. C., Hung, I. C., Kinshuk, & Chen, N. S. (2019). The impact of student engagement on learning outcomes in a cyber-flipped course. *Educational Technology Research and Development*, 67, 1573-1591.

[18] Aydin, B. (2021). Determining the effect of student-content interaction, instructor-student interaction, and student-student interaction on online education satisfaction level. *University of South Florida (USF) M3 Publishing*, 3(2021), 16.

[19] Zhao, X., Shao, M., & Su, Y. S. (2022). Effects of online learning support services on university students' learning satisfaction under the impact of COVID-19. *Sustainability*, 14(17), 10699.

[20] Ahmady, S., Khoshgoftar, Z., Toofaninejad, E., Sohrabi, S., Kalantarion, M., & Simpson, O. (2023). Identifying dimensions and components of student support system in virtual learning: A scoping review. *Journal of Education and Health Promotion*, (1), 332.

[21] Dawson, P., Carless, D., & Lee, P. P. W. (2021). Authentic feedback: supporting learners to engage in disciplinary feedback practices. *Assessment & Evaluation in Higher Education*, *46*(2), 286-296.

[22] Narciss, S., Prescher, C., Khalifah, L., & Körndle, H. (2022). Providing external feedback and prompting the generation of internal feedback fosters achievement, strategies and motivation in concept learning. Learning and Instruction. Vol 82, https://doi.org/10.1016/j.learninstruc.2022.101658.

[23] Bangert, E. (2008). Self-regulated learning in the online learning environment. MERLOT *Journal of Online Learning and Teaching*, 4(2), 1-16.

[24] Nicol, D. (2021) The power of internal feedback: exploiting natural comparison processes, Assessment & Evaluation in Higher Education. 46:5, 756-778, https://doi.org/10.1080/02602938.2020.1823314.

[25] Nicol, D., & Topping, G. (2009). Feedback and learning. *Educational Research Review*, 4(2), 28-42.

[26] Davis, F.D. (1989). 'Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology', MIS Quarterly, vol. 13, no. 3, pp. 319-40.

[27] Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. (1992), User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003.

[28] Musa, A.U., Mohammad, J., & Adakawa, M.I. (2021). Adoption and Use of E-learning in Nigerian Higher Institutions for Sustainable SocioEconomic Development. Ahmadu Bello University Library Complex International Conference Zaria Kaduna State, Nigeria, [Online]. https://www.researchgate.net/publication/368918387_Adoption_and_Use_of_E-learning_in_Nigerian_Higher_Institutions_for_Sustainable_Socio-_Economic_Development (Accessed Date: October 20, 2024).

[29] Yang, S. J., Lu, O. H., Huang, A. Y., Huang, J. C., Ogata, H., & Lin, A. J. (2018). Predicting students' academic performance using multiple linear regression and principal

component analysis. *Journal of Information Processing*, 26, 170-176.

[30] Borges, V. R. P., Esteves, S., de Nardi Araújo, P., de Oliveira, L. C., & Holanda, M. (2018). Using principal component analysis to support students' performance prediction and data analysis. *Brazilian symposium on computers in education (simpósio brasileiro de informática na educação-SBIE)* (Vol. 29, No. 1, p. 1383).

[31] Aboagye, E. A., & Mensah, C. (2016). Principal component analysis of students' academic performance in mathematics and statistics. *American Based Research Journal*, Vol. 5(10).

[32] Lasekan, O. A., Pachava, V., Godoy Pena, M. T., Golla, S. K., & Raje, M. S. (2024). Investigating Factors Influencing Students' Engagement in Sustainable Online Education. *Sustainability*, 16(2), 689.

[33] Peng, W. (2017). Research on model of student engagement in online learning. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(7), 2869-2882.

[34] Suresh-Kumar, S., & Mallikarjuna-Shastry, P. M. (2019). Analysis of student engagement and course completion in massive open online courses. *Integrated Intelligent Computing, Communication and Security*, 447-458. http://dx.doi.org/10.1007/978-981-10-8797-4_46.

[35] Kuzminykh, I., Ghita, B., & Xiao, H. (2021). The relationship between student engagement and academic performance in online education. *5th International Conference on E-Society, E-Education and E-Technology* (pp. 97-101). https://doi.org/10.1145/3485768.3485796.

[36] Ali, S., & Mirza, M. S. (2020). Relationship between Various Forms of Interaction and Students' Satisfaction in Online Learning: Case of an Open University of Pakistan. *Pakistan Journal of Distance and Online Learning*, *6*(2), n2.

[37] Leem, B. H. (2023). Impact of interactivity on learning outcome in online learning settings: Ordinal logit model. *International Journal of Engineering Business Management*, 15(3). http://dx.doi.org/10.1177/18479790231203107.

[38] Stephens, G. E., & Roberts, K. L. (2017). Facilitating collaboration in online group. *Journal of Educators Online*, 14(1), 1-16, [Online]. https://files.eric.ed.gov/fulltext/EJ1133614.pdf (Accessed Date: October 20, 2024).

[39] She, L., Ma, L., Jan, A., Sharif Nia, H., & Rahmatpour, P. (2021). Online learning satisfaction during COVID-19 pandemic among Chinese university students: the serial mediation model. *Frontiers in psychology*, Vol 12. http://dx.doi.org/10.3389/fpsyg.2021.743936.

[40] Adewale, S., & Tahir, M. B. (2022). Virtual learning environment factors as predictors of students' learning satisfaction during the COVID-19 period in Nigeria. *Asian Association of Open Universities Journal*, 17(2), 120-133.

[41] Kintu, M. J., Zhu, C., & Kagambe, E. (2017). Blended learning effectiveness: the relationship between student characteristics, design features, and outcomes. *International Journal of Educational Technology in Higher Education*, 14, 1-20.

[42] Harsası, M., & Sutawıjaya, A. (2018). Determinants of student satisfaction in online tutorial: A study of a distance education institution. *Turkish Online Journal of Distance Education*, 19(1), 89-99.

[43] van Kol, S., & Rietz, C. (2016). Effects of Web-Based Feedback on Students' Learning. *International Journal of Teaching and Learning in Higher Education*, 28(3), 385-394.

[44] Al-Darei, I. S., & Elhag, A. (2022). The effect of feedback type in the e-learning environment on students' achievement and motivation. *Journal of Educational Technology and Online Learning*, 5(3), 694-705.

[45] Faulconer, E., Griffith, J., & Gruss, A. (2022). The impact of positive feedback on student outcomes and perceptions. *Assessment & Evaluation in Higher Education*, 47(2), 259-268.

[46] Aafia, H. A. (2019). Feedback pattern (corrective-explanatory) in an electronic formative evaluation environment and its impact on developing engineering drawing skills for college students industrial education in computers. *The Scientific Journal of the Faculty of Specific Education*, 20 (1), 115- 180.

[47] Ismail, M. (2015). The effect of the difference in the feedback pattern in the e-learning environment via networks in

developing programming skills for third-year preparatory students. *Journal of College of Education: Benha University* 26(102), 345-362

[48] Field Survey, 2024 (SPSS Version 21).

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

The authors equally contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself

No funding was received for conducting this study.

Conflict of Interest

The authors have no conflicts of interest to declare.

.