

EFFECTIVENESS OF VIRTUAL LEARNING IN ENHANCING STUDENTS' ACADEMIC ACHIEVEMENT IN TERTIARY INSTITUTIONS IN FCT, ABUJA

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Abstract

This research examined the effectiveness of virtual learning in enhancing students' academic achievement in tertiary institutions in FCT, Abuja, Nigeria. This study comes as a result of the increase in the adoption of virtual learning in institutions of higher learning especially due to the course of the Covid-19, and the requirement to analyse its academic consequences. The research design utilized for the study was descriptive survey design. The target population were the postgraduate students of Veritas University, Abuja, out of this only thirty-three (33) took part in the survey. Structured questionnaire was used as the instrument for data collection which was designed using Google form and administered online through the WhatsApp group. The research questions were answered using the frequency distribution and percentage. The findings showed that virtual learning positively influences student's academic achievement. Also, students indicated significant perceptions towards virtual learning as an efficient mode of learning, owing to its improved interaction with instructors, flexibility, increased understanding of course content and effective time management. Nevertheless, the study highlighted some issues like unreliable electricity supply, limited internet connectivity, lack of technical know-how and inaccessibility of digital devices which have a negative impact on students' academic performance. The study comes to a conclusion that virtual learning is an effective learning method that has the capacity to improve students' academic achievement when properly maintained. It suggests enhanced capacity building for students and lecturers, increased technological infrastructure and improved online instructional practices so as to balance the learning outcomes in tertiary institutions.

Keywords: *Virtual Learning, Students' Academic Achievement, Constructivism Learning Theory.*

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1. INTRODUCTION

In order to provide distant learning to more than 1.5 billion children who were affected by school lockdowns brought on by the COVID-19 epidemic, educators around the world have been entrusted with managing virtual classrooms and interacting with their pupils via social

media and other channels (UNESCO, 2020). For both professors and students, teaching modules that are only offered online have brought about a new experience. Although in-person training cannot be entirely replaced by this new teaching style, it does present an opportunity to reform teaching methods, requiring creative approaches that combine rigorous and extensive learning activities (Adebayo & Balogun, 2019). Teachers were forced to quickly come up with ways to improve students' online learning experiences and results during the COVID-19 epidemic (Bryson & Andres, 2020).

However, many institutions have once again turned to using virtual classrooms, even after the pandemic. With its virtual classrooms, distance learning represents a new paradigm in education (Mbhiza, 2021). In order to create an atmosphere where students and teachers can interact with each other normally as if they are present in a physical classroom, this strategy makes use of cutting-edge educational technologies (Todri, et al., 2021). According to Alshorman & Bawaneh (2018) distance learning is denoted to mean a style of learning where teachers and students do not meet in a typical classroom. Rather, students employ different digital platforms, media, including the Internet to assist with learning. One of its elements is a creative approach based on digital technology, web-based environments, and other types of educational resources (Shatri & Kelmendi, 2023). Giving pupils a customized, learner-centered, open, entertaining, and interactive experience that enhances and promotes learning processes is its main goal (Ranjha et al., 2020).

Additionally, Primarily amid the COVID-19 epidemic, modern technology that made it possible to create virtual classrooms were increasingly common, requiring the widespread use of remote learning strategies (Moyo et al., 2022). As a result, universities were forced to switch from conventional educational settings to online learning, which presented far more difficulties (Odularu et al., 2022). To enable remote learning, online classes, and both asynchronous and synchronous interactions involving instructors and students, institutions are free to select platforms, Learning Management Systems (LMSs), and a variety of educational technologies (Shava, 2022). Examining how virtual classrooms affect students' academic performance is crucial despite the many obstacles to online learning implementation, such as those related to pedagogy and infrastructure.

Al-Qahani, 2019 & Mathew et al. (2019) disclosed that virtual classrooms may be more productive than traditional in-person classrooms, and students can engage with lectures and learning materials from anywhere at any time (Zhou et al., 2020), which promotes communication, teamwork, and an enthusiasm to learn. Students have many possibilities to interact and communicate with the instructor as well as with each other in virtual classes, providing a wealth of options for collaborative learning (Hamouda, 2020; Shava, 2022). Put another way, students' learning results are impacted by the increased learning engagement that virtual classrooms enable. The effectiveness of learning is positively impacted by virtual classroom instruction, claims Uzoamaka (2017). According to the author's results, among other things, virtual classrooms had a beneficial impact on Nigerian university students.

The statistically substantial benefits of virtual classrooms in raising average accomplishment scores, interaction levels, and student satisfaction rates were also highlighted in a study by Hassan and Baraka (2021). These beneficial benefits on students' academic performance were also noted by Yilmaz (2015) in a study examining the influence of "live virtual classrooms" in distant learning. also, Alhawiti (2017) employed virtual classroom education at Tabuku Community College to enhance students' English language ability. The author of this study emphasized that students in the experimental group, who received their education virtually, performed better on a variety of tests.

Nevertheless, students as well as teachers both are confronted with a lot of issues during virtual classes. The inability of the students to take part in the learning process via virtual classrooms is affected by challenges like poor internet connectivity, epileptic power supply and institutional support (Iqbal et al., 2022). Similarly, Nikolopoulou and Kousloglou (2022) in their survey discovered that lecturers are confronted with same problems. Interestingly, teachers have this notion that, in spite of these above-mentioned issues, virtual learning still lead to better instructions and a lot of students desire it for their academic pursuits. This theoretical framework is an investigation into how virtual learning improves the academic performance of students. This framework makes an important provision on how virtual classrooms can positively enhance the learning outcome of students by making a beak down of some essential factors and processes. Based on these resolutions, this survey aimed at evaluating the effectiveness of virtual learning on student's academic achievement in tertiary institutions in the Federal capital Territory, Abuja. This research examines their opinions on flexibility, student teacher relationships, collaboration, technical know-how and quality of

contents. In relation to how these variables function together, virtual classrooms reveal that virtual learning may create a welcoming and productive environment for learning.

Objectives of the Study

1. To ascertain the degree to which virtual learning influences students' academic achievement in tertiary institutions in the FCT, Abuja.
2. To investigate students' perceptions of the effectiveness of virtual learning as a mode of learning in tertiary institutions in the FCT, Abuja.
3. To explore issues related with the engagement of virtual learning and how these issues affect students' academic achievement in tertiary institutions in the FCT, Abuja.

Research Questions

1. How does virtual learning influences students' academic achievement in tertiary institutions in the FCT, Abuja?
2. What are students' perceptions of the effectiveness of virtual learning as a mode of instruction in tertiary institutions in the FCT, Abuja?
3. What issues do students encounter in the use of virtual learning, and how do these issues affect their academic achievement in tertiary institutions in the FCT, Abuja?

2. CONCEPTUAL FRAMEWORKS

Virtual Learning/Online Learning/E-learning

According to Bossman and Agyei (2022), virtual learning, which is often termed remote learning, e-learning or online learning, is primarily a web-based environment that makes information or knowledge accessible to students any time, irrespective of their location or schedule limitations. According to Kerimbayev (2016), virtual learning is a contemporary teaching strategy that leverages technology to support learning and is used to acquire the necessary competitiveness in an engaging learning environment, as well as the attitude, behavior, desirable skills and knowledge. Beginning in the late 1990s, this type of education has been present for a while and has developed rapidly. Particularly for adult learners, it has been regarded as a wise option (Rahman et al., 2023). This method encourages access to higher

education while utilizing cutting-edge teaching techniques and learning approaches. Its foundation is a participatory and active learning strategy that engages students in their education through dialogue and introspection. Learner that participate in educational process via goal-oriented, collaborative, reflective and constructive activities and who are self-motivated and learning-oriented can benefit from this method (Martín et al., 2021). Interactive learning environments that make use of cutting-edge, technology-based instruction enable virtual education.

Students are encouraged to take an active role in the learning process as part of the student-focused strategy promoted by online education. Interactive components, computers, mobile devices, the internet, and other technology that let students receive and exchange knowledge are some of the digital instruments utilised in online learning (Perez et al., 2023). Online learning comes in a variety of forms, including synchronous, asynchronous, blended, microlearning, personalised learning, and massive open online courses (Rahman et al., 2023).

Students can benefit from remote learning in a number of ways, including its ease of use, versatility in respect to engagement, and ability to adjust to individualised interests. Students can participate in their remote classes from any comfortable place and study certain courses with reduced time and location limits thanks to user-friendly online learning materials on their PCs or laptops (Basar et al., 2021).

Rajabalee & Santally (2021) noted that among the students' problems of virtual learning are learning experiences and academic achievement. Furthermore, although technology makes online learning platforms more accessible and user-friendly, it can also have limiting consequences, as it may be hard for students to have access the internet. Adoption of virtual learning platforms is challenging as a result of Aguilera-Hermida's (2020) issues with engagement and attendance in virtual classes (Nambiar, 2020). Educational policy, learning pedagogy, accessibility, cost, and flexibility are additional concerns with e-learning (Maheshwari, 2021). Access to digital gadgets and a dependable internet connection are major problems in many developing nations, particularly for students from families of low-income (Pokhrel & Chhetri, 2021). Compared to a typical real-world situation, it may be tougher to maintain students' engagement in a virtual setting (Kedia & Mishra, 2023). Even With all of the benefits of remote learning, student-teacher communication is less frequent. The lack of opportunities for human connection, which has been shown to be crucial for fostering peer

support and generating in-depth group discussions on the subject, is another obstacle to remote learning (Al-Amin, et al., 2021).

Since pandemic has spread throughout the world during the previous four years and the enforcement of school closure, students and educators were pushed at all levels to quickly move to online learning in order to stem the disease spreading out while sustaining education continuity (Elnour et al., 2023). The pandemic made traditional in-person training and instruction methods unfeasible (Fahim et al., 2022). Despite the transition to virtual learning was sudden and important, Henriksen et al. (2020); Zhu et al. (2020) and Bao (2020) concurred the necessity of sustainability of the learning approach. This unexpected adjustment created a debate over the quality of education and its students' gratification (Baber, 2020). While remote and conventional learning have many similarities, equally they differ in a number of ways. Afzal and Crawford (2022) list the following as some of the similarities: Students must be present, comprehend the course content, turn on their internet connection, and complete group tasks. According to Paul and Jefferson (2019), Lecturers are saddled with the responsibility to develop curricula, improve the standard of their instruction resources, answer questions from students, motivate them to learn, and grade tasks for assessment. Although face-to-face (F2F) learning is teacher-centered and requires minimal participation from the student, online learning is student-centered and requires active learning (Paul & Jefferson, 2019). Another difference is that whereas traditional instruction necessitates learning to occur at a specific place and time, online learning is not limited by these factors (Francescucci & Rohani, 2019). Online learning makes it possible to use internet-based information delivery systems for both teaching and learning (Pei & Wu, 2019).

Students' Academic Achievement

Academic achievement, according to Shiku et al. (2025), is the capacity to acquire knowledge or the level of proficiency in schoolwork, typically assessed through standard tests and represented by a grade or units based on students' performance. Therefore, excellence or accomplishments in all academic fields in the classroom and extracurricular activities can be referred to as academic achievement. Excellence in athletics, behavior, self-assurance, communication skills, punctuality, the arts, culture, and other areas that can only be attained when a person is well-adjusted are not included in this, though. In a similar spirit, Amazigo (2017) believed that academic achievements can also refer to academic performance, which includes both curricular and extracurricular activities of the students, while Good (2019) saw

academic achievements as the knowledge acquired or skills developed in the school subjects typically designed by test scores or marks assigned by the teachers. Thus, it includes the students' learning objectives. A learner's achievement indicates how much they have learnt. It comprises pupils' academic performance, which is typically gauged by their grade point average on tests or ongoing evaluations in educational environments. Academic achievement, is the achievement of academic targets, the academic success of students, or more precisely, the extent to which a learner has fulfilled the declared goals of learning, according to Okoli and Okeke (2018). Academic success is the term used to describe the mathematical, scientific, social science, oral, reading, writing, and cognitive processes and skills that affords a student the opportunity of succeeding in his/her academics and in society at large (Nnajiolor, 2024).

With the fast digitization and global movement toward remote instruction, student academic accomplishment in virtual learning environments has grown in importance as a field of study in education. In this context, academic achievement is described to be the extent to which a learner successfully complete courses, achieve grade point averages, demonstrate mastery of the material, and pass assessments using digitally mediated instructional platforms (Shiku et al., 2025). When it comes to learner engagement, instructional delivery, and assessment procedures, virtual learning environments are considerably different from traditional in-person classrooms. These discrepancies have considerable sway academic achievement of the students. In this, students are required to be in-charge of their learning as virtual learning emphasizes more on the self-directed, autonomy and flexibility study of the learner. Student's digital competence, enthusiasm as well as attitude greatly have substantial effect on their academic achievement in virtual learning environment. Students with good time management abilities and intrinsic drive typically perform better academically in online courses, according to empirical research (Gat et al., 2021).

Instructional design is a major element of academic achievement in virtual learning. However, a detailed virtual course that integrates evident-based learning objectives, various tactics for assessment and content that is interactive supports better cognitive engagement and knowledge retention. Student's understanding can be enhanced through the application of quizzes, collaborative tasks, multimedia resources and discussion forums which leads to different learning formats (Rosito, 2020). Similarly, online courses which are not well designed jeopardize academic achievement, not because of the online mode on itself but because of lack of pedagogical planning as well as inadequate presence of the facilitator. Setiawan et al. (2020),

is of the opinion that the lecturer's activeness is still the main focus of the academic achievement of students in virtual learning platforms. Even though physical conversion may not be there, the lecturer's duty as a facilitator, feedback provider and motivator is noticeable. Frequent communication, actively taking part in discussion forums and timely feedback all substantially contribute to academic performance of students. Studies have it that effective instructor presence brings increase students' engagement and decreases feeling of isolation which influences students' academic achievement significantly.

In virtual learning, assessment practices influence students' academic outcome (Abdel & Shalash, 2020). Also, Abdel & Shalash (2020) maintained that learning objectives and online assessment must be aligned and designed in order to examine the higher-order thinking abilities rather than memorizing of notes. Furthermore, the author mentioned that continued assessment approaches like project-based, reflective tasks and assignments are specifically effective in drawing students' learning progress. More so, the integrity of academic and disparity in access to technology can have a negative impact on achievement if not attended to. It is opined that institutions must concentrate on technological support systems and strong assessment mechanisms to ascertain integrity and equity in online analysis. In the context of virtual learning, technological infrastructure and access are very important in determinants of academic achievements. To ensure students' active participation in online courses, access to necessary devices, user-friendly learning management systems and stable internet connectivity are very important. On the other hand, Ayeni & Aderinkola (2022), mentioned that digital divides as well as technical issues can limit learning engagement and result to decrease in academic performance particularly in emerging countries.

3. THEORETICAL FRAMEWORK

The constructivism learning theory of Bruner is what this study is anchored on. This theory tends to motivate students to improve in their critical and conceptual thinking ability. The theory's emphasis is on student's interaction with the environment with their learning environment. According to the notion, people create meaning and knowledge from their experiences; in other words, knowledge is created by a person's relationship with a particular location. This means that when people actively participate in learning by doing and exchanging ideas with classmates, they create their own knowledge. In the process, the learner constructs meaning from a task by using sensory information. Assimilation and accommodation are two of the fundamental ideas of constructivism learning theory that lead to the creation of a person's

new knowledge. A person who is assimilating integrates new experiences into their existing ones. As a result, the person develops new perspectives, reconsiders previously held misconceptions, and assesses what matters, ultimately changing their perceptions. Contrarily, accommodation involves reinterpreting the outside world and novel experiences in terms of the existing mental capacity. People imagine that the world functions in a specific way. They must adapt and reframe the expectations with the results when things do not function in that setting.

The constructivism learning theory has an invaluable role attached to educators. According to this view, teachers help students understand themselves by acting as facilitators rather than lecturers. In this situation, the facilitator must ensure that the student draws their own conclusions rather than receiving instructions or responding to questions that are solely related to their course material. Additionally, teachers engage in constant dialogue with their pupils, fostering a learning environment that is adaptable to their requirements as they advance and develops them into capable critical thinkers.

The Relationship Between Constructivism Learning Theory and Virtual Learning

Virtual learning and constructivism learning theory are somewhat connected in a number of ways, as enumerated below by Chen (2000).

1. Constructivist education is consistently engaging, appealing, and problem-representing with surrounding contextual situations. Nonetheless, students may encounter issues in a three-dimensional setting that mimics real-world circumstances when learning virtually.
2. A problem might be interpreted in a way that promotes other ways of thinking through constructive learning. Virtual learning, on the other hand, can exclude unpleasant aspects that would divert a learner's attention from the learning process and present many perspectives, each of which can be independently managed.
3. In a constructive learning strategy, the student uses his senses to make sense of a topic. However, the virtual learning environment allows for unrestricted problem-solving. Here, participating students can watch feedback and interaction through visual, audio, and other cues.
4. Constructivist education offers a wealth of information. Additionally, the necessary knowledge is included in virtual learning, which can be enhanced by other technology devices to access additional pertinent information online.

5. Constructivist learning helps students create socially shared knowledge by the employment of collaboration and interaction tools that help in the sharing and accessing of knowledge. However, with virtual learning, a group of students could be given a common area to work together to create knowledge through synchronous and/or asynchronous communication. In order to make the collaborative process a reality, it might also take over virtual bodies.

4. METHODOLOGY

The research design used is descriptive survey research method. In order to measure respondents' viewpoints on the topic of virtual learning and students' academic progress, a survey approach is very suitable for this study. Closed-ended questionnaires with Likert-type items on a 4-point scale were used to gauge respondents' opinions on a range of topics pertaining to virtual learning and students' academic performance at FCT, Abuja's postsecondary institutions. Additionally, 40 postgraduate students from Veritas University in Abuja make up the study's population. This population was chosen for the study because they are new postgraduate students who only started their studies in the academic years 2024–2025–2025–2026. They also witnessed remote learning in the COVID-19 pandemic period and are currently utilizing it for their coursework.

Additionally, a standardized survey questionnaire was used to obtain the need data for the study. Google Forms was used to administer the survey online. In measuring the participants' perception, a four-point Likert rating scale was applied. According to Saunders, Lewis, and Thornhill (2000), researchers can ascertain respondents' opinions regarding their agreement or disagreement with a set of statements by using the Likert-style rating approach of questionnaire design. Another benefit is that it makes it possible to assign numerical values to situations for simple quantitative analysis (Zinberg, Revelle & McDonald, 2006). In addition, in answering the research questions, the frequency and percentage was employed in the analysis of the data obtained.

5. RESULT AND DISCUSSION

The questionnaire was emailed to the students' group chat—there are forty (40) students in total and thirty (33) of them responded, indicating that 82.5% of the replies were received and

deemed fit for the study. This suggests that the questionnaire was sufficient for the study because the majority of respondents gave it positive answers.

Research Question One: To what extent does virtual learning influences students' academic achievement in tertiary institutions in FCT, Abuja?

Table 1: Virtual learning influence on students' academic achievement in tertiary institutions in FCT, Abuja

S/N	Statement	Strongly Disagree	Disagree	Agree	Strongly Agree
1	The use of virtual learning environment has assisted my online presence and significantly enhanced my achievement academically.	-	-	16(48.5%)	17(51.5%)
2	The use of remote learning can be very efficient, active as well as interesting as it has positively impacted academic success	-	4(12.1%)	15(45.5%)	14(42.4%)
3	I am able to learn on my own due to the use of online learning settings.	-	7(21.2%)	12(36.4%)	14(42.4%)
4	Learning remotely has helped in the enhancement of my problem-solving and critical thinking abilities which has affected my academic success positively.	7(21.2%)	-	20(60.6%)	6(18.2%)
5	The use of virtual learning has positively influenced my overall academic achievement	-	-	10(30.3%)	23(69.7%)

The responses of the respondents about the impact of virtual learning on students' academic performance in postsecondary institutions in the Federal Capital Territory, Abuja, are displayed in Table 1. This indicates that all respondents (100%) agree that adopting a virtual learning platform has helped them become more visible online and significantly enhanced their

academic achievement. While 12.1% disagreed, 87.9% of respondents stated that virtual learning may be highly engaging, successful, efficient, and has affected their academic achievement. Furthermore, 78.8% of respondents think that they may learn at their own speed using virtual learning platforms, while 21.2% disagree. Furthermore, 78.8% of respondents agree that virtual learning enhances their ability to think critically and solve problems, which has an impact on their academic achievement, whilst 21.2% disagree. Most importantly, all respondents (100%) agreed that using virtual learning has improved their overall academic performance. Thus, evidence suggests that students' academic performance in FCT, Abuja's higher institutions is positively impacted by virtual learning.

Research Question Two: What are students' perceptions of the effectiveness of virtual learning as a mode of instruction in tertiary institutions in FCT, Abuja?

Table 2: Students' perceptions of the effectiveness of virtual learning as a mode of instruction in tertiary institutions in FCT, Abuja

S/N	Statement	Strongly Disagree	Disagree	Agree	Strongly Agree
1	My understanding of the learning content has greatly improved when the lecturer is teaching virtually.	4(12.1%)	4(12.1%)	22(66.7%)	3(9.1%)
2	It is interesting to use different online classroom applications in the presentation of the learning content.	3(9.1%)	7(21.2%)	23(69.7%)	-
3	The learning content being presented in online classroom has helped me manage my time successfully	3(9.1%)	-	11(33.3%)	19(57.6%)
4	Virtual learning provides flexibility that enhances my learning experience	3(9.1%)	5(15.1%)	19(57.6%)	6(18.2%)
5	The lecturer's summarization of the learning content is most appropriate using the remote classroom.	-	4(12.1%)	16(48.5%)	13(39.4%)

The responses given by participants about students' opinions of virtual learning's efficacy as a teaching method in FCT, Abuja, higher education institutions are shown in Table 2. It is evident from this that 75.8% of respondents feel that learning content is better understood when the teacher uses a virtual classroom, while 24.2% disagree. Additionally, 69.7% of respondents agreed and 30.3% disagreed that learning knowledge presented in a virtual classroom through various applications is more appealing. Furthermore, 90.9% of respondents agreed that the virtual classroom's presentation of learning materials helped them manage their time efficiently, whilst 9.1% disagreed. Furthermore, while 24.2% disagreed, 75.8% of respondents felt that virtual learning offers flexibility that improves their educational experience. Additionally, 87.9% of respondents believe that a virtual classroom is an appropriate setting for learning and summarizing the material with the instructor, while 12.1% disagree. Based on the statistics above, it can be concluded that students in FCT, Abuja's tertiary institutions have favorable opinions about the efficacy of virtual learning as a teaching method.

Research Question Three: What challenges do students encounter in the use of virtual learning, and how do these challenges affect their academic achievement in tertiary institutions in the FCT, Abuja?

Table 3: The challenges associated with the use of virtual learning and how these challenges affect students' academic achievement in tertiary institutions in the FCT, Abuja.

S/N	Statement	Strongly Disagree	Disagree	Agree	Strongly Agree
1	Poor internet connectivity affects my participation in virtual learning.	4(12.1%)	3(9.1%)	4(12.1%)	22(66.7%)
2	Frequent power supply interruptions hinder my academic performance during virtual learning.	3(9.1%)	7(21.2%)	-	23(69.7%)
3	Limited access to digital devices affects my ability to learn virtually.	-	11(33.3%)	19(57.6%)	3(9.1%)
4	Technical difficulties during online classes reduce my academic effectiveness during classes.	5(15.1%)	3(9.1%)	6(18.2%)	19(57.6%)
5	Virtual learning-related challenges negatively	13(39.4%)	-	4(12.1%)	16(48.5%)

	affect my academic achievement.				
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Table three presents the respondents' responses on the challenges associated with the use of virtual learning and how these challenges affect students' academic achievement in tertiary institutions in the FCT, Abuja. In this, it could be noticed that all 78.8% the respondents are in support that poor internet connectivity affects their participation in virtual learning while 21.2% were in disagreement. Also, 69,7% agreed that frequent power supply interruptions hinder their academic performance during virtual learning while 30.3% disagreed. More so, 66.7% of the respondents are in support that limited access to digital devices affects their ability to learn virtually while 33.3% were not in support. In addition, 75.8% agreed that technical difficulties during online classes reduce their academic effectiveness during classes while 24.2% disagreed. Furthermore, 60.6% of the respondents are of the agreed that virtual learning-related challenges negatively affect their academic achievement whereas 39.4% did not agree. Hence, this indicates that the challenges associated with the use of virtual learning affects students' academic achievement in tertiary institutions in the FCT, Abuja

6. DISCUSSION

It was found that virtual learning has favorable impact on academic achievement of the students in tertiary institutions in the Federal Capital Territory, Abuja. This corroborates the results of Chakraborty & Nafukho's (2015) study which discovered that employing virtual learning leads to appropriate student commitment which includes behavioural, emotional, and psychological and are essential for successful learning, student welfare, and success. Additionally, Babalola et al. (2023) demonstrated that there is two-way communication between the teacher and the student and that virtual learning promotes understanding more than traditional teaching approaches. Unlike in a traditional classroom, students actively participate in their education through this communication medium. In addition to the aforementioned, senior high school students participating in online learning during the COVID-19 pandemic showed a statistically significant improvement in academic performance, according to Nwachukwu & Eze's (2021) study on the influence of instructional modalities on academic success of the students.

When comparing the average final grades of 1,449 students in remote learning environments with 1,913 students in conventional in-person mode, the study indicated that online learners

generally performed proficiently well, with a p-value less than 0.05. Additionally, a survey by Collins et al. (2025) evaluated the effects of mobile learning approaches on the academic performance and retention of Rivers State senior secondary school students in marketing courses. The research discovered that students who received teaching using different mobile learning platforms, like Zoom and Google Classroom, had dramatically different achievement levels when compared to traditional lecture approaches. When properly designed and implemented, online learning platforms have the potential to increase student engagement and academic accomplishment, according to all of these studies. El Malaki & Kroum (2022) investigated both the online and in-person training effectiveness amidst COVID-19 epidemic at the University of Cape Coast in Ghana, which contrasts with the previously cited findings. According to their analysis, classroom training was more effective than online instruction, even if the difference was not statistically significant.

Furthermore, the survey found that students at postsecondary educational institutions in Abuja's Federal Capital Territory (FCT) have a positive view of virtual learning's effectiveness as a teaching strategy. According to a study by Zeeshan et al. (2023), Ambitious and knowledge-driven students that participate in the educational process via successful, mutual, enthusiastic, and reflective activities benefit greatly from this approach. Khan et al. conducted an empirical study in India during COVID-19 on students' view of online learning (Khan et al., 2021). The study's findings demonstrated that intellectuals had favourable opinions about e-learning and desired to use the new system in order to complete their studies amidst the pandemic era. Additionally, Muthuprasad et al. (2021) examined Indian e-learning attitudes and preferences during the COVID-19 pandemic. According to the study, 70% of students were open to choose their online course during the epidemic. For online learning, the majority of respondents favoured using cellphones.

They discovered through content analysis that in order to increase learning efficacy, students prefer recorded examinations at the conclusion of each class. Students believed that the flexibility and ease of use of online programs made them a desirable choice, even when internet connectivity problems in distant areas make it difficult for them to benefit from online learning initiatives. Students can learn at their own pace and easily share information with facilitators and other students, according to the findings of a study by Ayimbila et al. (2024) that examined how students felt about online learning. Online learning has also been demonstrated to save time and money because it eliminates the need for students to visit study centers. However,

during the COVID-19 pandemic, Abbasi et al. (2020) looked into how students at a private medical school felt about online learning. According to the report, roughly 76% of students utilised cell phones for class, and 77% of students are skeptical towards online learning. Additionally, the study demonstrates that during the lockdown, students favour in-person instruction over online learning.

Accordingly, this study shows that students' academic performance in tertiary institutions in the Federal Capital Territory (FCT), Abuja, is impacted by the difficulties related to the usage of virtual learning. This finding is consistent with that of Harefa and Sihombing (2022), who discovered that students' connection with lecturers is frequently impeded by unstable networks and that their inadequate technological proficiency causes them to postpone participating in online sessions. The author added that it can be an issue for students to participate in online courses if they live in distant locations with poor internet connectivity. In addition to the aforementioned, Tanjung & Utomo (2021) pointed out that online learning has a number of disadvantages, such as low network speed, a large need for internet bundles, and cheating, copying, and pasting. Other challenges of online learning include the absence of in-person engagement, a lack of technical assistance, missing school, and a lack of digital resources such as computers, cell phones, and tablets. Practical skill development is not aided by online learning (Chan et al. (2021). There aren't many opportunities for useful tasks. Online courses do a terrible job of encouraging physical exercise and the development of motor skills. Social isolation, a lack of technological expertise, and internet issues are only a few of the issues or drawbacks associated with online learning (Khan et al., 2020). Sah (2021) claims that students' involvement in online learning is further impacted by the significant financial outlays required to purchase laptops, smartphones, tablets, PCs, and internet bundles. The drawbacks of online learning include limited independence and poor time management.

In addition to the aforementioned difficulties, Dube (2020) listed a number of obstacles to online education. The scholar claims that these difficulties include costly internet data, inadequate internet connectivity, a lack of online learning resources, and a lack of computer skills. It's interesting to note that online learning eliminates pen and paper work and in-person interaction (Dube, 2020). Pen and paper practice helps pupils get better at handwriting, according to the author. Additionally, the author implied that students' involvement in online classes is impacted by family distractions, time constraints, and bad internet access. Pelgrum (2001) pointed out that inadequate training for both facilitators and students is one factor

contributing to the criticism of online learning. Teachers' unease with online instruction, computer anxiety, and fear of technology, particularly among the elderly, are all exacerbated by the facilitators' insufficient training (Bhati et al., 2009). Students frequently feel alone during online classes, which diminishes their sense of belonging, according to Sharma et al. (2022). It might be difficult for teachers to gauge their students' true learning levels in online classes.

7. CONCLUSION

This research examined the effectiveness of virtual learning in increasing the academic achievement of students in tertiary institutions in Federal Capital Territory, Abuja. The study disclosed that based on the students' viewpoints, actual data and the theoretical perception, it could be ascertained that virtual learning has a drastic influence on students' academic achievement. The discoveries made from the study signifies that online learning environments provides students' accessibility, learner commitment flexibility and interaction which are important in increasing the academic performance of students. Based on the analysis of the study, majority of the students believed that virtual learning is an effective approach to teaching and learning. The respondents highlighted learning flexibility, efficient time management, increase in the understanding of the course materials, enhanced interaction with teachers as the benefits of virtual learning. However, these findings align with the constructivist learning ideology which prioritizes learner-based education, effective commitment and teamwork. This, indicate that virtual learning platforms has the capacity to support meaning learning outcomes and make it simple to attain academic objectives in higher education when supported by effective instructor presence and instructional design.

In spite of all these positive results, the study also found some remarkable issues related to virtual learning that influence the academic achievement of the students. It was found that issues such as unstable electricity supplies, technical issues, poor internet connectivity and limited access to digital devices mitigate the active participation and commitment in virtual learning education. These issues show the effectiveness of online education is dependent not just on the instructional approaches but equally on the adequate availability of technological infrastructure and institutional support. In Nigeria where there is consistent discrepancy in access to digital devices, these hinderance create a tangible menace to the continuous and fairness of online learning programmes. Consequently, the result of the study stress that virtual learning is a practical and efficient learning method with the ability of improving student's

academic achievement in tertiary institutions. Thus, it is important to state that, virtual learning should not be seen as a provisional substitute to conventional learning but a transformative and corresponding means of learning that can develop tertiary education especially in the post-Covid-19 period. Deliberate investment in capacity building, technology and systematic educational policies would be important in the maximization of the academic benefits of virtual education in tertiary institutions within the FCT and beyond.

Recommendations

1. Strengthening Technological Infrastructure and Power Supply

Seeing that electricity interruptions and poor internet connectivity have been pinpointed to be the main issues militating against active students' participation in online learning and affects their achievement academically, higher institutions ought to prioritize the enhancement of technological infrastructure. In addition, institutions need to partner with internet services providers (ISPs) to provide consistent and cheap internet connectivity and also make investment in alternative power supply such as solar energy system. The solution to these issues is paramount to the sustenance of students' commitment and reaping the academic of online learning.

2. Capacity Building and Digital Skills Development for Lecturers and Students

This research showed that virtual learning has a positive influence on students' academic achievement if lecturers provide active presence and students can engage actively with online environments. Moreover, steady training programmes for the lecturers should be instituted so as to improve skills in virtual assessment approaches, instructional design and online pedagogy. Similarly, students need to be given orientation and continuous support to increase their digital know-how on the efficient use of virtual learning tools and self-regulation which will help in strengthening their commitment as well as increase their learning outcomes.

3. Improved Online Instructional Design and Lecturer-Student Interaction

The findings revealed that students expressed optimistic views on virtual learning owing to its improved interaction between lecturers and students, quality of content delivery as well as flexibility. Based on this, lecturers must implement interactive instructional and learner-centred procedures which consist of the utilization of multimedia resources, timely feedback systems,

collaborative tasks and discussion forums. More so, improved instructor presence in online platforms will uphold greater engagement, decrease isolation which increases the academic achievement of the students.

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