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# Computer educators' perception of the utilization of online assessment in the Covid-19 era

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**Abstract**

The proliferation of ICT in today's world of work particularly in education has necessitated the need to assess lecturers' views of online assessment use in the covid-19 era given the disruptions in face-to-face teaching and learning process. The study adopted a mixed research design. The population for the study was 84 computer educators made up of 40 males and 44 females from the four public tertiary institutions in Enugu State, Nigeria. Three research questions and two hypotheses guided the study. The instruments used for data collection were a structured questionnaire titled "Computer Educators' Perception of Use of Online Assessment" (CEPUOA) and a guided interview relating to the research questions. The internal consistency was determined using the Cronbach $\alpha$ reliability test which gave an index of .9. The data collected were analyzed using mean and standard deviation while the null hypotheses were tested using a *t*-test at 0.05 level of significance. The findings of the study indicated that computer educators have a positive disposition toward the use of online assessment in conducting various assessment techniques such as tests/quizzes, semester examinations, and seminar/project evaluations. The findings of the study further showed that the utilization of online assessment techniques facilitates timely monitoring of students' progress, and the provision of immediate feedback to the learners helps in preparing students with digital skills required to function in the 21st-century workplace, among others. In view of these, it was recommended that tertiary institutions should initiate workable policies that will encourage the effective use of online assessment by lecturers.

**KEYWORDS**

computer educators, ICT utilization, learning assessment, online assessment, perception

## 1 | INTRODUCTION

Technological development facilitated by ICT has brought new and positive opportunities into teaching and learning processes [78]. This rapid ICT advancement in education has shifted the assessment paradigm from the traditional method of assessment to computer-based assessment and to a more recent online assessment [66, 71]. Online assessment involves the use of technological devices such as laptops, desktop computers, smartphones, iPads, Android tablets, and so forth. connected to the internet to manage and deliver assessments to students [18, 41, 102]. According to [77], different kinds of assessment can be explored through various online

  

assessment techniques with a view to transforming assessments that include professional examinations, qualifications, certifications, school tests, job interviews, and so forth.

Thus, assessment is globally recognized as an important and powerful element of educational activities which "provides observable evidence of learning; determines student progress and demonstrates an understanding of the curriculum" [47]. According to Turning [92], "assessment is not just the rounding off of the teaching and learning period but to a large extent a central steering element in those processes which is directly linked to learning outcomes" p. 4. It is also a mechanism for providing educators with data for improving their teaching methods and for guiding and motivating students to be actively involved in their own learning [69, 91]. Majorly, the three types of assessment used by educators to gauge students' learning outcomes from the beginning of the learning process to the end are categorized into diagnostic, formative, or summative assessments [34]. Categorically, diagnostic assessment is the beginning of the learning process assessment that helps in identifying the students' current knowledge, skill, and capabilities; formative assessment is an ongoing assessment that provides feedback and information as learning is taking place while summative assessment sums up the teaching and learning process which comes either at the end of a module, semester, study year or educational program [4, 5, 20, 34, 65].

Today, educators continue to explore different kinds of assessment so as to gauge how much learning has taken place through different assessment techniques such as continuous assessment in form of assignments, quizzes or tests, examinations (midterm, termly, and/or final examinations), projects among other assessment techniques [2, 11, 60]. Continuous assessments such as tests and quizzes offer students opportunities to demonstrate their understanding of the materials provided; gives ongoing information about students' understanding and serve as feedback for improvement [1, 36]. On the other hand, examination as an assessment technique is viewed as a spoken or practical test at school or college, especially an important one that the students need to take to get a qualification [93]. The examination also serves for certification, selection, motivation, and controlling the activities of the school by providing information that can be used in managing the educational system, holding the school and teachers accountable for students' achievement levels at the end of the term or session [28, 49, 50, 61]. Furthermore, students' project work is also a very important assessment technique that involves planning and developing a schedule of study and outcomes to be achieved over a period of time usually longer than that of an individual assignment [32, 54]. Projects can be assessed in a way that allows students to connect various pieces of knowledge together towards finding a solution to a given problem [54] opined that since project work requires students to apply knowledge and skills throughout the project-building process, lecturers will have the opportunity to assess their understanding, the quality of work as well as their level of participation right from inception.

Considering the significant role of assessment in the educational sector coupled with the disruptions in learning caused by covid-19 pandemic nowadays, it is recommended that various assessment techniques would get to an innovative level where students are able to be assessed at anytime and anywhere via online means [42]. This is because of the numerous potentials of using online assessment compared to pen and paper methods such as efficiency, cost-effectiveness, security, faster, easier, grading and reporting students' performances at any time regardless of geographic location, provision of immediate feedback, improve effective utilization of large question banks and supports distance learning [13, 26, 40, 53]. According to [25], online assessment tools in use today vary from simple Multiple-Choice Questions and Answers (MCQs) tools to complex Programming Assignments Tools such as Web-CAT, Web-Work, Web-based Grading, and Class-Marker. Some of these online assessment tools include tools such as Google Forms, Survey Monkey, Kahoot, Quizizz, Summative, and so forth. More recently, Google Form is one of the widely used and free online assessment tools which allows lecturers to create multiple-choice questions in the form of a survey; enhanced with images and videos in a few minutes, and send the questions to the students using created link or their personal email address [75, 96].

Furthermore, these online assessment tools provide resilient solutions to combat disruptions such as civil unrest, emergencies caused by disaster, and disease outbreaks such as the recent coronavirus (Covid-19) pandemic that affected face-to-face interaction of educational delivery and assessment [7, 62]. Also, [71] opined that in other to effectively carry out an assessment in the midst of a large population of students, reduce the rate of examination malpractices, bias in marking examination scripts, delay in the release of results, among other challenges facing pen-paper assessment, the use of online assessment tools must be advocated for in tertiary institutions in Nigeria. In view of this, [17] posits that to achieve the goals of tertiary education in today's technological era, an online assessment which is seen as the best tool for examining learners' progress should not be compromised. To this end, there has been widespread interest from governments, industries, and educators in

identifying a model of learning and assessment in higher education that meets the challenges of learning in this digital age toward preparing students for an uncertain future. Moreover, [72] asserted that successful schools are those that provide integrated technological experiences for their students aimed at increasing their technological skills and competencies hence any higher institution that failed to incorporate new technologies into their teaching, learning, and assessment processes with reference to industry requirements and the trend cannot seriously claim to be preparing their students for the 21st-century world of work.

Nevertheless, studies have shown that there are divergent views on the use of online assessment tools for various assessment techniques from both students and staff of higher education. For instance; in the studies carried out by [21, 63], many students and staff have negative views of online assessment online test is mainly dominated by Multiple Choice Questions (MCQs) and hence may not allow students to demonstrate their level of knowledge of psychomotor skills while some showed positive attitudes because of the perceived ease of use of MCQs. Besides, an online quiz is considered to be an effective online assessment technique suitable for formative assessment, especially for an independent mode of learning as it gives instantaneous feedback. These notwithstanding, users' perception of ICT can positively or negatively influence its adoption or utilization as highlighted in the Technology Acceptance Model (TAM) [19]. According to TAM, the two factors that determine how users perceive the use or integration of any ICT tools are perceived usefulness and perceived ease of use. Therefore, both lecturers' and students' perception of online assessment tools can significantly influence their usage either in terms of how useful they perceived it to be or how relatively easy it is to use. Thus, assessing computer educators' perception of the utilization of online assessment in higher education is considered essential given that they are pacesetters in the use of ICT resources, for example, e-learning and online learning resources in classroom learning and everyday problem-solving. In view of the foregoing, the main purpose of this study was to determine computer educators' perception of the utilization of online assessment tertiary institutions in Enugu State.

**Statement of the Problem**

With the level of technological impact in today's world of work and education, in particular, the use of online resources in the achievement of educational objectives like an assessment of students learning outcomes is no longer optional but obligatory given the covid-19 restrictions. Therefore, the need to shift from the pen-paper method of assessment to online assessment in the educational sector, especially in tertiary institutions cannot be over-emphasized. This is because online assessment is not only suitable for large classes but suitable for learning in the covid-19 era by reducing physical contact between people; providing immediate feedback to the students and lecturers and also helping in equipping the students with desirable ICT skills required in today's world of work.

Yet, there seems to be low utilization of online assessment tools by many lecturers in Nigerian tertiary institutions in spite of the numerous advantages associated with online assessment. Perhaps, this has contributed to the loophole affecting most Nigerian graduates from thriving in an increasingly technological and interconnected world of work especially when they are exposed to online job assessment leading to employment. There is no doubt that a poorly trained student in the area of technological innovations will obviously affect one's chances of excelling in the present competitive world of work driven by ICT. In view of this, this study sought to determine the perception of computer education lecturers who are considered pacesetters of ICT/computer usage in the teaching and learning process with a view to understanding how online assessment is used in the pre and post covid-19 era and the reasons behind the low utilization of online assessment in carrying out different assessment techniques by faculty members in tertiary institutions in Enugu State.

## 1.1 | Research questions

1. What is the perception of computer educators on the utilization of online assessment for conducting quizzes/tests in tertiary institutions?
2. What is the perception of computer educators on the utilization of online assessment for conducting semester examinations in tertiary institutions?
3. What is the perception of computer educators on the utilization of online assessment for seminar/project assessment in tertiary institutions?

## 1.2 | Hypotheses

$H_{O1}$: Significant difference does not exist in the mean responses of male and female computer lecturers on the utilization of online assessment for conducting examinations in tertiary institutions in Enugu State.

$H_{O2}$: Significant difference does not exist in the mean responses of computer education lecturers in Universities and Colleges of Education on the utilization of online

assessment for conducting examinations in tertiary institutions in Enugu State.

## 1.3 | Literature review

### 1.3.1 | Overview of assessment in tertiary institutions

Tertiary institution according to the [104] refers to all postsecondary education, including both public and private universities, colleges, technical training institutes, and vocational schools. It is the third stage of post-secondary education following the completion of secondary school with the responsibility of training people in specific disciplines [30, 31]. Tertiary education prepares individuals by providing them with adequate and relevant job skills required to become active members of society through continuous assessment [22]. Therefore, assessment is a systemic process aimed at providing empirical data on tertiary institution students' learning which helps to refine learning programs and improve their academic outcomes or performance [52]. On the other hand, academic performance refers to what the student has learned or what skills the student has learned and is usually measured through assessments (especially the three major types of assessments) in the form of standardized tests, performance assessments, and portfolio assessments [80]. According to [12], academic performance or achievement is the extent to which a student, lecturer, or institution has attained their short or long-term educational goals. According to [24], academic performance or achievement should be measured in multiple manners and methods such as lecturers' observation, benchmark assessments, student portfolios, rubrics, progress monitoring tools, standardized assessments, and other assessment techniques.

Assessment in higher education is crucial in measuring the educational effectiveness and quality of learning offered by an institution. Assessments help different stakeholders, students, instructors/educators/lecturers, and administrators to answer various questions about student development, the value of specific courses, and the credibility of an institution [35]. However, [65] suggest five levels of assessments to be carried out in higher institutions which are: assessing individual student learning within courses, assessing individual student learning across courses, assessing courses, assessing programs, and assessing the institution. Assessment in higher institutions is usually conducted through continuous assessment, examinations, seminars, projects, etc. which mainly focus on the assessment of knowledge or skills gained by the student within a specific field [2, 38]. Having identified the need for assessment in tertiary institutions, students need to receive feedback from their lecturers at the beginning of the course, during the course, and at the end of the course/semester. Literature has shown that most assessment strategies used in higher education such as course assignments, serve as formative and summative assessment functions [39, 88]. According to [37], tertiary institutions around the world have adopted different assessment methods and processes as a part of their basic academic and administrative strategic planning to achieve, maintain and improve accreditation recognitions. This is currently one of the key factors that students consider while choosing where they intend to study. In view of this, these institutions have today incorporated technology in their assessment with a view to control and manage essential data, monitor assessment processes, and identify breaches and poor performances for immediate improvement.

### 1.3.2 | Impact of ICT on learning assessment

According to [37], by harnessing relevant ICTs, student experiences can be enhanced through better access to assessment information, a broader range of tasks, automated feedback, and student-to-student and student-to-lecturer or staff dialogue regarding individual or group support. Also, the Joint Information Systems Committee [44] also identified that many higher education institutions have defined the advantages of assessing academic and administrative performance through technological tools. [43] summarized the benefits of the use of ICT tools in assessment: greater variety and authenticity in the design of assessments, improved learner engagement, choice in the timing and location of assessments, capture of wider skills and attributes not easily accessed by other means, efficient submission, marking, moderation, and data storage processes. Furthermore, the use of web tools, such as blogs, forums, and wikis involving group work and collaborative activity, sometimes referred to as online instructional delivery can offer innovative opportunities for assessment tasks in tertiary institutions [43].

As society relies more on Information and Communication Technology, tertiary institution lecturers and students must be able to use technology for interactive learning, problem-solving, and application in their daily lives [68, 86] assert that ICT is now the primary basis for information retrieval, study materials, and curriculum enhancements; which are all components that contribute to student success [15]. Thus, as the world continues to promote, create, and support ICT integration, educational systems must continue to follow suit to keep

students aware of the latest innovations and technological tools that lead to student achievement. Globally, most institutions implementing traditional assessments in the form of high-stakes examinations are faced with various malpractices such as lecturers taking bribes and leak questions or invigilators favoring some students [71]. Other issues faced by traditional assessments include the heavy load on lecturers in terms of marking, organizing, and recording student scripts, the high cost of printing of examination papers, security issues, delays in providing feedback to the students, and so forth [6]. Therefore, integrating technology into assessment is perceived as an effective means of addressing the challenges influencing the effective implementation of traditional assessment in tertiary institutions [6].

Nevertheless, since the emergence of ICT in education, many technological tools and strategies have been incorporated [14] due to its positive impact on both academic achievement and motivation [29]. In view of this, studies by [82] found a significant relationship between ICT advancement in education and academic improvements. [45] noted that these advancements have had and will continue to have a significant impact on higher education worldwide. In light of the above, [9] asserted that if ICT is correctly used in learning, online learning environments can provide students and lecturers with richer, more immediate feedback which in turn will increase productivity and learning outcomes. For example, studies by [85] posit that online assessment tools can be used for diagnostic, formative, and summative purposes given the widespread implementation of LMS (Learning Management Systems) in higher education.

### 1.3.3 | Online assessment and online assessment tools

More recently, the education system has witnessed a shift from the conventional mode of assessment to the online mode of assessment [100]. The online assessment also called online examination is the process used to measure certain aspects of information for a set purpose where the assessment is delivered via a computer connected to a network [41]. According to [73], online assessment otherwise known as e-assessment is defined as the use of ICT facilities connected to the internet to support the iterative process of gathering and analyzing information about student learning by lecturers and evaluating it in relation to prior achievement and attainment of intended and unintended learning outcomes. Other studies, for example, [33] perceive online assessment as the presentation of formative assessment within learning online and blended situations where the lecturer and learners are detached by time, place, and/or space and where a considerable amount of learning/teaching events are led through web-based ICT tools.

[10] pointed out that the goal of merging these methods; formative assessment, online and blended situations to support learning that is transferable to changing environments that illustrate the essentials of the 21st century professional [33] opined that effective presentation of assessment in online learning environments might provide a state-of-the-art pedagogical approach to simplify such prospects. For example, [101] noted that the use of a computer to administer multiple-choice questions and another choice of examination during assessment has an encouraging influence on students' enactment. [44] identified that online assessment can be implemented following a mode referred to as a lifecycle: planning, authoring, preparing to deliver, delivering the assessment, managing the results, review, and evaluation leading to the next round of planning.

Online assessment has become widespread in recent times with the emergence of the computer-based test (CBT) in the early 2000s; some tertiary institutions today use online platforms or applications as their primary delivery modes [89]. According to [79], online assessment can have different forms such as automatic administrative procedures, digitizing paper-based systems, and online testing that includes multiple-choice tests and assessments of problem-solving skills. Online assessment supports educational goals, by supporting high-order thinking skills such as critiquing, and reflection on cognitive processes and facilitates group work projects [79]. Online assessment has the ability to sort questions which cannot be easily done using the paper and pen test. For example, software simulation helps to represent the information in a simple and fast way [3]. According to [56], there are many online assessment tools, software, and/or applications that allow instructors to assess learners using desktop computers, tablets, or smartphones connected to the internet. Some of these online assessment tools include Socrative, Formative, Kahoot, Quizzes, Google Forms, Poll Everywhere, and so forth. According to [105], Socrative remains a great online assessment tool for lecturers to use in the classroom. It is an online assessment tool with two distinct capabilities. One, it allows the creation of a preprepared quiz for students, and second, it allows some live quick questioning and easy provision of answers [105]. The preprepared quiz option permits the building of lecturers' own assessment with either multiple choices, true/false, or short-answer questions. [90] noted that Socrative is an interactive, real-time, and Web-based Student Response Systems (SRS) platform which enables lecturers to create quizzes and other educational

exercises that can help guide the focus of a particular lesson as well as general discussions with students.

Also, formative is another online assessment tool that offers lecturers a number of interesting ways to collect the data they need to better shape their instruction [105]. It is fast, easy, and works on all modern devices. It allows lecturers to create an assignment, assign it to students, watch the live results as they come in, and then provide instant feedback [16]. With the formative tool, all four types of assessment tests namely true/false, multiple choices, short answer, and show your work can be achieved. The show your work option available in the formative online assessment tool is perhaps the most interesting because it allows students the ability to draw their responses (or upload images). This is great for mathematics and/or science students who may want to draw formulas or chemical structures on mobile devices. Other interesting options of formative include: the ability to upload PDF, Word files, Google Docs, and so forth which can be used as the basis for assessment. It also offers the ability to grade those short answers or drawing questions with a few quick clicks and at the same time enables lecturers to view the student's progress in real-time via the lecturers' dashboard [33].

Similarly, Kahoot is another popular formative assessment tool for implementing e-assessment by lecturers in higher institutions. It is also a great opportunity for students to create their own quizzes to demonstrate the depth of their learning on the subject matter [23]. Literature has shown that Kahoot is a game-based student response system (GSRS) or gamification technique integrated into student response systems that make use of game principles and student response systems tools to support learning, engagement, motivation, and fun during the learning and assessment processes [58, 64, 74]. It is designed for the creation of interactive quizzes (on a computer, tablet, or smartphone) and to animate a course in a classroom. According to [51], Kahoot is an online assessment tool that helps lecturers to create an active, competitive, engaging, fun environment and relaxing atmosphere, which can help improve learners' performance as well.

Also, quizzes can be enhanced with images and videos, and the teacher is able to control the pace of play while students are awarded points for answering questions correctly, and the timeliness of correct responses also impacts the points awarded [57]. Kahoot like other GSRSs fosters motivation and engagement [67, 97] and improves classroom dynamics as the system provides students with real-time feedback on their performance, and to some extent adapts teaching activities based on students' responses to quizzes [74]. Students can grow in confidence by doing well on the quiz as well as by being recognized by their lecturers and peers using Kahoot [57].

Google Forms is a popular e-assessment tool for lecturers that work with Google Apps for education purposes and any lecturer with a public Google account has access to Google Forms [55]. The different question types that can be created on a Google Form include short and long free-form of answers, multiple choice, check-boxes, a drop-down list of answers, scale type of answers, selecting an answer from a rubric-style grid, and so forth. Besides, it gives lecturers the opportunity to add images and YouTube videos to their quizzes [105]. According to [70], Google Form is a very impactful classroom assessment tool through which the lecturers can send out a number of questions in a survey-like format and the student responses can then be compiled into a spread-sheet for analysis. [105] also noted that Google Forms are used in conjunction with a clever add-on called Flubaroo that performs auto-grading functionality with the ability to automatically email grades to students if required. According to [8], these whole processes of online assessment can be really efficient with online survey sites like Survey Monkey or Google Forms.

In addition to Google Form, Poll Everywhere may be used synchronously or asynchronously as students can provide their responses at any time they wish, and not be confined to a physical meeting place or time. This is to say that students can respond to polls even when they do not have a live Internet connection but to display the poll or view results in real-time, the presenter must have an internet connection [48, 81, 83]. According to [48], Poll Everywhere is a great tool in a variety of classrooms that encourages students to utilize their distracting technologies for a specific, learning-centric purpose and as well fosters formative assessment in the classroom in ways that are both engaging and enjoyable. Poll Everywhere connects students' current use of technology with instructors' needs for in-class assessment and feedback [81]. Accordingly, Poll Everywhere can be used as a formative assessment strategy that enhances and amplifies classroom discussion, participation, and understanding [81].

Above all, these online assessment tools provide effective support for utilizing e-assessment in tertiary institutions. Many studies (e.g., [33, 84] argued that the use of e-assessment tools is needed in tertiary institutions for effective monitoring of students' performance. Perhaps, this is necessitated owing to the increasing number of students in tertiary institutions which increases the demand for a fast and accurate method of assessment [99]. Given that most tertiary institutions today need a timely result mechanism to facilitate the appropriate selection of qualified applicants like university tertiary matriculation examination (UTME/PUTME),

effective use of online assessment tools is considered paramount [76]. Therefore, for online assessment tools to be effectively utilized in tertiary institutions, lecturers, administrators, and students should become familiar with these assessment tools. It is important that users have the basic knowledge, competencies, and skills required for the effective use of online assessment tools [59] in spite of the challenges influencing their utilization in higher education settings.

## 2 | METHOD

### 2.1 | Design of the study

This study adopted a mixed research design. According to [103], a mixed research design refers to an emergent methodology of research that advocates the systematic integration of quantitative and qualitative data within a single study. The design is considered suitable for this study because it enabled the researchers to elicit responses from computer educators on the utilization of online assessment in the evaluation of lessons using a structured questionnaire and guided interview so as to provide more adequate research results [46, 94].

### 2.2 | Participants

Purposive sampling was used to select 84 Computer educators comprising of 40 male and 44 female computer educators (Lecturers, Instructors, and Technologists) with relevant ICT experiences from four public tertiary institutions namely universities and Colleges of Education in Enugu State that offer computer science/education in their academic programs. These schools are the University of Nigeria Nsukka (UNN), Enugu State University of Science and Technology (ESUT), Enugu State College of Education Technical (ESCET), and Federal College of Education Eha-Amufu (FCEE). These schools have the basic ICT/e-learning resources to adapt online assessment in their teaching and evaluation processes. Therefore, the choice of the study area is very important considering the urgent need to change the teaching, learning, and assessment modes due to pedagogical changes emanating from the global school closure in 2020.

### 2.3 | Instrumentation

A structured questionnaire and in-depth interview were used to collect data on computer educators' perceptions of the utilization of online assessment in higher education. The structured questionnaire titled "Computer Educators' Perception of Online Assessment Utilization (CEPUOA)" was designed to obtain data on the usefulness, ease of use, and effects of the use of online assessment tools while the in-depth interview was used to gain a better understanding of the responses of the participants on the usefulness, ease of use, effect, and essence of online assessment tools, especially in terms of various assessment techniques that can be conducted online. CEPUOA is a 40-item questionnaire divided into three clusters in line with the three research questions that guided the study. The questionnaire was divided into two sections. Section 1 was for respondents' demographic data while Section 2 was subdivided into three clusters: A, B, and C. Cluster "A" is made up of 20 items to elicit information on the computer educators' view of the utilization of online assessment in conducting quizzes/tests. An example of an item in this cluster is "I enjoy using OATs in conducting class tests because of its convenience and ease of use." Cluster "B" is made up of 10-item statements to elicit information on computer educators' view of the utilization of online assessment in conducting semester examinations. An example of an item in cluster B is "My use of OATs in conducting examinations prepares my students to meet up with innovations in technology." While Cluster "C" is made up of 10 questionnaire items designed to elicit information on computer educators' view of the utilization of online assessment in conducting seminars. An example of an item in cluster C is "Using OATs to evaluate my students' seminar and project encourages them to think more critically and analytically." The instrument was designed based on a 4-point scale rating of strongly agree, agree, strongly disagree, and disagree with assigned weights of 1, 2, 3, and 4, respectively. On the other hand, the in-depth interview guide is an open-ended question that further probed the opinions and suggestions of the respondents about the unresolved answers and controversy if any that the questionnaire items could not address. The Cronbach $\alpha$ method was used to determine the internal consistency of the items of the instrument and the reliability coefficient was .9 showing that the reliability level of the instruments was consistent.

### 2.4 | Data collection procedure and analysis

The authors obtained approval from the Department of Computer & Robotics, Faculty of Vocational and Technical Education Research Ethics Committee,

University of Nigeria, Nsukka. Also, participants' consent was obtained before the collection of data. To ensure the timely collection of data, four research assistants were engaged in the collection of data. Furthermore, the research assistants obtained approval from the school Principals before the distribution of the questionnaire to the respondents. Thereafter, the participants were requested to fill out the questionnaire on the spot. However, for those who could not complete theirs on the spot, the research assistants returned 2 days later to retrieve them. Both the distribution and response of the structured questionnaire and the in-depth interview were carried out sequentially to avoid bias in the responses. The interview responses were properly recorded and analyzed descriptively. Mean and standard deviation was used to analyze the research questions while a *t*-test was used to analyze the hypotheses.

## 3 | RESULTS AND FINDINGS

Data presented in Table 1 shows the mean and standard deviation of computer educators' views on the utilization of online assessment tools in conducting quizzes/tests. The cluster grand mean of 3.18 indicates that the majority of the respondents strongly agreed with the utilization of online assessment in conducting quizzes and school tests. Therefore, the results showed a positive perception of computer lecturers on the utilization of online assessment tools for conducting quizzes/tests in tertiary institutions. From the guided interview session, these participants' statements demonstrated a positive perception of online assessment in conducting tests/quizzes during teaching and learning activities:

**Interviewee 1**: *My view is that using online assessment tools is good and helpful to both lecturers and students. As a matter of fact, I have used a lot of them like*

**TABLE 1** Mean and standard deviation of responses of computer educators' perception of online assessment utilization in conducting quizzes/tests.

| S/N | Item statement | $\bar{x}$ | SD | Rem |
|---|---|---|---|---|
| 1 | The use of online assessment tools (OATs) for administering quizzes/tests is easier than pen-paper method. | 3.59 | 0.49 | A |
| 2 | The use of OATs in administering quizzes to my students is very convenient. | 3.78 | 0.41 | A |
| 3 | The use of OATs helps me in guiding my students with moderate and continual efforts. | 3.28 | 0.45 | A |
| 4 | My use of OATs provides me with a clearer and easier online interface for quizzes. | 3.69 | 0.51 | A |
| 5 | I discover that OATs can lead to laziness with some of my students taking quizzes at their home. | 2.16 | 0.82 | D |
| 6 | My use of OATs makes it easier for me to monitor my student's performance in real time. | 3.71 | 0.45 | A |
| 7 | The use of OATs provides my students with immediate feedback to immediately correct their mistakes. | 3.83 | 0.37 | A |
| 8 | I noticed that my use of OATs can breed lack of self-discipline among my students. | 2.07 | 0.80 | D |
| 9 | My use of OATs arouses both my interest and that of my students for quiz taking. | 3.38 | 0.49 | A |
| 10 | The use of OATs helps to reduce interruptions that come from my students when taking quizzes. | 3.26 | 0.54 | A |
| 11 | I enjoy using OATs in conducting class tests because of its convenience and ease of use. | 3.48 | 0.51 | A |
| 12 | The use of OATs helps me to better understand my students' growth and improvements in the course. | 3.23 | 0.57 | A |
| 13 | I often use OATs to better determine my students' qualifications based on set criteria. | 3.17 | 0.48 | A |
| 14 | My use of OATs makes my students feel better and more relaxed during test taking. | 3.48 | 0.59 | A |
| 15 | I sometimes use OATs to improve the academic achievement of my students. | 3.12 | 0.67 | A |
| 16 | My use of OATs better assesses my students at ranges of cognitive, affective, and psychomotor levels. | 3.45 | 0.55 | A |
| 17 | My use of OATs helps me to effectively assess my students of the acquired knowledge and skills required in this digital age. | 3.76 | 0.43 | A |
| 18 | My use of OATs encourages academic engagement among my students. | 3.48 | 0.55 | A |
| 19 | I use OATs to maintain transparency and consistency during test-taking. | 3.79 | 0.42 | A |
| 20 | I always use OATs in administering quizzes/tests because they help me to analyze my students' performances rather than paper-and-pen. | 3.59 | 0.49 | A |
| | Grand mean | 3.18 | 0.49 | A |

Abbreviations: $\bar{X}$, mean; A, Agree; D, Disagree; Dec, Decision; SD, Standard Deviation.

*Google Form, Kahoot, and Poll-everywhere among others to conduct assessments.*

**Interviewee 2**: *I see the use of online assessment in conducting quizzes or tests as something worthwhile. From my own experience, using these online assessment tools in administering quizzes makes it easier for me and I see that my students attend to test questions with ease. Most of my students also participate fully in the quiz without fear.*

**Interviewee 3**: *I support the use of online assessment tools in carrying out tests or quizzes because of the current issue of the Covid-19 pandemic. With the use of online assessment tools, students can be assessed from home provided the lecturers have access to technology and a suitable online assessment platform.*

**Interviewee 4**: *I perceive that the use of online assessment tools will help reduce malpractices because questions are timed. Also, the automatic grading aspect of it reduces stress and workload for lecturers.*

**Interviewee 5**: *Using online assessment tools in administering tests or quizzes in tertiary institutions is very good because it improves independence and self-discipline in students.*

**Interviewee 6**: *I see using online assessment tools in conducting tests/quizzes as what we should build on because it's something that can help us as lecturers to effectively carry out our duties without much stress and heavy loads.*

**Interviewee 7**: *I perceive the use of online assessment tools in administering quizzes as something worthwhile. From my own experience, I see that the use of online assessment tools in our institutions helps to build self-reliance in the students and promotes independent work during quiz taking. Also, the provision of the immediate feedback aspect relieves lecturers of the workload of pen and paper marking.*

**Interviewee 8**: *It's no news that we are in a digital era and everything is moving online. Using online assessment tools makes quiz-taking faster and easier. Also, it also lifts off a load of marking students' scripts from the lecturer's shoulder.*

From these responses above, all the interviewees have a positive perception of the use of online assessment tools in administering tests or quizzes in tertiary institutions. These positive views of interviewees further corroborate the quantitative result which shows the positive perception of computer educators on online assessment utilization as shown in Table 1.

Furthermore, Table 2 shows the mean of responses and standard deviations of computer educators on the utilization of online assessment in conducting semester examinations. The result shows that all the items were agreed to by the lecturers as indicated in the mean of the items which ranged from 3.19 to 3.88. Thus, it can be inferred that computer educators share similar views of the use of online assessment in terms of usefulness, ease of use, and its effects in conducting semester examinations. The in-debt interview conducted emphasized that the utilization of online assessment provides lecturers

**TABLE 2** Mean and standard deviation responses of computer educators on the utilization of online assessment in conducting examinations.

| S/N | Item statement | $\bar{x}$ | SD | Rem. |
|---|---|---|---|---|
| 1 | I use OATs for administering semester examinations to provide immediate feedback to my students. | 3.33 | 0.53 | A |
| 2 | My use of OATs provides me with an easier platform to monitor the overall class progress of my students. | 3.57 | 0.50 | A |
| 3 | My use of OATs serves as a more reflective tool to validate my students' learning in this technological era. | 3.71 | 0.46 | A |
| 4 | I use OAT to strengthen my students' involvement in academic activities. | 3.42 | 0.59 | A |
| 5 | I use OATs to effectively evaluate my students' competencies. | 3.28 | 0.46 | A |
| 6 | I see the use of OATs as better platform for understanding the growth and improvements in my students' performances. | 3.19 | 0.51 | A |
| 7 | My use of OATs in conducting examinations prepares my students to meet up with innovations in technology. | 3.88 | 0.33 | A |
| 8 | I use OATs in conducting semester exams because they better make my students competent in the globalized world. | 3.90 | 0.29 | A |
| 9 | My use of OATs better determines my students' progress and demonstrates their understanding of the curriculum. | 3.28 | 0.51 | A |
| 10 | I support that use of OATs made compulsory for taking different examinations in tertiary institutions for all the courses. | 3.55 | 0.50 | A |
| | Grand mean | 3.51 | 0.44 | A |

Abbreviations: $\bar{X}$, mean; A, Agree; D, Disagree; Dec, Decision; SD, Standard Deviation.

with innovative tools and relevant ICT skills that students and lecturers can leverage to develop skills for future employment and growth. From the guided interview, the following statements of the participants indicated their positive views of using online assessment in conducting semester examinations:

***Interviewee 1***: *I cannot categorically say if it should be used for every examination because there are institutional policies guiding our work; hence we work in accordance with their laid down rules and regulations which may make it difficult for us to make individual choices. I said this because I don't think that the university would approve of conducting the whole examinations (both semester and final year exams) using an online platform until when it is fully adopted and prepared for. Therefore, the various online tools at this stage can only be used in carrying out assessments like tests, quizzes, assignments, and a few departmental examinations. Moreover, I don't see using these online assessment tools in conducting exams that require the students to perform practical and manipulative tools while the lecturer observes and rates their manipulative skills, competencies, etc. as a good approach. The various online assessment tools can easily be used to assess cognitive and affective domains of knowledge but it could be hard when it comes to assessing students' psychomotor domain except the students are to be engaged in using a platform like zoom or any other online assessment tool that captures students on cameras, permits for video, audio, and virtual background.*

***Interviewee 2***: *Sincerely, I welcome the idea of conducting examinations in tertiary institutions using online assessment tools. I see that it makes the grading of students easier since marking is automatically done by the system which helps lecturers to meet their deadline for result submission. Also, the students can easily see their performance without bothering or shifting blame for their success or failure to the lecturer.*

***Interviewee 3***: *Adopting this innovation would help to prepare the students to successfully fit into the global world and acquire good jobs after graduation, especially in a situation whereby most job interviews are done using online platforms. I believe that integrating online assessment tools in examinations in tertiary institutions would get the students well acquainted with the tenets and skills for using the tools.*

***Interviewee 4***: *I am of the opinion that various online assessment tools should be introduced and used in writing both semester and every form of examination in tertiary institutions because when students get conversant with the tools, they can easily secure a job after graduation. I said this because these days, most employers no longer engage their interviewees in pen-and-paper interviews and the world is going global.*

***Interviewee 5***: *Not focusing only on the challenges, I see that the use of online tools in conducting exams grants proper monitoring of students' activities through webcams and helps in reducing/curbing examination negativities and malpractices. Again, online assessment tools can help students to think critically and as well build their self-confidence.*

***Interviewee 6***: *If only examinations could be adequately monitored using something like a camera to reduce misconduct and unnecessary interferences, the use of online assessment tools will be a better option. The fact that every question in online assessment is timed makes it faster and more focused for the students.*

***Interviewee 7***: *It's true that examination is not a true test of knowledge but it helps to a greater extent to know the ability of a student. I perceive that when online assessment tools are used, examinations can be more credible and faster.*

***Interviewee 8***: *I see the use of online assessment tools in conducting examinations as something good and an approach that will help curb examination malpractices. It can also help lecturers to cover a vast area of course content while teaching and assessing students.*

The above interview analysis showed that lecturers were of the opinion that online assessment is a more credible platform for conducting semester examinations in tertiary institutions with a view to curbing malpractices, and delay in result submission as well as acquainting the students with current trends in ICT and world or work. Their views were in line with the items in Table 2 which agreed to the use of online assessment tools in tertiary institutions. Some of the views of the interviewees on conducting examinations in tertiary institutions using online assessment tools stemmed from the fact that most job interviews undergone by tertiary institution graduates today are mainly done online. Therefore, it is required that students are better prepared and get acquainted with the use of these online assessment tools while still in school to enable them to thrive in a knowledge-based based economy.

Also, Table 3 shows the mean of responses and standard deviations of computer education lecturers on the utilization of online assessment tools for conducting seminar/project assessment in tertiary institutions. The result reveals that the computer education lecturers agreed to the entire item with mean range of 2.97 to 3.69 except for item 9 which has the mean value of 2.23 which is less than the cut-off point of 2.50. Therefore, the result indicated that the lecturers agreed that students' seminar/project can be effectively evaluated using online assessment tools. Furthermore, the in-debt interview session conducted shows that the participants emphasized that support and willingness in the use of online

**TABLE 3** Mean and standard deviation responses of computer educators on the utilization of online assessment in conducting seminar and presentation.

| S/N | Item statement | $\bar{x}$ | SD | Rem. |
|---|---|---|---|---|
| 1 | I use OATs for seminar/project evaluation to encourage a better collaboration of my students with their peers, teachers, and the larger/global world community. | 3.09 | 0.69 | A |
| 2 | Using OATs to evaluate my students' seminars and projects encourages them to think more critically and analytically. | 3.62 | 0.49 | A |
| 3 | I use OATs to make seminars/projects more collaborative than competitive for my students. | 3.33 | 0.53 | A |
| 4 | I use OATs to keep my students up-to-date with the current issues in the field of discussion. | 3.64 | 0.48 | A |
| 5 | I use OATs to help my students develop the skills, behaviors, and confidence necessary for success in the 21st-century. | 3.69 | 0.47 | A |
| 6 | I use OATs to help my student think beyond the boundaries of the classroom. | 3.38 | 0.69 | A |
| 7 | My use of OATs in seminar/project evaluation can be more engaging than face-to-face seminar interaction. | 2.97 | 0.64 | A |
| 8 | I use OATs to better improve my students' communication and presentation skills. | 3.36 | 0.65 | A |
| 9 | I discovered that my use of OATs does not permit verbal discussion of my students' seminar/project work. | 2.23 | 0.69 | D |
| 10 | My use of OATs helps me to reduce panicking in my students during seminar/project presentation | 3.17 | 0.49 | A |
| | Grand mean | 3.29 | 0.52 | A |

assessment in assessing project and seminar presentations based on the following positive statements:

**Interviewee 1**: *Conducting seminar/project using online assessment tools is a good idea. Using online tools in assessing student during seminars will help to reduce cost and helps students to present their work from any location they may be without compulsorily converging at the classroom. It will also train the students on how to connect to the global world using virtual tools.*

**Interviewee 2**: *It may be difficult because even in physical presentation of seminar or project some students find it very difficult noting or grabbing the corrections given to them.*

**Interviewee 3**: *Conducting seminars/project in tertiary institutions using online assessment tools is good because it saves everybody the economy, huddles and stress of coming together to present and correct students' work.*

**Interviewee 4**: *I don't perceive the use of online assessment tools in conducting seminar and project as a good thing. In my own understanding, seminar and project are academic exercises where students are expected to defend what they have actually done. Here, it is expected that there should be an interaction between students and their examiners during the presentation which I don't see the possibility when using online assessment tools.*

**Interviewee 5**: *Using online assessment tools in conducting seminar and project is good to a great extent. It's just like using Zoom in hosting a meeting. Like in my department, external examination of students' project has been done this year using Zoom in view of the Covid-19 social distancing protocol.*

**Interviewee 6**: *With the use of online assessment tools in conducting seminar and project, students will be exposed to the use of sophisticated devices that can be used in carrying out such tasks. It will as well make the students to explore new knowledge, new skills and widens their understanding of the larger world. At this point, the students would see that they have more to learn in this digital age and this will make them to sit up academically.*

**Interviewee 7**: *I think the use of the online assessment tools would help in exposing the students to the global world and make them more organized.*

**Interviewee 8**: *My view is that using online assessment tools in conducting seminar is also good especially when it has to do with timing the students.*

The opinion of majority of lecturers interviewed supported the use of online assessment tools in conducting seminar and project presentation. These views confirmed that the use of online assessment tools for conducting seminar and project presentations helps in exposing students to the global and digital world. Although, few computer education lecturers do not support it because they think that using online assessment tools may not allow students to express themselves very well during the presentation. However, judging from the responses of the greater number of computer education lecturers, the use of online assessment tools in conducting project evaluation was positively supported which is in line with the result of Table 3.

Also, Table 4 shows the *t*-test analysis of computer educators' perception of the utilization of online assessment in conducting examinations in higher education

with respect to gender and institutional type. Data presented in Table 4 revealed that no significant gender difference exists for all 10 items $M(3.03,\ 1.24) = t(18.42,\ p = .14)$. Therefore, the hypothesis of no significant difference was upheld for all 10 items of the cluster. Also, Table 4 showed the *t*-test analysis of the responses of computer educators' perception of online assessment utilization in conducting examinations in higher education with respect to institutional type. The result showed that the $p > .05$ level of significance $M(3.32,\ 1.42) = t(18.44,\ p = .08)$. Therefore, the hypothesis of no significant difference between universities and colleges of education was upheld for all the 10 items.

## 4 | DISCUSSION

The findings of this study showed that computer educators have a positive perception of online assessment utilization in conducting tests and quizzes in tertiary institutions. This positive disposition is perhaps based on its effectiveness as an innovative ICT tool compared to the pen-and-paper method of conducting tests and quizzes. This finding is in support of the findings of [27, 95, 98] who viewed that online assessment through automatic grading makes correction of students easier and provides them with immediate feedback which could help them make possible but timely adjustments. As there were different views on the level of student's knowledge and skills that could be assessed using online assessment tools, this study indicates that those tools can assess students ranging from cognitive, and affective to psychomotor levels. It also shows that different knowledge and skills required in this digital age can be better and effectively assessed using online assessment tools. Furthermore, the findings of this study from the qualitative analysis revealed that transparency and consistency, ease of monitoring students in real-time, and analyzing of their performances while conducting quizzes are better maintained and achieved using online assessment tools. Also, the responses from the interviewees further showed that the use of online assessment tools helps students to acquire the knowledge and skills required in this digital age. Hence, it shed more light on the use of online assessment as an assistive tool for overcoming the disruptions in academic activities caused by the Covid-19 pandemic.

Similarly, the findings shown in Table 3 revealed that computer educators have a positive perception of the use of online assessment in conducting examinations. In view of this, the use of online assessment tools in conducting examinations in tertiary institutions is seen to be generally agreed as an indispensable approach that fills the gap between fully online learning and face-to-face learning. This assertion further corroborates the result obtained from the questionnaire and interview responses of computer educators that online assessment prepares students to keep abreast of current technological innovations and makes them competent in using online assessment tools in today's globalized world. Additionally, the result of hypotheses 1 and 2 showed no significant difference in the mean responses of participants on the use of online assessment in conducting examinations with respect to gender and institutional types. This finding supports [87] study who posits that there is a need for identifying a model of learning and assessment in higher education typical of synchronous online assessment that meets the challenges of the digital natives towards preparing them for an uncertain future as well as granting them the opportunity to be able to lead and work effectively with others in this increasingly interconnected world.

As presented in Table 3, the findings revealed that computer educators agreed to the use of online assessment in conducting seminars and project assessments in tertiary institutions. From their views, it was found that the use of online assessment in assessing students' seminar and project works encourages them to think more critically and analytically, improves their communication and presentation skills as well as helps to reduce stage fright associated with face-to-face presentation. As deduced from the qualitative analysis, the majority of respondents agreed that conducting seminars and project works through synchronous online assessment mode is a

**TABLE 4** Summary of the *t*-test analysis of computer lecturers on their perception of utilization of online assessment in conducting examinations with respect to gender and institutional type.

| Hypotheses | Group | *N* | $\overline{X}$ | SD | Sig. | *t* | *df* | Sig. (two-tailed) | Rem |
|---|---|---|---|---|---|---|---|---|---|
| $H_{O1}$ | Male | 40 | 3.03 | 0.46 | | | | | |
| | Female | 44 | 1.24 | 0.48 | 0.14 | 18.42 | 83 | 0.14 | NS |
| $H_{O2}$ | Universities Lecturers | 49 | 3.32 | 0.31 | 0.08 | 18.44 | 83 | 0.08 | NS |
| | Colleges of Education Lecturers | 35 | 1.42 | 0.05 | | | | | |

Abbreviations: $\overline{X}$,mean, *df*, degree of freedom; SD, standard deviation; *Sig*, Significance.

good way of reducing the cost, distraction, and stress associated with traveling to a physical location. This view is therefore in line with the study of [7] who recommends the use of online assessment tools like Zoom and MS Team during seminar presentations given the restrictions imposed by the Covid-19 pandemic.

## 5 | IMPLICATIONS OF FINDINGS

The findings of this study have several practical implications not only for the lecturers in public tertiary institutions but also for students and education commissions like the National University Commission (NUC), National Commission for Colleges of Education (NCCE), and National Board for Technical Education (NBTE). The findings of the study revealed that computer educators have a positive perception of the use of online assessment in conducting various assessment techniques such as tests/quizzes, assignments, and examinations in tertiary institutions. The implication of this is that computer educators' inability to demonstrate willingness and preparedness to use online assessment tools in their day-to-day teaching and learning processes will not spur other teaching staff from embracing online assessment tools and making the best use of its facilities for better assessment of students in tertiary institutions. Furthermore, the findings of this study have serious practical implications for teaching and learning in the covid-19 era as it provides a formidable option for addressing the challenges imposed by covid-19 restrictions since online assessment reduces physical contact between students and teachers.

Also, the findings of this study have another implication for students learning given that the result shows that the use of online resources in assessment keeps students up-to-date with the current issues in the field of discussion, connects them to the larger world, and helps to reduce some challenges and delays associated with traditional assessment such as exam malpractice, delay in marking and grading as well as missing scripts. For these reasons, educational stakeholders, administrators, the government, and private organizations are enjoined to strive towards ensuring the effective utilization of online assessment tools in tertiary institutions.

Lastly, the findings of this study have implications for curriculum planners whose responsibility is to develop an appropriate curriculum that will make provision for the adoption and utilization of online assessment for implementing various assessment techniques. This is because having found that online assessment tools are very effective and efficient in assessing students, especially for future benefits, there is a need for computer educators and all the lecturers in tertiary institutions to adopt these online assessment tools in their day-to-day assessment of students' learning outcomes.

## 6 | LIMITATIONS OF THE STUDY

One of the limitations of this study is the noninclusion of students in the data collection process given that both students and teachers is seen to be involved in the use of online assessment platforms. Thus, not including students in this study to gauge their perception of online assessment utilized in tertiary education in terms of ease of use, timing, ICT skills possessed, challenges encountered, etc. is considered a limiting factor to the generalization of the findings. Another setback considered important to the generalization of this study is the sample size which is small because of the relatively few public tertiary institutions offering computer-related programs in the study area. Therefore, we recommend that future studies should consider widening the scope and sample of the study so as to collect robust data on computer educators and students perception of online assessment utilization in the covid-19 era.

## 7 | CONCLUSION

The disruption in learning caused by the Covid-19 pandemic and the subsequent closure of schools in Nigeria and beyond in 2020, education was moved to students' homes facilitated through online learning. The implication of this sudden online learning mode is that many countries, particularly Nigeria, faced the challenges of teachers' unpreparedness in the use of digital technology and inadequate infrastructure to implement online learning. In view of this, the study sought to gauge lecturers' perception of the use of online assessment in conducting lesson evaluations such as quizzes, tests, semester examinations, and project and seminar presentations given that these teaching and learning activities continued in the face of the Covid-19 lockdown. The study concludes that computer educators have a positive disposition and willingness towards the utilization of online assessment tools in conducting tests, examinations, and project defense in tertiary institutions. Hence, online assessment of students' learning was perceived as an effective and convenient means of implementing various assessment techniques while observing the social and physical distancing requirement of Covid-19 protocols. Lastly, given that these online assessment tools can

be effectively used to assess a wide range of students' abilities ranging from cognitive, and affective to psychomotor levels, computer educators' preparedness in using these online assessment tools is imperative to achieving continuous teaching and learning capable of overcoming any disruption in learning.

## 8 | POLICY RECOMMENDATIONS

Based on the findings of the study, the following recommendations were highlighted:

1. Effective and persistent use of online learning requires institutional policy to function hence higher institution administration should initiate workable policies that will encourage widespread adoption of online assessment by lecturers' in the pre and post covid-19 era.
2. There is a need for periodical workshops, seminars, and webinars on digital technology to help retrain lecturers on relevant ICT skills required for the effective utilization of online assessment tools in higher institutions.
3. The federal government of Nigeria through the ministry of education and other donor agencies should assist in providing adequate infrastructures and online learning resources such as the internet, portal, computers, uninterrupted power supply, etc. required to implement online assessment in tertiary institutions in Nigeria.

## AUTHOR CONTRIBUTIONS

All the authors made substantial contributions to conceptualization of the study, literature review, and research design. Chekwube Blessing Eloanyi carried out data collection and collation, Olelewe Chijioke Jonathan performed data analysis and Shaohua Lu did the initial editing and proofreading of the manuscript while all authors read and approval the final manuscript.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

All data collected and analyzed for this study are included in this article. On request at chijioke.olelewe@unn.edu.ng.

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