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# Formative and Summative Assessment Using Technology: A Critical Review

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***ABSTRAK***

*Penggunaan teknologi di kelas telah merevolusi proses pengajaran dengan memberikan lebih banyak kebebasan dan kesempatan kepada pendidik untuk membedakan pengajaran. Tujuan dari penelitian ini adalah untuk menilai secara kritis berbagai pendekatan teknologi yang dipilih secara khusus karena kesesuaiannya dan kemampuan untuk meningkatkan penilaian yang ada untuk praktik pembelajaran. Sudut pandang yang mendasarinya adalah (a) evaluasi sumatif dan formatif merupakan peluang pembelajaran yang penting, dan (b) pemanfaatan teknologi dapat meningkatkan pembelajaran melalui proses evaluasi dan umpan balik. Metode penelitian menggunakan Systematic Literature Review (SLR). Pencarian literatur dilakukan melalui database akademik, seperti PubMed, ERIC, dan Google Scholar. Manfaat dan kerugian penggunaan teknologi dievaluasi menggunakan penelitian dari studi penelitian melalui literatur. Dikatakan bahwa penggunaan berbagai bentuk teknologi dapat membantu memfasilitasi penilaian pembelajaran dan umpan balik yang efisien di pendidikan tinggi dengan mengadopsi strategi yang fleksibel dan mengambil langkah-langkah kecil yang bertahap. Dalam lingkungan pembelajaran yang mendukung, dimana pendekatan staf-siswa dapat sangat membantu, kepercayaan antara siswa dan staf dapat membantu keberhasilan metode inovatif.*

**ABSTRACT**

The use of technology in the classroom has revolutionized the teaching process by giving educators more freedom and opportunities to differentiate instruction. The purpose of this research is to critically assess a variety of technological approaches that were particularly chosen for their compatibility with and ability to improve on existing assessment for learning practices. The underlying viewpoints are that (a) summative and formative evaluations are both important learning opportunities, and (b) utilizing technology can improve learning throughout evaluation and feedback processes. The research method uses Systematic Literature Review (SLR). A literature search was conducted through academic databases, such as PubMed, ERIC, and Google Scholar. The benefits and downsides of employing technology are evaluated using research from a research study through literature. It is said that the usage of various forms of technology can aid in the facilitation of efficient assessment for learning and feedback in higher education by adopting a flexible strategy and taking tiny incremental steps. In a supportive learning environment, where a staff-student approach can be particularly helpful, trust between students and staff can help innovative methods succeed.

## 1. INTRODUCTION

The use of technology in the classroom has revolutionized the teaching process by giving educators more freedom and opportunities to differentiate instruction. Teachers now have the ability to alter their teaching landscape both inside and outside of the classroom thanks to the endless supply of new technologies (Ghavifekr et al., 2014; Ghavifekr & Rosdy, 2015; Li, 2021). Teachers are being asked to look for new ways to make use of the plethora of technology tools as traditional educational models are being transformed by technology. The use of technology as a formative assessment tool is one instructional area that has been affected by the rise of technology (Fatimah & Santiana, 2017; Imam et al., 2018). Teachers frequently make use of platforms like Kahoot and Google Forms to assess students' content knowledge and solicit feedback from them. A lot of research has been done to show that educational technology is a better formative assessment tool than paper-based and web-based formative assessment tools because of how quickly technology changes (Charlina & Septyanti, 2019; Hidayat et al., 2023). According to previous study

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technology has made it much easier to give and grade assessments for feedback (Gikandi & Morrow, 2016). This has resulted in learning gains and increased student motivation.

In higher education, summative assessment methods like exams, projects, and final papers get the majority of the attention from instructors. Technology assessment tools can be used to provide valuable formative feedback to instructors and students, even though college instructors have less time with students than elementary or secondary teachers, and they may help students better prepare for summative assessments (Faqih & Jaradat, 2015; Grimes & Warschauer, 2010). According to other study many of the available technologies make it simple for teachers to administer weekly assessments to ascertain whether students comprehend the material being taught (Jahnke & Liebscher, 2020; Yazon et al., 2019). Additionally, many formative assessments enable teachers to provide students with immediate feedback in order to track student performance and increase student engagement in the college classroom. More specifically, educational technology assessments are interactive, offer students immediate feedback on their comprehension, and provide them with a fun and interactive learning environment (Dishon & Gilead, 2020; Gubbels et al., 2020). Educational assessment technologies are constantly being developed for classroom use, as is the case with all technology, and it is necessary to investigate the various effects of technology assessment tools in a variety of classroom settings (Liaw & Huang, 2013; Shakir, 2021).

As a result, the objective of this study was to analyze the differences between a number of different educational technologies, as well as the preferences of teachers and students regarding these technologies. The novelty of this study specifically provides an overview of the latest technology used in providing assessments. It was also hoped that this study would reveal whether or not formative technology assessments have an effect on students' scores on summative assessments.

## 2. METHOD

The research method uses Systematic Literature Review (SLR) is a research method used to collect, review and synthesize relevant literature in a particular research field (Manfra, 2019). This method has systematic steps designed to minimize research bias and ensure that all relevant literature has been examined. This approach is particularly useful for investigating the potential of education in Nigeria's industry 4.0 era: overcoming challenges of digital transformation. The data collection process is carried out by identifying and evaluating scientific articles that are relevant to the topic. This data includes findings, research results, and other related information contained in these articles. A literature search was conducted through academic databases, such as PubMed, ERIC, and Google Scholar, using appropriate keywords such as “Formative assessment”, “Summative Assessment”. After identifying relevant articles, the data analysis process began by thoroughly reading each selected article. Relevant data such as findings of positive or negative impacts of school-university partnerships and professional learning communities were extracted. Next, this data is analyzed to identify patterns, trends, and consistencies in the findings. Compiling a summary and synthesis of the findings helps in understanding the overall impact. The analysis also allows identification of potential of education in Nigeria's industry 4.0 era: overcoming challenges of digital transformation. The results of this analysis form the basis for drawing up the conclusions in the SLR report, which presents a comprehensive picture of the impact of the partnership based on existing evidence in the literature.

## 3. RESULT AND DISCUSSION

### Result

Acceptance and demand for digital learning tools have increased as more schools have implemented one-to-one digital device instruction and improved their digital infrastructure. According to previous study the majority of teachers and students are supportive of the use of technology in the classroom and its integration, and numerous technology tools are available for instruction and assessment (Kilis & Yildirim, 2019; Machay et al., 2022). Web-based tutoring systems like MathLab are among these technology tools and assessments based on games like Kahoot! The learner benefits and suffers in different ways from these various forms of technology. The use of technology in the classroom has been shown to increase student engagement and may further develop understudy student results (Miller, 2018; Schunk & DiBenedetto, 2020). However, other study have also noted that technological issues in classroom technology may overwhelm and frustrate college students (Lampropoulos et al., 2019). According to other study different systems and user preferences cause differences (Elshami et al., 2021).

***Importance of Technology for Formative Assessment***

The utilization of technology in the classroom facilitates streamlined assessment and provides teachers and students with immediate feedback. Students and educators can use this immediate feedback to check for comprehension, identify concepts that require additional study, and prepare for summative assessments (Motlhaka, 2020; Nair et al., 2022). According to previous study the teaching environment shifts and students are given the opportunity to discuss what they have learned during the lesson, resulting in a more student-centered atmosphere (Miller, 2018). Insightful Mentoring Frameworks (ITSs) have exhibited the advantages of expanding understudy commitment and learning through web-based developmental appraisal games, and these games may likewise prompt expanded critical thinking abilities (Keinänen et al., 2023; Sanchez et al., 2023). In addition, it has been claimed that mobile learning and technological assessment tools can effectively engage students' behaviors in higher education. The number of required assessments is also rising in tandem with the rapid enrollment growth (Malmquist & Collins, 2016; Tise et al., 2023). Teachers would have less time to grade papers and plan lessons, and they would have more time to spend with friends and family.

***Using Technology in Summative Assessment and Feedback***

A flexible "trial and error" approach to capturing technology's most useful tools for teaching and learning is advantageous due to the fact that technology is changing at an increasingly rapid rate. A "multi-modal approach" is a useful principle, employing a variety of assessment and feedback techniques with a variety of technologies (Lin et al., 2021; Zhao et al., 2019). Technology is useful for both giving feedback and conducting assessments. Audio-visual technology, for instance, can make feedback information more personal and improve its quality. According to previous study staff and students with hearing or visual impairments may also encounter issues with audio-visual technology (Fearnley & Amora, 2020; Ibrahim et al., 2018). In addition, staff members spend a lot of time learning how to use new technology, but paradoxically, technology can ultimately save time in the long run. There were only a few empirical studies on how to use technology to improve assessment and feedback up until recently, but interest in this area is growing quickly.

***Feedback on Assessment for Learning***

Effective feedback is required for learning assessment in order to assist and direct students in improving their work. Effective feedback remains a multifaceted and complicated issue despite the existence of guiding principles (Elmahdi et al., 2018; Vartiainen et al., 2016). Students must have opportunities to correct misunderstandings, enhance their skills, and modify their assessment approach. According to previous study effective feedback is predicated on the presumptions that it is understandable, meaningful, timely, and acted upon (Riddell, 2015). However, if feedback is returned too late for students to improve their performance on the subsequent assessment, it becomes redundant. Guidance on how to improve future work is required in order to act on feedback, which is also known as feed-forward. Mutual understanding of academic literacies is required, which necessitates productive dialogue between staff and students, for this to be successful and long-lasting. Students may be assumed to understand their feedback by staff; However, it's possible for students to misunderstand what feedback means. Dissatisfaction and the loss of learning opportunities are possible outcomes of this miscommunication. It is argued that academic literacies should be integrated into classroom instruction to address this issue (Basyoni et al., 2020). Academic literacies are the knowledge and comprehension of assessment-feedback discourse as well as subject-specific discourse. Using technology to give feedback can significantly speed up the process, make feedback communication clearer, and make staff and students feel like they are getting individual attention and care (Hwang et al., 2022; Vrancken et al., 2021).

***Educational Technology in Higher Education***

Technology for formative assessments aids in student learning and teacher instruction. When it comes to dynamic formative assessment, digital tools are ideal. Digital tools allow for the capture, storage, and analysis of students' interactions with online learning tasks for learning behavior patterns and requirements (Fatimah & Santiana, 2017; Sefriani & Sepriana, 2022). Additionally, the constant idea of information catch and revealing with advanced devices offers instructors opportune updates. Previous study believes that teachers can save time by not having to manually grade quizzes or assignments with technology-based tools (Wu et al., 2022). Digital tools can make real-time adjustments to students' learning paths by analyzing student activity and responding to it with more or less challenging tasks based on where the student is. This allows learning goals and content to be tailored to each child. Waggle, a digital tool designed for efficient formative assessment, is available from HMH.

Teachers can now assess students in a variety of ways thanks to technology, which has also broadened the scope of classroom assessments. Moodle and other Learning Management Systems (LMSs) provide students with a variety of content, quizzes, and assignments, but because they require students to pace themselves, these technologies may encourage procrastination (Dias et al., 2020; Hasan et al., 2019). When it comes to in-class assignments, students now complete live quizzes via Kahoot, Quizlet, Menti, or Socrative rather than filling out multiple-choice quizzes. According to previous study technology-based tools for formative assessment, such as Plickers, encourage student engagement and individualized learning (Fatimah & Santiana, 2017; Ioannou et al., 2016). Through their individual dashboards, students are aware of the objectives they are working toward and take responsibility for their own education. Students can decide what they want to work on next by selecting their goals and educational games. As a result, learning objectives are obvious.

Assessments based on technology typically involve more hands-on activities and necessitate a greater level of comprehension from students. When used as a formative assessment following a lecture, game-based assessments also result in greater long-term usage (Fatimah & Santiana, 2017; Torres-Gastelú & Kiss, 2016). Students can gain a deeper level of understanding by taking technology assessments, which can be multiple-choice or short-answer. According to previous study assessment without technology would still rely on pencil and paper, making it difficult to provide the consistent, formative feedback students need to learn and comprehend new information (Cahyono et al., 2016). It is essential to investigate the quality of educational technologies for responsive pedagogical integration due to the numerous advantages of incorporating technology into the classroom and the fact that educators have been tasked with incorporating more technology into their pedagogy.

### *Overview of Persuasive System, E-Learning, and Technology Web 2.0 Persuasive System for Formative Assessment*

Information systems could be used to predispose their users to improving and altering human behavior in a variety of ways. Interactive technology can be categorized as persuasive technology because it causes behavior and attitude shifts. A persuasive idea should be tailored to the goal, the dissemination of messages, and the adoption of computer technology. Opportunities for this technology to influence user behavior will arise as the social web's ability to compose, collaborate, and distribute information expands. Computer software or information systems that are designed to reinforce change or improve attitudes, behavior, or both without coercion or deception are referred to as persuasive systems. Enticing framework configuration created has three fundamental stages (Irving, 2006; Widiaswanti et al., 2019). Before putting a persuasive system into action, the first stage—essential—requires an understanding of the fundamental issues that form its foundation. In the subsequent stage, matters connected with the setting of the enticing framework are talked about. At this point, contexts include both intent and the event and persuasive system strategy. The type of change and the persuader make up the intent context.

## Discussion

An example of using various technologies for formative, summative, and feedback is presented in this article. It demonstrates how using a variety of technologies can make learning assessment and feedback easier and more effective. It was predicated on an educational methodology developing from a staff-understudy organization and an interest in working on understudies' evaluation and criticism skill levels (Balakrishnan Nair, 2022; Vartiainen et al., 2016). Importantly, the idea that all assessment can be used for learning bolstered the justification for using aligned technology.

Overall, students found that using technology in the classroom allowed them to be more objective and gave them more time to carefully evaluate themselves. Before the co-assessment meeting, students could view the learning as many times as they wanted. Poignantly, they could also decide not to watch the instructional videos because some students said they were uncomfortable with the idea of being on an instructional video (Moradi & Chen, 2019; Nursyahrina et al., 2021). Unfortunately, the incompatibility of some students' electronic devices made it difficult for them to access the recordings. The framework is planned basically for address recording, so the appropriate setting for the introductions must be pre-booked ahead of time and as per the accessibility of talk theater space. Google Class offered greater adaptability, despite the fact that its use has other limitations, such as limiting head movement while recording. Because they provided students with direct, one-on-one feedback, waggle, camtasia, and google classroom were the most frequently used technologies in the study. Additionally, it allowed for more feedback than if it had been written.

According to literature, students believed that feedback was of higher quality, simpler to comprehend, and more personalized. Previous study claimed that it was more interesting than reading written comments, and some of them even said that they took the feedback more seriously (Frydenberg &

Andone, 2011). Students can use this technology to effectively improve their work by receiving prompt feedback through this technology (Maamuujav et al., 2019; Morrar et al., 2017). Like other technologies, its application has both benefits and disadvantages. In this instance, one of its benefits is that, provided that students' devices are compatible, audio-visual feedback delivered in the form of an mp4 file can be accessed at any time and from outside the campus.

However, students with hearing or other impairments may not find audio-visual feedback to be as helpful, so written feedback may be offered instead. This could be accomplished by utilizing additional technology. Students' resistance made it difficult to implement technology in the assessment process. According to previous study may have been because innovative assessment and feedback methods are frequently viewed with discomfort and cynicism due to the conservative nature of traditional higher education practices (Su et al., 2022). When assessment methods were unfamiliar to the students, resistance was typically evident. Students' resistance may have also been caused by the idea of change itself, which can occasionally cause discomfort.

## 4. CONCLUSION

This article has demonstrated that technology can enhance summative and formative assessment and that they can be used for learning. In a similar vein, the study has demonstrated that technology can also be used to enhance feedback. Technology, on the other hand, is only a useful tool if it serves its intended purpose and is in line with the goals of the assessment and feedback. Openness and clarity in communication between staff and students are also absolutely necessary. For instance, by explaining to students how and why a particular technology is being used, you can increase their willingness to participate and reduce or eliminate any discomfort they may be experiencing. In a supportive learning environment, where a staff–student approach can be most helpful, trust between students and staff can help with the success of innovative methods.

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