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A QUALITATIVE STUDY ON HOW ARTIFICIAL INTELLIGENCE (AI) SUPPORTS FORMATIVE AND SUMMATIVE ASSESSMENT IN EDUCATION

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ABSTRACT

This qualitative study explores the integration of Artificial Intelligence in educational assessments, focusing on how it supports formative and summative assessment practices. The study investigates how AI tools are used, perceived benefits, challenges faced, and pedagogical implications through in-depth interviews with educators and school administrators and AI experts. Key findings indicate that AI supports timely feedback and personalized learning, among other things, in formative assessment, while also aiding large-scale grading, improving objectivity and efficiency, reducing bias, and carrying out performance analytics in summative assessments. However, several concerns about ethical data usage, algorithmic transparency, and teacher preparedness remain persistent barriers. The study concludes by giving a framework for responsible AI integration into assessment strategies in modern education and underlines implications for educational policy, pedagogy, and teacher training.

Keywords: *Artificial Intelligence, formative assessment, summative assessment, qualitative research, educational technology.*

INTRODUCTION

Assessment is a fundamental aspect of instruction and learning, which informs teaching and learning decisions about student learning. In the 21st-century classroom, the accelerating advent of Artificial Intelligence (AI) in education has transformed conventional instructional and assessment models and the incorporation of Artificial Intelligence (AI) into assessment processes has become a revolutionary trend. Though the impact of AI in personalized education and intelligent tutoring is broadly understood, its application in formative and summative assessments is still a newly evolving field of research, especially in qualitative contexts. As AI tools become increasingly more common—from automated essay scoring programs to AI-based learning management systems (LMS)—teachers are struggling with new means of measuring, monitoring, and servicing students' learning. Although AI implementations in education have so far concentrated on personalized learning, its application in assessment—formative and summative—is gaining prominence. This research seeks to investigate the assistance AI brings to

assessment practice, with emphasis on its perceived effectiveness, real-world applications, and related challenges.

AI technologies like machine learning, natural language processing (NLP), and predictive analytics are being brought increasingly into educational spaces to enable greater personalization, responsiveness, and data-informed decision-making (Luckin et al., 2016). Of the many areas in which AI is having a profound impact, assessment—both summative and formative—is a prime area of innovation and controversy. Both forms of evaluation are integral to good pedagogy but are time-consuming to implement and prone to errors of bias, inconsistency, and late feedback. AI, in formative assessment, can deliver instant feedback and tailor learning pathways to the progress of the learner, thus facilitating learning more effectively. In summative evaluation, AI facilitates automated marking of free answers, identifies trends in students' performance, and lessens teachers' grading loads (Balfour, 2013). Such tools as ETS's e-rater, Gradescope, and Turnitin are currently used extensively for such ends.

Yet, even as AI holds much promise in education testing, it also poses some issues. Scholars have identified threats of algorithmic discrimination, in which AI systems can continue prevailing disparities in educational attainment (Binns et al., 2018). Additionally, privacy issues concerning the large amounts of student data being collected and utilized in AI-driven platforms have arisen (Williamson & Piattoeva, 2021). One of the biggest challenges is likely to be the deskilling of teachers since relying too much on AI might limit the ability of teachers to make professional judgments and design meaningful assessment (Selwyn, 2019).

In light of these promises and issues, there is an increasing imperative to investigate the application of AI in assessment from a qualitative approach, capturing the experiences, perceptions, and insights of those most directly engaged in the educational profession—teachers, administrators, and technology developers. The majority of current literature has concentrated on quantitative results, such as gains in performance and system effectiveness, while neglecting the contextual and human aspects of AI-supported assessment. Thus, this research aims to bridge this gap by looking into how AI facilitates formative and summative assessment within educational institutions and how the stakeholders view its effects, advantages, and drawbacks.

2. Literature Review

2.1 Conceptualizing Assessment in Education

Assessment in education, as defined by Black and Wiliam (1998), involves several approaches of assessing the learning of students, with formative assessment being an ongoing, process-oriented strategy that is directed towards improving learning by the use of timely feedback and adjusting instructions. Formative assessment encompasses quizzes, feedback, peer review, and reflections. It encourages reflection, critical thinking, and individualized learning by revealing individual needs throughout the process of instruction. Conversely, summative evaluation, as outlined by Harlen (2007), is carried out at the conclusion of a learning cycle to assess if learners have mastered the desired outcomes, typically through more formal, graded activities like exams and projects. Both play vital functions—formative being "assessment for learning" and summative being "assessment of learning"—and effective educational practice would preferably employ both to aid and monitor student success holistically. It involves tests, assignments, or standardized tests.

2.2 Role of AI in Education

Based on Luckin et al. (2016), Artificial Intelligence (AI) increasingly shapes educational practice in a variety of areas such as adaptive learning, intelligent tutoring systems (ITS), natural language processing (NLP), and learning analytics. AI-driven platforms are created to take note of patterns in students' behavior, performance, and responses, and this helps them provide adaptive and personalized content suited to specific needs of learning. By integrating technologies like machine learning, NLP, and predictive analytics, AI systems can keep tracking the progress of students continuously, identify knowledge gaps, and suggest specific resources or interventions. Such abilities not only make learning more efficient but also assist teachers by streamlining repetitive administrative and instructional functions. In terms of assessment in education, AI makes a huge contribution by facilitating automated marking, instant feedback, and adaptive testing, thereby making evaluation more responsive, scalable, and tailored to student performance. According to Luckin et al. (2016),

the application of AI in education is an indication of the trend toward data-driven, learner-focused practices intended to enhance both student outcomes and teaching effectiveness.

2.3 AI in Formative Assessment

According to Shute and Rahimi (2021), artificial intelligence tools like Intelligent Tutoring Systems (ITS) and learning analytics tools are essential in amplifying the effectiveness of formative assessment by offering real-time individualized feedback to learners. These technologies are based on assessing students' responses in real-time, enabling them to offer instant guidance and recommend corrective measures, which enables instructors and learners to make instructional changes in good time. By mapping patterns of students' performance and behavior, AI systems can create customized learning paths that enable the material to be tailored to each student's level, pace, and style of learning. This customization helps meet different learning requirements within the classroom. In addition, AI-powered platforms continuously monitor student activity, detect spots where learners are having difficulty, and point out learning gaps that might otherwise go unnoticed under conventional evaluation models. Platforms like Knewton, Century Tech, and Smart Sparrow realize these abilities through AI technologies that make dynamic, learner-centric environments that allow real-time assessment and adjustment. Highlighting how the use of AI in formative assessment not only aids improved learning results but also in enabling more effective and responsive pedagogical strategies, Shute and Rahimi stress the importance of embedding AI in the processes of formative assessment.

2.4 AI in Summative Assessment

As argued by Balfour (2013), Artificial Intelligence (AI) greatly improves summative assessment through the facilitation of crucial evaluative processes like automated marking, plagiarism checking, and data analysis performance. AI-based systems of marking, especially for open-ended questions such as essays, have proven highly consistent in marking, thereby lessening the workload on instructors and facilitating faster feedback to learners. These include natural language processing (NLP) and machine learning-based systems like ETS's e-rater and Grade scope, which test grammar, structure, relevance of content, as well as argumentation, providing a time- and standardized-solution alternative to human grading. Other products, like Turnitin, utilize AI in identifying cases of plagiarism through comparisons with huge repositories of published materials and scholarly submissions, thus maintaining academic integrity. Apart from grading and integrity testing, AI is used in predictive analytics, assisting educators in forecasting the performance of their students according to previous performance patterns and behavior. Nonetheless, not with standing these benefits, concerns exist over the reliability and openness of AI systems. There are questions regarding how such systems reach their conclusions, whether they can completely factor in creativity and critical thinking, and how algorithmic bias could influence fairness. As Balfour (2013) describes, while AI holds great promise for the enhancement of the efficiency and scalability of summative assessment, vigilant regulation and ongoing improvement are necessary to secure accuracy, equity, and trust in these technologies.

2.5 Challenges and Ethical Issues

While Artificial Intelligence (AI) has great potential to improve assessment practice, there are a number of worrying concerns that have to be met if it is to be used responsibly and equitably within education. The most urgent of these, as noted by Binns et al. (2018), is algorithmic bias and fairness. AI systems learn from past data, which can have inbuilt social and cultural biases. When these biases are left unchecked, the AI could generate unjust or discriminatory results—most notably disadvantaging students belonging to underrepresented or marginalized communities. This triggers ethical concerns regarding the impartiality of AI-based assessments and the justice of the feedback or grades they provide. Further, privacy of data is a significant issue, as noted by Williamson and Piattoeva (2021). Educational AI solutions tend to be based on large-scale data collection and analysis of personal information such as behavioral patterns, records of performance, and even biometric information in certain situations. In the absence of proper policies and measures, such data can be abused, and there may be violations of student confidentiality or unauthorized surveillance. Additionally, there is an emerging concern of overdependence on AI tools,

which can result in the deskilling of teachers. As teachers increasingly rely on automated systems for functions such as grading and feedback, they will increasingly forfeit essential professional skills and pedagogical judgment necessary to read the learning of students in context. Thus, as much potential AI has in changing the way educational assessment is done, Binns et al. (2018) and Williamson & Piattoeva (2021) stress the pressing importance of having transparent algorithms, robust data protection rules, and harmonious human-AI collaboration to keep education's integrity, fairness, and humanity intact.
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3. Rationale for the Study

Despite the widespread use of AI in education, the majority of research to far has taken a quantitative approach, emphasizing tool efficacy and performance indicators. The perspectives, lived experiences, and educational difficulties that educators and developers encounter are still not fully understood. This study is qualitative in nature. By documenting the complex viewpoints of those involved in employing AI for assessment, this work seeks to close that gap.

4. Research Questions

1. How is AI currently being used to support formative and summative assessments in educational settings?
2. What are the perceived benefits and challenges of AI-assisted assessment tools?
3. How do educators and developers perceive the pedagogical and ethical implications of AI in assessment?

5. Research Objectives

1. To explore the ways in which Artificial Intelligence (AI) tools are used to support formative and summative assessment practices in education.
2. To examine educators' perceptions of AI's effectiveness in assessment.
3. To identify the pedagogical, technical, and ethical challenges associated with using AI for formative and summative assessments.

6. Significance of the Study

This study is important because it explores a crucial but little-studied area where AI and educational assessment meet. It is crucial to comprehend how AI is influencing assessment procedures as educational systems throughout the world work to achieve equity, effectiveness, and personalized learning. In order to guarantee that technology enhances rather than replaces the professional judgment and human-centered values that constitute the foundation of effective education, the research findings may influence future policy, teacher preparation programs, and the ethical design of AI systems.

7. Methodology

Research Design

The current research employs a qualitative research strategy, grounded in a phenomenological research design, in order to inquire into and comprehend the ways in which Artificial Intelligence (AI) assists formative and summative examinations in educational settings. Qualitative research is especially apt for embedding the richness of educational practices as well as the lived realities of individuals who are interacting with AI tools. The phenomenological perspective was chosen to explore in-depth the subjective reflections of educators, administrators, and edtech experts that have first-hand exposure to AI-infused assessment processes. Phenomenology allows the research to record detailed participants' perceptions, attitudes, and insights, thereby giving rich, contextualized information about how AI is reshaping the educational assessment landscape.

Population

The population in this study consists of those currently engaged with educational institutions that have introduced AI-based assessment tools. This includes school teachers, instructors in colleges or universities, academic coordinators, school administrators, and education technology experts. To screen participants who can offer valid and informed opinions.

Sampling Technique

The research makes use of a purposive sampling method. This type of non-probability sampling is used to ensure that participants are chosen according to certain inclusion criteria: (a) participants should have at least one year of experience in AI tool application in formative or summative assessment, (b) they should be presently engaged in institutions where these types of tools are applied systematically, and (c) they should be

willing to conduct interviews and agree to audio recording.

Sample Size

Twelve participants were selected using purposive sampling, which is seen to be adequate for phenomenological studies, where depth of knowledge is valued above breadth. These participants included two school administrators, four AI education platform developers, and six secondary school instructors.

Participants

Participants in the study come from a range of educational institutions, including private educational technology companies, colleges, universities, and elementary and secondary schools. To obtain a comprehensive grasp of how AI is applied across various institutional types and educational levels, this diversity is crucial. The participants' years of teaching or administrative experience, subject-matter competence, and level of familiarity with certain AI evaluation techniques differ. The chosen contributors offer insightful viewpoints on how artificial intelligence (AI) supports or contradicts conventional and contemporary assessment techniques, such as adaptive testing, real-time analytics, automated grading, formative feedback systems, and personalized learning pathways.

Data Collection

Semi-structured interviews are the main data collection tool of this study. This will allow one to gain an in-depth exploration into the experiences of participants, yet maintaining consistency in questioning from one interview to the other. The interview protocol is developed based on key identified themes in the literature, including integration of AI in educational settings, assessment practices, feedback mechanisms, and ethical concerns. Questions are open-ended to allow participants to express themselves freely and elaborate on specific experiences. Sample questions include: "How have you used AI tools in formative assessments?", "In what ways has AI changed the nature of summative evaluations in your institution?", and "What challenges have you encountered when using AI for assessment purposes?" Each interview lasts approximately 45 to 60 minutes and can be conducted either face-to-face or online through platforms such as Zoom or Microsoft Teams, depending on the participant's availability and preference. With informed consent, all interviews will be audio-recorded, with accompanying field notes taken during the session to capture contextual non-verbal cues and observations.

Data Analysis

This thematic analysis follows Braun and Clarke's (2006) thematic analysis framework, comprising six phases: familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. Following transcription, data were read multiple times to immerse the researcher into the content. Coding is done manually and through NVivo to identify patterns and categories which emerge from the data. Subsequently, codes are grouped into broader themes that reflect participants' collective experiences and understandings of how AI supports assessment. These might include areas such as "automated feedback for continuous learning," "AI in high-stakes testing," "teacher autonomy and control," and "ethical and transparency concerns." NVivo will support data organization and will be used to maintain an audit trail to ensure reliability.

To ensure the trustworthiness of the study in accordance with the criteria set by Lincoln and Guba (1985), several strategies have been put in place. The member checking strategy was used to enhance credibility: participants were given the opportunity to review and verify their interview transcripts or preliminary findings for accuracy. Transferability is enhanced by providing thick, rich descriptions of the context of the study and participants to allow readers to determine whether findings may be applicable to other settings. Dependability is established by maintaining detailed documentation of the research procedures and decision-making processes during the study. Confirmability is addressed through the practice of reflexivity, whereby the researcher recognizes personal biases and takes steps to minimize their influence on data interpretation.

Ethical considerations are deeply entwined in this study. Ethical clearance is first sought from an Institutional Review Board or ethics committee before data collection can take place. Full information about the aims and nature of the research is provided to all participants through an

informed consent form, which explains their rights, including the right to withdraw at any point without penalty. Confidentiality and anonymity will be strictly observed by the use of pseudonyms and deletion of identifiable information from transcripts and reports. The collected data, including audio recordings and transcriptions, are kept securely in encrypted digital formats accessible only to the researcher.

In all, this approach presents a tight framework for the exploration of the ways in which AI underpins formative and summative assessment practices within education. With its phenomenological design, purposive sampling, in-depth interviews, and thematic analysis, this study will add value both to academic debate and practical implementation approaches about AI in educational assessment.

8. Findings

Theme 1: Integration of AI tool in organization

The adoption of Artificial Intelligence (AI) technology in companies has evolved as a strategic initiative to increase efficiency, innovativeness, and decision-making. AI technologies such as automation, predictive analytics, chatbots, and intelligent data processing simplify operations, lower expenses, and enhance customer experiences. With the use of machine learning and natural language processing, companies can process large amounts of data to make actionable decisions, predict trends, and customize services. Yet, successful integration demands planning, training employees, and ethical considerations to guarantee openness, justice, and data protection. In general, the adoption of AI enables firms to stay competitive in a fast-changing digital world.

According to AI Expert 1: *"We're in a transitional phase. AI tools are currently used alongside traditional methods, mainly in blended learning environments. Some departments are more advanced—like computer science and business—where AI-driven analytics and adaptive assessments are part of the formal assessment strategy."*

This quote locates the current state of AI in education at a midway point. AI applications are not yet integrated into all schooling contexts but are increasingly adopted alongside standard instruction and testing practices. Blended learning contexts are indeed where digital tools are interfaced with one-on-one teaching. The quotation also indicates that the extent of AI adoption varies across disciplines of study. Faculties of business and computer science, for example, are more advanced in this respect-they have incorporated AI-powered analytics and adaptive tests into their formal assessment processes. Presumably, such faculties are leading the charge due to their familiarity with technology and data-driven practices. Overall, the quotation reveals an evolving regime of assessment practices in education, in which the role of AI is becoming increasingly integral yet, in most contexts, a subsidiary one.

Theme 2: Use of AI in Formative Assessment

2.1 Real-time Feedback and Adaptive Learning

AI-based learning tools offer immediate feedback by immediately evaluating student answers and pointing out errors or misconceptions. This enables learners to correct errors in real time instead of relying on delayed evaluations. Adaptive learning by AI personalizes content by varying difficulty level, speed, and exercise type according to individual performance. This guarantees individualized support, closes gaps in learning, and allows mastery at one's own pace.

Instructors indicated that they employed AI-driven platforms like Google Classroom, Edmodo, and Khan Academy for formative assessments. The above tools provided immediate feedback and individualized learning paths depending on responses by the students.

According to Teacher 1, Grade 9: *"The AI in our LMS recommends extra materials based on quiz results—it really helps identify who's falling behind.it also helps in personalized feedback, identification of learning gaps and enhance students engagement".*

The following statement elucidates how AI integrated into an LMS is being used to extend and support student learning. The instructor identifies that the AI module analyzes quiz scores for recommendations on further learning, based on individual student performance. This makes it easier not only to identify struggling students but also to "provide personalized feedback", targeting learning needs at the individual level. Moreover, the teacher highlights AI's role in "spotting gaps in learning" well in advance, hence enabling timely intervention that eventually leads to "increased student engagement". The quote is a testimony to the positive experience of the teacher with AI as a means for providing differentiated learning and making the whole classroom experience more responsive and engaging.

According to teacher 2, Grade 10: *"My students get immediate suggestions on what they need to improve–this wasn't possible before AI."*

The quote below underlines the new role of AI in providing real-time, personalized help to learners. The teacher says that with the help of AI, students now receive "immediate feedback and targeted suggestions" that were impossible to provide by conventional means. The immediacy of this guidance allows learners to "know their mistakes and correct them in time," so they will learn more effectively. This comment underscores the ways in which AI accelerates "speed and personalization of feedback" so that teachers can be more supportive in the progress of their students, and students have higher control over their learning process.

2.2 Personalized Content Recommendations

AI technologies use information on learners' performance history, interests, and behavior patterns to make suggestions on content. This personalized suggestion helps students or users to work with best-matched content, which enhances their motivation, understanding, and learning performance. In companies, too, such systems can help boost productivity by offering timely, relevant resources and training content. AI adapted content based on student performance. Developers said algorithms adapt quizzes and reading to individual needs.

In the words of Teacher 6, Grade 10: *"It learns from patterns and offers remedial exercises without me even asking. Overall, AI supports it–mainly through adaptive learning paths and immediate feedback. But there is also a risk of generalization. AI can customize the content, but it cannot yet grasp emotional or contextual subtleties in students' behavior in the way a teacher might do."*

This sentence encompasses the strengths and weaknesses of AI in schools. The speaker thanks AI, which independently can assess student performance trends and provide practice exercises without requiring direct teacher intervention, for its "efficiency and adaptability". With abilities such as "adaptive learning paths and instant feedback", AI greatly enhances individualized learning and makes it easier for students to work on their weaknesses. But the lecturer also raises a "critical concern" regarding AI limitations-that it fails to understand fully the "emotional and contextual factors" behind student behavior. While AI is excellent at adapting content to data, it lacks the "human sensitivity and intuition" that teachers use in interpreting students' emotions and needs. This supports the need to balance AI tools with human judgment in education.

According to IA Expert 2: *"We use AI for the generation of real-time formative feedback via learning platforms. For instance, adaptive quizzes adjust the difficulty according to the student's response, and AI chatbots also give immediate clarification or hints. These tools help identify learning gaps early without waiting for summative results."*

This quotation emphasizes the active role of AI in enhancing formative assessment through feedback mechanisms in real-time. The speaker explains how AI-enabled software, such as "adaptive quizzes" and "AI chatbots", is embedded into learning systems to feedback dynamically to the student needs. Adaptive tests re-adjust their difficulty according to students' answers so that learners are constantly pushed at the right level, and AI chatbots offer "instant clarification or hints", thus facilitating understanding in real-time. All these allow the teacher to "identify learning gaps early" so that intervention and support can occur when required rather than having to wait until end-of-term summative exams. In sum, the quote shows the extent to which AI has transformed assessment from a once-off static exercise into a "continuous, responsive process" that optimizes learning and teaching.

Theme 3: Use of AI in Summative Assessment

3.1 Automated Grading and Consistency

AI technology helps grade by rapidly marking objective tests, quizzes, and even brief answers, lightening the load of teachers. Automated grading promotes better consistency and justice since it uses the same set of criteria for everyone, eliminating human bias. Not only does this save time, but it also enables teachers to devote more time to individualized teaching and student interaction. AI graded essays as well as multiple-choice tests.

According to School Administrator A: *"For our overcrowded/ large enrollment classes, auto-grading saves us days of manual checking."*

The quotation also illustrates the huge time-saving advantages of AI-driven auto-grading tools, especially for courses that have large enrollments and where checking assignments or exams manually may be a very time-consuming exercise. Automating the grading ensures that teachers and administrators can free up time they would

otherwise use on routine assessment work to concentrate on higher-value activities like delivering feedback, refining course content, or taking a more direct engagement with the students. This effectiveness not only facilitates smooth administrative procedures but also enables timely delivery of feedback, which can further improve students' learning experience.

3.2 Predictive Analytics and Performance Trends

AI-powered predictive analytics assists in finding patterns in student or worker data to predict future performance. Through examination of attendance, participation, and previous outcomes, AI may identify learning gaps, anticipate risk of underachievement, and recommend early interventions. This enables data-driven decision-making and enhances long-term success through early intervention. Dashboards enabled institutions to predict student performance and act accordingly.

According to School Administrator B: *"We identify at-risk students based on AI predictions, sometimes before the midterm."*

The passage points to the active part played by AI in monitoring student performance and intervening early. Through the examination of attendance, engagement, and assessment patterns, AI systems can identify which students are likely to perform below expectation well ahead of common evaluation milestones such as midterms. This early alerting allows educators to deliver support specifically to those students through remedial education, mentoring, or additional services, to enhance their performance. Such predictive information changes the strategy from reactive to preventive and adds to the overall efficacy of teaching and student support measures.

Theme 4: AI in Summative Assessment

AI facilitates summative assessment by streamlining the marking of exams, projects, and standardized tests, with quicker and more uniform grading. AI has the capacity to review extensive amounts of response, identify patterns, and generate extensive reports on performance. AI further enhances the reliability of assessments by alleviating human error and prejudice and saves teachers time and effort. AI was mostly applied for automated grading of short answers and multiple-choice questions. AI additionally facilitated plagiarism detection and analytics.

According to School Administrator B: *"The automated grading system saves hours and gives a fairly accurate report on student performance trends in such themes as efficiency in grading, data-driven insights and bias migration in scoring".*

The quote highlights the efficiency that automated assessment systems bring by significantly cutting the time required to grade student work, liberating educators from tedious hand marking. In addition to speed, these systems offer data-based information through the production of in-depth reports on student performance trends, which allow teachers to monitor progress, detect areas of learning gaps, and modify instruction. In addition, using standardized scoring guidelines, automated grading can serve to counter human biases in marking, leading to fairer and more objective evaluations of all students.

According to Teacher 5, Grade 9: *"Primarily through automated grading and analytics. AI tools like Gradescope and ExamSoft help with bulk grading of objective questions, and in some cases, AI assists with short-answer evaluations. It saves time and improves consistency, especially in large classes."*

The quotation reveals how AI-based tools like Gradescope and ExamSoft are utilized to automate assessment processes, especially in big classes. Through the automation of grading of objective questions, even for short-answer evaluations, these systems minimize the marking time teachers spend and guarantee uniform application of scoring rubrics. This not only enhances effectiveness but also increases fairness in grading, since the standardized methodology reduces variability in grading that can result from manual evaluation. Furthermore, the incorporation of analytics enables teachers to instantly spot patterns in performance and modify instruction accordingly.

Theme 5: Challenges Identified

5.1 Challenges of AI in Assessment

Although AI improves efficiency in evaluation, it also presents challenges. Some of these include possible bias in algorithms, transparency issues regarding decision-making, and issues of data privacy. Excessive dependence on AI can diminish human judgment, and technology bugs can impact equity. Moreover, teachers and students can be hindered from adapting new systems without training and assistance. Apart from the advantages, criticism came in regard to: Data privacy and ethics, Over-reliance on automation, Limited capability to

measure higher-order thinking and Absence of teacher training

According to Teacher 3, Grade 9: *"AI can't yet fully assess creativity or argument quality in essays. It's good, but it's not a substitute for human judgment."*

The instructor emphasizes an important limitation of AI in evaluation: although AI software is good at grading straightforward tasks and giving immediate feedback, AI is weak at assessing subtle, subjective aspects like creativity, critical thinking, and argument quality in essays. This indicates that human judgment remains crucial in domains with deeper meaning, subtlety, and contextual sensitivity. That is to say, assessment can be facilitated by AI but not the teacher's role in the evaluation of higher-order abilities.

Teacher 5, Grade 9: *"There is a steep learning curve for educators who are not familiar with technology. Also, sometimes AI tools misinterpret students' responses, particularly for open-ended or creative tasks. Infrastructure and internet reliability may be an issue, too, especially in rural or underfunded areas."*

This reference provides real-life challenges faced by teachers in implementing AI in examination settings. He quotes that the learning barrier for most teachers, especially those who have less exposure to technology, is very high and acts as a hindrance to proper integration. The second issue is the precision of the AI resources, as they can misunderstand open-ended or imaginative student answers where human intervention is more appropriate. The problem of infrastructure and internet connectivity is also identified as schools in underprivileged or rural areas may not have access to technological means to be able to harness AI. The combination of these arguments demonstrates that although AI holds immense promise, its implementation depends on training teachers, the reliability of tools, and equal access to technology.

5.2 Algorithmic Bias

Some educators felt AI tools were biased toward specific writing styles or vocabulary.

As noted by Teacher 2, Grade 10: *"My students who are non-native speakers often get low essay scores even when their arguments are valid."*

The educator says that in AI grading systems, the skill of using language overpowers the quality of the ideas. Non-native speakers are at a disadvantage for grammar and vocabulary errors, though their arguments are sound and logically coherent. This points out problems of unfairness in AI essay grading and the need for fairer assessment that focuses on content and logic rather than usage correctness.

5.3 Ethical and Privacy Concerns

They agreed that the best method to ensure ethical AI use, particularly in collecting biometric data or monitoring learning behavior, is challenging.

Teacher 2, Grade 10: *"Yes, data privacy is a large ethical issue; especially when there are third-party vendors collecting student performance data. There is also bias in the algorithms; if they are trained on biased data sets, then algorithms can further exacerbate existing inequalities. If something goes wrong, nobody is sure who to hold accountable."*

This statement mentions three top ethical issues that instructors see in using AI for grading. First, there is the privacy of data, as third-party providers collect personal student performance information, which raises safety and permission issues. Secondly, the instructor mentions the possibility of algorithmic bias; AI systems could learn from biased datasets and afterwards replicate or even increase existing disparities, making them disadvantageously discriminate against particular categories of students. Finally, the teacher points out the issue of accountability in case of mistakes or injury due to AI-based assessments; it is not clear who is responsible-the teacher, the school, or the technology company. This echoes more general concerns in education about trustworthiness, fairness, and the ethical use of AI tools.

5.4 Pedagogical Limitations

Teachers emphasized that AI cannot replace nuanced understanding of context, creativity, or emotional expression in assessment.

According to teacher 1, Grade 9: *"AI has shifted my attention away from routine grading to strategic teaching. It allows for more responsive teaching and makes differentiated support possible. However, it even pushes educators to continuously adapt and rethink how we define evidence of learning and rigor in assessment."*

This is both the advantage and disadvantage of incorporating AI in assessment. The instructor points out that AI eases the workload of mundane grading, making more time to focus on effective teaching strategies like scaffolding support and encouraging deep learning. AI further enables responsive and differentiated teaching, thus allowing teachers to respond to students' needs more personally. However, the quote also admits that AI catalyzes the pressure that it puts on

teachers because it requires them to be constantly updating their practice to consider new conceptions of evidence for learning and rigor in assessment. It entails that while AI increases efficiency and customization, it at the same time forces teachers to redefine educational standards and teaching methods per AI-informed practice.

Theme 6: Improvement recommended for AI-based assessment systems

According to Administrator B: *"AI-based assessment should make more transparent and customizable. Teachers should be able to understand how decisions are made and adjust the AI's parameters. Also, improve their handling of subjective responses—especially in the arts, humanities, and languages where nuance is key."*

The quote highlights the necessity for transparency, flexibility, and contextual awareness in AI-assessment. Administrator B stresses that teachers must not only rely on AI as a "black box" but can also develop an understanding of how the system arrives at its decisions and be able to tailor its parameters to suit classroom requirements. This speaks to a higher level of teacher agency and control in AI implementation. Moreover, the administrator points to a lingering drawback of AI: its inability to assess subjective and sensitive answers, especially where fields like the arts, humanities, and languages are concerned, which relies on interpretation, imagination, and analytical thinking. The quotation implies that for AI to effectively and reliably function in teaching, it needs to develop in such a way that it delivers understandable processes, enables teacher-initiated modifications, and creates enhanced means of dealing with qualitative factors of students' work.

Results and Discussion

The findings of this study show that the integration of AI in organizational and educational settings has become a strategic innovation aimed at improving efficiency, creativity, and informed decision-making. Consequently, organizations are increasingly using automation, predictive analytics, chatbots, and intelligent data systems in their operations in an effort to cut costs and improve customer experiences. In educational institutions, AI is also gradually becoming part of teaching and assessment to enhance the quality of learning and the effectiveness of feedback. However, despite the impressive potential identified with the integration of AI into assessment, it still remains at a transition point characterized by the coexistence of traditional and digital approaches. According to the description provided by one of the AI experts, in many institutions, teaching and assessment are still in the "blended learning environments" phase, where AI-based tools are operating alongside conventional approaches. This transitionary period signifies the partial nature of adoption, as those disciplines that are closely related to either data analytics or digital technologies-for instance, computer science and business-have significantly moved forward. These findings indicate that while AI's role in education is continuing to grow, for the most part it continues to be a supporting tool in human-led assessment practices.

The study therefore establishes that one of the most critical areas where AI contributes significantly is in formative assessment. Teachers indicated that AI-driven LMS, such as Google Classroom, Edmodo, and Khan Academy, are an integral approach in providing real-time feedback and adaptive learning. The potential of the same systems to evaluate students' responses immediately and highlight mistakes enables learners to make corrections without wasting any time, hence making learning deeper and active. According to teachers, AI identifies learning gaps early, recommends supplemental materials, and enables a more personalized approach to teaching. As one teacher mentioned, "the AI in our LMS recommends extra materials based on quiz results-it really helps identify who's falling behind." This automation facilitates differentiated instruction, enhances student engagement, and reduces instructors' time on repetitive feedback work. "Students immediately receive suggestions about what they need to work on, which we couldn't do before AI," said another teacher, highlighting real-time digital feedback to accelerate learning progress. These stories confirm the pedagogical value of AI in supporting personalized, timely, and data-driven learning experiences-the literature places much emphasis on feedback as a core component in effective formative assessment.

Beyond feedback, AI helps in the personalization of learning content as it analyzes students' performance histories, interest profiles, and behavioural patterns to recommend appropriate study materials. Teachers said that AI systems "learn from patterns and offer remedial exercises without even being asked," reflecting their ability to automatically adapt learning pathways when

required. This functionality facilitates continuous learning and skill mastery at each learner's best pace. However, participants also warned that there are limits to AI personalization-particularly in interpreting student behavioral factors emotively and contextually. While algorithms can sift through performance data, empathy is what human teachers bring into the classroom, and it reassures the notion that AI will never replace the teacher's role in offering emotional and motivational support. As an expert on AI explained, adaptive quizzes and chatbots now issue real-time formative feedback and clear explanations to students, ensuring that assessment transforms from a static, end-point activity into a continuous process that's interactive in nature. Nevertheless, personalization for real seems to be achieved by a balance between computational precision and human insight.

The results further highlight the increasingly important role of AI in summative assessment through automated grading and predictive analytics. School administrators and teachers consistently emphasized the time-saving aspects of auto-grading systems, especially for classes with heavy enrollment. As one administrator commented, “auto-grading saves us days of manual checking,” emphasizing how AI automation alleviates administrative burden and improves efficiency in grading. The objectivity and consistency of the AI-driven results were commended for reducing human biases and providing fairer assessments. Tools such as Gradescope and ExamSoft were valuable in processing large quantities of short and multiple-choice responses while generating analytic reports on student performance trends. Teachers agreed that automated grading encourages uniform application of the criteria of evaluation and enables them to invest more in instructional improvement. In addition, AI-enabled predictive analytics have provided institutions with the power to first identify at-risk students based on patterns related to attendance, participation, and prior performance. According to one administrator, “we identify at-risk students based on AI predictions, sometimes before the midterm.” This proactive ability enables educators to intervene early, shifting their educational strategy from reactive to preventive and improving overall student retention and performance outcomes.

However, the findings also reveal several challenges and limitations in the use of AI for assessment. Teachers expressed concerns about algorithmic bias, particularly relating to linguistic and cultural disparities. One teacher noted that non-native English speakers “often get low essay scores even when their arguments are valid,” signaling an inherent bias toward specific writing styles and vocabulary. Such tendencies suggest that AI grading systems may unwittingly value linguistic precision over critical thinking or argument quality, raising equity issues for diverse learners. Another significant concern is on data privacy and ethics. Educators identified risks with third-party vendors collecting sensitive student information, raising a number of consent, transparency, and accountability concerns. Participants also brought up concerns about who should be held accountable when the AI systems make mistakes or produce biased results. These concerns echo global conversations on the ethics of using AI in education, marked by a growing call for clear guidelines, algorithmic transparency, and institutional oversight. Besides ethical concerns, the research showed pedagogical limits and practical barriers to AI implementation. Teachers noted that AI cannot assess creativity, originality, and expression of emotion—qualities necessary in assessments of higher-order thinking. One teacher explained, "AI can't yet fully assess creativity or argument quality in essays. It's good, but it's not a substitute for human judgment." This point reinforces an ongoing tension between automation and human interpretation in educational assessment. Additionally, educators identified the steep learning curve of teachers with limited technology experience and persistent infrastructure issues in under-resourced or rural schools. Poorly stable internet and lack of training opportunities create the very conditions that, instead of bridging the gap in education, widen it. As one teacher pointed out, while AI has moved them "from routine grading to strategic teaching," it also requires continuous adaptation and redefinition of what will constitute valid evidence of learning. This duality reveals how AI is both transformative and disruptive of traditional pedagogical roles. The general discussion tends to indicate that the integration of AI into assessment is both a quantum step forward and a complex challenge simultaneously. On one hand, AI certainly increases efficiency, fairness, and

personalization; it also creates new ethical, technical, and pedagogical questions on the other hand. This would, therefore, suggest that the most effective use of AI comes within a *collaborative model*, where human and artificial intelligence complement each other. The teacher remains indispensable in interpreting subtle learner behaviors and ensuring fairness and emotional engagement, while AI offers a much-needed analytical precision, scalability, and immediacy of feedback. This balance cannot be accomplished without ongoing teacher training, infrastructure development, and ethical governance. It is very important to remember that AI should not be used as a replacement for educators; rather, it should be a transformative partner that, when applied responsibly, can ultimately enrich assessment practices, yielding a more responsive, data-informed, and equitable learning environment.

Conclusion

AI integration into the assessment practices within organizations and educational settings presumes a transformative shift toward efficient, data-driven, and personalized systems. This study has affirmed that AI is a prime productivity tool that fosters innovation while supporting evidence-based decision-making. In education, AI holds greater significance in both formative and summative assessments for real-time feedback, adaptive learning, automatic grading, and predictive analytics. These innovations have enabled teachers to carry out more individualized support, enhanced consistency in evaluation, and identification of at-risk learners much earlier than traditional assessment methods could achieve.

However, the study also shows that AI integration continues in a transitional period. Whereas it is increasingly present, it still often acts in addition to traditional approaches of teaching and assessment rather than a replacement. Disciplines with stronger technological underpinnings-such as computer science and business-show far more developed use, suggesting that institutional readiness and digital literacy are strong influences on the speed and depth of AI implementation. This transitional state underlines the need to strike a balance where the use of AI supplements and does not supplant human capabilities.

Meanwhile, many issues remain. Educators raised very legitimate concerns about algorithmic bias, data privacy, and other ethical issues with AI-driven assessments. The inability of AI to evaluate higher-order cognitive and creative skills, along with its limited sensitivity to emotional and contextual factors, underscores the irreplaceable role of human judgment in education. Technical barriers include insufficient infrastructure, unreliable internet access, and a lack of teacher training that further hinder the equitable adoption across schools, especially in under-resourced regions. These are reminders that the successful integration of AI requires not just technological readiness but also ethical oversight, policy support, and professional capacity-building.

In conclusion, AI affords powerful opportunities for innovation in the field of assessment, making it more adaptive, fair, and insightful. Its effectiveness, however, ultimately depends on how well it is integrated within pedagogical frameworks that value technological efficiency and human empathy alike. A sustainable path forward involves a collaborative model in which educators and AI systems work in partnership. Teachers should use AI's strengths in analysis to enrich feedback and efficiency, while continuing to apply their professional insight in interpreting data, nurturing creativity, and supporting the emotional dimensions of learning. By aligning technological innovation with ethical practice and human-centered pedagogy, institutions can harness AI not as a substitute for educators but rather as a catalyst in creating more responsive, inclusive, and meaningful learning experiences.

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