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The Impact of Artificial Intelligence on Teaching and Assessment

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ABSTRACT

Artificial intelligence has emerged as an influential force in contemporary education, transforming how teachers prepare instructional content, communicate with learners, monitor academic progress, and evaluate student achievement. The rapid development of generative artificial intelligence, intelligent tutoring systems, automated grading applications, learning analytics, and adaptive educational platforms has extended the role of technology from administrative support to direct participation in teaching and assessment. This conceptual review examines the major effects of artificial intelligence on instructional practices and educational evaluation. It argues that artificial intelligence can improve personalized learning, generate teaching resources, provide immediate feedback, support differentiated instruction, identify students at academic risk, and reduce the time teachers spend on routine assessment tasks. AI-supported assessment can also facilitate continuous evaluation by analyzing patterns of student performance rather than relying exclusively on final examinations. Despite these opportunities, the integration of artificial intelligence introduces serious concerns related to inaccurate information, algorithmic bias, student privacy, academic dishonesty, excessive technological dependence, unequal digital access, and the possible weakening of independent thinking. Automated systems may reproduce inequalities contained in their training data, while generative AI may allow students to submit work that does not reflect their actual knowledge or abilities. The article maintains that artificial intelligence should support rather than replace teachers' professional judgment. Responsible implementation requires institutional policies, transparent disclosure of AI use, redesigned assessments, teacher professional development, student AI literacy, human verification of automated decisions, and protection of educational data.

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Introduction:

Artificial intelligence refers broadly to computer-based systems that perform tasks commonly associated with human intelligence, including recognizing patterns, interpreting language, generating content, making predictions, solving problems, and supporting decisions. In educational environments, AI includes intelligent tutoring systems, adaptive learning platforms, automated essay-scoring applications, learning analytics, recommendation systems, conversational chatbots, plagiarism-detection programs, and generative tools capable of producing text, images, presentations, questions, and computer code. Earlier educational technologies primarily delivered digital content or supported communication. Contemporary AI systems perform a more active role by analyzing learner behavior, adapting instructional material, producing feedback, and recommending educational actions. The United States Department of Education explains that AI introduces a transition from merely collecting educational data to detecting patterns and automating decisions based on those patterns. Such automation creates opportunities for instructional improvement but also requires stronger governance because biased data can lead to unfair or inaccurate educational decisions. Generative AI has accelerated this transformation by making advanced language-processing tools accessible to teachers and students. Teachers can use these systems to develop lesson plans, simplify difficult concepts, prepare classroom activities, translate instructional material, construct assessment rubrics, and generate practice questions. Students can use the same tools for tutoring, brainstorming, language development, revision, research support, coding assistance, and formative feedback. Research nevertheless emphasizes that AI-generated responses can contain factual inaccuracies, fabricated references, cultural bias, and oversimplified explanations. Therefore, AI output cannot automatically be treated as reliable academic knowledge. The impact of artificial intelligence is especially important in countries such as Pakistan, where educational institutions face large classes, variations in teacher preparation, multilingual learning needs, limited academic support services, and unequal access to digital infrastructure. AI may help extend educational support beyond the physical classroom, but unequal access to devices, reliable internet connections, quality digital content, and trained teachers may deepen existing educational inequalities. This means that institutional adoption should be based on accessibility and educational need rather than technological popularity alone. UNESCO and the OECD consequently emphasize human-centered, inclusive, transparent, and equitable approaches to AI implementation.

Transformation of Teaching Practices:

Artificial intelligence is changing teaching from a largely uniform process into a more adaptive and data-informed activity. In conventional classrooms, a teacher normally presents similar content, learning activities, and explanations to an entire class. However, students differ in their prior knowledge, language proficiency, learning pace, motivation, and academic difficulties. AI-supported platforms can analyze student responses and recommend exercises or explanations that correspond to individual learning needs. Personalized learning is among the most frequently discussed benefits of AI in education. An adaptive system may provide advanced material to high-performing learners while offering additional examples, simplified explanations, or remedial exercises to students who are struggling. Generative AI can also explain the same concept at different levels of difficulty. For example, a teacher may request an introductory explanation for school students, a technical explanation for university learners, and a practical example for vocational trainees. AI may also improve instructional planning. Teachers can use AI-assisted applications to generate lesson objectives, classroom questions, case studies, discussion prompts, examples, worksheets, summaries, and revision activities. These outputs can reduce preparation time, particularly when teachers handle several classes or large numbers of students. AI can assist with translating instructional material into local languages and adapting content for learners with different reading abilities. However, teachers must verify generated material because linguistic fluency does not guarantee factual accuracy or pedagogical suitability. Another important development is the use of conversational AI as an academic support tool. AI

catboats can respond to routine questions outside normal class hours, provide practice activities, demonstrate problem-solving procedures, and help students revise key concepts. Such support may increase learner independence, particularly when students cannot immediately consult a teacher. Nevertheless, unrestricted use may encourage students to request finished answers instead of engaging in the intellectual process needed to develop knowledge. The teacher's role therefore does not become unnecessary. Instead, it changes from being the principal source of information to becoming a designer of learning experiences, evaluator of evidence, mentor, discussion leader, and ethical guide. UNESCO's teacher competency framework identifies a human-centered mindset, AI ethics, and knowledge of AI foundations, AI-supported pedagogy, and professional learning as important dimensions of teacher preparation. Effective AI-supported teaching requires teachers to decide when technology adds educational value and when direct explanation, classroom discussion, experimentation, collaborative work, or personal interaction is more appropriate. The educational objective should remain the development of student understanding rather than the production of faster content.

AI-Enabled Assessment and Feedback:

Assessment is one of the areas most directly affected by artificial intelligence. Traditional assessment often depends on periodic examinations, written assignments, quizzes, and projects graded manually by teachers. Although teacher-led evaluation is essential, it can be time-consuming, particularly in institutions with large student populations. Delayed marking may also reduce the usefulness of feedback because students receive comments after they have moved to another topic. AI-supported assessment systems can evaluate selected-response questions, identify common errors, classify student performance, and provide immediate feedback. Some systems can analyze written responses for organization, grammar, vocabulary, argument development, and similarity with existing texts. Learning analytics can combine information from quizzes, attendance, online participation, assignment submission, and platform activity to identify students who may require additional assistance. Immediate formative feedback is educationally valuable because students can correct misunderstandings while the learning activity is still taking place. AI can provide hints rather than complete answers, recommend revision material, and generate additional questions based on areas of weakness. Teachers can then use the resulting information to modify instruction for individuals or the entire class. Artificial intelligence may also improve assessment consistency. A clearly designed automated system can apply the same criteria across a large number of responses, reducing variations caused by fatigue or inconsistent marking. However, consistency should not be confused with validity. A system may apply inappropriate criteria consistently or fail to recognize creative, culturally specific, interdisciplinary, or unconventional responses. Automated grading must therefore be reviewed by qualified teachers, especially when assessment results influence progression, scholarships, admission, certification, or employment. Generative AI has simultaneously weakened the reliability of many conventional take-home assignments. Students can use AI to generate essays, reports, computer code, presentations, and answers that appear original. As AI-generated text becomes increasingly difficult to distinguish from human writing, institutions cannot depend entirely on detection software. Research on academic integrity recommends redesigning assessments so that they evaluate the learning process, personal reasoning, disciplinary application, and the ability to defend conclusions. More reliable assessment approaches may include staged assignments, supervised components, and oral presentations, oral defense of written work, reflective commentary, and drafts with revision histories, locally grounded case studies, practical demonstrations, personalized questions, and documentation of how sources and AI tools were used. The objective is not necessarily to prohibit all AI assistance but to distinguish legitimate support from substitution of the student's intellectual work.

Pedagogical and Institutional Benefits:

The first major benefit of AI is its capacity to support personalized education. Students can receive explanations, exercises, feedback, and learning pathways appropriate to their individual needs. This is particularly useful in mixed-ability classrooms where a single teacher may struggle to provide continuous individualized support. The second benefit is improved access to learning assistance. AI tools may operate outside institutional hours and provide students with immediate academic guidance. Learners who hesitate to ask questions publicly may interact privately with a digital tutor. Students with language difficulties can request simplified explanations, translations, vocabulary support, or examples. Accessibility tools may also convert speech into text, generate captions, summarize lengthy content, and support learners with certain disabilities. Third, AI can improve teacher productivity. Routine activities such as formatting lesson plans, developing practice questions, drafting rubrics, preparing initial feedback, organizing course information, and summarizing performance patterns may be completed more efficiently. The time saved can be redirected toward student mentoring, classroom interaction, research, curriculum improvement, and support for struggling learners. The OECD notes that AI has the potential to free teachers' time, although this benefit depends on the availability of trained teachers who retain professional autonomy over the selection and use of digital tools. These benefits are not automatic consequently; institutions should not measure successful AI adoption by the number of applications purchased. Success should be evaluated through improvements in learning quality, feedback, inclusion, teacher capacity, student engagement, and the validity of assessment.

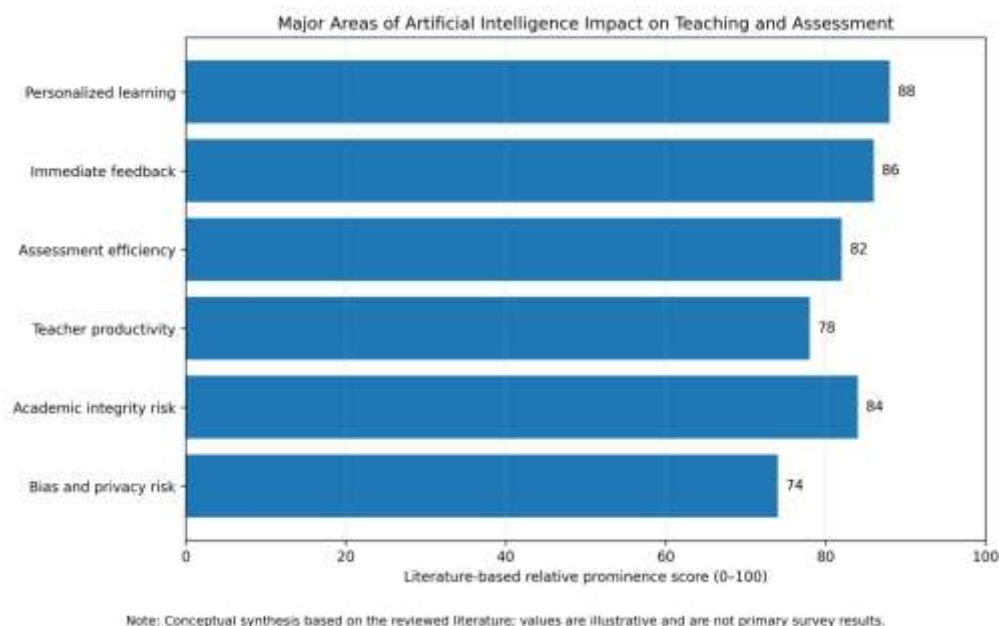
Ethical, Academic and Social Challenges:

Academic integrity is among the most immediate challenges associated with generative AI. Students may use AI to produce work and submit it without acknowledgment. This practice prevents teachers from determining whether the student has achieved the intended learning outcomes. It may also create unfairness between students who complete their own work and those who depend heavily on automated generation. A policy based only on detecting AI-generated text is inadequate. Detection systems can produce uncertain results, and an incorrect accusation can seriously harm a student. Institutions should instead communicate clear rules describing permitted, restricted, and prohibited uses of AI. Students should disclose the tools used, explain how they were used, verify generated information, and remain responsible for the submitted work. Accuracy is another concern. Generative systems produce language by predicting probable patterns rather than by independently verifying every factual statement. They may present invented information, nonexistent references, inaccurate calculations, or misleading explanations in a confident style. Students with limited subject knowledge may be unable to identify these errors. Teachers must therefore teach verification through textbooks, scholarly articles, official data, experiments, and primary sources. Algorithmic bias can influence both teaching and assessment. AI systems learn from data that may contain historical, cultural, linguistic, racial, socioeconomic, or gender inequalities. Automated grading may disadvantage students whose language patterns, educational backgrounds, or forms of expression differ from those represented in the system's training data. The U.S. Department of Education warns that pattern detection and automated decision-making may introduce bias and unfairness, making governance and human oversight essential. Privacy and data protection present further risks. Educational AI systems may collect student writing, voice recordings, behavior, performance information, disability-related details, or personal identifiers. Students and teachers may not know how long these data are retained, whether they are used for model training, or whether they are transferred to external organizations. Sensitive educational information should not be uploaded to public AI platforms without appropriate authorization and protection. Overdependence on AI may weaken critical thinking, creativity, perseverance, and independent writing. Productive learning often involves difficulty, uncertainty, revision, and the gradual development of understanding. When AI immediately completes a task, students may obtain a polished product without

experiencing the intellectual process through which learning occurs. Research therefore recommends using AI to support questioning, feedback, explanation, and reflection rather than simply generating final answers. The digital divide is also important. Students with paid AI subscriptions, modern devices, reliable internet access, and stronger digital literacy may receive greater benefits than students with limited resources. In Pakistan and other developing countries, institutional AI strategies should therefore include shared facilities, low-bandwidth tools, accessible platforms, teacher training, multilingual resources, and alternatives for students who cannot use commercial AI systems.

Framework for Responsible Integration:

Responsible integration should begin with a clearly defined educational purpose. Institutions must identify the teaching or assessment problem before selecting an AI system. Technology should not be adopted merely because it is fashionable. A proposed application should demonstrate how it will improve student learning, feedback, accessibility, instructional quality, or administrative efficiency. Second, institutions need comprehensive AI policies. These policies should define acceptable use by teachers and students, disclosure requirements, data-protection standards, procedures for reviewing automated decisions, and consequences for dishonest use. Chan's AI Ecological Education Policy Framework organizes institutional considerations into pedagogical, governance, and operational dimensions, demonstrating that AI implementation extends beyond classroom activities to infrastructure, training, accountability, privacy, and institutional management. Third, teachers require continuous professional development. Training should include basic AI concepts, prompt design, and verification of outputs, instructional applications, assessment redesign, bias recognition, privacy protection, and academic integrity. Teachers should have opportunities to test AI tools, discuss discipline-specific concerns, and share effective practices. Professional development should not be limited to technical operation; it must connect AI use with curriculum objectives and learning theory. Fourth, students need AI literacy. UNESCO's student competency framework emphasizes preparation for responsible and meaningful engagement with AI. Students should understand that Fifth, assessment design must be revised. Institutions should classify tasks according to whether AI use is prohibited, limited, permitted, or required. An assignment may allow AI for brainstorming but prohibit generated final text. Another may require students to generate an AI response, identify its weaknesses, correct its evidence, and explain the revisions. This approach transforms AI from an invisible shortcut into an object of critical analysis. Sixth, human oversight must remain compulsory in high-stakes decisions. AI may assist with preliminary marking, performance analysis, or risk identification, but teachers and authorized academic officers should make final decisions. Students should also have a clear process for questioning or appealing decisions influenced by automated systems. Finally, institutions should monitor outcomes continuously. AI initiatives should be evaluated for accuracy, fairness, accessibility, learning effectiveness, teacher workload, student satisfaction, and unintended consequences. Systems that do not demonstrate educational value or that creates unacceptable risks should be modified or discontinued. UNESCO and the OECD both emphasize that AI should strengthen human agency, inclusion, transparency, and educational quality rather than displace professional responsibility.



Summary:

Artificial intelligence is transforming teaching and assessment by introducing personalized instruction, automated feedback, adaptive learning, content generation, learning analytics, and data-assisted decision-making. It can help teachers prepare materials, differentiate instruction, identify learning difficulties, and reduce the burden of routine tasks. For students, AI can provide immediate explanations, practice opportunities, language support, accessibility assistance, and learning resources beyond normal classroom hours. In assessment, AI can accelerate grading, improve the frequency of feedback, identify common errors, and support continuous monitoring of academic progress. At the same time, generative AI has made conventional written assignments increasingly vulnerable to unauthorized assistance. This development requires institutions to move away from assessment practices that reward only the final product. Greater attention should be given to reasoning, practical application, oral explanation, reflection, drafts, revision history, and evidence of the learning process. The risks of AI include academic dishonesty, fabricated information, algorithmic bias, privacy violations, unequal access, excessive dependence, and reduced human interaction. These problems cannot be resolved through technological solutions alone. AI-detection applications, for example, cannot replace fair institutional procedures, authentic assessment design, or open communication with students. The most appropriate educational approach is neither complete prohibition nor uncritical adoption. AI should be used as a supervised educational assistant operating within clear pedagogical and ethical boundaries. Teachers must retain authority over curriculum, assessment standards, feedback, and high-stakes decisions. Students must remain responsible for the accuracy, originality, and integrity of their work. For Pakistan, responsible AI integration should include investment in digital infrastructure, affordable access, localized content, Urdu and regional-language support, teacher development, data-protection procedures, and institutionally consistent academic-integrity policies. Without these measures, AI may benefit already advantaged learners while increasing inequalities for students with fewer resources.

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