

# AI in Education: Enhancing Efficiency and Engagement Through Innovative Tools

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**Abstract:** Artificial Intelligence (AI) is reshaping education by offering advanced tools that improve instructional efficiency, student engagement, and personalized learning. This article examines the transformative potential of AI in educational environments, emphasizing its capacity to automate administrative tasks, generate adaptive content, provide real-time feedback, and support data-informed pedagogical decisions. The integration of AI empowers educators by reducing workload and enabling a focus on impactful teaching strategies. Through an analysis of current research and practical case studies, this paper highlights the benefits and challenges of AI adoption, including ethical concerns, data privacy, algorithmic bias, and equity in access. It further explores a range of AI-powered tools—such as intelligent tutoring systems, gamified assessment platforms, and content-adaptive learning software—and their effectiveness in enhancing learning outcomes. Ultimately, this study underscores the need for thoughtful implementation, teacher training, and inclusive design to ensure AI contributes to a more equitable and effective educational landscape.

**Keywords:** Artificial Intelligence, AI in education, personalized learning, educational technology, teacher empowerment, challenges, administrative automation, student engagement

## INTRODUCTION

Artificial intelligence (AI) is integrated into various aspects of our daily lives, including web search engines, mobile applications, and healthcare systems (Sánchez-Prieto et al., 2020). In the educational landscape, technology has evolved from a supplementary

tool to an indispensable component of the instructional framework. Among the myriad technological advancements, AI is a potent catalyst, poised to revolutionize pedagogical methodologies and student learning experiences. As educational institutions grapple with increasing demands and elevated expectations, AI tools present a unique opportunity to alleviate administrative burdens, streamline educational processes, and empower educators to deliver high-quality instruction. By embracing AI technologies, educators can optimize workflows and cultivate more dynamic, responsive, and personalized learning environments.

The swift advancements in AI are instigating significant transformations across numerous industries, with education a notable impact area. AI in education utilizes advanced computer systems to enhance teaching and learning processes. These AI technologies can automate administrative tasks, personalize learning experiences, provide real-time feedback, and support data-driven decision-making (Al Nabhani et al., 2025; Ayeni et al., 2024). By implementing AI effectively, educational institutions aim to improve efficiency, engagement, and learning outcomes (Chaudhary et al., 2024). AI simulates human intelligence, encompassing capabilities such as speech recognition, learning, decision-making, and natural language processing. Prat (2019) describes AI as a tool that enhances cognitive abilities by combining human intellect with AI's computational strengths.

The effect of AI on education is evident in its capacity to personalize learning experiences, fundamentally transforming the delivery of instruction. With AI-driven systems, learning can be tailored to each student's needs and pace, making it more effective and engaging (Chaudhary et al., 2024). Additionally, by automating administrative tasks, AI allows teachers to focus more on direct instruction and student interaction, improving teacher effectiveness and reducing workload. Integrating AI into education is no longer a futuristic concept but an evolving reality with the potential to transform teaching and learning. With its capacity to process vast amounts of data, identify patterns, and automate tasks, AI offers unprecedented opportunities to personalize instruction, enhance educator efficiency, and improve student outcomes (Collin et al., 2023). AI-powered data analysis further assists educators in identifying students who need extra support or advanced challenges, leading to more effective interventions. AI tools also enhance remote learning by providing interactive and adaptive resources, making education more accessible and flexible (Matsiola et al., 2024).

Through dynamic, efficient, and customized learning environments, AI is helping to prepare students for future success. The following sections provide a scoping review of the current impact of AI in education, examining the potential benefits and challenges associated with its implementation. This article discusses valuable applications of AI within education, examines the associated challenges and ethical considerations, and showcases successful practices where AI has significantly impacted teaching and learning practices, while also exploring how AI can enhance teaching, offer innovative solutions that augment productivity, personalize learning experiences, and stimulate student engagement.

## **AI IN EDUCATION**

AI in education uses advanced computer systems to enhance teaching and learning processes. These AI technologies can automate administrative tasks, personalize learning experiences, provide real-time feedback, and support data-driven decision-making. By implementing AI effectively, educational institutions aim to improve efficiency, engagement, and learning outcomes (Bobade et al., 2024). AI simulates human intelligence, such as speech recognition, learning, decision-making, and natural language processing (Olaseni, 2024). Prat (2019) describes AI as a tool for enhancing cognitive

abilities like learning and decision-making by combining human intellect with AI's computational strengths. In Education, AI has the potential to revolutionize the field by providing personalized, efficient, and data-driven learning experiences.

AI encompasses various analytical methods, including machine learning, neural networks, and deep learning (Aggarwal, 2018). Machine learning uses algorithms to learn from data and make decisions independently (Popenici & Kerr, 2017). The most common models are supervised, which use labeled training data, and unsupervised, which analyze untagged data to discover unknown patterns (Alenezi & Faisal, 2020). AI is used in education in different ways. For instance, AI is integrated into instructional technologies such as chatbots (Clark, 2020). Previous research conducted on the educational use of AI presented AI's support for student collaboration and personalization of learning experiences (Luckin et al., 2016), scheduling of learning activities and adaptive feedback on learning processes (Koedinger et al., 2012) and reducing teachers' workload in collaborative knowledge construction (Roll & Wylie, 2016).

AI can revolutionize the field by providing personalized, efficient, data-driven learning experiences. AI-powered tools adapt to each student's unique pace and needs, creating customized learning pathways while enabling educators to concentrate on impactful instructional activities (Al Nabhani et al., 2025). Furthermore, AI-driven analytics can identify students who require additional support or those ready for advanced challenges, facilitating targeted interventions (Ayeni et al., 2024). By integrating AI into education, educators can foster more engaging and effective learning environments that better prepare students for the complexities of the 21st century.

AI-powered tools adapt to each student's unique pace and needs, providing customized learning pathways while freeing educators to focus on impactful instructional activities. Furthermore, AI-driven analytics can identify students who need extra support or those ready for advanced challenges, enabling targeted interventions. By integrating AI into education, educators can foster more engaging and effective learning environments that better prepare students for the complexities of the 21st century. Understanding the benefits and challenges of AI-based teaching for teachers is crucial to make AI pedagogically relevant. However, teachers' perspectives in AI-based education have been largely overlooked (Langran et al., 2020).

### **IMPACT ON EDUCATION**

AI's impact on education lies in its ability to personalize learning experiences, transforming instruction delivery. With AI-driven systems, learning can be tailored to each student's needs and pace, making it more effective and engaging. Additionally, by automating administrative tasks, AI allows teachers to focus more on direct instruction and student interaction (Ilkka, 2018). Integrating AI into education is no longer a futuristic concept but an evolving reality with the potential to transform teaching and learning (Holmes, 2020). With its capacity to process vast amounts of data, identify patterns, and automate tasks, AI offers unprecedented opportunities to personalize instruction, enhance educator efficiency, and improve student outcomes. Shan and Liu (2021) propose a Hybrid Teaching model combining AI with the Flipped Classroom, leveraging big data, cloud, and online applications for tailored learning. AI-powered data analysis further helps educators identify students who need extra support or advanced challenges, leading to more effective interventions. AI tools also enhance remote learning by providing interactive and adaptive resources, making education more accessible and flexible. Through dynamic, efficient, and customized learning environments, AI is helping to prepare students for future success.

Artificial Intelligence AI has a dual impact on student learning experiences. On the positive side, it offers immediate feedback, personalized learning, continuous support, resource access, and data analytics (Huang et al., 2021; Chan & Hu, 2023; Aithal & Aithal,

2023). These advantages enhance engagement, learning effectiveness, and self-directed learning among students. Conversely, AI's negative impact includes limited interaction, academic integrity issues such as plagiarism, technology dependence, and restricted practical experiences (Ali et al., 2024; Michel-Villarreal et al., 2023). The lack of face-to-face interactions can adversely affect mental health and motivation. Moreover, AI's structured approach may impede the development of creative and critical thinking skills essential for future careers (Nguyen et al., 2024). Maintaining academic integrity and ensuring AI accommodates diverse learning needs is crucial for optimizing students' learning experiences. The following section provides a scoping review of the current impact of AI in education, evaluating the potential benefits and challenges associated with its implementation.

### *CHALLENGES*

Integrating AI into teaching and learning, while promising significant advancements in personalized education and automation, also introduces complex challenges that impact educators and students. Though the potential for transformation is immense, the journey toward effective and ethical AI integration requires navigating these obstacles with care and intention. One pressing issue is that many AI applications currently available in education are developed primarily for commercial interests rather than educational improvement. Frequently, AI developers lack comprehensive knowledge of the learning sciences and are often unfamiliar with the practical realities that teachers face in the classroom (Luckin & Cukurova, 2019). This gap can result in technologically impressive tools misaligned with real instructional needs, limiting their effectiveness and adoption.

Furthermore, the challenge extends beyond technical and commercial considerations. Successful implementation of AI in education demands a collaborative approach, involving input from educators, researchers, and technologists to ensure that these tools support pedagogical goals and foster meaningful learning experiences. Without this cooperation, there is a risk that AI solutions might prioritize efficiency or data collection over genuine educational enrichment.

As schools and institutions look to harness AI's potential, developing professional development programs that equip educators with technical know-how and the pedagogical understanding necessary to integrate AI meaningfully into their teaching practices becomes crucial. In summary, while AI holds great promise for revolutionizing education, realizing its benefits hinges on bridging the gap between technological innovation and educational expertise. Only then can AI become a trusted partner in cultivating dynamic, equitable, and effective learning environments.

### *CHALLENGES FOR EDUCATORS*

Educators face several key challenges in adopting artificial intelligence (AI) in academic settings. A primary concern is inadequate knowledge and training regarding AI's applications and limitations. Research indicates a significant confidence gap among educators, with many reporting low self-efficacy in using AI tools effectively (Delello et al., 2025). This highlights the need for comprehensive professional development that goes beyond introductory workshops and focuses on building deep, practical competencies. The integration of AI also requires a re-evaluation of curricula and pedagogical strategies. Educators must learn to harness AI to enhance learning experiences without displacing traditional methods. This involves designing instructional approaches that balance AI's capabilities with human interaction and collaborative learning (Abrams, 2025). A pressing ethical and practical challenge is AI's impact on academic integrity. The ease with which AI can generate content raises concerns about cheating and plagiarism. Educators often

struggle to establish clear guidelines for AI use and to detect AI-generated content, especially given the limitations and false positives associated with current detection tools.

AI systems can perpetuate algorithmic bias and disseminate misinformation. Since AI models are trained on large datasets that may contain societal biases, their output can inadvertently reinforce discrimination, particularly against marginalized student groups. AI-generated errors require educators to teach students to critically assess AI information and remind them that it cannot replace thorough academic research. Practical barriers also persist, including resource constraints and inadequate infrastructure. Equitable access to AI tools and supporting technologies is not universal, which risks exacerbating the digital divide (Alghamdi, 2023). Finally, there is concern about the potential reduction in human interaction. Over-reliance on AI might diminish meaningful teacher-student and peer-to-peer engagement, essential for developing social and emotional skills. Because of this, instructors must encourage student engagement and decrease any barriers that may hinder the learning process.

### *CHALLENGES FOR STUDENTS*

There are additional concerns associated with the widespread use of AI in education. Furthermore, security and privacy invasions arise because most AI-powered applications seek and gather users' data, often without their consent. Technology in education can lead to feelings of disconnectedness from learning, curriculum, peers, teachers, and devices. By offering enhanced interactivity, AI-infused classes enable students to actively engage in learning, rather than passively observing and losing focus. However, the technology supporting this can also lead to student disconnectedness, manifesting as a sense of separation from the learning material, classmates, instructors, and even the devices used. This disengagement negatively impacts learning outcomes, reducing student ownership and agency (Dimitriadou & Lanitis, 2023).

Excessive automation can also lead to social isolation and reduced levels of interpersonal engagement, which significantly diminishes the role of teachers in the teaching and learning process. Ethical challenges related to AI applications in education include bias and discrimination (automatic scoring methods), surveillance (personalized learning systems), and autonomy (predictive systems) (Akgun & Greenhow, 2022). Additionally, some students have expressed concern regarding the reliability of Generative AI technologies. ChatGPT lacks the originality and creativity inherent to humans (Chan & Hu, 2023) and cannot generate a thesis for postgraduate students.

## **SYSTEMATIC EMPIRICAL EVIDENCE SUPPORTING AI TOOLS IN EDUCATION**

To move beyond broad trend analyses and ensure clarity about where verified evidence ends and aspirational claims begin, this section systematically accounts for recent experimental, quasi-experimental, and design-based studies on AI in education. Organized tool by tool, the review highlights empirical findings related to Brisk Teaching, QuestionWell, Magic School, Wayground, and Diffit. This approach allows educators and researchers to discern better the demonstrated affordances and challenges of each tool, while also identifying areas where gaps in evidence remain and further study is warranted.

While AI's theoretical affordances are widely discussed, its classroom implementation must be grounded in empirical evidence to distinguish verified impact from aspirational claims. Several experimental, quasi-experimental, and design-based studies have begun to establish the effectiveness of specific AI tools across various educational settings. A quasi-experimental study by Eltahir and Babiker (2024) found that pre-service teachers using AI-enhanced learning tools in an educational technology course significantly outperformed peers receiving traditional instruction. Improvements were noted in academic performance,

critical thinking, and motivation, supporting the claim that AI-facilitated personalization improves learning outcomes. Similarly, Chaudhary et al. (2024) conducted an experimental study involving AI-powered adaptive assessments in higher education and reported higher engagement levels and academic gains among students using intelligent feedback mechanisms.

In K–12 settings, design-based research by Bonneton-Botté et al. (2020) demonstrated the effectiveness of AI-supported handwriting applications for students with fine motor delays. The AI tools provided tailored feedback and practice, helping learners improve foundational skills. Another quasi-experimental design by Huang et al. (2021) examined AI tutoring systems in primary education, showing that students receiving adaptive tutoring support exhibited increased self-efficacy and test performance compared to control groups.

Teacher professional development has also benefited from AI integration. Tammet and Ley (2023) illustrated how AI tools embedded within a professional learning model enhanced teachers' ability to notice and respond to classroom patterns, suggesting that AI can positively influence pedagogical decision-making. Their design-based approach reinforced the value of co-design between educators and AI developers to ensure meaningful alignment with instructional goals.

Despite these positive findings, the literature also documents mixed outcomes, notably when AI implementation lacks pedagogical coherence or ethical issues (e.g., data bias, equity gaps) are not proactively addressed (Ali et al., 2024). This underscores the need for critical evaluation and context-aware deployment of AI in educational environments. Emerging empirical research supports AI's transformative potential in education, but also signals the importance of implementation fidelity, educator agency, and institutional support to maximize its benefits.

Table 1. *AI Tool Affordances, Challenges, and Maturity Level*

AI Tool	Pedagogical Affordances	Documented Implementation Challenges	Maturity Level*
Brisk Teaching	Automated essay feedback, lesson plan generation, reading level adjustment, and multilingual translation	Requires teacher training to leverage the complete feature set; the quality of AI feedback varies with input.	Early adoption in K–12 and higher ed; high functionality but evolving
QuestionWell	Content scanning across media, standards-aligned question generation, and export to LMS	Generated questions may require refinement and occasional misalignment with the local curriculum.	Emerging maturity; rapidly expanding user base
Magic School	Automated lesson planning, grading, interactive content creation, and AI chatbots	Over-reliance risk; requires integration with existing pedagogical models	Moderate maturity; integrated into multiple institutions
Wayground	Gamified assessments, interactive lessons, and analytics for progress tracking	Can favor surface learning if game mechanics overshadow content	High maturity; well-established in K–12 and higher ed
Diffit	Reading level adaptation, differentiated materials, vocabulary support	Limited to text-based content; requires teacher oversight for accuracy	Early maturity; growing adoption in inclusive education

### SUCCESSFUL PRACTICES AND INTEGRATION

As AI educational tools become more common, research is growing for educators to utilize. Bonneton-Botté et al. (2020) found that teachers used AI feedback to implement exercises like writing letters and numbers for students with low graphomotor skills. Our synthesis shows AI can make teaching more engaging, with teachers reporting that AI-tutors helped break classroom monotony (McCarthy et al., 2016). The following case studies provide practical illustrations of AI tools' application in education. They offer valuable insights into the benefits, challenges, and implications of integrating these technologies into various learning environments.

Table 2. *Instructional Objectives Mapped to AI Tool Features*

Instructional Objective	Example AI Tools	Core Features Supporting the Objective
Formative Feedback	Brisk Teaching, Magic School	Automated, detailed writing feedback; adaptive quizzes; rubric generation
Adaptive Practice	Diffit, Magic School	Reading level adjustment; personalized learning pathways
Content Generation	Brisk Teaching, QuestionWell, Magic School	Lesson and unit plan creation; standards-aligned question generation
Gamified Learning	Wayground	Leaderboards, points, and power-ups to increase engagement
Learning Analytics	Wayground, Magic School	Real-time performance dashboards; progress monitoring

### THE INFLUENCE OF ARTIFICIAL INTELLIGENCE TOOLS ON STUDENT PERFORMANCE IN E-LEARNING ENVIRONMENTS

The case study by Eltahir and Babiker explored the impact of artificial intelligence (AI)-driven personalized learning tools on pre-service student teachers' academic performance and attitudes. This study was conducted within an educational technology course, a mandatory component of the Professional Postgraduate Diploma in Teaching program at Ajman University. Using a quasi-experimental research design, this study compared two groups: an experimental group of 55 student teachers using AI-enhanced learning tools and a control group of 55 students receiving traditional instruction.

Data was collected through pre- and post-tests, rubric-based essay assessments, and a questionnaire measuring performance, knowledge retention, critical thinking, motivation, and engagement. This study specifically examined the effects of integrating AI tools with the Moodle platform compared to conventional teaching methods. Statistical analysis revealed that the experimental group demonstrated significant advantages over the control group in several areas. These students demonstrated improved academic performance, better knowledge retention, and enhanced critical thinking, motivation, and engagement. These findings highlight the potential of AI-powered personalized learning tools to transform teacher education. Such tools enable personalized instruction, intelligent tutoring, automated grading, and adaptive learning, ultimately leading to more effective and inclusive learning environments (Eltahir & Babiker, 2024). The researchers concluded that AI integration could enhance student learning outcomes, increase engagement, and optimize educator workload.

### INTEGRATING AI TOOLS IN TEACHER PROFESSIONAL LEARNING: A CONCEPTUAL MODEL AND ILLUSTRATIVE CASE

Kairit Tammet and Tobias Ley (2023) explore the intricate dynamics of integrating artificial intelligence (AI) technologies into teacher professional learning. The focus is on how AI can synergistically enhance key aspects of teacher practice, particularly teacher

noticing and subsequent decision-making. This study also explores AI's potential to facilitate adaptive teaching strategies, ensure alignment with competence frameworks, and foster professional vision.

One of the key arguments in this paper is the shift in perspective regarding adopting AI in education. Rather than focusing solely on the technical aspects of AI implementation or the role of teachers in designing AI tools, this study emphasizes the teacher's perspective. It investigates how AI tools can be meaningfully integrated into teaching practices to enhance their effectiveness, emphasizing the importance of pedagogical considerations and the teacher's agency in the process.

This conceptual work further illustrates a novel approach to teacher training that combines the development of professional vision and professional learning with AI solution design. This integrated model emphasizes the importance of actively involving teachers in designing and developing AI tools. Teachers can better understand the potential and limitations of AI in their practice by participating in professional learning models that emphasize knowledge-based reasoning skills, pedagogical concepts, and the creation of new mental models (Tammets & Ley, 2023). This collaborative approach ensures that AI tools are not simply imposed upon teachers but are co-created with them, fostering a more effective and sustainable integration of AI in education.

## **EMPOWERING EDUCATORS WITH EFFICIENCY THROUGH AI TOOLS**

The swift advancements in Artificial Intelligence are instigating significant transformations across numerous industries, with education being a notable area of impact (Popenici & Kerr, 2017). AI tools offer educators a remarkable chance to transform teaching, streamline their work processes, and tailor learning to individual student needs (Hu, 2024). This shift transcends mere automation; it centers on empowering educators to concentrate on the fundamental elements of their profession: nurturing student development and promoting in-depth learning.

One primary way AI empowers educators is by increasing efficiency and decreasing the time dedicated to administrative tasks. Artificial intelligence tools can automate time-consuming tasks like grading assignments. This is particularly beneficial given the increasing importance of providing individualized feedback in education (Mao et al., 2024). For instance, platforms like Diffit leverage AI to streamline the assessment of diverse assignments, ranging from essays to multiple-choice quizzes. Furthermore, AI can aid in other administrative functions, including monitoring attendance and composing communications, enabling educators to allocate more time to lesson design and student interaction (Popenici & Kerr, 2017).

AI tools offer significant benefits to education beyond mere administrative support. AI-powered platforms can personalize the teaching and learning experience by analyzing student data. This includes modifying content and activities to align with students' unique learning requirements and preferences. This personalization accommodates varied learning styles and ensures students can progress at their own pace, fostering a more profound comprehension of the subject matter. Moreover, AI can facilitate the development of more interactive and engaging educational settings. Educators can leverage dynamic lesson creation tools like Wayground and QuestionWell to enhance student engagement and motivation. These platforms enable the integration of real-time feedback mechanisms and collaborative activities into lessons. This interactive approach fosters a more engaging learning environment for students.

Integrating artificial intelligence provides educators with significant data-driven advantages. AI analytics can track student progress, identify specific areas of difficulty, and evaluate the efficacy of different instructional approaches. This data can inform

pedagogical decisions, enabling educators to refine their teaching approaches and offer focused student support. Additionally, AI can play a critical role in advancing inclusive education. Assistive technologies are crucial in creating more inclusive educational settings for students with disabilities. One notable example is speech recognition software, which offers numerous benefits. For students who struggle with writing due to physical limitations or learning disabilities like dyslexia, speech recognition can provide an alternative means of expressing their thoughts and ideas. Converting spoken words into text bypasses the challenges associated with handwriting or typing, allowing students to participate more fully in classroom activities and demonstrate their understanding of the curriculum. This enhances their academic performance and fosters greater independence and self-confidence.

Furthermore, implementing assistive technologies like speech recognition contributes to a more equitable learning environment. Traditional methods of instruction and assessment can inadvertently create barriers for students with disabilities, limiting their access to education and their ability to showcase their knowledge. By providing tools that accommodate diverse learning needs, schools can level the playing field and ensure all students have an equal opportunity to succeed. This commitment to accessibility aligns with universal learning design principles, which advocate for creating flexible learning environments adaptable to individual differences. Therefore, integrating assistive technologies is not merely a matter of providing support but a fundamental step towards creating a truly inclusive and equitable educational system.

Artificial intelligence tools are designed to support, not replace, educators. By handling administrative tasks, customizing education to individual needs, and providing data-driven insights, AI empowers teachers to be more efficient and impactful. This technology enables educators to create more interactive, accessible, and student-focused classrooms, ultimately improving educational outcomes. AI fosters a collaborative learning environment by enabling real-time feedback and communication between students and teachers. Tools like AI-driven discussion platforms can facilitate deeper engagement and understanding of the subject matter. AI also encourages continuous professional development among educators, offering insights into teaching practices and helping them refine their strategies based on student performance data. Integrating AI into education can create a more responsive and adaptive learning ecosystem that benefits teachers and students. Many AI tools can be used to support student engagement and boost teacher productivity. The following are some frequently used AI tools. Most are user-friendly, have video tutorials, and have active online user communities. These communities can help instructors learn best practices and foster other innovative ways to incorporate AI into learning.

#### *AUTOMATED CONTENT CREATION AND FEEDBACK*

One of the most notable areas where AI contributes to instructor efficiency is content creation and lesson planning. Traditionally, designing high-quality instructional materials requires significant time and effort, often limiting educators' ability to provide multiple learning pathways for diverse students. AI-powered platforms now streamline this process by rapidly generating comprehensive lesson plans, unit outlines, and curriculum ideas, dramatically reducing the initial time investment in instructional design (Hu, 2024). These platforms can produce diverse resources—including differentiated tasks, vocabulary lists, and practice questions of multiple formats (e.g., multiple-choice, short answer, and open-ended prompts)—that align with instructional goals and cognitive demand levels such as Bloom's Taxonomy.

In addition to creating new content, AI tools enable the dynamic adaptation of existing materials. Educators can effortlessly adjust reading levels, translate texts into multiple

languages, or modify instructions to accommodate students requiring individualized education plans (IEPs) or struggling with comprehension. This adaptive functionality supports inclusivity by ensuring all learners have equitable access to curricular materials (Ravaglia, 2024). AI-generated scaffolds such as sentence starters, simplified glossaries, and comprehension guides further help students engage with content at their own pace.

Another key contribution lies in AI's ability to generate formative assessment materials and immediate feedback loops. For example, platforms can automatically create exit tickets, quizzes, and rubrics that provide instant insights into student understanding (Chaudhary et al., 2024). Brisk Teaching, for instance, allows teachers to upload essays and receive detailed, criterion-based feedback, reducing grading burdens while ensuring consistency in evaluation. These automated feedback systems save teachers' time and help students improve through actionable, real-time guidance.

AI's role also extends to enhancing instructional interactivity. By generating discussion questions, polls, and interactive slide decks, tools like Magic School and QuestionWell enable instructors to design lessons that encourage critical thinking and collaboration. This capacity fosters active learning environments, aligning with constructivist approaches where knowledge is co-created through dialogue and exploration. Recent quasi-experimental studies confirm that AI-driven formative feedback and interactive materials can significantly improve student motivation and critical thinking skills compared to traditional instruction (Eltahir & Babiker, 2024).

Despite its clear advantages, reliance on AI for content creation is not without challenges. Concerns include the accuracy and contextual alignment of generated materials, as AI outputs may occasionally produce errors, cultural mismatches, or overly simplified interpretations of complex topics. Educators must review, refine, and contextualize AI-generated content to ensure pedagogical coherence and academic rigor. Moreover, there is a risk of over-reliance, where instructional creativity is reduced if teachers lean too heavily on automated generation rather than their professional expertise (Luckin & Cukurova, 2019).

AI-powered content creation and feedback tools represent one of AI's most practical and transformative educational applications. When implemented thoughtfully, they empower educators to allocate more time to higher-order instructional tasks—such as facilitating inquiry, mentoring students, and engaging in differentiated instruction—while ensuring that learners receive timely, personalized support. By balancing automation with professional judgment, educators can harness these tools to foster more efficient, inclusive, student-centered learning environments. Table 3 provides a comparative overview of key AI platforms and their affordances, feedback mechanisms, and associated challenges in supporting automated content creation and instructional feedback.

Table 3. *AI Platforms for Automated Content Creation and Feedback*

AI Tool	Content Creation Affordances	Feedback Capabilities	Documented Challenges
Brisk Teaching	Generates lesson plans, rubrics, presentations, and differentiated reading materials	Provides automated essay feedback on grammar, structure, and content	Requires teacher oversight to validate accuracy; feedback quality varies with input
QuestionWell	Scans documents, slides, websites, and videos to generate standards-aligned discussion questions	Enables quick export to Google Forms, Canvas, and other platforms	Generated questions are sometimes misaligned with the local curriculum; refinement is required

Magic School	Creates comprehensive lesson plans, quizzes, and interactive activities	Automates grading and provides adaptive, personalized student feedback	Risk of over-reliance; educators must align content with pedagogical models
Diffit	Adapts reading passages to multiple grade levels and generates vocabulary lists, worksheets	Supports formative assessment with tiered comprehension questions	Limited to text-based content; occasional oversimplification requires teacher review
Wayground	Produces gamified quizzes, flashcards, and interactive lessons	Offers real-time analytics dashboards on student performance	Gamification may prioritize surface-level engagement over deeper learning if not carefully integrated

*Note. The table summarizes the affordances, feedback features, and challenges of AI platforms commonly used for content creation and instructional feedback.*

### **BRISK TEACHING**

Brisk Teaching is an advanced AI-powered tool that significantly assists educators by streamlining various teaching tasks. With over 30 different features, this software enhances the efficiency and effectiveness of education processes. One of its primary functionalities is the automated essay feedback feature, which enables teachers to upload student essays and receive comprehensive feedback on grammar, structure, and content. This feature saves educators time while ensuring students receive consistent, detailed, and constructive feedback on their writing.

Additionally, Brisk Teaching can generate lesson plans based on specific topics or learning objectives, simplifying the planning process. Educators can create comprehensive and coherent lesson plans quickly and efficiently. The software also includes a reading level conversion tool that helps teachers adjust the complexity of reading materials to suit various student reading levels, making it easier to implement differentiated instruction.

Brisk Teaching employs AI to facilitate accessible and inclusive learning through its “Change Reading Level” feature. This innovative tool allows users to input any web article into a Google Doc, where the reading level can be seamlessly adjusted to meet the needs of diverse learners. By simplifying complex texts, teachers can focus on the core concepts, ensuring comprehension for students of varying abilities. To further enhance accessibility, Brisk Teaching also offers translation options for articles in multiple languages, promoting multilingual understanding and breaking down language barriers (Ravaglia, 2024).

Figure 1 includes several other valuable tools for educators. The AI Quiz Maker, for example, allows teachers to create quizzes in Google Forms and Docs, complete with embedded answer keys, providing a streamlined method for assessing student understanding. The AI Presentation Maker enables educators to craft engaging presentations from scratch or by incorporating content from articles, websites, and YouTube videos, enhancing instructional delivery. Another notable functionality is the AI Rubric Generator, which helps educators quickly create clear and detailed assessment rubrics, outlining criteria and expectations for student work. The AI Syllabus Generator supports instructors by simplifying the creation of course syllabi, ensuring that course goals and expectations are effectively communicated. Brisk Teaching also provides tools for professional communication, such as the AI Email Writer, which assists educators in composing professional emails to communicate with parents and colleagues. The AI Newsletter Generator also helps create engaging newsletters to keep the school community informed and connected. Brisk Teaching seamlessly integrates into existing educational routines, significantly reducing educators’ time on grading, lesson planning, and providing

personalized feedback. By automating these tasks, instructors can focus more on engaging instructional activities and fostering student engagement, ultimately enhancing the overall educational experience.

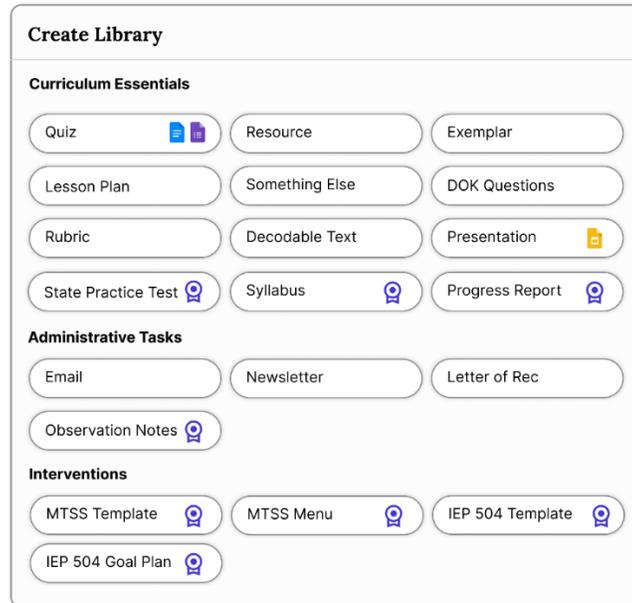


Figure 1. Screenshot of Brisk Teaching dashboard displaying AI-powered lesson planning, rubric creation, and reading level adjustment tools

### *INTERACTIVE CONTENT & QUESTION GENERATION*

Integrating AI into educational practices presents a paradigm shift in creating and delivering learning materials. Specifically, AI's capacity to efficiently scan existing content and subsequently generate pertinent questions for learning and discussion offers significant advantages for educators. This capability not only streamlines pedagogical preparation but also enhances the depth and personalization of the learning experience.

Traditionally, creating practical questions for quizzes, assignments, and class discussions is labor-intensive, requiring educators to meticulously review content, identify key concepts, and formulate questions that align with learning objectives and cognitive levels (Bloom's Taxonomy). AI-powered tools, particularly those built upon large language models (LLMs), can automate this process, generating a diverse range of questions, from recall-based to analytical and evaluative, in a fraction of the time (Bhowmick et al., 2023). This automation frees up valuable educator time, allowing them to focus on higher-order tasks such as individualized student support, curriculum development, and fostering dynamic classroom interactions.

AI's ability to scan content and generate questions can revolutionize differentiated instruction. By analyzing student performance data or individual learning profiles, AI can tailor questions to suit varying levels of comprehension and learning styles within a single classroom (Chen et al., 2022). For instance, AI can generate simpler, foundational questions for students struggling with the material after scanning a complex text while producing more challenging, application-based questions for advanced learners. This adaptive questioning ensures that all students are appropriately challenged and supported, fostering a more inclusive and effective learning environment.

Beyond mere recall, AI can be prompted to generate questions that encourage higher-order thinking skills. AI can formulate questions requiring synthesis, analysis, evaluation, and creative problem-solving by understanding a text's semantic relationships and conceptual hierarchies (Zeghouani et al, 2024). For example, instead of simply asking

“What is X?”, an AI can generate questions like “Compare and contrast X and Y, providing real-world examples,” or “Critically evaluate the implications of Z on modern society.” This capability empowers educators to move beyond surface-level understanding, guiding students towards a more profound engagement with the subject matter and cultivating essential critical thinking abilities.

AI-generated questions can serve as excellent prompts for classroom discussions, sparking intellectual curiosity and encouraging collaborative learning. Educators can quickly deploy AI to generate open-ended questions based on recent readings, providing a structured yet flexible framework for student dialogue. Furthermore, the rapid generation of questions supports ongoing formative assessment. Educators can quickly create short quizzes or exit tickets to gauge student understanding in real-time, identifying areas where further instruction or clarification is needed.

### *QUESTIONWELL*

QuestionWell is an advanced AI-powered tool designed to enhance the creation of interactive and dynamic learning experiences for educators. This tool streamlines various aspects of lesson planning and content creation by leveraging advanced technology, helping instructors engage students more effectively. One of the primary functionalities of QuestionWell is its content-scanning capability. The software analyzes a wide range of content to extract pertinent information, including documents, images, slides, websites, videos, and text. This comprehensive scanning process ensures that educators have access to diverse content from various sources, enabling a holistic and well-rounded approach to lesson planning.

A significant feature of QuestionWell is its ability to generate high-quality learning outcomes and discussion questions based on the scanned content. These questions are carefully crafted to align with educational standards and curriculum requirements, helping educators stay on track while meeting learning objectives. The software’s robust question-generation functionality saves valuable time for instructors, ensuring that the instructional materials are consistent and relevant to the subject matter.

As shown in Figure 2, QuestionWell offers extensive customization options, allowing educators to select, edit, and filter the generated questions according to specific learning outcomes or standards. This flexibility ensures the content can be tailored to each educator’s unique instructional needs and preferences. Additionally, the tool supports various export options, allowing instructors to seamlessly integrate the generated questions and readings into educational platforms such as Canvas, Google Forms, and Wayground. To enhance the user experience further, QuestionWell includes a feedback mechanism allowing educators to provide input on the generated questions. This feature enables the AI to refine its question-generation process continually, ensuring that the tool evolves to better meet educators’ needs. QuestionWell fosters a more adaptive and personalized learning experience by incorporating users’ feedback. Question Well plays a significant role in enhancing the quality and effectiveness of educational experiences by streamlining the lesson-planning process and offering customizable, standards-aligned content.



Figure 2. Screenshot of QuestionWell interface illustrating lesson planning and student engagement

### *COMPREHENSIVE AI FOR TEACHING EFFICIENCY*

Integrating comprehensive artificial intelligence (AI) into education represents a pivotal advancement in improving teaching efficiency. Comprehensive AI refers to multifaceted systems that can support educators across various instructional and administrative tasks, from lesson planning to individualized student feedback. Unlike narrowly focused AI applications, comprehensive AI systems are designed to act as instructional partners, streamlining routine responsibilities while enhancing pedagogical effectiveness (Luckin et al., 2016). By automating time-consuming duties such as grading, content creation, and progress tracking, comprehensive AI enables educators to dedicate more time to high-value interactions, such as mentoring and differentiated instruction (Zawacki-Richter et al., 2019).

Research suggests that one of the most substantial benefits of AI in education is its ability to personalize learning at scale, adapting content and pacing based on individual student performance and learning preferences (Holmes et al., 2019). This personalization is achieved through data-driven insights that allow educators to make real-time decisions. When AI systems are comprehensively integrated, they serve not only as reactive tools but as proactive co-facilitators of instruction. For instance, AI can flag at-risk students, recommend scaffolded resources, or suggest alternative instructional strategies to match diverse learning needs (Chen et al., 2020).

Moreover, comprehensive AI enhances collaborative teaching practices as a centralized intelligence system aggregating learning analytics across classes and schools. Teachers can use these insights to reflect on instructional efficacy, align with schoolwide goals, and make evidence-based decisions about curriculum design. As such, AI supports a shift from reactive to proactive pedagogy, where decisions are informed by predictive modeling and pattern recognition, reducing inefficiencies caused by fragmented data and inconsistent interventions (Tuomi, 2018). However, effective deployment of comprehensive AI in classrooms requires professional development and thoughtful alignment with pedagogical goals. Teachers must be empowered to use these tools and critically understand their underlying logic, limitations, and ethical implications. Studies emphasize the importance of "AI literacy" for educators, advocating for training that covers

data interpretation, algorithmic bias, and responsible use of automated systems (Long & Magerko, 2020). Without this foundation, there is a risk that comprehensive AI may be underutilized or misapplied, limiting its potential to transform instructional practice.

As AI continues to evolve, tools that embody comprehensive functionality, such as AI-powered lesson generators, intelligent tutoring systems, and administrative bots, are poised to become essential components of modern education. These systems promise to alleviate cognitive and logistical burdens on teachers, enabling them to focus more deeply on fostering student engagement, critical thinking, and socio-emotional development. The following section explores Magic School AI, a platform that exemplifies the principles of comprehensive AI in practice, offering an integrated suite of tools designed to enhance educator efficiency and instructional quality.

### *MAGIC SCHOOL*

Magic School is an advanced AI-powered educational platform significantly enhancing teaching efficiency and student engagement. One of its core functionalities is automated lesson planning. This feature streamlines the lesson planning process, enabling educators to save time and focus more on direct instructional activities and student interactions. By leveraging AI, Magic School ensures that lesson plans are comprehensive, coherent, and aligned with educational standards.

Another key feature of Magic School is its grading and feedback functionality. The platform offers powerful grading tools that provide adaptive, personalized feedback tailored to individual students' needs. This approach helps teachers offer specific support to each student, ultimately improving learning outcomes. Automating the grading process also reduces the administrative burden on educators, freeing up time for other essential tasks.

Magic School also excels in content creation, offering tools for developing engaging educational materials such as quizzes, assessments, and interactive activities. These tools help educators create dynamic learning experiences that capture students' interest and foster a deeper understanding of the subject. Additionally, the platform includes AI-powered proofreading and summarization tools, ensuring educational content is clear, accurate, and well-organized.

The tool integrates features like AI chatbots and interactive activities to enhance student engagement further, promoting active learning and keeping students engaged. These elements make learning more enjoyable and encourage students to participate actively in their education, enhancing the overall learning experience. By streamlining administrative tasks, improving educational outcomes, and fostering a more interactive, individualized learning environment, Magic School empowers educators to deliver high-quality education more efficiently and effectively.

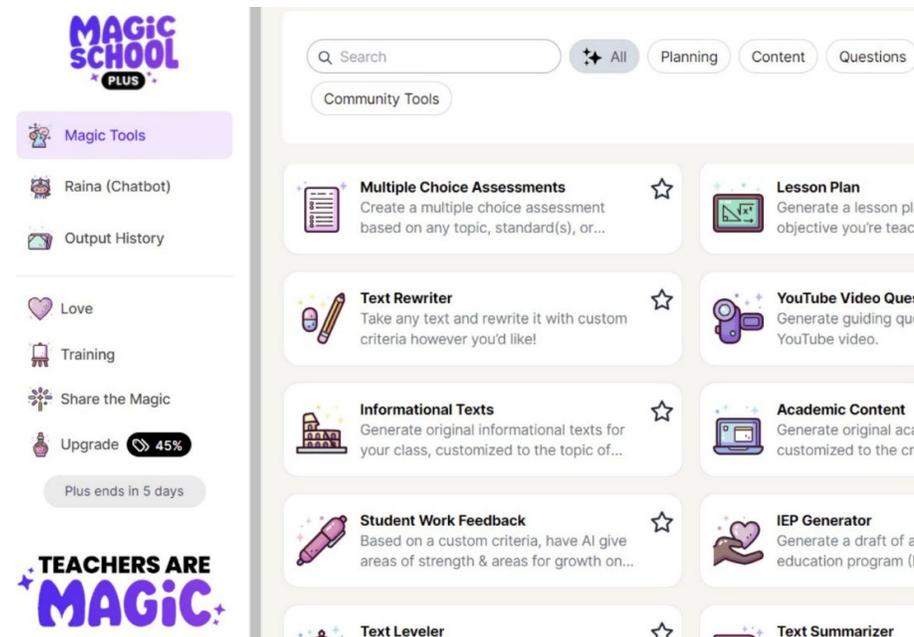


Figure 3. Screenshot the various tools available in Magic School AI that focus on education enhancement

### *GAMIFIED ASSESSMENT & INTERACTIVE LESSONS*

Integrating gamified assessment and interactive lesson design has become an increasingly effective strategy in modern education, particularly within digital and blended learning environments. Gamification refers to using game design elements—such as points, badges, leaderboards, and challenges—in non-game contexts to enhance engagement and motivation (Deterding et al., 2011). When applied to assessment, these elements can transform routine testing into dynamic and motivating experiences, encouraging students to participate more fully and persist through challenges. Interactive lessons, which leverage multimedia, real-time feedback, and adaptive learning pathways, further complement gamification by promoting active engagement. These pedagogical strategies are rooted in constructivist and social learning theories, where learners construct knowledge through experience, interaction, and collaboration (Vygotsky, 1978). Interactive lessons provide opportunities for immediate feedback, self-pacing, and peer competition or collaboration, which have increased cognitive engagement and retention (Mayer, 2014).

Research supports the efficacy of gamified learning in improving academic outcomes and learner motivation. For example, a Hamari et al. (2014) meta-analysis found that gamification positively affects student engagement and learning outcomes, particularly when game elements align well with instructional objectives. Furthermore, studies suggest that integrating game-based mechanics into formative assessments can increase student motivation and improve performance, particularly among younger and middle-grade learners (Sánchez-Mena & Martí-Parreño, 2017). In addition, gamified assessment can be a valuable tool for differentiated instruction. Because students interact with content at their own pace and receive instant feedback, teachers can more easily identify learning gaps and tailor instruction accordingly (Domínguez et al., 2013). When used alongside interactive digital tools, gamified lessons can foster a more inclusive and equitable learning environment, allowing students of varying abilities and backgrounds to participate meaningfully.

Digital platforms that support gamification—such as Wayground, Kahoot!, and Gimkit—enable educators to implement these strategies easily. These platforms typically include teacher dashboards, data analytics, and customizable content, making them both pedagogically powerful and practical. These tools align with Universal Design for Learning (UDL) principles, supporting multiple means of engagement, representation, and action.

#### WAYGROUND AI

Wayground AI is an interactive online platform designed to enhance the creation and delivery of engaging quizzes and lessons. This tool has become popular among instructors for “gamifying” instruction (seen in Figure 4), which helps keep students engaged and motivated. This fun and competitive atmosphere promotes active participation and boosts student motivation. Educators can create a variety of quizzes, including multiple-choice, fill-in-the-blank, and open-ended questions, allowing for customized assessments that align with specific learning objectives.

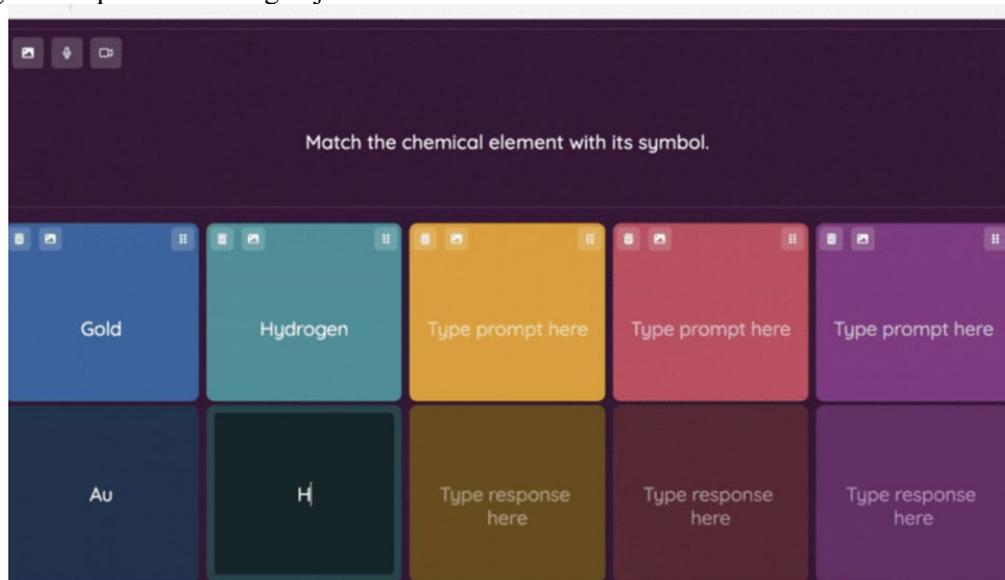


Figure 4. Screenshot from a gamified question created with Wayground AI.

Additionally, Wayground enables the creation of interactive lessons by integrating quizzes, flashcards, and videos, fostering a dynamic and immersive learning environment. The software also incorporates gamification elements such as power-ups, leaderboards, and avatars to motivate students further. Teachers can conduct live, teacher-paced quizzes for real-time interaction or assign asynchronous quizzes for flexible, self-paced learning.

Wayground provides detailed analytics on student performance, giving educators valuable insights into student progress and enabling informed instructional decisions. The platform also offers a vast library of pre-made quizzes and lessons, saving educators significant time and effort. Integrating Google Classroom, Canvas, and Microsoft Teams further enhances its compatibility with existing educational workflows. By offering versatile tools, gamification, flexible session management, and comprehensive analytics, Wayground plays a key role in enhancing both the effectiveness and enjoyment of the educational process.

*DIFFERENTIATED INSTRUCTION & MATERIAL ADAPTATION*

Differentiated instruction has emerged as a foundational approach in contemporary education, emphasizing the need to address students' diverse academic, cognitive, and socio-emotional needs. Grounded in the work of Tomlinson (2014), differentiated instruction involves tailoring content, process, product, and learning environment based on individual student readiness, interest, and learning profile. This approach acknowledges that a one-size-fits-all methodology fails to support equitable access to learning and instead promotes instructional flexibility and student-centered practices.

Material adaptation is critical to differentiated instruction, enabling educators to modify learning resources to meet varying student proficiency levels. Adapting materials involves adjusting text complexity, reformatting assignments, providing scaffolds, and incorporating multimedia to accommodate students with different learning needs and preferences (Hall, Strangman, & Meyer, 2011). This is especially crucial in inclusive classrooms where students may have disabilities, language barriers, or other learning challenges. Through thoughtful adaptation, teachers can ensure that all students engage with grade-level content meaningfully.

Technological tools have greatly enhanced the feasibility of differentiated instruction and material adaptation. Digital platforms allow for the dynamic customization of texts and learning activities, offering multimodal representations and alternative pathways for student engagement. Coubergs et al. (2017) state that technology-assisted differentiation empowers teachers to manage diverse learning groups efficiently, automate content tailoring, and provide immediate, personalized feedback. As classrooms become increasingly heterogeneous, such tools are vital in maintaining instructional equity and fostering learner autonomy.

Furthermore, research underscores the academic benefits of differentiated instruction. A meta-analysis by McQuarrie, McRae, and Stack-Cutler (2010) found that students exposed to differentiated practices showed improved engagement and academic outcomes compared to those in traditional classrooms. These outcomes are especially pronounced for students with learning difficulties and those from linguistically and culturally diverse backgrounds. Thus, differentiated instruction and material adaptation support academic achievement and promote inclusive and responsive teaching environments. Differentiated instruction and material adaptation are essential strategies in modern pedagogy, especially within diverse and inclusive educational settings. As educators strive to meet the needs of all learners, integrating digital tools that support these practices, such as the Diffit tool discussed in the following section, has become increasingly important.

*DIFFIT*

Diffit is an AI-powered tool designed to help educators create differentiated instructional materials tailored to diverse student needs. The platform adapts reading passages, articles, or excerpts to multiple reading levels, ensuring accessibility for students across a wide range of proficiencies. By automatically generating simplified versions of complex texts, Diffit promotes inclusivity, enabling students with varying literacy skills, English language learners, and students with disabilities to engage with grade-level content meaningfully.

Beyond text adaptation, Diffit streamlines lesson preparation by producing supporting instructional resources such as vocabulary lists, comprehension questions, graphic organizers, and worksheets aligned with Bloom's Taxonomy and Depth of Knowledge (DOK) levels. These features allow teachers to scaffold content, provide tiered assignments, and align activities with curriculum standards, saving considerable time in lesson planning. The platform supports print and digital formats and integrates seamlessly

with tools like Google Docs, Forms, and Slides, making it versatile across instructional settings.

Empirical research on differentiated instruction supports the pedagogical foundation of tools like Diffit. For example, Coubergs et al. (2017) found that technology-assisted differentiation enables teachers to manage diverse classrooms more effectively, providing individualized feedback and content adjustments. Similarly, McQuarrie, McRae, and Stack-Cutler’s (2010) meta-analysis revealed that differentiated instruction significantly improves student engagement and academic performance, particularly for students with learning difficulties or from linguistically diverse backgrounds. While Diffit itself is a relatively new platform, its design aligns with these established benefits of differentiated practices.

Despite its promise, Diffit has limitations. Its current functionality is text-based mainly, which may not fully meet the needs of students requiring multimodal learning supports. Teachers also remain responsible for reviewing AI-generated adaptations to ensure accuracy and alignment with instructional goals, as occasional oversimplifications can reduce conceptual depth. To maximize effectiveness, educators must integrate Diffit into broader instructional frameworks that balance accessibility with rigor. Diffit illustrates how AI can operationalize the principles of differentiated instruction at scale, allowing teachers to accommodate student diversity more efficiently while maintaining curricular coherence. As adoption grows, further design-based research is needed to evaluate its direct classroom impact and refine its capacity to support inclusive education. To illustrate its functionality, Figure 5 presents the Diffit interface. It highlights how the platform adapts reading passages across multiple levels while generating accompanying instructional resources such as comprehension questions, vocabulary lists, and worksheets.

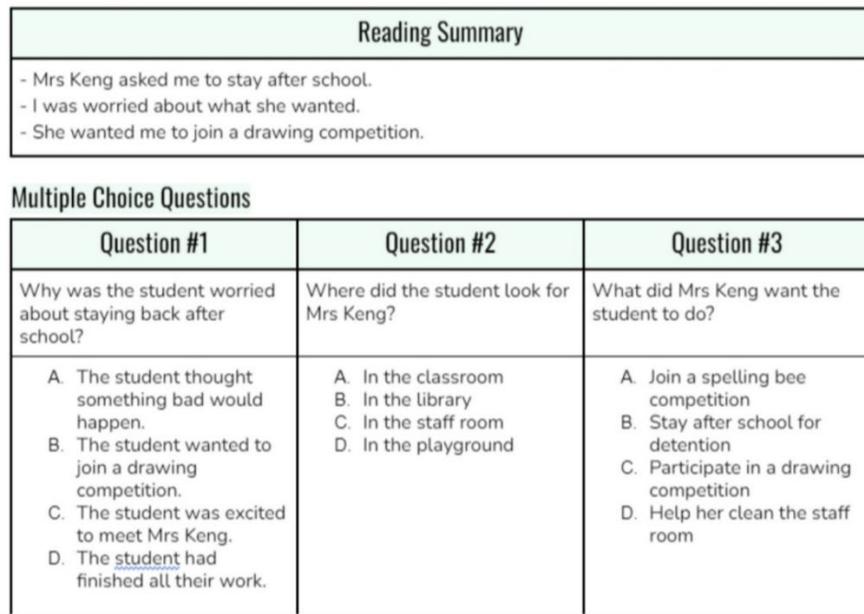


Figure 5. Screenshot of a reading summary and questions generated by Diffit

### PRACTICAL IMPLICATIONS FOR EDUCATIONAL STAKEHOLDERS

Integrating artificial intelligence into educational contexts holds distinct implications for K–12 educators, higher education faculty, and corporate instructional designers. Understanding these differences can help stakeholders align AI adoption strategies with their specific instructional environments and learner needs. AI technologies also introduce

opportunities for ongoing innovation, allowing educators to experiment with new pedagogical models and to respond quickly to evolving educational challenges. As digital tools become more advanced, collaboration between sectors will be vital in establishing best practices and ensuring equitable access for all learners. In turn, a thoughtful approach to AI implementation can foster a culture of continuous improvement and adaptability throughout the education system.

### *K–12 EDUCATORS*

AI tools in K–12 education support differentiated instruction, early intervention, and inclusivity (Tomlinson, 2014; Alghamdi, 2023). Platforms like Diffit and Brisk Teaching help teachers adapt materials for varying reading levels and languages (Ravaglia, 2024). AI analytics identify at-risk students, allowing for timely and targeted support (Ayeni et al., 2024). Effective use of these tools depends on professional development covering technical skills and ethical, pedagogical confidence (Delello et al., 2025; Langran et al., 2020).

### *HIGHER EDUCATION FACULTY*

In higher education, AI can facilitate active learning, provide scalable feedback, and personalize learning pathways for large and diverse groups of students (Holmes, 2020; Hu, 2024). Tools such as Magic School and QuestionWell are designed to help reduce grading workloads, generate standards-aligned questions, and support blended or flipped classroom models (Shan & Liu, 2021). Integrating AI into curriculum design processes allows it to complement existing academic practices without replacing scholarly rigor (Luckin & Cukurova, 2019). The development of institutional policies regarding AI use, academic integrity, and data privacy is important in promoting trust and sustainable adoption within universities (Ali et al., 2024; Michel-Villarreal et al., 2023).

### *CORPORATE INSTRUCTIONAL DESIGNERS*

AI tools can speed content creation, personalize training modules, and deliver immediate performance analytics (Clark, 2020; Holmes et al., 2019). Gamified platforms like Wayground boost engagement in skill-based learning (Hamari et al., 2014; Sánchez-Mena & Martí-Parreño, 2017). AI supports microlearning and timely training, helping organizations quickly meet new skill needs (Popenici & Kerr, 2017). Companies should focus on aligning AI with business goals, protecting data, and making training accessible worldwide (Matsiola et al., 2024).

### *CROSS-SECTOR CONSIDERATIONS*

In shaping the future of education, it is crucial to evaluate how AI-driven solutions can be tailored for local contexts and existing pedagogical structures, promoting innovation and integrity in learning environments. Proactive dialogue among teachers, administrators, technologists, and learners fosters a shared vision for technology adoption, while regular review processes ensure that AI enhances, rather than disrupts, core instructional goals. Through measured implementation and a commitment to ethical standards, educational systems can harness the advantages of AI—encouraging experimentation and adaptability—while preserving the essential human elements of teaching and learning.

## **SUMMARY**

This paper examined how Artificial Intelligence (AI) reshapes education by streamlining instructional processes, fostering personalized learning, and enhancing student engagement. A systematic, tool-by-tool review of recent experimental, quasi-experimental, and design-based studies demonstrated that AI applications such as Brisk

Teaching, QuestionWell, Magic School, Wayground, and Diffit have verified affordances alongside documented challenges. Evidence shows that these tools can improve academic performance, critical thinking, and student motivation while reducing teacher workload and enabling differentiated instruction. Tables summarizing affordances, challenges, and instructional objectives further clarify each tool's maturity and practical utility.

At the same time, the analysis highlighted persistent concerns, including issues of equity, data privacy, algorithmic bias, and the need for professional development to build educator confidence. The review underscores that AI should be viewed not as a teacher replacement but as a partner that enhances efficiency and instructional quality. The practical implications for K–12 educators, higher education faculty, and corporate instructional designers emphasize the importance of aligning AI adoption with local contexts, ethical safeguards, and pedagogical goals. Ultimately, by grounding aspirational claims in empirical evidence and presenting systematic comparisons across tools, this study offers a more straightforward pathway for educators, policymakers, and researchers to harness AI responsibly and effectively in diverse learning environments.

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