

Artificial Intelligence and the Transformation of Academic Integrity in Higher Education: A Systematic Review

Wannakorn Phornprasert¹, Wongpanya S. Nuankaew², Praty Nuankaew^{3*}

Department of Educational Measurement and Evaluation-School of Education,
University of Phayao, Phayao, 56000 Thailand¹

Department of Computer Science-School of Information and Communication Technology,
University of Phayao, Phayao, 56000 Thailand²

Department of Digital Business-School of Information and Communication Technology,
University of Phayao, Phayao, 56000 Thailand³

Abstract—This study examines how Artificial Intelligence (AI) is transforming academic integrity in higher education, altering both learning opportunities and the risks associated with misconduct. As creative AI tools become embedded in everyday academic work, they provide valuable support for writing, research assistance, and skills development. Still, they also challenge long-held assumptions about authorship, originality, and assessment. Emerging evidence suggests that students are using AI in a variety of ways, from supporting legitimate learning to producing fully automated assignments. However, AI-driven integrity technologies, such as plagiarism detectors and authorship checking models, are becoming more effective but continue to face issues of bias, false positives, and limited transparency. This rapid shift has created a gap between technological change and academic readiness, highlighting the need for institutions to rethink assessment design, improve integrity frameworks, and foster a culture of responsible AI use, rather than relying solely on surveillance and sanctions. This review compiles the latest studies published between 2020 and 2025 to map current practices, risks, and policy responses. The findings suggest that academic integrity in the age of artificial intelligence (AI) cannot be focused solely on preventing fraud. But this needs to expand to support ethical digital literacy, redesign learning tasks that require human reasoning, and ensure fairness in automated decision-making systems. The study concludes with recommendations for educators, researchers, and policymakers to balance innovation with responsibility to ensure that AI becomes a tool for transforming learning, rather than a threat to academic values.

Keywords—AI in education; academic integrity; Generative AI; ethical digital literacy; assessment transformation

I. INTRODUCTION

The usage of Artificial Intelligence (AI) in education has changed the education landscape by improving personalized learning, such as customized learning pathways by adapting to the different needs and learning styles of individual students [1]. This makes administrative tasks more efficient through methods such as automated grading, which allow teachers to focus more on teaching and improving student engagement [2]. However, the usage of AI in education also posts ethical concerns and challenges, such as data privacy [3], the quality

of the data used, and the need for ongoing training for teachers and students [1].

A. Background

AI has become more recognized as a personalized learning tool in education. AI-driven platforms allow the analyzation of students' performance data, creating a customized learning path and addressing individual strengths and weaknesses [4]. This feature allows students to self-regulate their learning and take control of their own education journey [5]. Additionally, AI has also become more recognized for its potential in increasing efficiency by automating assessment and feedback in education. Tools such as Automated Essay Scoring (AES) reduce administrative burden on teachers by enabling fast and consistent grading [6]. Moreover, AI has also been used as a tool to support students' success. AI tools such as chatbots offer a personalized self-service platform, where students can address any question and get help with course selection in education [7].

The integration of Generative AI (GAI) gives rise to an opportunity for enhancing learning by offering a personalized learning journey to students, this foster engagement and critical thinking in students [8]. These features help in students' comprehension of the course materials [9]. However, this also gives rise to a challenge in academic integrity. Due to the ease of generating content, there are risks such as dishonesty, plagiarism [10], and even a decline of cognitive skills and critical thinking from overreliance on GAI [11].

In higher education, AI assists students through the inclusion and enhancement of learning by personalization, which makes education more accessible to students with diverse needs [12]. Those with disabilities or those facing language barriers can benefit from these AI features, as AI allows them to learn from anywhere and generate content in their preferred language [13]. In teaching assistant and virtual classroom, AI tools provide personalized study plans and support that help in explaining complex concepts [14]. Additionally, AI creates an immersive learning environment with the uses of things such as virtual reality, which provide a safe space for students to practice their skills [15].

*Corresponding author

B. Research Objectives

The primary objective of this research is to conduct a systematic review of AI applications in higher education across seven key topics by searching for recent literature to identify both opportunities for enhancing learning experiences and associated challenges. This study aims to evaluate how AI tools contribute to personalized learning, automated assessment, academic advising, academic integrity, inclusion, virtual teaching support, and institutional readiness while maintaining unbiased, keeping ethical considerations in mind, and considering practical implications for teachers and students.

C. Scope and Significance

This review focuses on peer-reviewed studies published between 2020 and 2025, emphasizing AI's role in higher education within the seven specified topics. It excludes non-academic sources and broader K-12 applications to maintain a targeted analysis. The significance lies in providing teachers, administrators, and policymakers with a concise framework for understanding AI's transformative potential, addressing gaps in ethical integration, and fostering informed strategies to improve student outcomes and institutional efficiency in an evolving educational landscape.

D. Structure Overview

This study is structured as follows: Section I introduces the topic, background, objectives, scope, and significance. Section II outlines the proposed systematic review method and framework. Section III details the methodology of implementation, search processes, quality assessment and limitations. Section IV presents results and discussions for each of the seven topics in Section V. Section VI concludes with key findings and recommendations for future research.

II. PROPOSED METHODOLOGY

A. Systematic Review Approach

The systematic review method used in this study was designed to provide a comprehensive, transparent, and replicable way to synthesize existing research on the use of Artificial Intelligence (AI) in higher education. This approach ensures that the review maintains strong methodological standards while reducing bias in how studies are selected, evaluated, and interpreted. It also helps identify trends, challenges, and research gaps across different academic settings related to AI's integration in higher education.

The review follows the principles of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, which offers structured guidance for finding, screening, and reporting research evidence. By following this framework, the study guarantees that each step—from searching databases to final inclusion—is transparent and well-documented. The review focuses on seven key themes that represent critical areas of AI use in higher education: personalized learning, automated assessment, academic advising, academic integrity, inclusion, virtual teaching support, and institutional readiness.

The process started with a systematic search across selected academic databases, including IEEE Xplore, Google Scholar,

and Scopus, chosen for their wide coverage of peer-reviewed research in educational technology and AI applications. The search combined relevant keywords and Boolean operators to find a broad range of studies published from 2020 to 2025. This timeframe was selected to reflect recent advances in AI and to match the current era of technological change shaping higher education.

Each study found was reviewed through a structured screening process in two stages: an initial review of titles and abstracts, then a detailed examination of the full texts to determine eligibility. Inclusion criteria specified that studies focus on higher education, present empirical or conceptual analyses of AI tools, and be published in peer-reviewed journals. Materials that were not academic, such as editorials or studies unrelated to higher education, were excluded. After selecting eligible studies, all were assessed for quality using the GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) framework. This ensured that the evidence included in the review was credible, relevant, and methodologically strong. The final dataset supported an analysis of how AI is transforming teaching, learning, and institutional operations within higher education.

Overall, this systematic review method provided a structured, evidence-based way to explore AI's transformative effects. It highlights both potential benefits and the ethical, pedagogical, and institutional challenges that come with AI integration. This approach ensures that the conclusions are based on reliable, diverse academic evidence.

B. Proposed Framework

The proposed framework for this systematic review was developed to ensure a transparent, reproducible, and unbiased process when analyzing existing literature on artificial intelligence (AI) applications in higher education. It provides a clear and structured pathway for identifying, selecting, and synthesizing relevant studies, helping readers understand the methodology and reasoning behind each step of the review. Essentially, the framework follows a predefined, step-by-step protocol inspired by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. This protocol emphasizes consistency, accuracy, and traceability throughout the review process. It consists of three main stages: searching, selecting, and synthesizing.

In the searching stage, relevant academic databases — IEEE Xplore, Google Scholar, and Scopus — were systematically explored to find peer-reviewed publications from 2020 to 2025. This time frame was chosen to focus on recent developments and emerging practices in AI, reflecting the fast-changing nature of technology and education. The search strategy used a combination of specific keywords related to the seven themes: personalized learning, automated assessment, academic advising, academic integrity, inclusion, virtual teaching support, and institutional readiness.

The selection stage involved a multi-step screening process to reduce subjectivity and bias. First, duplicates and non-academic sources were removed. Next, studies were filtered based on relevance of title and abstract, followed by a full-text review to confirm they met the inclusion criteria—specifically,

that each study involved AI applications in higher education and was published in a peer-reviewed outlet.

Finally, in the synthesizing stage, all eligible studies were analyzed and grouped according to the seven key areas. Data was extracted using a structured template to record essential details such as research goals, methodologies, AI techniques employed, main findings, and limitations. The synthesis aimed to combine findings across studies to identify common patterns, emerging themes, and significant challenges in the field.

This systematic framework offers a balanced and comprehensive approach for understanding the opportunities and challenges of AI in higher education. By applying consistent criteria, selecting high-quality sources, and maintaining transparency, the review minimizes bias and ensures that the analysis provides both clarity and credibility in illustrating the evolving relationship between AI and higher education practices.

C. Visualization

This systematic review process is for identifying and selecting studies for a quality system. This review highlights PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) benefits, such as providing an intuitive abstraction layer that simplifies database operations and improves code quality, security, and scalability [51, 52].

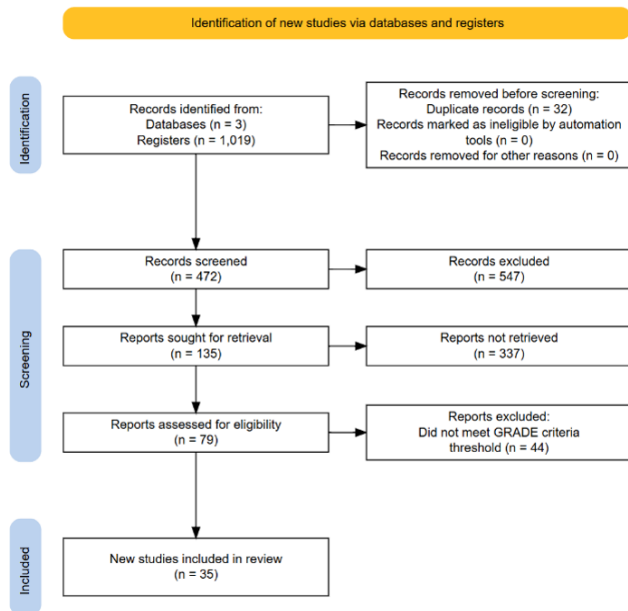


Fig. 1. PRISMA flowchart for inclusion and exclusion of works.

The PRISMA flow diagram in Fig. 1 shows the review process in the beginning, with 1,019 studies identified from 3 databases. Prior to screening, 32 duplicate records and ineligible records marked by automation tools were removed, reducing the total to 472 records screened. From these, 547 records were excluded, and then 135 reports were sought for retrieval. Of the retrieved reports, 79 were assessed for eligibility, excluding 44 that did not meet GRADE criteria, resulting in 35 new studies being included in the review.

D. Expectations

The review expects to produce clear summaries for each topic and to highlight both benefits and challenges. The process and result of these summaries will determine the methodology and results, which will provide insights for teachers as a clear, concise, systematic review structure.

III. METHODOLOGY

A. Implementation

The implementation phase of this systematic review was conducted by strictly following the proposed framework to ensure methodological rigor, transparency, and reproducibility. The process began with an extensive search across major academic databases, namely IEEE Xplore, Google Scholar, and Scopus, which were chosen for their vast collections of peer-reviewed research in education, technology, and artificial intelligence. The search strategy used a combination of predefined keywords and Boolean operators designed to find relevant literature on seven key themes: personalized learning, automated assessment, academic advising, academic integrity, inclusion, virtual teaching support, and institutional readiness.

The data collection was limited to the period between 2020 and 2025 to reflect the latest developments in AI-driven educational tools and to ensure that the review addressed the current technological and pedagogical landscape. Search results were first screened by titles and abstracts to remove unrelated or duplicate studies. Then, full-text articles were reviewed to verify eligibility based on criteria such as publication in peer-reviewed journals, relevance to higher education, and direct discussion of AI applications within one or more of the seven focus areas.

Once selected, data from each eligible study were systematically extracted using a standardized data extraction form. This form recorded key details, including study goals, research methods, AI technologies used, outcomes, limitations, and implications for higher education. The extraction aimed to ensure consistency across studies while keeping contextual details for accurate synthesis.

To enhance the reliability and validity of the combined findings, each study underwent a structured quality assessment using the GRADE (Grading of Recommendations, Assessment, Development, and Evaluations) framework. This assessment focused on criteria such as methodological quality, risk of bias, relevance to the research questions, and clarity of the presented evidence. Studies rated as “high” or “moderate” in quality were prioritized in the synthesis to increase the trustworthiness of the conclusions.

Finally, the collected and evaluated data were organized into clear thematic summaries aligned with each of the seven topics. The synthesis highlighted patterns and interpreted differences across studies. The findings were presented in clear, accessible academic language to provide educators, researchers, and policymakers with insights into the roles and challenges of AI in higher education. This systematic approach not only helped organize and validate diverse research findings but also built a transparent basis for further analysis and discussion within the review.

B. Search and Selection Process

The search uses databases IEEE, Google Scholar, and Scopus, which contain numerous peer-reviewed records that are regularly updated. Studies criteria, such as peer-reviewed and dated between 2020 and 2025, were included while also following the PRISMA process to ensure transparency and to manage the scope within the study's limits.

C. Quality Assessment

The quality of selected studies was evaluated using the GRADE (Grading of Recommendations, Assessment, Development and Evaluations) framework to ensure reliable evidence for the systematic review of AI in higher education. GRADE assesses studies based on criteria like risk of bias, inconsistency, imprecision, and indirectness by assigning each criterion a quality rating (high, moderate, or low). For this research, studies were examined for relevance and methodological clarity to the seven topics. This streamlined process ensured only credible sources shaped the synthesis to maintain the focus and transparency of this study [53, 54].

D. Limitations

This systematic review is constrained by its reliance on selected databases (IEEE, Google Scholar, and Scopus), which may overlook relevant studies in other repositories, like non-English publications. The time frame of 2020-2025 limits the historical context, which may also potentially miss foundational developments in AI applications. The streamlined quality assessment using GRADE may introduce subjective judgments, and the focus on peer-reviewed sources may exclude emerging gray literature, which could affect the overall insight into the rapidly evolving AI technologies in higher education.

IV. RESULTS

A. AI as a Pedagogical Tool: Personalized and Adaptive Learning

Artificial Intelligence (AI) transforms education by enabling personalized adaptive learning experiences. Traditional teaching methods come with fixed pacing and normal content, while AI systems customize instruction to each student's progress preferences and performance data. AI tools can offer immediate feedback and targeted remediation, which allows students to learn at their own speed [16]. These tools excel in subjects like math and science, where student abilities often differ greatly. By analyzing learner behavior in real-time, AI helps teachers meet diverse needs in large classrooms and improve learning outcomes [17]. AI tutoring systems and virtual assistants enhance personalization by providing real-time support and recommending resources tailored to students' actions. These systems help with customized content, guiding students through problem-solving and constant feedback [17]. Using these systems with personalized feedback boosts comprehension and increases student motivation and emotional engagement [18]. These systems can also be paired with certain environments, like AI-extended reality, by adapting tasks based on student performance and supporting the students using experiential learning to further help with student and system development [19].

However, the use of AI in teaching can cause some ethical and professional concerns. Automation can allow for streamlining of tasks like grading work and feedback, but risks alienation between students and teachers, especially if the work is streamlined, the grading or feedback may lack the correct context [20]. Decisions like this may limit the teachers' ability and the students' experiences. The alternative is to use models that require human management or input during critical decision-making processes, which will ensure that teachers use technology as a supportive tool rather than a replacement, allowing for the adjustment of features of the AI and giving students an overall good experience [20].

TABLE I. AI IN PERSONALIZED AND ADAPTIVE LEARNING: SUMMARY AND GRADE ASSESSMENT

No.	Key Points	Challenges	Effect on Teachers and Students	GRADE
[16]	Tools like Knewton and ALEKS can provide immediate and targeted feedback to improve results.	Automation risks alienating students from teachers due to a lack of context in feedback.	Teachers use AI as a supportive tool while students gain motivation through personalized feedback.	Moderate
[17]	AI analyzes learner behavior in real time for customized content and problem-solving guidance.	Decisions may limit teacher autonomy if not human-managed.	Boosts comprehension and emotional engagement to help close achievement gaps in diverse classrooms.	Moderate
[18]	System tracks emotional and cognitive engagement and fits different cultural contexts.	Overreliance on AI could reduce human interaction.	Enhance self-regulated learning, which allows teachers to focus on higher-order tasks.	High
[19]	Extended reality integration for performance-based experiential learning.	Ethical concerns in data usage for personalization.	Supports student development in immersive environments.	Moderate
[20]	Streamline tasks like grading, allowing teachers to focus on teaching.	Risks of inaccurate context/information in automated processes.	Requires human oversight for balanced experiences.	Low

Table I summarizes the role of AI in delivering personalized and adaptive learning experiences in higher education. It highlights how tools provide immediate feedback and customized content based on student performance, boosting engagement and comprehension. However, it also notes challenges such as the risk of reduced teacher-student

interaction due to automation and ethical concerns in data usage and emphasizes the need for human oversight to maintain effective learning experiences.

Overall, the potential of AI in education is mainly adaptive personalization and time-saving efficiency. Adaptive tools customize instruction to diverse learner needs, interests, and

cultural contexts, helping close achievement gaps [18]. Systems that track emotional and cognitive engagement would be able to provide feedback to keep students focused and invested [19].

B. Assessment and Feedback Automation

Using automation in assessment enhances efficiency and scalability in diverse learning environments by transforming how teachers assign grades and provide feedback [21]. AI grading systems can deliver objective results compared to human grading, which often shows bias [21]. This also allows for a much faster and more efficient system, especially for students dissatisfied with traditional grading methods and the amount of time needed for results and feedback [21]. These systems enable timely personalized feedback that encourages self-learning and deeper engagement with the material [22, 23]. However, automated feedback struggles with writing tasks or assessments that don't align with rigid linguistic criteria, as they may fail to recognize diverse or unique ways students demonstrate understanding [24]. Carefully designed systems with adaptive features can overcome these limitations to significantly improve learning outcomes [22]. In legal education, hybrid intelligence systems provide formative high-level feedback while preserving the teacher's role in deeper instruction [23].

For automated feedback to succeed, it must account for varied student performances and learning styles, especially in tasks like writing that resist fixed syntactic patterns [24]. Students are more likely to accept AI feedback when they have prior experience with it and perceive it as fair and unbiased compared to human grading, particularly when outcomes are unfavorable [21]. Transparent system design and student-centered implementation are essential for broader adoption [25]. Generative AI systems like ChatGPT advance feedback by offering structured personalized guidance aligned with learning goals [25]. When paired with clear prompts and ethical boundaries, these tools support student autonomy without replacing the teacher's evaluative role [22, 25]. Over-reliance on AI risks undermining this balance, but thoughtful integration allows automation to handle routine tasks while freeing teachers to focus on complex, creative, and motivational aspects of education [23, 24].

Table II outlines the impact of AI-driven assessment and feedback systems, which focus on their ability to reduce grading bias and enhance efficiency through objective and timely feedback. It discusses how these systems support self-learning but struggle with non-rigid tasks like writing, which may not align with fixed criteria. The table shows the importance of adaptive and transparent designs to improve learning outcomes while preserving the teachers' role in deeper instruction.

TABLE II. AUTOMATED ASSESSMENT AND FEEDBACK: SUMMARY AND GRADE ASSESSMENT

No.	Key Points	Challenges	Effect on Teachers and Students	GRADE
[21]	AI gives objective feedback, reducing bias and time, which promotes self-learning	Students accept AI more if perceived as fair, but dissatisfaction with traditional methods still happens.	Faster feedback encourages deeper engagement, which is essential for scalability in large classes.	Moderate
[22]	Personalized feedback helps with learning goals and systems in legal education.	Struggles with non-rigid tasks like writing.	Improves outcomes with adaptive features, which frees teachers for more creative aspects.	Low
[23]	Formative feedback preserves the teacher's role in deeper instruction.	Over-reliance risks compromising balance.	Supports autonomy, which requires thoughtful integration.	High
[24]	Handles different student writing styles with NLP exploration.	Fails to recognize unique demonstrations of understanding.	Enhance learning experience for student-centered designs.	High
[25]	Generative AI like ChatGPT offers structured guidance with ethical boundaries.	Transparency issues in system design.	Wider adoption via trust and clear prompts.	Moderate

C. AI Academic Advising and Learning Analytics

AI-powered academic advising and learning analytics are revolutionizing higher education by providing personalized, data-driven support to enhance student outcomes. Machine learning models can achieve high accuracy in predicting course outcomes, enabling students to select courses that align with their academic strengths, which helps performance and reduces dropout rates [29]. Also, many AI chatbots offer 24/7 accessible guidance that allows for comprehensive responses to general academic and career queries, which helps promote education for diverse learners and those who have limited access to traditional advising [28]. Systems like the Artificial Intelligence Tutoring System (AITS) can use web technologies and decision trees to analyze student performance data, help identify struggling students, predict final grades, and recommend personalized learning paths for students [30].

These AI systems enhance student engagement and retention by offering scalable and personalized recommendations. For example, AI advising platforms analyze

large datasets using academic records and career preferences to provide personalized courses and career pathway suggestions to help students with academic confidence and in making decisions [27]. Additionally, chatbots are also another option that can help streamline tasks like course registration and question handling, which would allow teachers to have more time and meaningful mentoring roles [26]. Studies highlight that factors like ease-of-use and trust significantly affect when adopting the use of these technologies, especially values like efficiency and accessibility [26]. AI can help make decisions and create synergies for students to use AI for guidance and help teachers with deeper and personalized support [28].

However, ethical challenges and data privacy concerns are still big problems. For example, AI advising systems rely on huge amounts of student data which would cause issues regarding compliance with regulations and bias results if there is not enough data of different types of students [27]. While personalized results are a key benefit, there is research that shows it may be less impactful and less efficient during the adoption stage, as the collection of data requires refinement

and time to become trustworthy [26]. These reasons and challenges show AI's potential in academic advising and learning analytics, but priority regarding data governance and

bias is needed to ensure fair, effective, and efficient implementation across educational fields.

TABLE III. AI IN ACADEMIC ADVISING AND LEARNING ANALYTICS: SUMMARY AND GRADE ASSESSMENT

No.	Key Points	Challenges	Effect on Teachers and Students	GRADE
[26]	Chatbots streamline tasks, which helps boost adoption through ease of use.	Initial data collection requires clarification for trustworthiness.	Free teachers for mentoring and help with efficiency for diverse learners.	Moderate
[27]	Analyze the dataset for personalized learning career suggestions to improve confidence.	Risk of bias and data privacy if the dataset lacks diversity	Enhances retention and prioritizes data governance.	High
[28]	24/7 guidance via chatbots promotes accessibility.	Compliance with regulations is needed.	Empowers students with limited access to advising.	Low
[29]	High accuracy in predicting outcomes for course selection.	Less impactful during early adoption stages.	Reduces dropout rates and helps with strengths and benefits.	Moderate
[30]	Decision trees for performance analysis and recommendations.	Ethical challenges in large data reliance.	Identifies struggling students early and offers personalized paths.	Moderate

Table III shows the benefits of AI in academic advising and learning analytics, such as predicting course outcomes and providing 24/7 guidance through chatbots to enhance student retention and accessibility. It also addresses ethical challenges, which include data privacy risks and potential biases in datasets. This highlights the need for robust data governance to ensure fair and effective implementation across diverse educational settings.

D. Generative AI and the Challenge of Academic Integrity

Generative AI's use in higher education offers many possibilities but also causes serious challenges to academic integrity. Tools like ChatGPT support writing, research, and personalized learning yet increase risks of academic dishonesty through plagiarism and automated essay generation [32]. Students sometimes use these tools to skip genuine learning, producing assignments with minimal effort, while traditional plagiarism detection systems often fail to catch AI-generated content [33, 35]. Teachers worry about students submitting work lacking originality or understanding, especially since some AI can create entire assignments independently [33]. Ethical knowledge gaps and outdated institutional policies worsen these issues, underscoring the need for clear governance and updated integrity standards [31].

AI itself can also help maintain academic honesty. AI-based systems detect plagiarism, verify originality and provide feedback to promote ethical behavior which often outperforms older methods [32]. Teacher uses these tools to spot cheating patterns and confirm work authenticity [32]. However, relying heavily on automated systems raises concerns about false positives, reduced student agency and lack of trust due to privacy or fairness issues when tools are opaque or unreliable [33, 34].

To tackle these challenges, institutions must rethink assessment models to emphasize project-based learning, critical analysis and real-world applications, which are harder for AI to replicate and encourage deeper engagement [31, 35]. Yet implementing these changes globally faces hurdles, especially in resource-limited settings with inadequate infrastructure, insufficient training and resistance from students and faculty [32, 34]. Promoting responsible AI use demands more than policy updates; it requires fostering an academic culture that values integrity, boosts digital literacy and aligns assessments with both technological realities and educational goals [33].

TABLE IV. GENERATIVE AI AND ACADEMIC INTEGRITY: SUMMARY AND GRADE ASSESSMENT

No.	Key Points	Challenges	Effect on Teachers and Students	GRADE
[31]	Supports in writing research and plagiarism detection better than traditional methods.	Outdated policies and lack of ethical knowledge	Rethink assessments for critical analysis and help foster integrity	Moderate
[32]	Verifies originality and promotes ethical behavior.	Risks of dishonesty via automated generation through giving false positives	Use AI for detection but training in resource limited settings	High
[33]	Gives feedback that help with spotting cheating pattern.	Students skip learning but create lack of trust in more traditional tools	Emphasize project-based learning and boost digital literacy	Moderate
[34]	Maintain honesty through advanced systems.	Privacy/fairness issues which reduces student autonomy	Align assessments with tech realities and drive policy updates	Moderate
[35]	Shifts to holistic assessments are harder for AI to replicate	Problem in global implementation in under resource areas	Encourages deeper engagement and creates responsible AI use	Moderate

Table IV shows the dual role of generative AI in higher education which helps in supporting writing and research, while posing risks to academic integrity through plagiarism and automated content generation. It notes that AI-based plagiarism detection tools outperform traditional methods, but face issues like false positives and reduced student trust. The

table advocates project-based assessments and updated policies to foster ethical AI use and deeper student engagement.

E. AI and Inclusion in Higher Education

AI is increasingly becoming more used in higher education institutions and showing more inclusivity and new ways to support learners with diverse needs. For example, robotic

assistants have been developed for children with ADHD which shows how AI can help users maintain attention and consistent engagement that could benefit students with cognitive challenges [36]. As well, smart technologies developed for older adults show the value of adaptive interfaces and principles where both are important for making accessible digital environments for people varying in physical and cognitive abilities [37]. These innovations highlight the need for participatory design approaches that prioritize user input from the start [36-37].

However, access to AI alone does not guarantee inclusion, as students are still facing barriers due to problems like digital literacy [39]. Studies show that individuals with visual impairments are more likely to engage with digital tools when they've had formal education and training in assistive technologies, which shows the need for targeted support in higher education [39]. AI tools can help with reading on smart

screens and real-time feedback systems, which can save a lot of time. However, their effectiveness on user competence and the extent where institutional are ready to provide correct training are still questioned [39, 40]. Also, individual factors such as trust, technostress, self-efficacy, and personality traits can also influence whether students and teachers use AI tools at all [40].

AI-generated text tools are now common in academic settings, which raises concerns about fairness, transparency, and potential misuse [38]. Biased algorithms and decision-making processes risk having educational inequalities unless addressed through transparent design and clear data representation [38, 40]. Inclusive integration and admission of AI use require not only technical safeguards but also a cultural and constant commitment to accessibility and ethical practice [37, 38]. Overall, AI should be used as a tool to help all learners and not just the digitally privileged.

TABLE V. AI FOR INCLUSIVE EDUCATION: SUMMARY AND GRADE ASSESSMENT

No.	Key Points	Challenges	Effects on Teachers and Students	GRADE
[36]	Robotics design for ADHD children to maintain attention	Access doesn't guarantee inclusion, especially due to barriers of low digital literacy	Targeted support for cognitive challenges	Moderate
[37]	Adaptive interfaces for older adults and smart tech for varying abilities	Biased algorithms risk inequalities	Cultural commitment to accessibility can affect ethical practice	Moderate
[38]	AI text tools are common in academics, and real-time feedback saves time	Fairness/transparency concerns and potential misuse arise	Address biases through transparent design	High
[39]	Training aids for visually impaired people and engagement via education	Institutional readiness for training due to personal factors like trust	Bridge the digital divide and formal assistive tech education	Moderate
[40]	Influences adoption via self-efficacy/personality and saves time	Technostress and competence issues	Inclusive integration for all learners and not just the privileged	Moderate

Table V shows AI's potential to enhance inclusivity in higher education, such as through robotics for ADHD students and adaptive interfaces for diverse learners. It identifies barriers like low digital literacy and institutional readiness, which hinder equitable access. This table emphasizes the need for transparent design and targeted training to address biases and ensure AI supports all learners, not just the digitally privileged.

F. AI in Teaching Assistants and Virtual Classrooms

AI is changing virtual classrooms, allowing dynamic, interactive, and customized learning through AI teaching assistants. Incorporating AI into video material via tools can allow for real-time and context-aware interaction in class, which changes students from passive viewers to active participants [41]. These systems help explain concepts, visualization, and answer students' questions. As well, intelligent agents in an e-learning environment act as virtual tutors by providing feedback and encouraging interactive discussion [42]. These types of features allow for a successful mimicking of an aspect of human instruction and action [44]. AI teaching assistants also increase accessibility in education. Chatbots can act as a real-time response and learning companion, offering academic assistance 24/7 through a natural language interface [43]. Further studies show that conversational AI can reduce teachers' workload while supporting students' learning [42]. Robot-assisted systems in VR settings allow students to learn and practice language in a low-pressure and contextual environment, which encourages

students' learning independence [45], which extends the AI role beyond the traditional classroom [43].

These systems are very personalized. For example, SAM feedback is based on an individual chat history and video context, which allows a tailored assessment; the system also provides personalized summaries for revision [41]. AI tools offer adaptive support across learning phases, such as generating quizzes and providing analytics to help guide teachers [44]. Also, AI isn't a replacement but an assisting tool that allows teachers to focus more on higher-order teaching, while AI handles routine tasks [42]. However, AI integration still poses challenges, such as students often using AI chatbot for basic tasks like formatting or rephrasing rather than learning these themselves [43]. AI can also struggle with complex communication due to program limitations [45]. These issues show the need for AI that supports critical thinking and reason-based interaction [41]. Further development of AI should focus on AI as an education tool that complements human teachers and encourages active learning rather than passive dependence [44].

Table VI shows how AI teaches assistants and virtual classroom tools such as chatbots and VR systems that create interactive and personalized learning environments. It highlights their ability to reduce teacher workload and provide 24/7 support, but notes challenges like over-reliance on AI for basic tasks and limitations in complex communication. The table stresses the importance of AI as a complementary tool to promote active learning and critical thinking.

TABLE VI. AI TEACHING ASSISTANTS AND VIRTUAL CLASSROOMS:
SUMMARY AND GRADE ASSESSMENT.

No.	Key Points	Challenges	Effects on Teachers and Students	GRADE
[41]	Tools to allow real-time interaction in videos and personalized summaries	Struggles with complex communication and risk of dependence	Turns passive viewers into active and personalized assessments	Moderate
[42]	Intelligent agents as tutors reduce workload.	Use of AI for basic tasks may hinder skill learning	Supports interactive discussion and enhances human teaching	High
[43]	Chatbots as 24/7 learning companions; natural language interface.	Limitations in program capabilities	Academic assistance at any time encourages independence	Low
[44]	Adaptive support with analytics and mimics human instruction.	The need for critical thinking focus.	Frees teachers for higher order tasks and allows for active learning	Moderate
[45]	Robot-assisted VR for low-pressure practice and learning.	Complex interactions challenging	Extends beyond classrooms and helps via contextual learning	Moderate

G. Institutional and Faculty Readiness

Institutional readiness for AI integration in education and healthcare depends on infrastructure, policy alignment and leadership support. Across sectors, institutions often lack the digital maturity required for large-scale AI adoption. For example, smart hospitals may often have a lot of investments for future technological development, but many public authorities and staff lack the expertise and training to use them effectively [46]. As well, educational institutions face challenges related to policy clarity, equitable access and resource allocation which are essential for the implementation of AI in higher education settings [48]. There are also infrastructure limitations such as specialized devices and connectivity which remain a significant barrier due to the large amounts of resources needed, even when administrative backing exists [49]. Without proper planning, enough resource allocation and community involvement, AI tools risk being underused or inequitably deployed [49, 50].

Faculty readiness is very important but also often overlooked, as teachers and health professionals are open to the concept and idea of AI, but their positive interactions often depend on targeted training and professional development [47]. Studies show that interested teachers often have steep learning curves due to insufficient structured assistance and ongoing training [47, 48]. Professional skills values such as autonomy, ethics and trust also influence people's uptake of AI tools. If these values were overlooked, resistance ensue [48]. As well, healthcare professionals must also possess digital literacy in order to counsel patients and practice in telemedicine environments [46]. Despite this requirement there are still skill deficiencies [46].

Individual attitudes and pedagogical models often influence AI uptake in high levels of self-efficacy and quality digital knowledge among teachers as this increases the likelihood that they will generate beneficial AI tool adoption [49]. However, internal readiness must be supplemented with institutional support through constant policies, mentorship programs and provision of technological infrastructure [49]. Perceived usefulness and believability of AI tools also affect the adoption by the faculty. If the AI tools are seen as credible and simple to use, then their adoption is much more likely [50]. Without trust, even the most advanced tools may be accepted hesitantly or rejected. Overall, readiness is not only about access to tools, but also an issue of organizational capacity, personal confidence and shared values. Professional development must go beyond functionality to address moral issues, career identity and structures of long-term care [48, 50]. Organizations that invest in meaningful training to establish ethics guidelines and foster collective experimentation will benefit from the advantages of AI in an equitable and sustainable way.

TABLE VII. INSTITUTIONAL AND FACULTY READINESS FOR AI
INTEGRATION: SUMMARY AND GRADE.

No.	Key Points	Challenges	Effects on Teachers and Students	GRADE
[46]	Infrastructure for AI in healthcare and education and technological acceptance in adoption	Lack of expertise/training and lack of skills	Invest in digital maturity and equitable implementation	Low
[47]	Targeted training improves well-being and reduces workload	Steep learning curves if lacked support	Professional development beyond functionality	Low
[48]	Policy clarity and resource allocation and values like ethics influence adoption acceptance	Resistance to changes if autonomy overlooked	Mentorship programs address moral issues	Moderate
[49]	High self-efficacy boosts adoption and allows community involvement	Infrastructure barriers like connectivity	Supplement with institutional support and shared values	High
[50]	Trust in credible tools and mediating effects on practices	Hesitant acceptance without perceived usefulness	Foster experimentation and sustainable integration	Moderate

Table VII shows the factors affecting institutional and faculty readiness for AI adoption, which includes infrastructure, training and trust. It notes that, while AI can reduce workload and enhance teaching, barriers like limited digital literacy, resource constraints and resistance due to ethical concerns persist. The table underscores the need for comprehensive training, clear policies and community involvement to ensure equitable and sustainable AI integration.

V. DISCUSSION

This review demonstrates that Artificial Intelligence (AI) has rapidly evolved from a supplementary tool to a core enabler of personalized and adaptive learning in higher education. Across the seven key topics analyzed, AI tools such as intelligent tutoring systems, generative platforms and predictive analytics consistently help and enhance student engagement, inclusivity and academic outcomes by personalizing and adapting content made for individual learning and needs [16-19]. The studies also show the transformative capacity of AI to close achievement gaps and offer equitable opportunities for students from diverse backgrounds or with special needs [12-14, 36-37].

However, the studies also highlight persistent ethical and practical challenges. Automated assessment tools and generative AI, while streamlining grading and feedback, risk diminishing the authenticity of assessments and student cognitive development if used without adequate safeguards [20, 31-35]. Academic integrity emerges as a major theme, with plagiarism detection and originality verification systems only partially mitigating risks [32-34]. However, issues of data privacy, algorithmic bias and transparency remain consistent across academic advising, learning analytics and inclusion initiatives [27-28, 38-40]. These challenges underscore the need for robust frameworks to ensure responsible implementation of AI technologies in education.

Institutional and faculty readiness also plays a decisive role in AI's success. While many teachers are open to AI adoption, gaps in digital literacy, professional development and infrastructure limit the full realization of AI's benefits [46-50]. Students' AI skills and teachers' perceptions of these skills do not always align, which may result in misjudgments of assessment authenticity or unintended over-reliance on automated systems. Addressing these disparities through targeted training, transparent communication and participatory design approaches can improve trust and efficacy in AI-driven systems [37-40]. Overall, the findings point to a dual imperative: scaling AI innovations to broaden access while embedding ethical safeguards and human oversight to preserve educational integrity.

VI. CONCLUSION

This review shows that artificial intelligence is no longer just an optional tool in higher education but a force that is actively reshaping how students learn, how teachers teach, and how institutions operate. Across different areas—such as assessment, advising, inclusion, and academic integrity, AI offers clear benefits: faster feedback, more personalized learning, and great support for diverse learners. However, the same technologies also create new problems that cannot be ignored, including risks to ethical practices, unequal access, and a growing dependence on automated systems.

A key message that emerges is that AI alone will not improve education. Its value depends on how well it is guided by human judgment, institutional policy, and shared responsibility among educators, students, and administrators. The findings suggest that successful use of AI requires three conditions: thoughtful design of learning and assessment,

investment in digital skills for both teachers and students, and clear policies that protect fairness, privacy, and academic values.

Rather than seeing AI as a replacement for human roles, this review supports the idea that AI should work as a partner—reducing repetitive tasks while allowing teachers to focus on creativity, mentoring, and deeper learning. The next step for higher education is not to decide whether to use AI, but how to use it responsibly, so that technology enhances learning without weakening integrity or human connection.

ACKNOWLEDGMENT

The authors gratefully acknowledge the valuable support and cooperation of the advisors, academics, researchers, students, and staff who contributed to the completion of this research. The authors also wish to thank the Thailand Science Research and Innovation Fund and the supporting organizations for their assistance throughout the study.

REFERENCES

- [1] N. Duarte, Y. Montoya Pérez, A. J. Beltran and M. Bolaño García, "Use of Artificial Intelligence in Education: A Systematic Review," May 2023, doi: 10.46254/sa04.20230169.
- [2] F. A. Bah, "Artificial Intelligence in Education System," *International Journal of Advanced Research in Science, Communication and Technology*, pp. 439–443, Nov. 2024, doi: 10.48175/ijarsct-22863.
- [3] H. Boumediene and M. Bouakkaz, "Artificial Intelligence in Education," *Advances in educational technologies and instructional design book series*, pp. 407–438, Dec. 2024, doi: 10.4018/979-8-3693-7220-3.ch014.
- [4] K. I. K. Gyonyoru and J. Katona, "Student Perceptions of AI-Enhanced Adaptive Learning Systems: A Pilot Survey," pp. 93–98, Oct. 2024, doi: 10.1109/cando-epe65072.2024.10772884.
- [5] P. Dubey, "Personalized Learning and Pedagogy," *Advances in educational technologies and instructional design book series*, pp. 81–102, Oct. 2024, doi: 10.4018/979-8-3693-6130-6.ch004.
- [6] I. Ogunsakin, "Unlocking The Potential of Artificial Intelligence," Nov. 2024, doi: 10.33830/ijrse.v6i2.1698.
- [7] K. Albinali, N. A. Iahad, A. F. Yusof and A. Abdulla, "A Systematic Literature Review of the Artificial Intelligence Role in Transformative Academic Advising: A Study of AI Applications in Higher Education," *International journal of academic research in business & social sciences*, vol. 14, no. 12, Dec. 2024, doi: 10.6007/ijarbss/v14-i12/24100.
- [8] M. D. H. Wirzal, N. A. H. M. Nordin, N. S. A. Halim and M. A. Bustam, "Generative AI in Science Education: A Learning Revolution or a Threat to Academic Integrity? A Bibliometric Analysis," *Jurnal Penelitian dan Pengkajian Ilmu Pendidikan*, vol. 8, no. 3, pp. 319–351, Oct. 2024, doi: 10.36312/e-saintika.v8i3.2127.
- [9] J. K. Wiredu, N. S. Abuba and H. T. R. Zakaria, "Impact of Generative AI in Academic Integrity and Learning Outcomes: A Case Study in the Upper East Region," *Asian Journal of Research in Computer Science*, vol. 17, no. 8, pp. 70–88, Jul. 2024, doi: 10.9734/ajrcos/2024/v17i7491.
- [10] J. K. Wiredu, N. S. Abuba and H. T. R. Zakaria, "Impact of Generative AI in Academic Integrity and Learning Outcomes: A Case Study in the Upper East Region," *Asian Journal of Research in Computer Science*, vol. 17, no. 8, pp. 70–88, Jul. 2024, doi: 10.9734/ajrcos/2024/v17i7491.
- [11] N. J. Francis, S. Jones and D. P. Smith, "Generative AI in Higher Education: Balancing Innovation and Integrity," *British Journal of Biomedical Science*, vol. 81, Jan. 2025, doi: 10.3389/bjbs.2024.14048.
- [12] A. Hamdan, "The double-edged sword of AI-integrated education: an investigation into personalized and inclusive learning in higher education," pp. 381–391, Dec. 2024, doi: 10.4324/9781003606642-91.
- [13] G. K. Ohri, "Advancing educational equity: the role of generative ai in creating accessible and inclusive higher education," *International journal of computer engineering and technology*, vol. 15, no. 6, pp. 1806–1815, Dec. 2024, doi: 10.34218/ijcet_15_06_154.

- [14] A. P. Singh, R. Saxena and S. Saxena, "The Future of Learning: AI-Driven Personalized Education," *Asian journal of current research*, vol. 9, no. 4, pp. 207–226, Dec. 2024, doi: 10.56557/ajocr/2024/v9i49018.
- [15] M. Abdullah, G. Rao, F. Sowell, V. J. Nirmal and S. Deb, "Optimizing Virtual Learning: Advanced Recommendations for an AI Teaching Assistant," Aug. 2024, doi: 10.18260/1-2--47822.
- [16] A. K. Bawaneh, "AI Shaping the Future of Education: Science and Math Teachers' Satisfaction Level and Motivating Factors towards Integrating Artificial Intelligence in Teaching and Learning," *International Journal of Information and Education Technology*, vol. 15, no. 3, pp. 496–509, Jan. 2025, doi: 10.18178/ijiet.2025.15.3.2261.
- [17] E. Elbasi, M. Nadeem, Y. I. Alzoubi, A. E. Topcu and G. Varghese, "Machine learning in Education: Innovations, impacts and ethical considerations," *IEEE Access*, vol. 13, pp. 128741–128770, Jan. 2025, doi: 10.1109/access.2025.3590134.
- [18] K. S. McCarthy *et al.*, "Toward more effective and equitable learning: Identifying barriers and solutions for the future of online education.," *Technology Mind and Behavior*, vol. 3, no. 1, Mar. 2022, doi: 10.1037/tmb0000063.
- [19] M. Hmoud, W. Daher and A. Ayyoub, "From experience to engagement: a mixed methods exploration of learning environments using artificial intelligence and extended reality," *Frontiers in Education*, vol. 10, Jul. 2025, doi: 10.3389/educ.2025.1617132..
- [20] A. Küçükuncular and A. Ertugan, "Teaching in the AI Era: sustainable digital education through ethical integration and teacher empowerment," *Sustainability*, vol. 17, no. 16, p. 7405, Aug. 2025, doi: 10.3390/su17167405.
- [21] S. M. Jones-Jang, M. Chung, J. Choi, N. Kim and S. Lee, "Fairness perceptions of AI in grading systems: Examining how discontent with the status quo and outcome favorability reduce AI reluctance," *Computers and Education Artificial Intelligence*, p. 100419, May 2025, doi: 10.1016/j.caeai.2025.100419.
- [22] D.-K. Lee and I. Joe, "A GPT-based Code Review System with Accurate Feedback for Programming Education," *IEEE Access*, p. 1, Jan. 2025, doi: 10.1109/access.2025.3581139.
- [23] F. Weber, T. Wambsgans and M. Söllner, "Enhancing legal writing skills: The impact of formative feedback in a hybrid intelligence learning environment," *British Journal of Educational Technology*, Oct. 2024, doi: 10.1111/bjet.13529.
- [24] M. Goldshtein, A. G. Alhashim and R. D. Roscoe, "An NLP-Based Exploration of Variance in Student Writing and Syntax: Implications for Automated Writing Evaluation," *Computers*, vol. 13, no. 7, p. 160, Jun. 2024, doi: 10.3390/computers13070160.
- [25] G. Huesca, M. E. Elizondo-García, R. Aguayo-González, C. H. Aguayo-Hernández, T. González-Buenrostro and Y. A. Verdugo-Jasso, "Evaluating the potential of generative artificial intelligence to innovate feedback processes," *Education Sciences*, vol. 15, no. 4, p. 505, Apr. 2025, doi: 10.3390/educsci15040505.
- [26] A. Saihi, M. Ben-Daya, M. Hariga and R. As'ad, "A structural equation modeling analysis of generative AI chatbots adoption among students and educators in higher education," *Comput. Educ. Artif. Intell.*, vol. 7, p. 100274, 2024, doi: 10.1016/j.caeai.2024.100274.
- [27] "AI-driven academic advising in higher education: Leveraging intelligent systems to personalize student support, improve retention and optimize career pathways," *CRSSS*, vol. 3, no. 2, pp. 229–248, Apr. 2025, doi: 10.59075/vy3v7k17.
- [28] D. Akiba and M. C. Fraboni, "AI-supported academic advising: Exploring ChatGPT's current state and future potential toward student empowerment," *Educ. Sci.*, vol. 13, no. 9, p. 885, 2023, doi: 10.3390/educsci13090885.
- [29] B. Shannaq, "The role of AI in university course registration in the Middle East: AI and machine learning approaches to improve academic performance," in *Proc. 2nd Int. Conf. Comput. Data Analyt. (ICDDA)*, Shinas, Oman, 2024, pp. 1–6, doi: 10.1109/ICDDA64887.2024.10867316.
- [30] F. Grivokostopoulou, I. Perikos and I. Hatzilygeroudis, "Utilizing semantic web technologies and data mining techniques to analyze students learning and predict final performance," in *Proc. IEEE Int. Conf. Teach. Assess. Learn. Eng. (TALE)*, Wellington, New Zealand, 2014, pp. 488–494, doi: 10.1109/TALE.2014.7062571.
- [31] B. G. Acosta-Enriquez *et al.*, "AI in academia: How do social influence, self-efficacy and integrity influence researchers' use of AI models?," *Social Sciences & Humanities Open*, vol. 11, p. 101274, Jan. 2025, doi: 10.1016/j.ssaho.2025.101274.
- [32] E. A. Obura and P. I. Emoit, "Artificial intelligence in academic writing and research skills in Kenyan Universities: Opportunities and challenges," *Africa Education Review*, pp. 1–23, Mar. 2025, doi: 10.1080/18146627.2024.2440351.
- [33] P. D. Yadav, V. Madhukar, A. Dhamija and R. Manrai, "Understanding behavioral intentions of UG and PG students in Tier II Indian cities toward AI-technology adoption in higher education: a mixed-methods approach using the SOR model," *Cogent Social Sciences*, vol. 11, no. 1, Mar. 2025, doi: 10.1080/23311886.2025.2476044.
- [34] A. D. Hernández *et al.*, "Mapping the individual, social and biospheric impacts of Foundation Models," *2022 ACM Conference on Fairness, Accountability and Transparency*, vol. 7, pp. 776–796, Jun. 2024, doi: 10.1145/3630106.3658939.
- [35] A. Ateeq, M. Alzoraiki, M. Milhem and R. A. Ateeq, "Artificial intelligence in education: implications for academic integrity and the shift toward holistic assessment," *Frontiers in Education*, vol. 9, Oct. 2024, doi: 10.3389/educ.2024.1470979.
- [36] J. Berrezueta-Guzman, I. Pau, M.-L. Martin-Ruiz and N. Maximo-Bocanegra, "Assessment of a robotic assistant for supporting homework activities of children with ADHD," *IEEE Access*, vol. 9, pp. 93450–93465, Jan. 2021, doi: 10.1109/access.2021.3093233.
- [37] J. Zhou *et al.*, "Grand challenges of smart technology for older adults," *International Journal of Human-Computer Interaction*, pp. 1–43, Feb. 2025, doi: 10.1080/10447318.2025.2457003.
- [38] Y. A. Mohamed, A. H. Mohamed, A. Kannan, M. Bashir, M. a. E. Adiel and M. A. Elsadig, "Navigating the Ethical Terrain of AI-Generated Text Tools: A review," *IEEE Access*, p. 1, Jan. 2024, doi: 10.1109/access.2024.3521945.
- [39] T. Pochai, P. Setthasuravich, A. Pukdeewut and S. Wetchakama, "Bridging the Digital Disability Divide: Determinants of Internet Use among Visually Impaired Individuals in Thailand," *Disabilities*, vol. 4, no. 3, pp. 696–723, Sep. 2024, doi: 10.3390/disabilities4030043.
- [40] L. Symasek, T. Yeazitzis, K. Weger and B. Mesmer, "Recent developments in individual difference research to inform the adoption of AI technology," *Systems*, vol. 13, no. 3, p. 156, Feb. 2025, doi: 10.3390/systems13030156.
- [41] A. Bodonheli, E. Thaqi, S. Özdel, E. Bozkir and E. Kasneci, "From Passive Watching to Active Learning: Empowering Proactive Participation in Digital Classrooms with AI Video Assistant. 2025," pp. 1–21, doi: 10.1145/3706598.3713513.
- [42] K. Okanlawon, "From Automation to Personalization: A Comprehensive Survey on the Role of AI in Modern e-Learning", *Tech-Sphere Journal of Pure and Applied Sciences (TSJPAS)*, vol. 2, no. 1, Tech-Sphere Multidisciplinary International Journal (TSMIJ), pp. 1–17, Jul. 16, 2025, doi: 10.5281/zenodo.15960870.
- [43] M. Usher and M. Amzalag, "From prompt to polished: Exploring Student-Chatbot interactions for academic writing assistance," *Education Sciences*, vol. 15, no. 3, p. 329, Mar. 2025, doi: 10.3390/educsci15030329.
- [44] P. Kwan, R. Kadel, T. D. Memon and S. S. Hashmi, "Reimagining flipped learning via Bloom's taxonomy and Student-Teacher-GenAI interactions," *Education Sciences*, vol. 15, no. 4, p. 465, Apr. 2025, doi: 10.3390/educsci15040465.
- [45] Y.-L. Chen, C.-C. Hsu, C.-Y. Lin and H.-H. Hsu, "Robot-Assisted Language Learning: Integrating Artificial Intelligence and Virtual Reality into English Tour Guide Practice," *Education Sciences*, vol. 12, no. 7, p. 437, Jun. 2022, doi: 10.3390/educsci12070437.
- [46] A. I. Stoumpos, F. Kitsios and M. A. Talias, "Digital transformation in healthcare: technology acceptance and its applications," *International Journal of Environmental Research and Public Health*, vol. 20, no. 4, p. 3407, Feb. 2023, doi: 10.3390/ijerph20043407.

- [47] N. Kshetri, "The Future of Education: Generative Artificial Intelligence's Collaborative Role With Teachers," *IT Professional*, vol. 25, no. 6, pp. 8–12, Nov. 2023, doi: 10.1109/MITP.2023.3333070.
- [48] K. Husárová, D. Šmida, A. Kmet, Š. Karolcik, and E. Hájková, "AI in the Classroom: How Teachers Perceive the Future of Education," in *2024 International Conference on Emerging eLearning Technologies and Applications (ICETA)*, Oct. 2024, pp. 206–211. doi: 10.1109/ICETA63795.2024.10850792.
- [49] M. Li and E. Manzari, "AI utilization in primary mathematics education: a case study from a southwestern Chinese city," *Education and Information Technologies*, Jan. 2025, doi: 10.1007/s10639-025-13315-z.
- [50] K. D. V. Prasad and T. De, "Generative AI as a catalyst for HRM practices: mediating effects of trust," *Humanities and Social Sciences Communications*, vol. 11, no. 1, Oct. 2024, doi: 10.1057/s41599-024-03842-4.
- [51] B. Gundogan, N. Dowlut, S. Rajmohan, R. Mimi, C. Borrelli, M. C. Millip, C. Iosifidis, Z. Yagazie, U. Ginimol, M. Mathew, J. Alexander, R. Fowler and A. Agha, "Assessing the compliance of systematic review research works published in leading dermatology journals with the PRISMA statement guidelines: A systematic review," 2020, doi: 10.1016/J.JDIN.2020.07.007.
- [52] S. Hullumani & R. Raghumahanti, "PRISMA Guidelines and Search Strategy," 2024, doi: 10.6084/m9.figshare.25013264.
- [53] G. H. Guyatt, A. D. Oxman, G. E. Vist, R. Kunz, Y. Falck-Ytter, P. Alonso-Coello, et al., "GRADE: an emerging consensus on rating quality of evidence and strength of recommendations," *BMJ*, vol. 336, no. 7650, pp. 924–926, 2008. doi: 10.1136/bmj.39489.470347.AD
- [54] G. H. Guyatt, A. D. Oxman, G. E. Vist, R. Kunz, R. Falck-Ytter, Y. Alonso-Coello, et al., "GRADE guidelines: 1. Introduction—GRADE evidence profiles and summary of findings tables," *J. Clin. Epidemiol.*, vol. 64, no. 4, pp. 383–394, 2011. doi: 10.1016/j.jclinepi.2010.04.026