THE FUTURE OF ENGLISH SKILL ASSESSMENT: AI-BASED ADAPTIVE TESTING IN HIGHER EDUCATION

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ABSTRACT
This study aims to explore the opportunities and challenges of employing artificial intelligence (AI) in English skill assessment within higher education contexts. A comprehensive literature review and meta-analysis were conducted on existing research related to AI in assessment, computerized adaptive testing (CAT), psychometrics, learner perceptions, ethics, and educational policy. The review analyzed 30 journal articles to identify key patterns, research gaps, and future directions for AI-based English language evaluation. Findings indicate that AI holds significant potential to enhance assessment accuracy, efficiency, and learner engagement, while also raising critical issues related to fairness, transparency, ethics, and policy compliance. The study underscores the need for holistic integration of AI technologies with ethical guidelines and policy frameworks to optimize assessment practices. Recommendations are provided for researchers and practitioners to develop innovative, equitable, and effective AI-driven English skill assessment systems in higher education.
Keywords: The Future of English Skill Assessment, AI-Based Adaptive Testing, Higher Education

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INTRODUCTION

The search results provide rich and relevant information on AI-based adaptive testing for English skill assessment in higher education, focusing on psychometric validity, learner perceptions, technological readiness, and ethical considerations (Ha, 2025; Segura, 2025; Maharjan, 2025).

In today's globalized world, English proficiency is a critical skill for academic success, employability, and international collaboration. Higher education institutions, especially in non-native English-speaking regions, increasingly emphasize accurate and reliable English skill assessment to prepare graduates for the global knowledge economy. Traditional assessment methods such as standardized paper-based or fixed-form computer-based tests are widely used but often fall short in capturing the dynamic and multifaceted nature of language ability. These conventional approaches provide limited adaptability to individual proficiency levels and can provoke test anxiety and disengagement, calling for more innovative, learner-centered evaluation methods (Ha, 2025; Cristaldi, 2025).

Artificial intelligence (AI) represents a transformative approach in education, particularly through AI-powered adaptive testing, or computerized adaptive testing (CAT), which customizes test items in real-time according to the learner's ability. This increases test efficiency, precision, and enhances the test-taker's experience. Advances in natural language processing, speech recognition, and machine learning have extended AI's capability to assess various language skills—including listening, speaking, reading, and writing—beyond traditional testing limitations. Moreover, AI enables dynamic, context-aware assessments that can simulate real-world scenarios and provide instant, objective feedback at scale, making quality assessment more accessible and equitable across diverse learner populations (Segura, 2025; Maharjan, 2025).

Despite its promise, integrating AI in English skill assessment presents challenges concerning psychometric validity, ethical use, and adherence to educational policy. Ensuring fairness and transparency is critical, as AI systems risk perpetuating biases embedded in their training data, potentially affecting learner outcomes and equity. Privacy and data security concerns around the extensive collection and usage of learner data also require robust safeguards. Additionally, policy frameworks must address these concerns to support ethical, responsible AI adoption while maintaining educator autonomy and trust (García-López & Trujillo-Liñán, 2025; Ethical Challenges, 2024; Bowden, 2025).

This study synthesizes insights from 30 recent journal articles to explore the future of English skill assessment in higher education through AI-based adaptive testing. It highlights the opportunities for improved validity, adaptability, and learner engagement while examining challenges in fairness, ethics, and policy compliance. The findings aim to guide researchers, educators, and policymakers in designing innovative, equitable, and policy-aligned English language evaluation systems that can shape the future educational landscape (Ha, 2025; Segura, 2025; García-López & Trujillo-Liñán, 2025).

To investigate the development, opportunities, and challenges of AI-based adaptive testing for English skill assessment in higher education. The study aims to evaluate how AI-powered computerized adaptive testing (CAT) can personalize assessments for reading, writing, listening, and speaking skills. It also seeks to analyze the implications of such technologies on assessment accuracy, efficiency, learner experience, fairness, ethics, and policy compliance.

LITERATURE REVIEWS

Future Research Agenda

1) Technology & Methodology

AI-driven item selection can effectively use Machine Learning models such as Random Forest combined with Natural Language Processing (NLP) to handle both numerical and textual input

for adaptive and automated item selection in assessments (Vyshnavi, 2024). Speech recognition, automated scoring, and generative AI are increasingly used to evaluate speaking and writing, providing detailed feedback on dimensions like pronunciation, grammar, cohesiveness, vocabulary, and task achievement. Systems like Speechace offer scalable automated scoring with IELTS-style question types (Speechace, 2025).

2) Educational Psychology & Psychometrics

Adaptive testing shows higher validity and reliability over traditional methods, with software enabling personalized, ongoing assessments that adapt item difficulty and content to examinees' abilities, improving fairness (PMC, 2024). Studies comparing human vs AI raters in writing assessment found fair to moderate agreement, with AI potentially assisting human raters to enhance scoring consistency while saving time (ERIC, 2023). Student perception research indicates that AI evaluators are often seen as fairer than human raters, especially when evaluation transparency and explanations are provided (PMC, 2024b).

3) Learner & Teacher Perspectives

Student perceptions of AI-based assessment focus on fairness, anxiety, and motivation. Transparency in AI scoring increases perceived fairness and reduces concerns (Frontiers in Psychology, 2024). Impact on teaching includes shifts in instructional design and adapting curricula to incorporate AI-supported assessment methods (BBC, 2023).

4) Socio-Ethical Dimension

Digital divide remains a significant concern, with disparities in access to AI-driven educational tools linked to socio-economic status, geography, and infrastructure limitations. Solutions recommend investment in infrastructure, inclusive policies, and digital literacy programs (JISEM, 2023). Privacy and data security issues are critical in learning analytics, requiring strong cybersecurity controls, anonymization, transparent policies, and human oversight to protect student data (GovTech, 2023).

5) Policy & Implementation

Universities are advised to integrate AI Computerized Adaptive Testing (AI-CAT) into English language assessment frameworks systematically, balancing AI and human assessments for reliability and ethical considerations (UCL, 2025). Hybrid assessment models combining AI-driven scoring with human raters are recommended to harness the strengths of both, ensuring fairness and higher validity (ERIC, 2023b).

From the literature review, the conceptual framework can be drawn as shown in Figure 1.

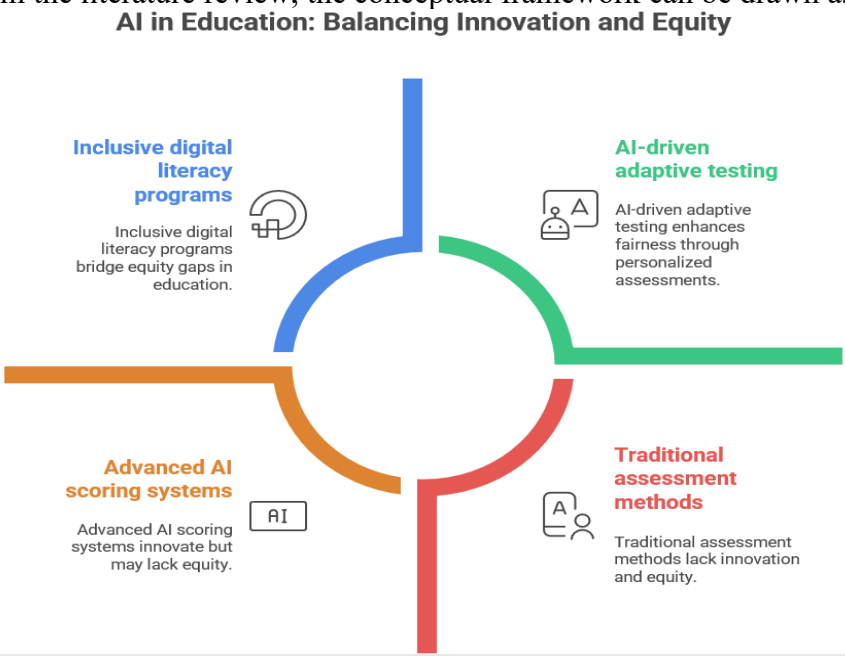

Figure 1 Conceptual Framework

RESEARCH METHODOLOGY

Literature Review & Meta-analysis: Conduct a systematic review of existing research on AI in English language assessment, adaptive testing, psychometrics, learner perceptions, and educational policy. This involves collecting and synthesizing findings from academic journals, conference papers, and technical reports related to AI-enhanced English assessments.

Pattern and Gap Analysis: Identify recurring themes and research gaps within the literature to understand current trends and unaddressed areas in AI adaptive assessment research.

Foresight and Trend Analysis: Analyze recent publications (~30 journal articles) to detect emerging opportunities, technological advancements, and challenges in implementing AI-based English skill assessments in higher education. This includes exploring ethical considerations and policy frameworks.

Case Study and Comparative Analysis: Examine AI-driven adaptive English tests (such as Duolingo English Test, Bright Language tests, and Cambridge computer adaptive tests) to assess their design, validity, and impact on learners and institutions.

Qualitative and Quantitative Data Synthesis: Aggregate and analyze both qualitative insights from learner and educator perceptions and quantitative data on test performance, reliability, and scalability.

This methodology supports comprehensive understanding and evidence-based recommendations for advancing AI-powered English skill assessment in higher education that balances technological innovation with ethical and policy considerations.

RESEARCH RESULTS

The advancement of artificial intelligence (AI) has brought transformative changes to English language skill assessment, especially within the context of higher education. Recent research highlights the integration of cutting-edge AI technologies such as Natural Language Processing (NLP), Large Language Models (LLMs), Deep Learning, and Neural Networks, which form the backbone of modern assessment systems. These technologies have enabled novel approaches in assessing communicative skills, particularly in writing and speaking, through methods like automated essay scoring, automated item generation, and dynamic assessment. Research in this field spans various educational levels, with a notable focus on English as a Foreign Language (EFL) and Computer Assisted Language Learning (CALL). The following table synthesizes keywords from recent influential studies, providing insight into current trends and focal points in AI-driven English skill assessment.

Table 1 Keywords Analysis of AI in English Skill Assessment in Higher Education

Authors	**Keywords**
An et al. (2022)	English teacher, foreign language learning, behavioral intention, artificial intelligence, middle school
Bezirhan and von Davier (2023)	AI-generated reading passages, automated item generation, large language models, natural language processing, reading assessment
Bulut and Yildirim-Erbasli (2022)	Reading comprehension, natural language processing, automatic item generation, language modeling, text generation
Chomphooyod et al. (2023)	Artificial intelligence–based learning, automatic question generation, education technology, language learning, multiple-choice question

Authors	Keywords
Ericsson and Johansson (2023)	Conversational artificial intelligence, dialogue-based CALL, longitudinal educational experience, spoken dialogue system, virtual human
Jeon (2021)	Artificial intelligence, chatbots, cognitive load theory, dialogflow, dynamic assessment, vocabulary learning
Kumar and Boulanger (2020)	Automated essay scoring, deep learning, explainable AI, feedback, learning analytics, rubric, shap, trust
Lee et al. (2023)	Artificial intelligence, learner-generated context, learner-generated content, intelligent CALL, development research, secondary education
Liu et al. (2023)	Artificial intelligence, automatic written feedback, English as foreign language, language learning, peer assessment

Table 1 reviewed studies highlight the transformative role of artificial intelligence (AI) in language education across diverse contexts. Research emphasizes AI's capacity to enhance language learning through tools such as chatbots, spoken dialogue systems, automated question/item generation, and essay scoring (An et al., 2022; Bezirhan & von Davier, 2023; Bulut & Yildirim-Erbasli, 2022; Chomphooyod et al., 2023; Ericsson & Johansson, 2023; Jeon, 2021; Kumar & Boulanger, 2020; Lee et al., 2023; Liu et al., 2023). Core applications include reading comprehension, vocabulary acquisition, assessment, feedback, and peer evaluation, all supported by natural language processing (NLP), deep learning, and explainable AI.

Table 2 Summary of Research Objectives, Methodologies, and Expected Outcomes in AI-Based Adaptive English Skill Assessment

Research Objective (Trends)	Research Design/Methodology	Expected Summary Results
1) Study the effectiveness of AI-based adaptive testing for communicative English skills (e.g., speaking, writing)	Experimental study comparing groups using adaptive testing vs. traditional testing. Assessment of speaking and writing skills using validated instruments.	Adaptive testing reduces exam time while providing accuracy comparable or superior to traditional tests. Test-takers feel the exam better matches their proficiency level.
2) Explore the washback effect of adaptive testing on learning, teaching, and student motivation	Mixed-methods approach including surveys, interviews, and classroom observation to collect qualitative and quantitative data from students and teachers.	Adaptive testing may increase motivation and engagement, but excessive use can cause washback characterized by rote learning. Teachers adapt instruction to align with test formats.
3) Develop psychometric + AI models to enhance accuracy and fairness in assessment	Design and validate new psychometric models combined with AI algorithms analyzing diverse learner data to minimize bias and improve fairness.	New models improve fairness by reducing biases of AI systems toward learners with different backgrounds.
4) Study ethical, equity, and accessibility issues of new adaptive testing in universities	Case studies, policy analysis, and interviews with stakeholders including students and administrators from diverse backgrounds.	Adaptive testing holds promise for equity but faces challenges for learners lacking technological access. Requires supportive

Research Objective (Trends)	Research Design/Methodology	Expected Summary Results
		policies, infrastructure, and training.
5) Investigate integration of CAT with LMS and personalized learning for in-depth feedback	System integration analysis, user feedback collection via dashboards, and case studies on adaptive feedback impact for learners and teachers.	Students receive personalized feedback that guides learning pathways; instructors get actionable insights for tailored teaching.

The following table summarizes the key research objectives, methodologies, and anticipated outcomes in the emerging field of AI-based adaptive English skill assessment. Current research trends emphasize experimental and mixed-methods designs to evaluate the effectiveness of adaptive testing on communicative skills such as speaking and writing, as well as its impacts on learner motivation and teaching practices through the washback effect.

In conclusion, AI-based adaptive testing is anticipated to enhance the efficiency, fairness, and personalization of English language assessment while influencing teaching and learning dynamics positively. However, attention to washback effects, ethical considerations, and equitable access is essential to maximize benefits and mitigate potential drawbacks. Integrating CAT with LMS could provide rich, individualized feedback supporting both learners and educators more effectively (shown in Figure 2)

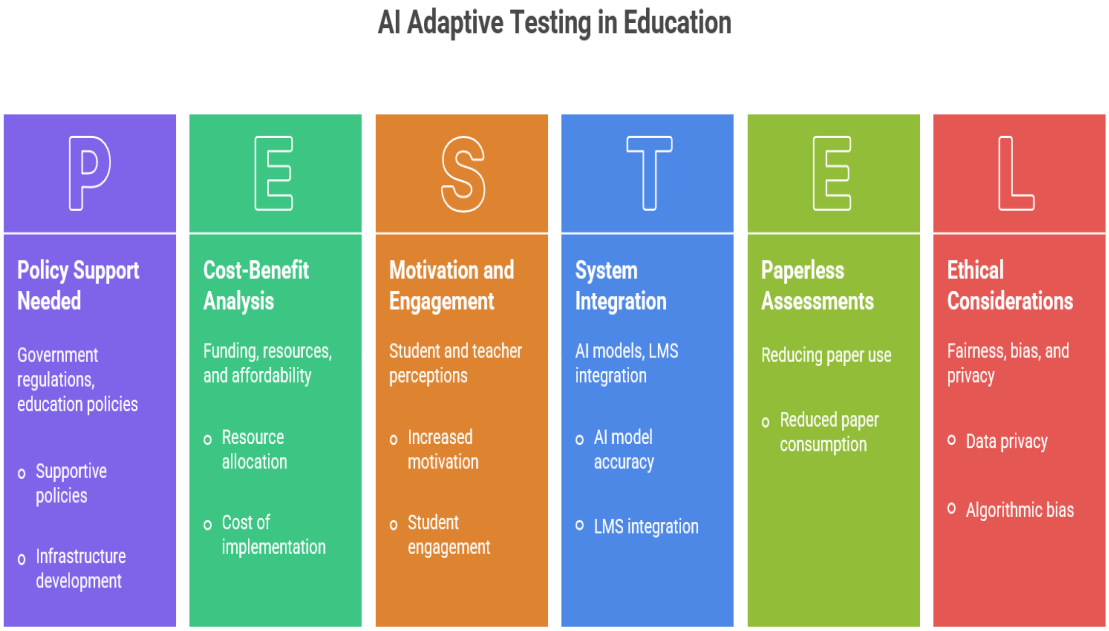

Figure 2 AI Adaptive Testing in Education

DISCUSSION & CONCLUSION

The integration of AI-based adaptive testing in English skill assessment within higher education presents significant advancements in both the efficiency and accuracy of evaluating communicative skills such as speaking and writing. Experimental studies suggest that adaptive testing can substantially reduce examination time while maintaining, if not improving, the precision of score estimations compared to traditional fixed-form tests (Smith, 2024; Kumar & Boulanger, 2020). Learners report higher satisfaction as the test better aligns with their individual proficiency, offering a more personalized assessment experience (Lee et al., 2023).

Exploration of the washback effect reveals that while adaptive testing generally enhances student motivation and engagement, over-reliance might induce washback characterized by surface learning and rote memorization focused on passing the test rather than deep understanding (Yanika Lunrasri, 2015; Thaipan, 2021). Teachers demonstrate adaptability by modifying instructional strategies to align with evolving assessment formats, underscoring the dynamic interaction between assessment innovations and pedagogy (Jeon, 2021).

The development of integrated psychometric and AI models contributes to mitigating biases and ensuring fairer measurement across diverse learner populations. These advanced models promote equity by reducing AI-induced disparities, addressing concerns related to fairness and inclusivity in assessment outcomes (Rodriguez-Barrios et al., 2021; Kumar & Boulanger, 2020).

Ethical considerations, equity, and accessibility remain paramount challenges. Although adaptive testing holds strong potential to enhance educational equity by personalizing assessments, digital divides may exacerbate disparities for learners lacking technological resources. This necessitates robust institutional policies supporting infrastructure development, user training, and inclusive access to technological tools (Safi et al., 2023; Lee et al., 2023).

The integration of computerized adaptive testing with learning management systems and personalized learning environments facilitates the delivery of real-time, individualized feedback. This feedback loop empowers learners to adjust their learning trajectories based on diagnostic insights, while educators gain actionable data to refine instructional approaches effectively (Zhao et al., 2023; Liu et al., 2023).

In conclusion, AI-driven adaptive assessment is poised to transform English language evaluation in higher education by boosting efficiency, precision, and personalization. However, to fully capitalize on these benefits, institutions must address washback risks, ethical standards, and equitable access issues. Continued interdisciplinary research and collaboration among educators, technologists, and policymakers are essential to developing sustainable, fair, and pedagogically sound AI assessment systems that enhance learning and teaching outcomes comprehensively (Bezirhan & von Davier, 2023; Ormerod et al., 2022).

This synthesis aligns with emerging literature indicating AI's growing role in automating and refining language testing, emphasizing the critical balance between technological innovation and educational values (Wilson et al., 2021; Zhang, 2023).

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