Revolutionizing Language Teaching: AI in Oral Language Assessment

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Abstract

Generative AI is revolutionizing oral language assessment by providing innovative solutions to alleviate the burden on teachers [1]. In traditional settings, particularly in HE classrooms with large student-to-teacher ratios, assessing each student's speaking abilities can be time-consuming and challenging, often resulting in inconsistencies and subjectivity. Generative AI addresses these issues by offering scalable solutions that maintain high standards of reliability and objectivity. It can analyze various aspects of spoken language, such as pronunciation, fluency, grammar, and vocabulary usage, providing detailed and immediate feedback [2]. Moreover, it incorporates multimodal cues, such as facial expressions, gestures, and body language, into oral performance assessment tasks, assessing not only linguistic competence but also communicative effectiveness and sociolinguistic appropriateness [3]. A compelling case study – a classroom with 145 students from the University of Padua – exemplifies the transformative impact of generative AI in oral language assessment. In this setting, the application of AI-driven assessment tools significantly improved the lecturer's effectiveness and efficiency. Previously overwhelmed by the sheer number of students, the lecturer was able to manage assessments more systematically, as the AI system provided consistent evaluations and immediate feedback on students' spoken language skills. This multimodal approach to oral language assessment offers a more nuanced understanding of learners' oral communication skills and fosters the development of communicative competence in real-life contexts [4].

Keywords: *Generative AI, oral language assessment, automated feedback, personalized instruction, educational technology*

1. Introduction

The rise of the digital age in language education has brought about a major transformation in both teaching strategies and language acquisition, as technology increasingly reshapes the learning experience. While technological innovations have long been available, their widespread adoption in education have been slow and incremental—until the dramatic shifts prompted by the global pandemic. Faced with the urgent need to move instruction online, educators—regardless of their familiarity with technology—were pushed to not only adopt digital tools but to overhaul their teaching models to support fully virtual learning environments [4]. This sudden shift left many educators feeling overwhelmed and unprepared for the complexities of online instruction, prompting a swift return to traditional, in-person classrooms as institutions sought a return to familiar routines. However, this reversion risks ignoring the valuable progress made in digital pedagogy and underutilizes the potential of technological innovations that could enhance teaching and learning.

This paper responds to this trend by offering a thorough analysis of the ongoing digital transformation in language education, focusing on the role of emerging technologies, including generative AI. Learners can now converse with AI-driven chatbots or connect with language exchange partners from across the globe, enabling authentic language practice in real-time [5]. A key advantage of these technologies is the ability to provide personalized, adaptive learning experiences. Using machine learning algorithms, digital platforms can track individual progress, tailoring content to address each learner's unique strengths and weaknesses [6]. This targeted approach offers customized feedback, exercises, and resources that promote more effective learning outcomes [7].

Assessing learners' output remains one of the most challenging and time-consuming tasks for educators, particularly in the field of language education. Laurillard [8] highlights the limitations of traditional assessment methods, emphasizing the need for pedagogical innovation to address these issues. Conventional approaches, such as standardized tests, written assignments, and oral

presentations, often fail to fully capture the wide range of linguistic skills and learning styles present among students. Moreover, these methods can be labor-intensive, requiring significant time to administer and grade. Gaballo [1] further reinforces these concerns, stressing the urgency for more effective and efficient assessment strategies that can improve both the accuracy and the practicality of evaluating language proficiency.

This paper explores practical strategies to integrate digital tools in ways that enrich language teaching while relieving educators from excessively time-consuming activities. Through concrete examples, the author illustrates how these technological advances can be aligned with modern pedagogical theories to unlock the full potential of AI-powered digital language education.

2. Evolution of Generative AI in Multimodal Language Assessment

The evolution of multimodal language assessment has transformed traditional assessment practices in English language teaching (ELT), expanding the ways students are evaluated in the context of technological advancements and changing pedagogical approaches. This evolution can be understood through three distinct stages [1]: an initial focus on multimodal input with monomodal output and manual assessment, a subsequent shift toward multimodal output with semi-manual assessment, and a final stage characterized by AI-powered automated assessment. Each stage reflects the growing complexity and integration of various modes of communication, as well as the increasingly sophisticated tools used to assess language proficiency.

2.1 Stage 1: Multimodal Input – Monomodal Output – Manual Assessment

The first stage in the development of multimodal language assessment centered primarily on the incorporation of multimodal input, while the assessment itself remained relatively traditional, focusing on monomodal output. In this stage, learners were exposed to a variety of modes of communication, including speech, writing, images (both still and moving), music, sound, and layout. This multimodal orchestration aimed to enhance student engagement, realism, and interaction with content. Through such diverse input, students developed critical thinking and analytical skills, media literacy, and the ability to engage with content from a variety of perspectives, catering to varied learning styles.

Despite this emphasis on multimodal input, the output expected from students during this stage typically remained monomodal, often limited to printed text. Learners were tasked with analyzing the multimodal input, synthesizing information from different sources, and integrating this information into a coherent, written output. This approach helped students hone their ability to process and synthesize data, but it did not fully leverage the richness of multimodal communication that the input provided.

Assessment in this stage was largely manual, which presented significant challenges. The subjective nature of evaluating a student's ability to critically engage with multimodal input often led to inconsistencies in grading, as well as issues with time efficiency. Assessing students' synthesis of information and their critical thinking skills required deep involvement from the educator, who had to provide extensive feedback on both content and the integration of multimodal literacy skills. However, the opportunity for holistic evaluation, which allowed the educator to assess more than just grammatical and syntactical correctness, was a significant advantage. This comprehensive feedback process not only allowed for a deeper understanding of students' abilities but also provided opportunities for improvement and growth.

2.2 Stage 2: Multimodal Input – Multimodal Output – Semi-Manual Assessment

The second stage in the evolution of multimodal language assessment marked a shift toward multimodal output, where students were not only analyzing multimodal input but also producing multimodal texts of their own. This change acknowledged the growing role of digital literacy and media in communication and language learning, and it encouraged learners to navigate and integrate information from a wide range of digital sources. The output at this stage included videos, presentations, or digital narratives that combined speech, text, images, and sound, requiring students to balance technical aspects, such as video production, with the synthesis of content.

The move toward multimodal output allowed for a more comprehensive assessment of language proficiency and communication skills. Students had to demonstrate not only their linguistic abilities but also their competence in navigating digital tools and their creativity in integrating different modes of communication into cohesive narratives. This type of output reflected real-world communication practices, fostering students' critical thinking, media literacy, and technical skills, while also encouraging ethical discussions around digital media usage.

In terms of assessment, this stage introduced a semi-manual approach, blending human evaluation with the use of digital tools. Rubrics became a critical component in ensuring fairness and consistency, as detailed criteria were necessary to evaluate not only the content but also the technical aspects of the multimodal outputs. While human judgment was still required to assess nuanced elements such as creativity and critical thinking, technological tools began to assist in evaluating technical proficiency and some objective aspects of the production process. This combination of human and digital assessment allowed for more balanced feedback, improving the fairness of evaluations while still addressing the diverse skills students were developing.

2.3 Stage 3: Multimodal Input – Multimodal Output – Automated Assessment

The most recent stage in the evolution of multimodal language assessment is characterized by the increasing use of AI-powered tools, which have introduced new possibilities for efficiency, consistency, and scalability in assessment. In this stage, learners engage with multimodal input that is rich in various forms of media, from speech and text to videos, images, and sound, creating an immersive learning environment. The multimodal output expected from students at this stage emphasizes not only technical skills and content synthesis but also a deeper understanding of audience and context. In this environment, learners are encouraged to collaborate, reflect on their own learning, and engage creatively with the material, often in ways that go beyond traditional forms of communication.

The AI-powered assessment tools used offered significant advantages in terms of efficiency and consistency. These tools quickly evaluated technical aspects of multimodal output, such as grammar, pronunciation, and even certain stylistic elements. However, one of the major challenges of AI-powered assessment is the difficulty of evaluating nuanced content, such as creativity, critical thinking, and the emotional or cultural layers of communication. As a result, supplementary human evaluation remains necessary to ensure that the assessment is comprehensive and captures the full range of a student's skills.

While AI-powered tools streamline the assessment process, allowing for faster feedback and greater scalability, they also raise important ethical considerations. Issues related to data privacy, the risk of over-reliance on automated systems, and the potential for algorithmic bias are critical concerns that need to be addressed. Educators must strike a balance between leveraging the benefits of AI and maintaining the human elements of language assessment, particularly when it comes to evaluating the more subjective and creative aspects of language use [9].

3. Leveraging Generative AI in Oral Skill Assessment

To effectively design AI-driven assessments of oral skills, several key factors must be considered. First, the assessment tasks should mirror real-life language use and be contextually meaningful. AI tools allow learners to practice speaking in different contexts, from casual conversation to professional settings.
AI can also assess more technical aspects of speech, such as pronunciation and intonation. Through speech recognition technology, AI can analyze learners' accents, stress patterns, and pacing, offering detailed, specific feedback on areas for improvement. This real-time analysis helps address one of the key challenges in traditional oral skill assessments: the ability to provide instant, targeted feedback, which is crucial for language development.
Furthermore, AI tools are increasingly capable of evaluating more complex aspects of language use, such as discourse management and pragmatic competence. These tools can assess how well learners organize their thoughts, maintain coherence, and respond appropriately in conversations. While fully automated systems still face challenges in evaluating nuanced aspects like humor, emotion, or cultural appropriateness, they can nonetheless provide a strong foundation for assessing a wide range of oral competencies.

The case study analyzed below explores the use of AI-powered assessment tools in a core module of the BA degree program in "Languages, Literatures, and Cultural Mediation" at the University of Padua. The primary aim of the module "LIN125 - Linguistics for Translation Studies", which included 145 students during the 2023-2024 academic year, was to deepen students' understanding of how language functions and how linguistic knowledge informs translation skills. The core module was based on *An Introduction to Language* by Victoria Fromkin, Robert Rodman, and Nina Hyams, and delivered through the Cengage MindTap platform, which is analyzed in *Digital Language Teaching and Learning* by Gaballo [1]. This study focuses on the evaluation process only, detailing how oral assignments were designed and assessed.

3.1 Designing AI-driven Assessment of Oral Skills

A tool, Bongo AI Coach, available in the Cengage MindTap platform connected to the adopted textbook, allows educators to tailor the assignment types to their style; they can choose among Individual & Group Assignment, Question & Answer, and Interactive Video.

Bongo's individual project assignment offers a supportive environment where learners can either acquire new skills or showcase their mastery. This approach combines repeated skill practice with feedback mechanisms like self-assessment and peer review to promote continuous improvement. As a low-stakes task, the individual project allows learners to record multiple video versions, reflect on their performance, and revise until they are satisfied. During the reflection process, learners benefit from auto analysis, an automated reporting tool that provides detailed insights into their progress. By tracking metrics such as speech rate, clarity, use of filler words, and custom content goals, auto analysis helps learners identify areas for improvement and assists evaluators in quickly pinpointing potential challenges. Individual project is typically used to practice training exercises or rehearse speeches.

The first individual project assignment (Video-Assignment 1) in the LIN125 course focused on descriptive and prescriptive grammar. The instructions provided are outlined below:

> "In contrast to linguists, who rely on descriptive grammar to understand the way people speak without placing any value judgments on them, some people are concerned with prescriptive grammar, which means they try to tell people the way they 'should' talk in order to sound 'proper.' Watch the music video by 'Weird Al' Yankovic (https://youtu.be/8Gv0H-vPoDc). He uses humor to discuss uses of language that violate prescriptive norms—what he calls 'word crimes.' Are there violations of prescriptive rules of grammar that particularly bother you, similar to Yankovic? Or, conversely, have you ever felt criticized for speaking or writing in a way that wasn't 'proper'? - Practice by adding videos of yourself responding to the prompts, then select the video you would like to submit for review."

The question arises as to how learners' responses can be assessed using Generative AI. To avoid simplism and ensure fairness and accuracy in AI-powered assessments, it is essential to use detailed rubrics that guide the technology in evaluating various aspects of speech, including discourse management and pragmatic competence. AI Coach is designed to build Learning Objectives and criteria that can be effectively used in the feedback and scoring process. By providing course materials at the time of assignment configuration to develop Learning Objectives, the AI Coach will provide feedback specifically around how well those Learning Objectives have been met in addition to the standard coaching feedback. Below is a list of learning objectives along with detailed criteria that were built based on the content submitted for Video-Assignment 1 (see the instructions quoted above). Instructors can select the objectives and criteria that they feel are relevant. In this particular instance, all the generated Learning Objectives and corresponding criteria were accepted to evaluate how effectively they would be achieved.

Reflect of personal experiences with prescriptive grammar
- Identify personal violations of prescriptive grammar rules that bother you, similar to 'Weird Al' Yankovic.
- Reflect on instances where you felt criticized for using language in a way that wasn't considered 'proper.'

- Analyze the reasons behind feeling criticized for language use.
- Discuss the impact of societal expectations on language use and communication.
- Evaluate the potential benefits and drawbacks of adhering to prescriptive grammar rules.

Examine 'Weird Al' Yankovic's music video and its relationship to prescriptive grammar
- Watch 'Weird Al' Yankovic's music video discussing 'word crimes.'
- Analyze the examples of language use that violate prescriptive norms in the video.
- Understand the use of humor as a means to discuss prescriptive grammar.
- Discuss the impact of the video in challenging prescriptive grammar rules.
- Evaluate different perspectives on language use in relation to the video.

Analyze the use of prescriptive grammar in society
- Identify individuals or groups who are concerned with prescriptive grammar.
- Understand the motivations behind prescribing particular language usage.
- Analyze the concept of 'proper' language use and its implications.
- Discuss the role of prescriptive grammar in maintaining social norms and hierarchies.
- Evaluate the criticisms and debates surrounding prescriptive grammar.

Understand the difference between descriptive grammar and prescriptive grammar
- Identify the definition of descriptive grammar.
- Explain the purpose of descriptive grammar in understanding the way people speak.
- Define prescriptive grammar.
- Differentiate between descriptive and prescriptive grammar by providing examples.
- Discuss the value judgments associated with prescriptive grammar.

Once Learning Objectives are generated, instructors can edit or delete both the objectives and their sub-criteria. The generated text for Learning Objectives and criteria is used to create custom prompts for the AI model, enabling it to provide targeted coaching feedback and automatically score videos. Instructors also have the ability to adjust the AI-generated scores for each Learning Objective, with these adjustments tracked to improve the AI's future performance. Additionally, a flag is available during configuration to control learner access to Smart Score results. Results can be immediately published for learners or hidden until reviewed and adjusted by the instructor, if necessary.

Another valuable feature of AI Coach is the Auto Analysis tool, which scans videos for key terms and phrases to ensure learners are addressing the desired topics. Instructors also have an additional tool (PhraseGen™) that allows them to upload relevant content into a text field, which then automatically generates suggested key terms and phrases based on the uploaded material. If instructors want learners to avoid specific phrases in their videos, they can input them into the 'terms to avoid' field, and these will be highlighted in the Auto Analysis insights for learners to see.

Instructors also have the option to enable the Reflection Questions feature when needed, providing a valuable tool to guide learners' thinking before starting an Individual Assignment. After reviewing the text or video instructions, learners are asked to answer up to 10 Reflection Questions before moving forward with the assignment. Once the assignment is submitted, instructors can view the learners' responses to these questions on the grading page.

Both instructors and learners can comment on the videos produced, either with a text or video comment. Depending on the instructor's settings learners can review a peer's submission with either 1) a 5-star rating or 2) a rubric. They may also have the option to self-assess. Peer reviews can be set to either Automatic (System Selected) – this option ensures that reviews are equally distributed among all submissions and allows students to review a submission completely before advancing to their next peer – or Manual (Student Selected) – this option allows the learner to choose the submissions to review from a drop-down menu.

The evaluation report generated for each learner covers specific learning objectives and criteria, offering feedback on how well they have been achieved and illustrating this with excerpts from the learner's video transcripts. A few examples, limited by space constraints, are provided below:

Reflect on personal experiences with prescriptive grammar.
- The speaker reflects on personal experiences with prescriptive grammar by acknowledging that they have been judged for their language use.
  - "Um, on the contrary, people tend to judge me, um, because of how I speak."
- The speaker mentions the potential drawback of adhering to prescriptive grammar rules, which is being criticized by friends for their mistakes.
  - "Um, I don't really put much importance in the rules of prescriptive grammar when I speak with my friends, but some of them tend to underline my mistakes and it, it's really annoying."

Examine "Weird Al" Yankovic's music video and its relationship to prescriptive grammar
- The speaker provides an example of a prescriptive grammar rule being violated in "Weird Al" Yankovic's music video.
  - "Um, there are a few exceptions, for example, when people, uh, use two conditionals in a sentence, like if I would like you, I would tell you instead of, if I liked you, I would tell you."
- The speaker acknowledges that they are not bothered by people making grammar mistakes, but rather by the judgment they receive for their own mistakes, which relates to the use of humor in "Weird Al" Yankovic's video.
  - "Um, but generally, yes, I, I wouldn't say I, I am bothered by people making these mistakes. Um, I'm more bothered when people judge me because I do them."

Analyze the use of prescriptive grammar in society.
- The speaker discusses the role of prescriptive grammar in maintaining social norms and hierarchies, expressing the desire to speak freely without judgment in certain contexts.
  - "Um, I'm more bothered when people judge me because I do them. It depends on the context anyways. If I'm, if I'm speaking with my friends, I think I should be able to speak as I want without being judged."
- The speaker mentions that some people criticize their language use, which implies the existence of criticisms and debates surrounding prescriptive grammar.
  - "Um, but some of them tend to underline my mistakes and it, it's really annoying."

Understand the difference between descriptive grammar and prescriptive grammar.
- The speaker acknowledges that they do not prioritize prescriptive grammar when speaking with friends.
  - "Um, I don't really put much importance in the rules of prescriptive grammar when I speak with my friends..."
- The speaker provides an example of a deviation from prescriptive grammar by using the imperfect tense instead of the conditional tense when discussing a hypothetical condition. This demonstrates an understanding of the difference between descriptive and prescriptive grammar.
  - "For example, sometimes when I speak about a hypothetical, um, condition, I use the imperfect, uh, instead of saying I would, I had because it's longer and it's not really necessary if I'm speaking with my friends."

The figure below displays a series of screenshots from the assessment page of a student's video assignment. It includes a range of features, from the overall score to an AI Coach overview, as well as a detailed transcript highlighting key words and phrases. Additionally, it presents a tonal analysis, along with personalized tips and feedback provided to the student. Certain elements, such as the student's personal information, have been anonymized for privacy reasons. This visual representation offers a comprehensive view of how various AI-powered assessment tools evaluate different aspects of the assignment, providing both quantitative and qualitative insights.

73298724548__1960745A-1AFF-4...
Mar 24, 2024, 4:37 PM ★★★★★ (1)

00:00 / 01:39 CC
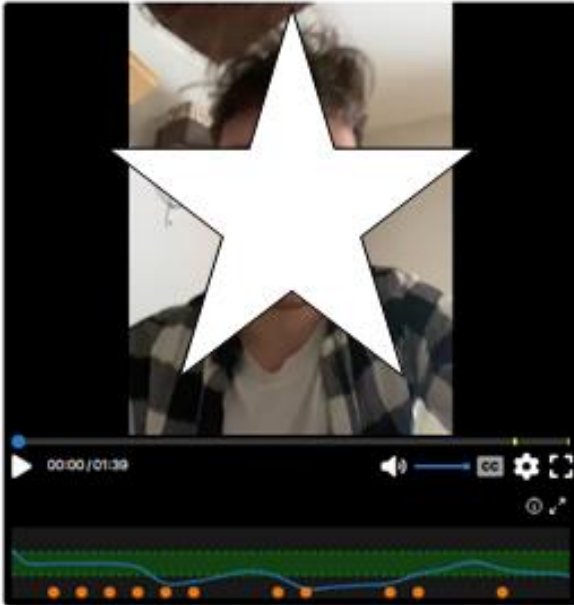
01:29 C▮▮▮▮▮
Very good!
3/29/2024, 12:20 PM

01:39 V▮▮▮▮C▮▮▮
Way to go!
4/3/2024, 11:50 AM

Score
Smart Scoring
Evaluation report

20 / 20

Based on 4 Learning Objectives

Show & Edit Details

AI Coach
More information

[Overview] [Tone] [Tips & Feedback]

The speaker reflects on personal experiences with prescriptive grammar and identifies a personal violation of prescriptive grammar rules similar to "Weird Al" Yankovic. They could improve their presentation by discussing the reasons behind feeling criticized for language use, evaluating the benefits and drawbacks of adhering to prescriptive grammar rules, examining "Weird Al" Yankovic's music video, analyzing the use of prescriptive grammar in society, and understanding the difference between descriptive and prescriptive grammar. Overall, their conversational tone and effective use of examples add a unique aspect to their presentation, though they should reduce fillers and speak at a slightly faster pace.

Delivery

Clarity
99% clear (2 unclear words)

Fillers
13 filler words

Speaking Rate
138 words per minute

TRANSCRIPT

[All Words ▼]

Top Words and Phrases

um	9
people	5
speak	5
would	4
really	4
use	3

Normally it doesn't bother me when people don't use prescriptive rules of grammar to speak or write. Um, there are a few exceptions, for example, when people, uh, use two conditionals in a sentence, like if I would like you, I would tell you instead of, if I liked you, I would tell you. Um, but i'm not really that bothered by it. Um, on the contrary, people tend to judge me, um, because of how I speak. Um, I don't really put much importance in the rules of prescriptive grammar when I speak with my friends, but some of them tend to underline my mistakes and it, it's really annoying. For example, sometimes when I speak about a hypothetical, um, condition, I use the imperfect, uh, instead of saying I would, I had because it's longer and it's not really necessary if i'm speaking with my friends. Um, but generally, yes, I, I wouldn't say I, I am bothered by people making these mistakes. Um, I'm more bot... anyways, if i'm, if i'm speak... judged. Um Whereas if i'm ... context, for example, then i...

[Transcript] [Tone] [Tips & Feedback]

🏅 The speaker has a relaxed and conversational tone throughout the presentation.
1 example

🏅 The speaker effectively uses examples to support their points.
1 example

🏅 ...f context in determining the usage of grammar
1 example

Examples
"For example, sometimes when I speak about a hypothetical, um, condition, I use the imperfect, uh, instead of saying I would, I had because it's longer and it's not really necessary if I'm speaking with my friends."

🚫 ...rate learning objectives related to societal ...g to prescriptive grammar, "Weird Al" Yankovic's ...iptive grammar, and the use of prescriptive ...rovide more insight, examples, and personal experiences to better demonstrate these learning objectives.
3 examples

[Transcript] [Tone] [Tips & Feedback]

Confident ———————— Nervous

Humorous ———————— Serious

Formal ———————— Casual

Persuasive ———————— Informative

5. Conclusions

As educators and institutions seek innovative methods to improve student outcomes, generative AI stands out as a powerful tool for shaping the future of language education. The evolution of multimodal language assessment reflects broader trends in educational technology and pedagogy. Moving from an initial focus on multimodal input and monomodal output to the integration of multimodal output and, finally, to AI-powered assessment tools, this progression highlights the increasing complexity of communication in the digital age. By continuing to refine multimodal assessment practices, educators can ensure that they are preparing students for the dynamic and multifaceted communication environments of the future.

The results of the case study indicate promising outcomes. AI-driven assessment tools were able to offer reliable analytics on student oral performance, providing insights into both strengths and weaknesses. Moreover, these tools helped mitigate biases and human errors inherent in traditional assessment methods, thereby fostering a fairer and more consistent evaluation process. By leveraging technology to analyze oral communication skills, educators can enhance the quality and fairness of assessments while reducing their workload.

The incorporation of AI-driven assessment tools into multimodal pedagogy offers considerable potential for enhancing language assessment practices. Automated content generation, where computers develop prompts and other elements of test tasks, is poised to play a central role in the evolution of large-scale assessments. Similarly, the automated scoring of oral responses is expected to become prevalent as machines improve their capabilities in speech recognition, feature extraction, and evaluation. The ongoing integration of large language models and generative AI systems will likely have an even more profound impact [10]. However, further research is required to investigate the long-term effects of these innovations on student learning outcomes and teaching practices. As technology advances, educators must stay proactive in adjusting their methods to ensure that assessments continue to be valid, reliable, and fair for all learners.

In conclusion, AI offers a promising approach to designing oral skills assessments that are efficient, scalable, and capable of providing personalized feedback. While human oversight remains important, the use of AI in evaluating oral language skills can significantly enhance the learning experience, offering learners the opportunity to practice and improve in a more flexible and supportive environment.

REFERENCES

[1] GABALLO V., 2019, "Digital Language Learning and Teaching: A Case Study", in PIXEL (ed.), Innovation in Language Learning, Bologna, Filodiritto, pp. 444-450.

[2] ZOU B., DU Y., WANG Z., CHEN J., ZHANG W., 2023, "An investigation into artificial intelligence speech evaluation programs with automatic feedback for developing EFL learners' speaking skills", in SAGE Open, 13(3), pp. 1-19.

[3] GABALLO V., 2024, "Innovation in multimodal language teaching and learning: The role of AI-powered oral performance assessment", in RILA, 2024-3.

[4] MOORHOUSE B.L., YEO M.A., WAN Y., 2023, "Generative AI tools and assessment: Guidelines of the world's top-ranking universities", in Computers and Education Open, 5, pp.100151.

[5] GODWIN-JONES R., 2023, "Emerging spaces for language learning: AI bots, ambient intelligence, and the metaverse", in Language Learning & Technology, 27(2), pp. 6–27.

[6] KOLLER A., STRIEGNITZ K., 2021, "Integrating Machine Learning and Language Learning: A Review of the State of the Art", in Journal of Educational Data Mining, 13(1), pp. 137-172.

[7] XIE H., CHU H.C., HWANG G.J., WANG C.C., 2019, "Trends and development in technology-enhanced adaptive/personalized learning: A systematic review of journal publications from 2007 to 2017", in Computers & Education, 140, p. 103599

[8] LAURILLARD D., 2002, Rethinking university teaching, New York/London, Routledge.

[9] WILLIAMSON, B. (2017). Big Data in Education: The Digital Future of Learning, Policy and Practice. SAGE Publications.

[10] NORRIS J.M., DAVIS L., 2025, "Assessing Second Language Speaking at ETS", in L. Davis & J.M. Norris, Challenges and Innovations in Speaking Assessment, London & New York, Routledge.