International Journal of Education and Social Development
ISSN: 3078-9931 (Print), ISSN: 3078-2287 (Online) | Vol. 3, No. 3, 2025

A Critical Evaluation of Otter as an Educational AI Tool: Insights from the UNESCO AI Competency Framework

Feiyu Qi

University of Toronto, St. George Campus, Toronto, Ontario M5S 1A1, Canada

Abstract: This study conducts a critical evaluation of Otter, a widely used AI-powered transcription tool in educational contexts, through a five-dimensional framework grounded in UNESCO's AI Competency Framework for Students. Focusing on the dimensions of ethics, inclusive bias, privacy, inequality, and explainability, the analysis reveals both the pedagogical value and the systemic risks associated with Otter's deployment. While the tool promotes accessibility and supports cognitive and instructional efficiency, it also presents unresolved issues related to data transparency, cultural inclusivity, and algorithmic accountability. This paper argues that current AI tools require more robust ethical governance and critical literacy to achieve equitable educational integration. The proposed framework not only bridges theoretical policy and classroom practice, but also offers practical insights for educators, developers, and policymakers seeking to evaluate and refine AI applications in education.

Keywords: AI in education; Otter; AI ethics; inclusive bias; algorithmic explainability; educational inequality.

1. Introduction

With the rapid development of AI technology, more and more AI tools are applied in educational scenarios to assist learning, teaching and assessment. Otter is a tool that integrates AI technologies such as Automatic Speech Recognition (ASR), Natural Language Processing (NLP), and Speaker Identification to convert speech to text, extract keywords, generate summaries, and distinguish between speakers in real time[1]. Otter nowadays is widely used in meetings, interviews and classroom recordings, and it shows significant benefits. However, while such tools enhance educational equity, they also bring about ethical, privacy, bias, and other issues worth pondering.

To systematically assess the impact of educational AI tools, this paper adopts the AI Competency Framework for Teacher proposed by UNESCO (2024) as the theoretical foundation[2]. This framework consists of five high-level aspects—human-centred mindset, ethics of AI, AI foundations and applications, AI pedagogy, and AI for professional development (Figure 1.). Each aspect features progression levels ranging from basic acquisition to creative application.

Aspects	Progression		
	Acquire	Deepen	Create
1. Human-centred mindset	Human agency	Human accountability	Social responsibility
2. Ethics of AI	Ethical principles	Safe and responsible use	Co-creating ethical rules
3. AI foundations and applications	Basic AI techniques and applications	Application skills	Creating with AI
4. AI pedagogy	AI-assisted teaching	AI–pedagogy integration	AI-enhanced pedagogical transformation
5. AI for professional development	AI enabling lifelong professional learning	AI to enhance organizational learning	AI to support professional transformation

Figure 1. The AI Competency Framework high-level structure[2]

This study focuses on two foundational aspects among these: Human-centred mindset and Ethics of AI. The Human-centred mindset emphasizes human agency, accountability, and social responsibility, while Ethics of AI encompasses ethical principles, responsible use, and the co-creation of ethical norms. These principles guide the critical evaluation in five key dimensions: ethics, inclusive bias, privacy, inequality, and explainability.

2. Literature Review

In this paper, Artificial Intelligence (AI) refers to the technology that exhibit intelligent behavior, and can infer patterns and draw conclusions based on algorithms and databases, such as speech recognition, natural language processing, and data analysis[3]. In the context of education, AI tools are increasingly used to support learning, assessment, and administrative processes[4].

In recent years, the application of AI technology in

education has expanded, with tools such as personalized learning, assisted assessment, and classroom aids gradually changing the traditional teaching mode. Research has shown that AI technology can significantly improve the learning experience and efficiency for students. Woolf et al. pointed out that Intelligent Tutoring Systems (ITS) can provide real-time feedback based on students' learning progress and performance, achieving tailored teaching and learning, which is especially helpful for students with slower learning progress or special needs[5].

In addition, a key value of AI tools in education is the increased accessibility and inclusiveness of information. Taking speech recognition and automatic transcription tools as an example, Wald found that real-time transcription of speech content into text can help students with hearing impairments, language learners, or high cognitive loads to better access classroom information, thereby reducing barriers to education[6]. This finding is highly consistent with UNESCO's concept of "technology for equity and inclusion in education" in its Student Competency Framework for Artificial Intelligence[4].

In the aspect of teaching management, AI is also widely used for tasks such as automatic correction of assignments, learning data analysis, and course recommendation, saving teachers' time and improving the overall quality of teaching decisions[7].

While academia generally recognizes the potential of AI technologies in education, more and more studies are focusing on the risks and challenges they may pose. UNESCO clearly stated that AI tools in education should be designed and applied following the basic ethical principles of "informed consent", "respect for student autonomy", and "transparency in data processing"[2]. However, in reality, many AI systems lack clear notification and effective protection mechanisms in data collection, model training, and user authorization. This leads obvious shortcomings in ethics and privacy[8]. In addition, students' over reliance on AI tools may weaken their agency and abilities to construct knowledge independently and limit the development of critical thinking[4].

Moreover, the issue of inclusive bias also cannot be ignored in current AI research. Birhane pointed out that the training data of most AI systems mainly derive from mainstream western contexts, and this data bias weakens the ability of AI models to understand and adapt to global multicultural contexts. AI tools are better at recognizing western language and behavioral patterns[9]. However, they struggle to accurately handle cultural expressions from non-western countries, ethnic minorities, or aboriginal groups, which may result in misinterpretation and exclusion.

At the same time, the widespread use of AI in education also threatens to exacerbate the existing digital divide. Holstein and Doroudi pointed out that AI systems often assume that users have a relatively sophisticated technological base and ability to use them, ignoring differences in equipment, networks, digital literacy, and pedagogical support across regions[10]. This asymmetry in "technological prerequisites" may further exclude already marginalized groups from the educational opportunities offered by AI.

Although many studies have explored the application of AI in education from various perspectives, including ethical challenges, technological biases, privacy risks, and the digital divide. Most of these studies remain at the macro-level policy analysis or theoretical approaches and lack systematic, multi-dimensional empirical analyses based on specific AI tools. In particular, in real-life teaching scenarios, discussions on the advantages and potential risks of specific AI tools used by teachers and students on a daily basis are still relatively limited in relevant research. In addition, the existing literature tends to discuss topics such as ethics, privacy, or fairness separately. A unified analytical framework to integrate these key dimensions into a complete assessment system is lacking. To fill the above gaps, this paper takes Otter—an AI voice transcription tool commonly used in practical teaching—as an example. The analysis is anchored in an international policy framework, UNESCO's Competency Framework for Artificial Intelligence in Education, in order to bridge theoretical analysis and practical instruction. In conjunction with the core principles proposed by UNESCO, this paper aims to conduct a structured critical analysis based on five key dimensions: ethics, inclusive bias, privacy, inequality, and explainability. With a view to providing targeted practical guidance for the design and use of educational AI tools.

3. The Case of Otter: Benefits, Concerns and Suggestions

3.1. Benefits of Otter in Education

Otter integrates AI technologies such as Automatic Speech Recognition (ASR), Natural Language Processing (NLP), and Speaker Identification to convert speech to text, extract keywords, generate summaries, and distinguish between speakers in real time[1]. In educational scenarios, Otter can provide synchronized transcribed content for hearing impaired students and second language learners, lowering barriers to accessing information in the classroom and promoting educational equity[6]. In addition, Otter helps students reduce cognitive load during class, focus on classroom learning, and provides opportunities for review through transcripts after class, thus effectively enhancing learning[11]. This also demonstrates the important role of Otter in realizing inclusiveness and accessibility in education[2]. For teachers, Otter provides a thorough record of classroom interactions, helping teachers to review teaching details, assess student engagement, and use it to reflect on teaching strategies for continuous improvement of teaching quality[7]. These functionalities demonstrate the potential of Otter to not only support individual learners, but also enhance pedagogical decision-making and education quality in diverse contexts.

3.2. Concerns of Otter in Education and Related Suggestions

3.2.1. Ethics

UNESCO states that ethical risks of AI tools should include informed consent, student autonomy, and transparency in data processing[2]. Otter, however, as a classroom aid, often lacks adequate notification of the person being recorded in actual use. For example, in group discussions or remote lectures, some teachers or students may not realize that they are being recorded, resulting in an involuntary data contribution that violates the informed consent principle of AI ethics. Meanwhile, Kröger et al. point out that most AI systems do not ensure full user authorization when collecting speech data, and users' knowledge of the system mechanisms is generally insufficient[8]. Although Otter states in its privacy terms said user recordings may be used to improve the service[12], it

does so in a subtle manner and does not ensure that all recording participants have understood and agreed to its terms of use. This type of asymmetric information structure amplifies the ethical risks of the use process. Furthermore, Dignum emphasizes that AI systems should be designed to augment rather than diminish human judgment[12]. Students who overly rely on Otter for note-taking and comprehension may ignore the active construction of knowledge and weaken critical thinking and human agency[4].

Therefore, it is suggested that users should clearly explain to all participants the purpose of Otter recordings, how they are stored, and their potential use before enabling Otter recordings to ensure that informed consent is obtained. At the same time, students should be guided to view Otter as an aid rather than an alternative to cognition in their teaching. They should also be encouraged to reflect on the boundaries of AI use to achieve ethically sustainable integration of the tool.

3.2.2. Inclusive Bias

Rubinstein pointed out that AI systems often give priority to recognizing mainstream accents and high-resource languages when processing speech, ignoring the needs of dialects, multilingual backgrounds, and people with language impairments[13]. Robinson et al. demonstrated through their study that large-scale language models, such as ChatGPT, perform much better than low-resource languages, such as English, reflecting a training language bias in the database[14]. Although Otter supports the recognition of a wide range of English accents, its accuracy in non-standard English and for L2 speakers remains insufficient. The resulting “accent bias” can lead to inaccurate transcriptions that create comprehension barriers for ESL students. To improve this problem, it is suggested that the developers incorporate more diverse accent samples into the training process to build a fairer recognition mechanism, and publicize the results of the multilingual test in the model evaluation.

3.2.3. Privacy

Privacy concerns do not only arise at the storage or sharing stage of data, but are present from the very beginning of data collection[13]. Many automated transcription tools begin recording without the user's full knowledge, thus bypassing the basic ethical requirement of informed consent. If students and teachers are recorded without being explicitly informed, their voice data are uploaded to the cloud in an unguarded manner and may be used for training models, which is a serious violation of an individual's right to privacy[8]. Furthermore, Syed et al. state that multi-tenant architecture, geographically distributed data centers, API vulnerabilities, and unauthorized access in cloud storage environments significantly increase the risk of data leakage, hacking, and information exposure[15].

A deeper concern arises from the biometric features contained in the voice data itself. Rubinstein points out that voice can be used to construct “voiceprints” and that these biometric features, even if de-identified, may be able to re-identify the user through cross analysis of the data[13]. For example, even if information such as name is removed, it is still possible to reverse-identify a specific individual by combining factors such as timbre, accent, and speaking habits. This means that the traditional “anonymization” process is not always effective in the voice data domain.

Under the current technological development trend, AI's reliance on biometric data is increasing, but public awareness of this issue is not yet sufficient. Therefore, when using transcription tools, all participants' right to know should be respected, with users being informed and granted the right to refuse. In addition, as a tool provider, Otter should offer users the option to control their data, establish clear data deletion mechanisms, and adhere to the principle of minimally handling biometric data. Schools should review their privacy policies when introducing transcription-based tools, inform students of the risks involved and guide their use. Teachers should guide students to consider their voices as important biological data and raise awareness of privacy protection.

3.2.4. Inequality

While Otter has the potential to promote equity and inclusion in education, there are some real-world challenges. Selwyn points out that functionally tiered edtech tools tend to exacerbate educational inequality, especially when core functions require payment[16]. The free version of Otter has significant limitations in terms of transcription length and functionality, which poses a technological threshold for low-income students. In addition, the lack of systematic support for the diffusion of AI technology, especially in terms of device acquisition and digital literacy training, will further magnify the existing social resource gap.

Language and cultural appropriateness is also an important indicator of the fairness of AI in education; Otter currently only supports English transcription, and its user interface is set up in English without the aid of multi-language translation. This creates an obvious accessibility barrier for non-native English speakers, especially learners from lower grades or new immigrant backgrounds. UNESCO points out that educational AI tools should be designed to be both "technologically accessible" and "culturally adapted" in order to achieve true equity in education[2].

Therefore, it is suggested that improvement measures should be taken at multiple levels. Platforms can cooperate with public interest organizations to provide unrestricted versions for low-income students, while schools should provide the necessary software, hardware resource support, and digital literacy training. In addition, platforms should further develop multi-language interfaces and speech recognition models to ensure that users with different linguistic backgrounds can access their services without any barriers.

3.2.5. Explainability

Explainability of AI systems is the basis for achieving fairness and trust, especially in the field of education, where learners and teachers need to understand how AI tools generate results. Currently, although Otter provides summary and keyword functions, the specific operation logic of how it filters, categorizes, and edits statements is not disclosed. When there is a recognition error or semantic deviation, the user is unable to determine the cause, track the process or make corrections. This “black box operation” affects users’ confidence in using it.

Ribera and Lapedriza suggest that AI tools should be user-centered and explain its behavioral logic in natural language, help users understand each step of decision-making[17]. In educational scenarios, such explanation mechanisms are especially critical to assist teachers in identifying model biases and guiding students to develop critical AI literacy.

Therefore, it is suggested that Otter develops a natural language interpretation module that transparently presents to users how it performs semantic extraction, keyword selection and summary generation. At the same time, an error annotation function can be added to allow users to provide feedback and correct recognition errors. This will not only

help to enhance users' understanding and trust, but also promote students' development of reflective use of AI systems in practice.

4. Discussion

The structured analysis of Otter, an AI tool, demonstrates numerous advantages in the educational environment. It enhances classroom accessibility, reduces students' cognitive load, and supports teachers' instructional reflection. However, the analysis also identifies systemic issues related to ethics, inclusive bias, privacy protection, educational equity, and interpretability. These problems not only reflect the design limitations of Otter itself, but also the general challenges faced by educational AI tools at present. Otter, as a typical case of current educational AI tools, reveals the potential risks arising from the rapid development of educational technology.

Based on the AI Competency Framework published by UNESCO (2024), this study pays special attention to the dimensions of "human-centered thinking" and "AI ethics." It combines these dimensions with five key issues highlighted in real-life pedagogical applications—ethics, inclusive bias, privacy, inequality, and explainability—to build an operational analytical framework. This framework not only complements the practical dimension of UNESCO's abstract competency model, but also provides a viable path for evaluating and making decisions about specific educational tools. It demonstrates that theoretical policy frameworks need to be refined to the practical technical level, especially in daily teaching and learning scenarios, in order to be truly useful.

In addition to technical and pedagogical considerations, it is also important to reflect on the governance logic underlying AI adoption in education. The increasing reliance on AI tools to record, summarize, and even interpret classroom interactions raises questions about the delegation of pedagogical authority. When AI systems begin to replace rather than support teachers' professional judgment, there is a risk of reducing education to a data-driven, depersonalized process. Critical discussions are needed on where to draw the line between automation and professional autonomy in education. In addition, the problem of opaque algorithms - commonly known as the "black box" problem - is particularly prominent in educational AI tools. Many systems based on deep learning models do not provide explainable outputs or traceable decision-making processes, which raises issues not only of user trust but also of accountability when errors occur. In Otter's case, its inability to explain how summaries are generated or how inaccurate transcriptions are produced reminds us that if the algorithmic logic is not transparent, users are unable to question or validate the outputs. This lack of transparency ultimately limits the development of critical AI literacy and ethical awareness.

At the practical level, the study provides targeted insights for AI tool designers, educators, and policymakers. For developers, tool inclusiveness, multilingual adaptation, algorithmic transparency and data use authorization mechanisms should be design priorities. For teachers and schools, students should be guided to maintain critical thinking when using AI tools, clarifying their agency rather than alternative roles. For educational institutions, comprehensive privacy policies, data usage norms, and digital literacy training mechanisms should be established to ensure that technology is used in a fair, informed, and safe manner.

It is important to note that this study is dominated by conceptual analysis and fails to incorporate specific empirical data or user interviews, and its conclusions still need to be further validated in a wider range of educational practices. Future research can conduct cross-cultural and cross-tool comparative studies based on the five-dimensional analysis framework proposed in this study, or use mixed-methods research that combines teachers' and students' feedback on the tool. This approach can continuously improve the framework's applicability and explanatory power to more effectively promote the fair and ethical development of AI educational tools.

5. Conclusion

Based on the AI competency framework proposed by UNESCO (2024), this paper systematically analyzes Otter, a widely-used AI voice transcription tool in teaching and learning. The analysis is conducted in terms of five dimensions: ethics, inclusive bias, privacy, inequality, and interpretability. The study points out that although Otter has demonstrated significant advantages in improving classroom information accessibility and supporting learning efficiency and teaching reflection, there is still much potential for improvement in terms of data processing mechanisms, cultural appropriateness, and transparency of use. These issues are not only related to the optimization of individual tools, but also reflect the structural challenges faced by current educational AI systems in the promotion process.

The five-dimensional analysis framework proposed in this study allows for a more comprehensive assessment of the impact of specific AI tools in educational scenarios. It also provides a targeted reference path for the design and specification of related technologies in the future. This paper calls for more emphasis on fairness, inclusiveness, and ethical safeguards while promoting the in-depth integration of AI technology and education. It aims to truly realize the goal of "human-centered" AI development in education and promote educational equity.

References

[1] "Speaker Identification Overview," Help Center, Feb. 27, 2024. https://help.otter.ai/hc/en-us/articles/21665587209367-Speaker-Identification-Overview (accessed May 17, 2025).

[2] UNESCO, AI competency framework for teachers. United Nations Educational, Scientific and Cultural Organization., 2024. doi: https://doi.org/10.54675/zjte2084.

[3] S. J. Russell and P. Norvig, Artificial Intelligence: a Modern Approach, 4th ed. London: Pearson, 2021.

[4] UNESCO, AI Competency Framework for Students. United Nations Educational, Scientific and Cultural Organization., 2024. doi: https://doi.org/10.54675/jkjb9835.

[5] Beverly Park Woolf, Building Intelligent Interactive Tutors: Student-centered Strategies for Revolutionizing E-learning. Morgan Kaufmann, 2008.

[6] M. Wald, "Using Automatic Speech Recognition to Enhance Education for All Students: Turning a Vision into Reality," Oct. 2005, doi: https://doi.org/10.1109/fie.2005.1612286.

[7] W. Holmes, M. Bialik, and C. Fadel, "Artificial intelligence in education. promise and implications for teaching and learning.," ResearchGate, Mar. 2019.

[8] J. L. Kröger, L. Gellrich, S. Pape, S. R. Brause, and S. Ullrich, "Personal information inference from voice recordings: User awareness and privacy concerns," Proceedings on Privacy

Enhancing Technologies, vol. 2022, no. 1, pp. 6–27, Nov. 2021, doi: https://doi.org/10.2478/popets-2022-0002.

[9] A. Birhane, “Algorithmic injustice: a Relational Ethics Approach,” Patterns, vol. 2, no. 2, p. 100205, Feb. 2021, doi: https://doi.org/10.1016/j.patter.2021.100205.

[10] K. Holstein and S. Doroudi, “Equity and Artificial Intelligence in Education: Will ‘AIEd’ Amplify or Alleviate Inequities in Education?,” Apr. 2021. Available: https://arxiv.org/pdf/2104.12920

[11] W. Holmes and R. Luckin, Intelligence Unleashed: an Argument for AI in Education. London: Pearson, 2016.

[12] “Privacy & Security | Otter.ai,” Otter.ai, 2025. https://otter.ai/privacy-security?utm_source=chatgpt.com (accessed Jun. 06, 2025).

[13] V. Dignum, “The role and challenges of education for responsible AI,” London Review of Education, vol. 19, no. 1, Jan. 2021, doi: https://doi.org/10.14324/lre.19.1.01.

[14] T. Walsh et al., “CLOSER TO THE MACHINE Technical, social, and legal aspects of AI,” Jan. 2019. Available: https://ovic.vic.gov.au/wp-content/uploads/2019/08/closer-to-the-machine-web.pdf

[15] N. Robinson, Perez Ogayo, D. R. Mortensen, and G. Neubig, “ChatGPT MT: Competitive for High- (but Not Low-) Resource Languages,” arXiv (Cornell University), pp. 392–418, Jan. 2023, doi: https://doi.org/10.18653/v1/2023.wmt-1.40.

[16] M. Dawood, S. Tu, C. Xiao, H. Alasmary, M. Waqas, and S. U. Rehman, “Cyberattacks and Security of Cloud Computing: A Complete Guideline,” Symmetry, vol. 15, no. 11, pp. 1–33, 2023, doi: https://doi.org/10.3390/sym15111981.

[17] N. Selwyn, Is technology good for education? Cambridge, Uk: Malden, Ma, 2016.

[18] M. Ribera and Àgata Lapedriza, “Can we do better explanations? A proposal of user-centered explainable AI,” IUI Workshops, Mar. 2019.