

Unpacking Duolingo's AI: Ethical Concerns and Effectiveness in Language Education

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Introduction

While AI is gaining traction across various disciplines, it is nothing new for some companies. Duolingo, in particular, claims to have integrated AI “for years” (Henry, 2023) and has recently broadened its application to deliver personalized learning and generate language lessons. They contend that this marks the future of language education, yet there are concerns regarding the potential displacement of human roles in the process. Notably, Duolingo recently laid off 10% of its contractors in light of their ongoing AI advancements (De Vynck, 2024) and has been using these technologies to develop lessons and assessments for real users (Henry, 2023). Nevertheless, AI lacks a deep understanding of cultural nuances, word connotations, and natural conversational flow. If Duolingo continues its reliance on AI, it faces the risk of inaccuracies in its language courses and the potential neglect of essential cultural contexts and meanings crucial to authentic language learning. Additionally, the company’s focus on efficiency and profitability has led to unethical employee treatment and inequitable resource allocation among languages, raising concerns about prioritizing efficiency over the value of human work.

Duolingo Background

First founded in 2011 by Luis von Ahn and Severin Hacker, Duolingo has become widely praised for its innovative approach to language learning (Duolingo, n.d.). The company has integrated gamification into its platform, utilizing rewards and points to encourage learners to consistently engage with the app and seek out new linguistic challenges. This engagement model

has shown its effectiveness as the app has become the most dominant language learning platform with a striking 60% share of the market (Curry, 2025). With its strong presence in the industry, Duolingo is undoubtedly a major influence on both the methods of language learning and the global community of language learners. It is even responsible for “about half of all language learning app revenues” (Curry, 2025). As technologies continue to evolve, Duolingo is well positioned to further shape the future of global language learning.

Stakeholders

With Duolingo being a major contributor to how people learn languages in the modern world, its teaching methods and implementations can have a significant impact on various groups. One of the primary stakeholders are the users of the app itself who depend on Duolingo for an effective language learning experience. The quality of Duolingo’s AI implementation directly affects their ability to acquire accurate communication skills and affects overall user satisfaction. Additionally, inaccuracies can impact native speakers and language communities by perpetuating misconceptions and affecting learners’ understanding of linguistic nuances, further shaping cultural perceptions. Blodgett and Madaio further highlight this in the broader context of AI implementation stating that there is a risk of perpetuating “dominant cultural ideologies” (Blodgett & Madaio, 2021).

Furthermore, the platform’s resource allocation and language prioritization directly impacts the visibility and preservation of smaller languages. When these languages receive less attention within the app, their marginalization may be exacerbated. Data and Society authors Emanuel Moss and Jacob Metcalf emphasize this vulnerability among those not directly interacting with the technology (Moss & Metcalf, 2020). As Duolingo advances its AI

capabilities, a comprehensive consideration of all stakeholders is essential to prevent such neglect.

With the layoff of a tenth of its contractor workforce, Duolingo's evolving use of AI is also affecting employees and language educators, who are secondary stakeholders. As with many other industries, this rapidly developing AI is significantly affecting employment opportunities for humans. If Duolingo and other companies increasingly rely on AI systems to meet work demands, job opportunities in these areas may continue to dwindle. Furthermore, Duolingo itself is a key stakeholder since the quality of its platform directly influences its success. Additionally, its accuracy and credibility affects its reputation in the market and reinforces its role as the leading language learning app.

Analysis

Duolingo's recent integration of AI has sparked significant ethical concerns, first in how it handled workforce layoffs during this transition. Initially, Duolingo reassured its employees that "they wouldn't be replaced with AI" (De Vynck, 2024). However, the company's decision to eventually lay off 10% of its contractor workforce contradicts their promise, highlighting an untrustworthy approach to the company's management. Benjamin Costello, a former Russian translator affected by these layoffs, said that Duolingo additionally assured him that laid off employees would receive assistance in securing new positions. Unfortunately, what was not made clear initially was that this offer of support was limited to roles within Duolingo itself. In the end, he was not provided with another job opportunity before his departure (De Vynck, 2024). This situation illustrates the company's self-serving practices and a lack of consideration or respect for employees. By reducing the number of employees, Duolingo additionally reaped

financial benefits as they lowered their payroll costs. This reliance on AI instead of paying workers raises ethical concerns about valuing profit over people.

The contractors who kept their positions were not untouched in the wave of layoffs. Seyma Albarino, Senior Staff Writer at Slater, highlighted that the remaining translators are now primarily tasked with “reviewing AI translations to make sure they’re ‘acceptable’” (Seyma Albarino, 2024). This trend raises significant ethical concerns, as it suggests a troubling future where AI developments compromise the quality and integrity of language education. Moreover, it again reflects Duolingo’s prioritization of profit and efficiency at the expense of human expertise.

Beyond Duolingo’s worker treatment, their shifts towards AI have sparked broader debates about its effectiveness in language learning. Similar to other industries, the boundary between what AI can and cannot replace remains unclear. With language education in particular, it is disputed whether AI can match the effectiveness of a human teacher. Duolingo has taken a strong stance in this debate with the company's Principal Product Manager, Zan Gilani, stating that “the idea here is that speaking is a muscle.” He further asserted that AI serves as a suitable substitute for learning a language when native speakers are hard to find or “nerve-racking” to learn from (Kulp, 2024). This approach emphasizes accessibility, utilizing AI’s convenience as a key benefit. Another reason for its layoffs and use of AI over humans has been to “increase productivity and efficiency” with a goal of creating and updating content and lessons quicker (De Vynck, 2024). This highlights their aim of using AI to boost operational speed, making it possible for Duolingo to adapt to learners' evolving needs more swiftly.

Although these approaches are meant to be beneficial, there are still drawbacks that have the potential to be overlooked. One of the greatest hurdles AI would face in its attempt to

replicate human language are the connotations and emotions embedded in language. Edinburgh Napier University lecturer Lee McCallum and University of Newcastle Research Officer Dara Tafazoli discuss this in their book, *Computer-Assisted Language Learning in the Global South*, stating that AI only “gives information based on facts and lacks human characteristics.” They expand these thoughts further, explaining that emotions are vital for languages (McCallum & Tafazoli, 2024, p. 87). Without this essential component, AI-driven language models may struggle to accurately interpret and teach the subtleties of human communication. For AI to be an effective tool for language education, it is crucial to integrate this emotional dimension.

In a broader scope of language, the cultural context surrounding these words is immeasurable by artificial intelligence. McCallum and Tafazoli connect the emotional aspects to this, stating that “we need emotions to feel culture” (McCallum & Tafazoli, 2024, p. 87). However, AI is fundamentally designed to make decisions based on patterns and is not yet fully equipped to comprehend human culture. In the broad context of language lessons, Purdue University’s head of the school of languages and cultures, Jen William, explains that language courses focus not just on grammar structures, but also on “seeing another culture through another lens” (Coffey, 2024). Ultimately, the richness of cultural understanding is deeply tied to human experience and emotion, elements that current AI technology cannot fully replicate.

The trust that Duolingo’s users have in the company is reliant on how effectively these issues are addressed and represented. However, with the current limitations of AI, the user's experience can be compromised. Even Duolingo itself acknowledges that its AI can still make mistakes (Duolingo Team, 2023). While the company allows users to report any inaccuracies in AI generated responses, it should not be their responsibility to compensate for the technology’s shortcomings. This idea relates to contractual ethics since users enter into an implicit agreement

with the company when they sign up, expecting a certain level of accuracy and reliability. This forms the basis for their continued engagement and trust.

The ongoing payments for Duolingo's premium plan have additionally sparked frustration among users. According to Seyma Albarino, several users are upset about "paying a premium for AI-generated content" (Seyma Albarino, 2024). From the perspective of contractual ethics, these users feel as though they did not consent to AI replacing the content they initially agreed to pay for. In response, many of these users have "canceled or planned to cancel their 'Super'-level subscriptions" (Seyma Albarino, 2024), with some even opting to switch to other language learning platforms. This dissatisfaction not only impacts the app's user experience, but it also suggests potential damage to its credibility and reputation.

Another growing concern regarding Duolingo's use of AI is its potential impact on less popular languages. Duolingo has already demonstrated its willingness to withdraw resources from smaller languages, as seen in the controversy over its decision to pause updates for its Welsh language course. BBC reporters James McCarthy and Owain Evans explained that Duolingo put more resources into "courses that were more popular among users" (Evans & McCarthy, 2023). This highlights Duolingo's focus on major languages at the expense of lesser known ones. Additionally, in his thesis exploring user perceptions of Duolingo's effectiveness, Michael Maria Wallenwein found that courses offered in users' native languages were "generally less complete" as compared to the English courses on the app (Wallenwein, 2023, p. 24). This further illustrates the app's prioritization for more widely spoken languages over less popular ones.

This shift has especially become a concern for users who rely on Duolingo for an accessible form of learning. Rachel Whittaker McClary, a Welsh language learner who lives in

Washington State, expressed her disappointment, stating that “not all platforms are easily accessible to those of us who live abroad” (Evans & McCarthy, 2023). Duolingo’s global reach makes it a crucial resource for learners living outside their language’s native country. If support for smaller languages diminish, it may become increasingly difficult for learners to access effective resources for studying them.

Given this previous controversy, it is understandable why users worry about how these priorities might combine with AI to disadvantage lesser known languages, especially since AI itself already presents discrimination risks. In a general sense, as Solon Barocas, Moritz Hardt, and Arvind Narayanan describe in the introduction of their book, *Fairness and machine learning: Limitations and opportunities*, “evidence-based decision-making is only as reliable as the evidence on which it is based” (Barocas, Hardt, & Narayanan, 2023, p. 2). Professors Rawat et al. further mention that effectively training AI requires a “significant amount of data” (Rawat et al., 2024). This adds to concerns that less widely spoken languages might not receive adequate AI implementation. By failing to prioritize languages equitably, as Duolingo has previously done, the platform risks undermining the cultural and educational value for learners. In this case, Duolingo should consider a data feminist approach that takes deeper considerations into prioritizing marginalized voices to better represent less popular languages. This ethical framework would not only promote linguistic diversity, but it would also ensure fair access to resources.

Duolingo’s blind eye to these consequences of using AI for language learning poses a risk to the overall experience of its users. Additionally, while AI can enhance efficiency, Duolingo’s reliance on it might “sacrifice the quality that human translators bring” (Noor, 2023). To effectively teach a language, it is necessary to have a grasp on the connotations behind the words

and its overarching cultural nuances that only humans can offer. It is especially important for such a dominant corporation to recognize these aspects to help further the future of language learning.

Findings and Conclusions

This analysis of Duolingo's transition to AI underscores significant ethical concerns. Firstly, the company's layoffs demonstrate a lack of transparency and unethical company leadership after initial assurances of job security. Duolingo's new reliance on AI also highlights a prioritization on efficiency and profitability over human work, jeopardizing the trust and experience of its users. Furthermore, the absence of emotional and cultural nuances of AI can affect users' ability to achieve a comprehensive understanding of a language, potentially negatively impacting their communication skills in that language. Additionally, prioritizing more widely spoken languages at the expense of less popular ones risks diminishing the company's ability to serve diverse audiences worldwide. If Duolingo fails to address these issues, it could degrade user experience, damage its reputation, and have greater effects on language communities. Therefore, integrating ethical considerations into its future technological advancements is essential for fostering long term stakeholder relationships and improving the future of language learning.

Recommendations

As University of Utah professor of philosophy C. Thi Nguyen warns, "Data is powerful but incomplete," emphasizing that AI cannot yet replace the depth that human educators bring to language learning. Researcher and professor Neil Selwyn further points out that AI in education

is not merely “a neutral benign addition” and it still has intricate political and cultural implications. Given these limitations, Duolingo should reevaluate its growing dependence on AI and transition to a model where AI enhances human work instead of replacing it.

First, Duolingo should focus on integrating AI as a complementary tool rather than a replacement for human content curation, especially in tasks that demand cultural and emotional insights. AI can manage preliminary tasks, while human experts should take charge of finalizing lessons to ensure cultural accuracy and emotional considerations before they become accessible to users. This approach will likely improve user satisfaction by offering more authentic content, fostering trust, and encouraging greater user engagement.

Next, to further support its diverse user base, Duolingo must ensure equitable resource allocation across languages, emphasizing the development of less popular languages. This can be achieved by involving native speakers and cultural experts in content curation and updates. The company could also partner with organizations focused on language preservation and collaborate more with interdisciplinary fields. Wayne State University professor Meina Zhu and Multilingual Writing Specialist Chaoran Wang contend that such collaboration with a wider range of disciplines would lead to a more “holistic, ethical, and effective approach to AI in language teaching and learning” (Zhu & Wang, 2025, p. 25). This would benefit the goals of the stakeholders in ethical language learning as well as Duolingo’s goal for effectiveness.

Additionally, with the company’s growing use of AI, Duolingo could establish an ethical AI task force to oversee AI developments and maintain user and stakeholder trust. Alongside such improvements, transparency with employees regarding AI’s role is essential, especially when it may impact their job responsibilities or career viability as a whole. Engaging employees in decision making about their roles with the advancements of AI can help address job security

concerns, enhance loyalty among employees, and retain valuable workers. Furthermore, clear communication with users regarding the use of AI with visible distinctions between AI-generated content and human made work will help manage user expectations and potentially reduce dissatisfaction. By implementing these strategies, Duolingo can maintain its innovative edge while also enhancing the quality and trustworthiness of its offerings.

Reflections

Analyzing a specific business presented challenges for me in finding resources I could use because of the narrow window of content related to their specific actions. I found this especially difficult when finding scholarly resources since Duolingo has not been as heavily researched regarding its AI in particular. Unlike academic sources, though, locating news articles and other sources was more straightforward, largely because many users have expressed their dissatisfaction with Duolingo's AI. These sources offered a large number of personal experiences with the shortcomings of the AI's effectiveness as well as opinions on the company's layoffs. The collection of resources then for me would be a weakness with this as I would have liked to have incorporated more scholarly sources than just the required number.

I did find it more engaging and easier to take a definitive stance in this case study. In contrast, the previous assignment's requirement for maintaining a neutral point of view was much more challenging and restrictive for me. But for this assignment, the flexibility of presenting my perspective was definitely a strength. I feel as though I took a clear position that drove the rest of the study and made it more interesting to immerse myself in the topic.

The structure of the case study was also a weakness for me at the start because I found it difficult to keep sections distinct and I merged their content unintentionally. This issue was

particularly evident in my feedback for Part A where the grader noted that I had blended different sections together. Throughout the process of revisions and lengthening the essay, though, it became easier to define sections with clarity and coherence.

Lastly, I would say that I thoroughly engaged with the class materials and successfully incorporated ethical frameworks into my arguments. I specifically applied data feminism and contractual ethics to analyze Duolingo's actions. I believe these approaches allowed me to make meaningful connections and commentary on the company's ethical concerns.

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Appendix: AI Usage

Citation: University of Michigan. (2025). U-M GPT [Generative AI model].

<https://www.umich.edu>, 2/22/25

Input: Can you help me generate a few better titles for my case study? Here is what I currently have:

Duolingo: Ethical Issues and Ineffectiveness of AI Usage for Language Learning

Output: Certainly! Here are some alternative titles you might consider for your case study:

1. "Duolingo and the Dilemma: Navigating Ethical Challenges and AI Shortcomings in Language Learning"
2. "Unpacking Duolingo's AI: Ethical Concerns and Effectiveness in Language Education"
3. "AI in Language Learning: Examining Duolingo's Ethical and Functional Hurdles"
4. "The Double-Edged Sword of AI in Duolingo: Ethical and Educational Implications"
5. "Duolingo's AI Revolution: Assessing the Ethical Landscape and Learning Outcomes"
6. "Balancing Innovation and Ethics: Duolingo's AI Journey in Language Acquisition"
7. "Beyond the Algorithm: Investigating Duolingo's AI Use and Ethical Challenges in Language Learning"

Feel free to mix elements from different titles to best capture the essence of your case study.

Input: Can you help me get ideas for this part of my essay about Duolingo's AI and its effectiveness and ethical concerns?

Explanation of the stakeholders—i.e., the different groups of people who will be affected (or already are affected) if the problem is not solved; explain how they are affected and the consequences of the business or organization's actions on their lives

Output: Certainly! When analyzing the stakeholders affected by Duolingo's AI, its effectiveness, and ethical concerns, consider the following groups and how they are impacted:

1. **Learners**:

- **Impact**: Learners are the primary users of Duolingo. The effectiveness of the AI directly affects their language acquisition and overall user experience. If the AI is not effective, learners may not progress as expected, potentially wasting their time and efforts.

- **Consequences**: Inadequate language learning outcomes can lead to frustration, decreased motivation, and the possibility of dropping out. If ethical concerns arise, such as data privacy issues, learners might lose trust in the platform.

2. **Educators and Language Experts**:

- **Impact**: Educators who recommend or integrate Duolingo into their teaching processes depend on its effectiveness. An inaccurate or biased AI could undermine their educational goals by providing flawed language learning support.

- **Consequences**: Teachers might have to invest additional time correcting errors or providing supplementary materials, which could strain resources and disrupt curricula.

3. **Parents and Guardians**:

- **Impact**: Parents and guardians who rely on Duolingo for their children's language learning expect it to be a safe and effective tool. If the AI is ineffective or unethical, it affects their trust in the tool's educational value.

- **Consequences**: They may need to seek alternative, potentially more costly education methods, which could impact family finances and children's learning opportunities.

4. **Developers and Researchers**:

- **Impact**: Employees who develop and maintain the AI want their products to be effective and ethically sound. Flaws or ethical breaches could harm their reputation and professional integrity.

- **Consequences**: Professionals might face backlash or pressure to address these issues, potentially leading to increased workloads or stress and impacting career opportunities.

5. **Investors and Shareholders**:

- **Impact**: They have a financial interest in Duolingo's success. An ineffective or ethically questionable AI could undermine the company's growth and profitability.

- **Consequences**: Negative perceptions due to poor AI performance could lead to a loss in user base, decreased revenue, and diminished investment value.

6. **Regulatory Bodies and Privacy Advocates**:

- **Impact**: These groups focus on ensuring that businesses comply with industry standards and ethical norms particularly concerning data protection.

- **Consequences**: Non-compliance with data protection laws or ethical standards could result in fines or sanctions, necessitating regulatory interventions and oversight.

7. **Global Communities (particularly non-English speakers)**:

- **Impact**: As a platform that provides language learning tools worldwide, Duolingo influences cultural exchange and communication. Ensuring that the AI is accessible and effective across diverse languages is crucial.

- ****Consequences****: If certain languages or dialects are not effectively supported, this could contribute to digital inequities and reinforce language hierarchies.

By addressing these stakeholders and their connection to the effectiveness and ethical challenges of Duolingo's AI, your essay can provide a comprehensive view of the implications if these problems remain unsolved.

Citation: University of Michigan. (2025). U-M GPT [Generative AI model].

<https://www.umich.edu>, 3/12/25

Input: Could you help me think of some recommendations I could give to Duolingo to improve user and employee trust for them to create effective and ethical AI implementations?

Output: Certainly! Building user and employee trust is essential, especially when implementing AI in educational platforms like Duolingo. Here are several recommendations that Duolingo might consider to improve trust through effective and ethical AI implementations:

Transparency

1. ****Clear Communication:**** Provide clear and detailed information about how AI is being used in the platform, including data collection, data usage, and customization processes.
2. ****Algorithm Descriptions:**** Offer understandable descriptions of how algorithms and AI systems make decisions, possibly through educational content that users can optionally engage with.
3. ****Impact Assessments:**** Publish regular AI impact assessments to transparently show how AI implementations are affecting user learning outcomes and experiences.

Privacy and Data Protection

1. **Data Minimization:** Collect only the data necessary for the stated purposes and store it securely, anonymizing data wherever possible.
2. **User Control:** Give users the ability to control what data is collected and used, along with options to review and delete their data from the platform.
3. **Privacy Policy Simplification:** Simplify privacy policies to make them accessible and understandable, helping users to easily comprehend their rights and how their data is used.

Ethical Standards and Practices

1. **Fair and Inclusive AI:** Ensure that AI systems are trained on diverse datasets to minimize bias and make sure they are equitable and inclusive for learners of all backgrounds.
2. **Ethical Guidelines:** Establish and adhere to a strong set of ethical guidelines that govern AI development and deployment, potentially drawing on existing frameworks like the EU's guidelines on AI.
3. **Regular Auditing:** Conduct regular internal and external audits of AI systems to ensure compliance with ethical standards and guidelines.

User Experience and Engagement

1. **Feedback Mechanisms:** Implement robust feedback systems where users can easily provide input on AI-generated content and experiences, enabling continuous improvement.
2. **Human Oversight:** Provide options for human review and intervention in AI-driven recommendations, ensuring that there is always a human element in decision-making processes.

3. ****Personalization with Consent:**** While leveraging AI for personalized learning experiences, ensure personalizations are done with user consent and allow users to opt out if preferred.

Employee Involvement and Training

1. ****Employee Education:**** Invest in training programs for employees to understand AI implications, ethics, and usage, empowering them to make informed decisions.
2. ****Inclusion in Decision Making:**** Involve employees in the development process of AI systems, ensuring they have a voice in how AI is implemented and used on the platform.
3. ****Internal Communication:**** Foster a culture of open communication where employees feel comfortable raising concerns about AI implementations.

By addressing these areas, Duolingo can work towards building stronger trust with both users and employees, ensuring that their AI implementations are both effective and ethically sound.

Citation: University of Michigan. (2025). U-M GPT [Generative AI model].

<https://www.umich.edu>, 3/13/25

Input: Can you give me some ideas for how to reduce word count in a case study analysis?

Output: Certainly! Here are some ideas for reducing the word count in a case study analysis:

- **Focus on Key Points:** Identify the main points and arguments that are essential to your analysis. Eliminate any extraneous information or tangential details that don't directly support your thesis or conclusions.

- **Use Concise Language:** Replace lengthy phrases with more succinct expressions. For example, "due to the fact that" can become "because," and "in order to" can be shortened to "to."
- **Avoid Repetition:** Ensure that you are not repeating the same information or ideas in different sections. Combine similar points to enhance clarity and efficiency.
- **Summarize Background Information:** Provide only the essential background details necessary to understand the case. Avoid lengthy historical or contextual information unless it is crucial to the analysis.
- **Streamline Examples and Evidence:** Use only the most pertinent examples and evidence to support your arguments. Omit examples that are redundant or less impactful.
- **Revise and Edit:** Go through each sentence and paragraph, looking for ways to pare down language and eliminate unnecessary words or redundancy.
- **Use Bullet Points or Tables:** For lists or comparative information, consider using bullet points or tables to present information more efficiently than full sentences.
- **Combine Sentences:** Merge sentences where appropriate to make the text more concise without losing meaning.
- **Eliminate Jargon or Technical Terms:** Where possible, use simpler words. However, ensure the analysis remains accurate and professional.
- **Review Structure:** Re-evaluate the structure of your analysis to ensure logical flow and organization, making it easier to identify and cut out superfluous information.

By applying these techniques, you can convey your case study analysis more effectively while maintaining the essential insights and conclusions

Input: Can you give me more examples of common unnecessarily lengthy phrases and what shorter versions they could be replaced with to decrease word count in an essay?

Output: Certainly! Here are some examples of unnecessarily lengthy phrases along with shorter alternatives you can use to reduce word count:

1. ****At this point in time**** → ****Now****
2. ****Due to the fact that**** → ****Because****
3. ****In order to**** → ****To****
4. ****For the purpose of**** → ****For****
5. ****Has the ability to**** → ****Can****
6. ****In the event that**** → ****If****
7. ****With regard to**** → ****Regarding****
8. ****On a daily basis**** → ****Daily****
9. ****In light of the fact that**** → ****Since****
10. ****With the exception of**** → ****Except****
11. ****In spite of the fact that**** → ****Although****
12. ****The reason why is that**** → ****Because****
13. ****It is important to note that**** → ****Notably****
14. ****At the present time**** → ****Currently****
15. ****A large number of**** → ****Many****
16. ****As a result of**** → ****Due to****
17. ****In close proximity to**** → ****Near****
18. ****Each and every**** → ****Every****

19. ****Make a decision**** → ****Decide****

20. ****Take into consideration**** → ****Consider****

Using these shorter alternatives can help make your writing more concise and direct, which often enhances clarity and impact.

Citation: OpenAI. (2025). ChatGPT (Feb 4 version) [Large language model].

<https://openai.com/chatgpt>, 2/27/2025.

Input: Help me come up with keywords to search on google scholar for scholar articles:

While AI has recently become prominent across various disciplines, it is nothing new to some companies. Duolingo, in particular, claims to have integrated AI “for years” (Henry, 2023). However, only recently have they broadened its application to deliver personalized learning and generate language lessons. They contend that this marks the future of language education, yet there are concerns regarding the potential displacement of human roles in the process. Notably, Duolingo recently laid off 10% of its employees in light of their ongoing AI advancements (De Vynck, 2024) and has been using these technologies to develop lessons and assessments for real users (Henry, 2023). Nevertheless, AI lacks a deep understanding of cultural nuances, word connotations, and natural conversational flow. Only native speakers can fully comprehend and teach these elements. If Duolingo continues its reliance on AI, it faces the risk of inaccuracies in its language courses and the potential neglect of essential cultural contexts and meanings crucial to authentic language learning.

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Output: Here are some keyword ideas to search for scholarly articles on Google Scholar related to your topic:

AI in Language Learning

- "Artificial intelligence in language education"
- "AI-powered language learning"
- "Machine learning in language acquisition"
- "Personalized learning with AI"
- "AI-driven language instruction"
- "Natural language processing in education"

Duolingo and AI Integration

- "Duolingo AI implementation"
- "Duolingo language learning technology"
- "Gamification in language education"

- "AI-based curriculum design in Duolingo"
- "AI and Duolingo layoffs"

AI vs. Human Instruction

- "Human vs AI language instruction"
- "Limitations of AI in language learning"
- "Cultural competence in AI language models"
- "AI and language learning accuracy"
- "AI bias in language education"

Broader Implications of AI in Education

- "AI replacing human teachers"
- "Job displacement due to AI in education"
- "Ethical concerns in AI-based education"
- "Future of AI in education"
- "EdTech and artificial intelligence"