

"Personalized Feedback in Formative Assessment: A Case Study in Mexican Higher Education in the Era of AI"

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ABSTRACT

This paper explores the effectiveness of short personalized feedback in formative assessment within the context of higher education, particularly concerning the increasing use of artificial intelligence (AI) in learning assessment. The main objective is to investigate how personalized feedback enhances the learning experience compared to AI-generated feedback, identify challenges and opportunities, and propose practical recommendations. Methodology combines a literature review and case analysis from institutions implementing AI in formative assessment. Results show that while AI feedback is beneficial for its immediacy, personalized feedback has a greater impact on student motivation and comprehension. Conclusion: both forms of feedback can complement each other, but human intervention remains crucial.

1. Introduction.

Formative assessment through feedback aims to foster responsible and reflective learning in students by providing active guidance from teachers, who can systematically organize the learning process (García et al., 2021). However, there is a growing need to reconsider formative assessment, as it currently represents one of the most complex challenges in classroom teaching. This challenge stems from its tendency to focus on quantitative measures of academic performance, rather than offering a more holistic approach to learning outcomes. In the current higher education context, the integration of artificial intelligence (AI) in assessment and feedback processes presents significant opportunities to enhance precision, objectivity, and efficiency. However, it is essential to maintain a human-centered approach, ensuring that emotional, social, and ethical aspects of learning are not compromised by advanced technological environments (Van der Kleij et al., 2015). AI can act as an innovative tool that supports personalized learning, adapting to the unique styles and paces of each student. Abarzúa and Cerda (2011), as cited by Rojas, Gómez, and García (2013), argue that diverse digital tools contribute to fostering diversity in the classroom, recognizing individual differences in students and creating a sense that their learning process is personalized rather than merely comparative to that of their peers. With the growing use of AI, this study aims to analyze the effectiveness of short, targeted feedback provided by teachers that is both concrete and includes socio-emotional components to motivate students. This type of feedback not only addresses academic content but also encourages students on an emotional level, helping them navigate the complexities of personalized learning environments.

The objective of this study is to analyze the effectiveness of short personalized feedback as a strategy for improving formative assessment in higher education, particularly in a context where artificial intelligence plays a significant role. The focus is on understanding how this approach can maintain a more human-

centered tracking of learning outcomes, considering the challenges and opportunities that emerge from the integration of AI in educational assessment. Moreover, the study seeks to provide practical recommendations for educators and assessment designers, helping them to make the most of timely feedback while balancing it with AI's advantages. This approach aims to preserve the critical role of human interaction in the learning process, ensuring that socio-emotional and ethical aspects of education are not neglected.

The hypothesis posits that the effective implementation of short personalized feedback strategies, alongside AI, in formative assessment can significantly improve the accuracy, objectivity, and efficiency of evaluations in higher education. At the same time, it emphasizes maintaining a human focus that safeguards the emotional, social, and ethical dimensions of learning. By identifying appropriate strategies for this integration, the study suggests that a more effective, human-centered way of tracking student progress can be achieved, benefiting both students and educators.

2. Literature Review.

At the international level, studies such as Tumoi (2018) have explored the impact of artificial intelligence (AI) on formative assessment and proposed approaches to optimize its use in the educational process. These studies have demonstrated how AI can offer more precise and detailed data analysis, allowing for more personalized and effective feedback for students. In particular, AI has been shown to tailor assessments to better meet the individual needs of students by offering feedback that adapts to their learning styles and paces. However, while AI tools provide personalized feedback based on performance data, they must be integrated carefully to ensure that emotional, social, and ethical considerations are not overlooked (Van der Kleij et al., 2015).

The use of AI represents an innovative tool that enhances personalized learning by accommodating different learning styles and rhythms (Abarzúa & Cerda, 2011, as cited in Rojas, Gómez, & García, 2013). This kind of technology can foster a sense of individualized learning, making students feel that their progress is uniquely tailored and not merely compared to that of their peers. According to Cabero-Almenara and Palacios-Rodríguez (2021), these tools are especially important in higher education, where the integration of AI in assessment has been linked to improvements in the learning experience through personalized feedback.

The implementation of short personalized feedback in formative assessment has gained prominence in today's educational landscape. This strategy is based on providing brief, specific comments to students regarding their performance, which facilitates an immediate and actionable understanding of their areas for improvement. According to López and García (2022), this form of feedback promotes better knowledge retention and understanding of key concepts, as it is tailored to each student's needs and level of competence. Short personalized feedback, while concise, aims to provide targeted advice that students can quickly apply, reinforcing their understanding and fostering deeper engagement with the material.

Despite these insights, this study is primarily based on the perception of students and does not present concrete empirical evidence that evaluates the actual effectiveness of short personalized feedback compared to feedback generated by AI. Although AI can efficiently offer immediate feedback, the lack of a direct comparative analysis between AI-generated and human feedback makes it difficult to conclude definitively which approach is superior. Tumoi (2018) emphasizes that while AI can provide precise feedback, the human element particularly in addressing emotional and socio-educational needs remains crucial.

In sum, previous research has provided both theoretical and empirical foundations that highlight the importance of improving formative assessment in higher education. Studies like those of Cabero-Almenara

and Palacios-Rodríguez (2021) underline the need to adopt more dynamic and adaptive approaches in assessment, which are more aligned with the evolving demands of the educational landscape. These previous works have identified the limitations of traditional assessment methods and stressed the potential of more personalized, technology-enhanced feedback to address the individual needs of students while maintaining a balance with ethical and emotional considerations.

3. Methodology.

This study investigates the strategy of short personalized feedback to improve formative assessment in higher education, particularly focusing on how artificial intelligence (AI) is integrated into these processes. Both a literature review and a detailed case study were conducted to understand the role of this strategy in providing a more human-centered approach to learning, considering the challenges and opportunities presented by technological integration.

The methodological design of this study employs a mixed-methods approach, combining qualitative and quantitative methods to comprehensively address the research objective. First, a systematic literature review was conducted using recognized academic databases and consulting high-impact sources in education and technology. This review helped frame the study within existing research on AI in formative assessment. Following this, a detailed case study was carried out to assess students' perceptions of AI's role in their learning, particularly regarding how it can be combined with personalized feedback that includes socio-emotional elements useful to students.

The mixed-methods design was chosen to allow for a more holistic analysis of the phenomenon under study. Quantitative data, collected through surveys, provides statistical insights into the students' perceptions, while qualitative data, gathered through interviews, offers a deeper understanding of their personal experiences and opinions. The mixed-methods approach ensures a more nuanced view of the research problem, capturing both measurable outcomes and subjective feedback. This combination aligns well with the need to balance the quantitative benefits of AI (such as precision and efficiency) with the qualitative benefits of personalized feedback (such as emotional engagement and contextual relevance).

Furthermore, the evaluation is not seen as an isolated element but rather as a process that must align with the curricular framework and the overall teaching model. The assessment serves to document, support, and promote learning, integrating seamlessly with the teaching methods used to achieve the educational goals. Thus, the formative assessment process is not merely about grading or performance metrics but about fostering a deeper understanding and application of knowledge.

Evaluation and Teaching Alignment: The role of evaluation in this study emphasizes that it must be integrated with available teaching tools and mechanisms to achieve learning outcomes. This perspective counters the common view of evaluation as a standalone process. Instead, evaluation is seen as a tool that supports both the methodology used in teaching and the broader learning objectives of the curriculum. This integration is crucial to ensure that teaching strategies are aligned with the evaluation methods, resulting in more effective learning experiences for students.

Additionally, the study focuses on defining short personalized feedback, which refers to concise, targeted feedback that provides specific, actionable advice to students regarding their academic performance. This feedback is delivered promptly and is tailored to each student's individual needs, ensuring that it is relevant

and immediately applicable. According to López and García (2022), short personalized feedback helps students retain knowledge and understand key concepts more effectively because it addresses their unique learning gaps and strengths.

After developing the strategy, it was implemented over a four-month period, starting in January. The following is an example of how the strategy was applied:

Context: English class – Basic Level A2-B1, according to the Common European Framework.

Objective: Improve the use of verb tenses in writing and conversation.

Feedback Format: Brief comments provided during activities, via email, or through an educational platform (e.g., Google Classroom or Moodle).

Timeframe: Weekly strategy or adjusted to the instructor's schedule.

For instance:

4. Week 1: After a paragraph-writing exercise using the present simple, students received feedback such as: "Excellent use of the past simple, but remember that the present perfect is primarily used to describe routines, not actions completed at the moment."
5. Week 2: After a paired conversation practice, the feedback was: "Your fluency was excellent, but try using 'will' for promises and 'going to' for plans."

This feedback process provides teachers with a method for delivering personalized support to students without requiring extensive time. Students, in turn, receive continuous and specific guidance to improve their skills progressively.

The case study's sample was selected intentionally, focusing on a representative group of higher education students exposed to varying technological tools. The sample consisted of 59 students aged 18-23 from different disciplines, including 32 women and 27 men. A 10-question survey, including both open and closed questions, was administered to assess students' perceptions of the feedback strategy's effectiveness. The survey was validated through a pilot test and ethical considerations were maintained, with all data kept confidential.

3. Procedure

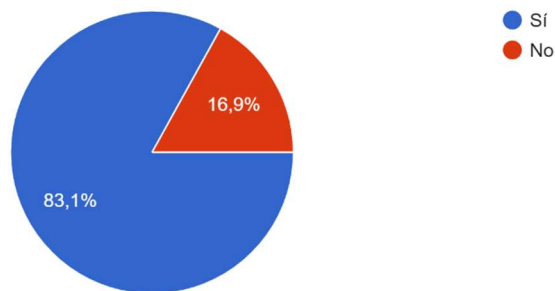
For the qualitative analysis of the case studies, a **content analysis approach** was applied to identify patterns, themes, and significant relationships related to feedback in the context of the growing use of AI. Additionally, descriptive and comparative statistical techniques were employed to examine the effectiveness and impact of the strategies and their relationship to students' performance and learning experience. Finally, most of the statistical analysis was conducted using Google Forms and Excel, which served as tools to analyze the collected responses. These responses were interpreted through graphs that provided a detailed overview of the study.

4. Results and Discussion.

The following are the results obtained:

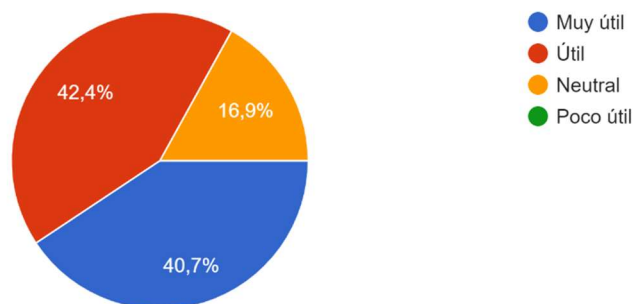
1. ¿Has recibido retroalimentación corta personalizada en tus cursos?

59 respuestas



2. ¿Cómo describirías la utilidad de la retroalimentación corta personalizada de tu docente en comparación con otros métodos de retroalimentación como lo es con IA?

59 respuestas



As can be seen in the previous graphs, the surveyed students showed a high degree of familiarity with the term of personalized short feedback. Of the 59 participants, 83.1% responded that they had received personalized feedback in their courses, while only 16.9% said they had not.

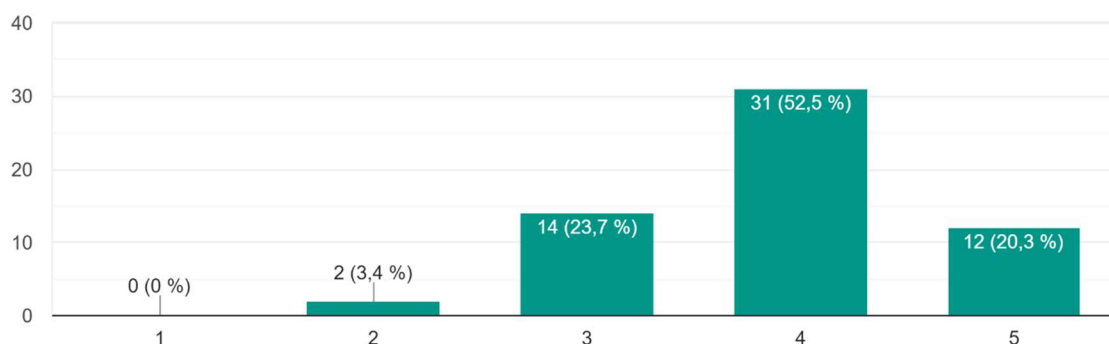
The participants highlighted several positive aspects of the feedback provided by their teachers in their educational experiences. First, personalization and adaptation to individual needs are considered key factors. Personalized feedback allows specific topics to be addressed and adapts to the needs of each student, making it more effective compared to AI-generated feedback. This personalization facilitates a better understanding of the topics and provides more precise error correction.

Another positive aspect is motivation and performance improvement, as students feel more motivated when they receive personalized feedback from their teacher, especially when the teacher dedicates quality time,

This personalized feedback can change the way students study and improve their long-term academic performance. Direct interaction with the teacher is appreciated for its dynamism and the ability to address specific problems without generalizing, which is often a limitation in AI-based feedback. The opportunity to practice and discuss directly with a person is considered more beneficial. (Canabal C. and Margalef L. 2017).

4. En una escala del 1 al 5, ¿cómo calificarías la motivación y el compromiso con el aprendizaje que te ha generado la retroalimentación corta personaliza...e inteligencia artificial en la retroalimentación?

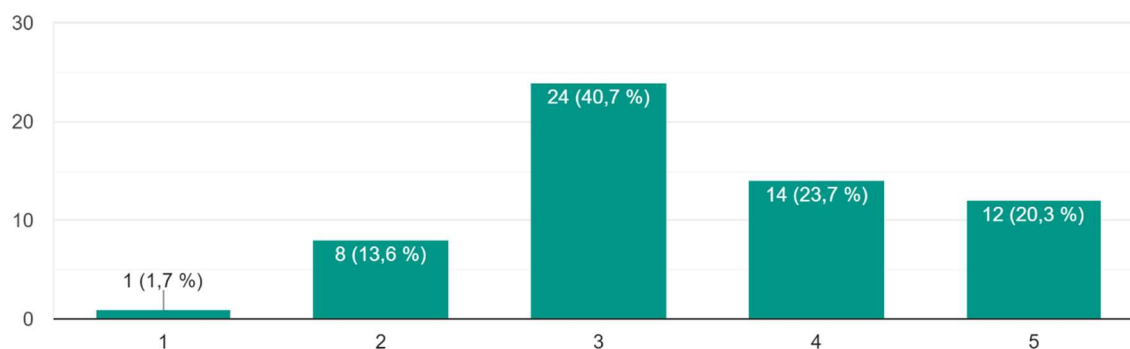
59 respuestas



Understanding and recall are crucial aspects of personalized feedback, as it helps remember previously learned information and provides a better explanation of topics. It facilitates the clarification of immediate doubts and promotes a deeper understanding of the content. As observed in question 4, respondents highlighted that the personalization of their feedback facilitates a better understanding of the topics and provides more precise error correction, including socio-emotional resources, which contribute to motivation and performance improvement.

6. En una escala del 1 al 5, ¿qué nivel de confianza tienes en el uso de la inteligencia artificial para proporcionarte retroalimentación corta personalizada?

59 respuestas



The previous graphs show the results on personalized feedback and confidence in the use of artificial intelligence (AI). In the first graph, 47.5% of respondents consider that personalized short feedback has been effective (rating 4), while 28.8% rate it as very effective (rating 5). This indicates that a significant majority of participants positively value personalization in improving the quality of teaching, underscoring the importance of adapting feedback to the individual needs of students.

In the second graph, the level of confidence in using AI to provide personalized feedback is analyzed. 40.7% of respondents express a moderate level of confidence (rating 3), while 23.7% and 20.3% have a high and very high level of confidence, respectively. However, 13.6% show a low level of confidence (rating 2), and a small percentage (1.7%) do not trust it at all. These results reflect a mixed but mostly positive perception of AI in education, suggesting that while many recognize the potential of this tool to improve feedback, there is still some uncertainty or resistance that could be addressed through more information and training on its benefits and applications.

Regarding the questions:

7. What do you consider to be the most positive aspects of personalized short feedback provided by your teacher in your educational experience?

8. How do you think the process of personalized short feedback in the educational field could be improved?

Participants offered various suggestions to improve the process of personalized short feedback. One of the main suggestions is to increase the time for counseling or feedback. Many suggest that teachers should dedicate more time to feedback and be more patient when teaching.

Another important suggestion is the integration of new technologies to facilitate feedback and improve teacher organization. The development of feedback skills is also a highlighted recommendation. Participants recommend developing skills for both giving and receiving effective feedback. The use of images and videos can make feedback more concrete and understandable, although this may represent a challenge and require more time from the teacher.

Finally, the analysis of the answers obtained from questions 9 and 10 is described:

9. Do you have any concerns or suggestions regarding the use of artificial intelligence in personalized short feedback?

10. What impact do you think personalized short feedback has on your future academic performance in times of AI use?

Concerns and suggestions regarding the use of AI in personalized short feedback reflect a mix of optimism and caution. A common concern is the dependence and accuracy of the information provided. Some participants expressed concern about the possible over-reliance and accuracy of the information provided. They recommend that it be used moderately and combined with teacher guidance to ensure the quality of the feedback.

5. Conclusions.

In conclusion, students highlighted several positive aspects of the short personalized feedback provided by their teachers. First and foremost, they emphasized the personalization and adaptation to the individual needs of each student as a crucial factor. This type of feedback allows teachers to address specific issues and provide more precise corrections compared to feedback generated by artificial intelligence (AI). Students expressed that this personalized approach significantly enhances their learning experience, as it targets their unique academic needs and challenges.

Additionally, motivation and improvement in academic performance were key aspects identified by the students. They reported feeling more motivated when receiving personalized feedback from their teachers, as it helps them clearly identify both their weaknesses and strengths. This targeted feedback leads to better performance and points to the need to strengthen teacher training programs, particularly in higher education. Many professors lack formal pedagogical training, which limits their ability to provide effective personalized feedback (Cabero-Almenara & Palacios-Rodríguez, 2021).

The interaction and dynamism of personalized feedback were also highly valued. Students appreciated the direct interaction with their teachers, particularly the ability to address specific issues without generalizing, a common limitation of AI-generated feedback. The opportunity to practice and discuss with a teacher was considered more beneficial for learning, as it allows for immediate clarification of doubts and fosters a deeper understanding of the material. This personal connection remains an essential component of effective teaching.

Students also provided suggestions for improving the personalized feedback process within educational institutions. One of the main recommendations was to increase the time dedicated to individual feedback and advising. Many students felt that teachers should allocate more time to offer personalized feedback and exhibit greater patience in the teaching process. This reflects a clear need for more dedicated time in educational settings to address students' individual learning concerns.

Regarding the use of AI in personalized feedback, students expressed a mix of optimism and caution. While they acknowledged the potential of AI to enhance the precision and efficiency of feedback, they recommended that AI be used moderately and always combined with teacher guidance to ensure the quality of the feedback. They emphasized the importance of maintaining a human element, as AI alone may fail to address the socio-emotional aspects that are essential for meaningful and effective learning.

Finally, the results indicate that short personalized feedback is highly valued by students for its ability to adapt learning to their individual needs, motivate them, and improve their academic performance. The integration of AI into this process, if managed appropriately, can complement and enhance the effectiveness of feedback, providing a powerful tool for the future of education. However, teachers must play a central role in this process to ensure that students do not increasingly rely on AI for feedback that a teacher can offer, especially when it comes to addressing socio-emotional needs.

Notes:

In the process of drafting this analysis on the implementation of formative assessment in higher education during the era of artificial intelligence, ChatGPT was used as a tool to improve the initial writing. Each paragraph was modified and reviewed by the author to ensure coherence and accuracy of the presented content. In this sense, the use of ChatGPT helped to enrich the clarity and articulation of the text, although the content and conclusions remain the sole responsibility of the author, based on the responses collected and analyzed from participants. Should further information about the methodology, strategy, or questionnaire be required, please contact the author for more details.

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