INTELLIGENT AGENTS FOR FEEDBACK IN UNIVERSITY PEDAGOGICAL PRACTICES

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Abstract

This article presents the results of developing an intelligent-agent-based technological artifact designed to support feedback in university teaching practices. The research was conducted under the Design Science Research approach with a group of undergraduate students in the Informatics Education program at the University of Córdoba. The artifact, called AVI (Intelligent Virtual Assistant), integrates natural language processing for automated feedback on teaching practice reports. The findings reveal significant improvements in report quality, student autonomy, and tutor feedback efficiency, demonstrating the potential of artificial intelligence as an ethical and pedagogical tool for educational innovation.

Introduction:-

Artificial Intelligence (AI) has opened new possibilities for strengthening teaching, formative assessment, and learning autonomy in teacher training. However, during university pedagogical practices, limitations persist regarding the quality of reports, feedback turnaround times, and tutor workload.

Various authors recognize the potential of AI to provide timely feedback and promote self-regulation (Avalos Guijarro, 2024; Hattie & Timperley, 2007), although gaps remain concerning its application in the systematization of practice reports. In the local context, studies on its impact on written production and pedagogical accompaniment are scarce, which highlights the need to explore its contribution to teacher training.

In response to this situation, AVI (Intelligent Virtual Assistant) was designed and implemented. AVI is an artifact based on intelligent agents and natural language processing aimed at analyzing and providing feedback on practice reports. Its general purpose was to evaluate the impact of using AVI in feedback processes during university pedagogical practice, through the design and implementation of the AVI artifact as a formative feedback assistant; the analysis of its effects on feedback efficiency and student autonomy; and finally, the assessment of tutors' and practitioners' perceptions regarding its pedagogical utility.

Materials and Methods:-

The research was conducted under the Design Science Research (DSR) framework, aimed at the creation and validation of technological artifacts applied to real-world educational contexts. This approach integrates scientific rigor with practical applicability through an iterative process of design, development, and evaluation (Peffers et al., 2007; Vaishnavi & Kuechler, 2015). The study took place within the Bachelor of Computer Science with an Emphasis on Audiovisual Media program at the University of Córdoba, involving 12 student teachers and 2 tutors from the Pedagogical Research Practice 5 (PPI5) course during the year 2025.

Methodological Approach and Design

The DSR approach guided the construction of the AVI (Intelligent Virtual Assistant) artifact, structured into six methodological phases:

1. Definition of Objectives: Formulation of functional goals to optimize review and feedback.
2. Design and Development: Creation of the prototype with Natural Language Processing (NLP) and semantic analysis modules.
3. Demonstration: Pilot implementation of the artifact in a real pedagogical practice environment.

4. Evaluation: Qualitative and quantitative analysis of the system's relevance and effectiveness.
5. Communication: Dissemination of results in institutional and international academic spaces

Figure 1. Methodological phases of the DSR approach applied in the research

Techniques and Instruments

Semi-structured interviews, participant observation, documentary analysis, and focus groups were employed to triangulate the information and ensure the validity of the findings.

Ethical Considerations

The research adhered to the ethical principles of voluntariness, confidentiality, and informed consent. The data were used exclusively for academic purposes.

Technological Resources and Tools

The artifact was developed using generative artificial intelligence and natural language processing tools, integrated into a functional web interface. The system was evaluated according to criteria of usability, semantic precision, and pedagogical relevance.

Data Analysis Techniques

According to Hernández, Fernández, and Baptista (2018), mixed-methods studies allow for the integration of the strengths of quantitative analysis with the depth of qualitative analysis, enabling a comprehensive understanding of the educational phenomenon. This methodological perspective supports the triangulation of techniques used in this research and contributes to strengthening the validity and reliability of the results obtained.

A mixed-methods strategy was employed for the analysis. Qualitative data collected through interviews, participant observation, and focus groups were examined using **thematic analysis**, which allowed for the identification of emerging categories associated with autonomy, efficiency, and pedagogical transformation. Quantitative data, obtained from measuring feedback response times and textual quality rubrics, were systematized in spreadsheets to calculate averages and percentage variations. Methodological triangulation ensured the validity and reliability of the results.

Results:-

This section describes the main findings obtained during the implementation of the "AVI" GPT in pedagogical practice. The results are organized into three analytical categories: efficiency in the feedback process, self-regulated

learning, and pedagogical transformation, integrating quantitative and qualitative data obtained throughout the different phases of the research.

Efficiency in Feedback

The comparison between review times before and after using the artifact showed a 50% decrease, dropping from an average of 90 to 45 minutes. Tutors reported a reduction in their operational workload, allowing them to dedicate more time to pedagogical accompaniment processes.

Self-Regulated Learning

90% of the students improved their reports through the iterative use of AVI, showing greater argumentative clarity and textual coherence. Students expressed feeling more autonomous regarding the report-writing process.

Pedagogical Transformation

The tutor–practitioner interaction shifted toward pedagogical reflection, transcending merely formal corrections. The critical construction of reports and the redefinition of the teaching role were promoted.The results demonstrate the artifact's effectiveness in improving the quality of practice reports, optimizing feedback time, and strengthening student autonomy.

Figure 2. Custom GPT: Pedagogical Investigative Practice 5 (PPI5)

Resultados generales

The analysis of the gathered information revealed significant transformations in pedagogical practice, where students attained greater argumentative clarity and proficiency in academic writing, while tutors achieved a considerable reduction in review times. These findings demonstrate the effectiveness of the AVI assistant in optimizing the feedback cycle and fostering a more sophisticated command of the reporting process among practitioners, ultimately strengthening the quality of pedagogical accompaniment in the university context.

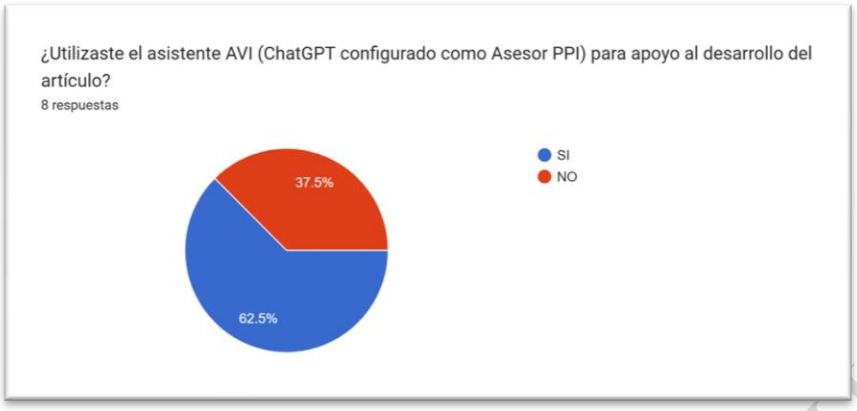

Figure 3. Use of the AVI Assistant (ChatGPT configured as PPI Advisor) during the article development

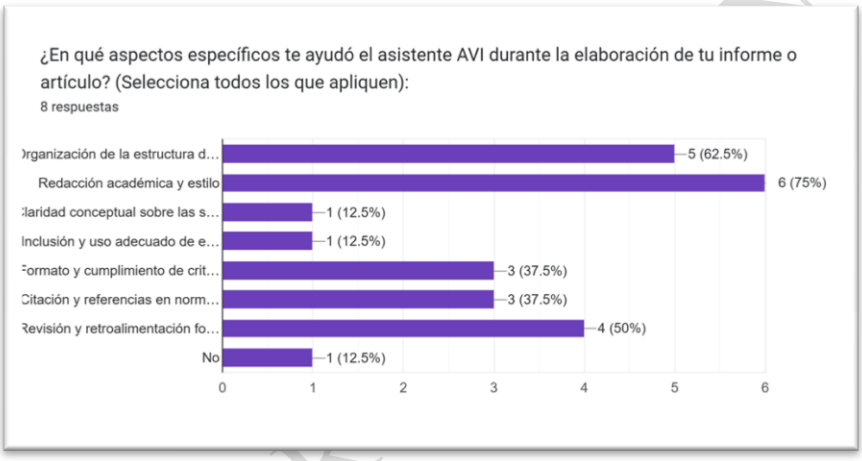

Figure 4. Areas in which the AVI Assistant supported the preparation of the report or article

Results by Methodological Phases

The implementation of the research according to the DSR framework yielded the following results across its various stages:

- Phases 1 and 2 (Problem Identification and Objective Definition): These stages allowed for the identification of critical bottlenecks in the traditional reporting process and the establishment of clear functional objectives for the technological solution.
- Phase 3 (Design and Development): During this phase, the AVI platform was constructed, integrating NLP (Natural Language Processing) modules specifically designed for textual analysis and pedagogical feedback.
- Phase 4 (Demonstration): During the pilot implementation, 90% of the students showed measurable improvement in their reports, while tutors achieved a 40% reduction in their initial review time.

Indicador	Antes del artefacto	Después del artefacto
Tiempo promedio de revisión	90 min	45 min
Claridad de redacción (escala 1–5)	3.2	4.6
Satisfacción del tutor (%)	60 %	90 %

Figure 5. Comparative results of the review and feedback process

In Phase 5, the qualitative analysis revealed three emerging categories: Efficiency, characterized by increased speed and precision in error detection; Self-regulated Learning, involving the strengthening of student autonomy in report improvement; and Pedagogical Transformation, which fostered a tutor–practitioner relationship centered on formative feedback. Subsequently, Phase 6 consolidated the dissemination of results in academic venues, highlighting participation in the first International Convention on Educational Innovation and the International Meeting of Research Seedbeds - RedCOLSI, 2025-.

Discussion:-

The results demonstrate that the use of the "AVI" GPT improved report quality, reduced feedback times, and strengthened student autonomy, aligning with perspectives that highlight AI's contribution to timely and personalized feedback (Avalos Guijarro, 2024). Furthermore, the iterative process fostered self-regulated learning, in line with Hattie and Timperley (2007), by allowing students to identify and correct their weaknesses prior to the faculty review. The reduction of mechanical tasks favored a more reflective pedagogical accompaniment, consistent with Luckin et al. (2021) regarding AI's potential to decrease the administrative burden on teachers. Additionally, this experience confirms the importance of systematization in the critical reconstruction of pedagogical practice (Jara, 2018). However, limitations such as technological dependence and the need for teacher training for the appropriate use of these tools are acknowledged.

Conclusions:-

The implementation of the "AVI" GPT strengthened feedback processes in university pedagogical practice by improving report quality, reducing review times, and fostering student autonomy, in accordance with Avalos Guijarro (2024) and Hattie and Timperley (2007). The results show that intelligent agents can effectively support teaching accompaniment, promoting iterative improvement and pedagogical reflection, while the decrease in administrative workload allowed more time to be directed toward qualitative processes, as noted by Luckin et al. (2021).

In accordance with the guidelines of the Ministry of National Education (2013), the incorporation of technologies in teacher training must be oriented toward strengthening pedagogical practice and the continuous improvement of educational processes. In this sense, the implementation of the AVI artifact responds to national policies promoting educational innovation and the ethical use of artificial intelligence in university contexts.

It is recommended to advance studies on the integration of AI in other practice contexts, as well as to strengthen teacher training for its ethical and critical use. Furthermore, it is suggested to delve deeper into the technological and methodological limitations associated with the adoption of these tools in university environments.

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