



Research Article

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Virtual Resources for Student Feedback in Higher Education: A Systematic Review, 2023

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Abstract

The following article presents a systematic review of the virtual resources used for feedback, which is essential for strengthening student learning. The objective was to analyze each resource used between the years 2018 to 2023. For the systematic review, databases such as Scielo, Latindex, Scopus, and Dialnet were searched using the Boolean codes "AND" and the terms "digital feedback," "feedback," "higher education," and "virtual resources." The inclusion criteria for the articles in the methodology were: a) Research published in indexed journals; b) Articles showing the use of ICT for feedback; c) Articles published between 2018 and 2023. The exclusion criteria for filtering were: a) Illegible articles; b) Articles not found in indexed journals; c) Articles not corresponding to research sources; d) Review articles; e) Articles discussing concepts, classification, and types. In conclusion, both virtual tools and virtual environments were found.

Keywords: Digital feedback, feedback, higher education

1. Introduction

In higher education, achieving meaningful and effective learning requires knowing and identifying various strategies and virtual resources for feedback provided by ICT. The teacher should not only focus on teaching and evaluation but also verify and reinforce learning. It is crucial to keep in mind

that students do not have a homogeneous understanding in the classroom; therefore, effective feedback is necessary. On the one hand, Marín (2021) points out that feedback allows for obtaining information about the student's academic performance, promoting assertive dialogue, and observing the successes and failures of the evaluation. Thus, the student can ask questions to improve their performance and learning. On the other hand, Diaz et al. (2021) states that feedback establishes evaluative judgments of the learning process, allowing for the recognition of students' strengths and weaknesses and seeking to improve learning. It is important to consider the management of the student's emotions so they can assimilate and correct the errors found during the evaluation. Feedback can be provided by various agents, such as teachers, team members, books, or the student themselves regarding their academic performance and progress in learning activities (Maraza et al., 2019). According to Lira (2021), feedback helps the student contrast their evaluation of what they understood with what they should have understood to achieve learning. It focuses on the evaluation that contextualizes the student's knowledge (Felipa y Paez, 2021). Additionally, Veytia y Rodríguez (2021), specifies that feedback should be useful, timely, and valid to achieve learning outcomes and stimulate the completion of various scheduled activities.

On the other hand, teachers have devised different ways to carry out this activity. Marin et al. (2021) [mentions the implementation of the Wiris Module on various platforms for Science and Engineering majors. This module includes three tools: a) Wiris Quiz, which allows for creating questions with two- and three-dimensional graphical representations and automatically provides feedback to the student, b) MathType, which allows for editing formulas to design or answer questions, and c) CalcMe, a computerized algebra system that also functions as a calculator and allows for using students' answers to provide more detailed feedback. This type of module has enriched educational processes by providing personalized feedback to students. For medical students, Diaz et al. (2021) promotes the use of clickers and a PowerPoint linked with the Turning Point application. Fifteen multiple-choice questions with four possible answers were presented and answered with the clickers. This resulted in a summary of the responses, and the teacher provided structured feedback incorporated into the presentation. Additionally, WhatsApp, a commonly used resource among students for clarifying doubts and obtaining notes on a topic, was utilized. Although students found the clicker activity more satisfactory for receiving teacher feedback, they recognized that WhatsApp allowed for more peer evaluation.

Maraza et al. (2019), uses gamification tools such as Quizizz and Kahoot to promote learning in secondary school students. These free online platforms allow teachers to create, share, and evaluate educational content in a fun way. These tools generate leaderboard results, identifying concepts not fully assimilated and enabling better-directed feedback, significantly influencing students' learning levels. Other authors like. Guerra – Zuñiga et al. (2020), use clickers and Kahoot for medical students in Chile, preferring Kahoot because it is free and does not require special equipment beyond students' technological devices. Both strategies favorably modify teaching-learning processes and enhance each other. Digital games allow for greater student participation, and several researchers are analyzing how they help provide more effective feedback. Castillo Cuesta (2021) implemented Educaplay to improve English grammar, a platform offering various games and interactive maps that can be used synchronously or asynchronously and incorporated into other platforms like Canva, becoming a virtual repository for students. This strategy is useful for developing students' vocabulary and increasing their interest in learning a foreign language. Based on previous research, we can affirm that using gamification directed at different levels and courses has improved the educational process, especially in feedback. Although there are still limitations due to teachers' lack of knowledge to employ or introduce them in a learning session, this can be addressed with training aimed at educators to achieve better advances in gamified feedback. During the pandemic, audiovisual media were implemented to provide feedback, replacing in-person contact. Felipa y Paez (2021), proposed implementing a podcast for university students in the Language I course, a versatile resource previously underutilized for educational purposes. Implementing this product was an elaborate and organized process aligned with class goals/objectives, where both the teacher and student become

active agents in achieving learning. Valenzuela et al. (2021), implemented interactive Genially presentations with explanatory audios in an asynchronous medical class in Chile, improving performance and generating satisfaction among participants. Segovia y Guerra (2020), implemented the use of video to provide feedback on significant work within a course, uploading the 18-minute video to the academic platform for students to review at their own pace, asking questions that teachers promptly answered. According to students, it was an opportune alternative during the coronavirus period. Torres y San Martín (2021) used Zoom for direct interaction with students, along with Google Suite for activity presentation and WhatsApp for interaction and motivation among students.

These proposals were accepted and applied with satisfaction by students and teachers, although they presented limitations for providing feedback on written texts, requiring more tools and educational strategies to complement each other and improve learning. Gonzales y Jarpa (2023), analyzed the effect of digital feedback on a draft using Google Docs, where the teacher leaves written comments online, mobilizing epistemic and collaborative competencies in students. Cabrera (2020), analyzed the use of portfolios to improve English in an Ecuadorian university, using tools like Evernote and Google Drive, the latter preferred for its ability to motivate, organize, and provide feedback on the writing process. An interesting proposal is Lira (2021), which implemented the use of a blog for peer feedback in an English class. This tool allows for exchanging written and multimedia content, offering multiple opportunities for receiving feedback from peers and a general audience, developing critical thinking, and promoting collaboration inside and outside the classroom. However, Veytia y Rodríguez (2021), points out that educators need to improve their handling of digital tools to provide better feedback in each session, using email for asynchronous communication, discussion forums for peer assessment, chat for synchronous communication, and shared boards for collaborative participation and analysis. Martínez (2022), continues studying the importance of feedback on written production tasks using the LexTutor tool, which analyzes the corpus and improves lexical variety. According to Casanova et al. (2021), the teacher must cede their power in feedback when implementing technological tools, promoting that the student self-evaluates, has a feedback library, and receives grades after considering the feedback. Loaiza et al. (2023), implemented a website called EFIWEB, incorporating interactive and gamified tools to provide feedback on knowledge related to the Physical Education course, promoting student motivation and participation.

To give students greater participation in the feedback process, Jacques y Lequeu (2020), used the flipped classroom, showing improved learning for engineering students compared to the traditional approach. Times have changed, and with the implementation of different strategies and digital tools, education has also changed. Now, with the arrival of artificial intelligence, new ways of providing feedback are being explored. Hooda et al. (2022) considers that AI can act as an instructor, monitor the student and their performance, correct and adjust teaching, and provide synchronous feedback. This systematic review aims to answer the following question: What are the virtual resources used for feedback in higher education between 2018 and 2023? Therefore, the objective of this systematic review is to review original articles and evaluate the ICT used, their form of use, and the courses applied.

2. Methodology

2.1 Type of Study

In the research, a rigorous search of the literature was conducted, considering reliable sources in order to analyze the virtual resources used for feedback in education. This began with the systematic classification of articles related to the topic. A total of 277 publications were extracted from recognized databases relevant to the research. Additionally, the appropriate filters were applied, taking into account inclusion and exclusion criteria. The methodology used adhered to PRISMA

guidelines, and the guiding question of the study was: "What virtual resources were utilized for feedback in higher education between 2018 and 2023?"

Table 1: The keywords used in the search:

Keywords
Feedback
Virtual resources
Digital feedback

A. Information Sources

In the process of searching for articles, a total of 277 studies related to feedback using virtual resources were identified. This search was conducted across various databases such as Scielo, Latindex, Scopus, and Dialnet. In a first filtering phase, 234 documents were excluded for various reasons, including illegibility, irrelevance, duplication, thesis format, or a focus on topics unrelated to the research. This left 43 articles, and a second filtering phase excluded 25 articles, resulting in a final sample of 18 articles: 4 from Latindex, 3 from Scielo, 2 from Dialnet, and 9 from Scopus.

Table 2: Article filtering

	Incluye	Excluye
Busqueda inicial	277	----
Primer filtrado	43	234
Segundo filtrado	18	25
Resultado final	18	-----

B. Information Search

The initial search in the Scielo database employed Boolean operators to refine the investigation, focusing on the period from 2018 to 2023 and identifying three original articles. This approach was replicated in the Dialnet database, resulting in the selection of two articles focusing on feedback. The Latindex database contributed four relevant articles within the specified timeframe. Finally, Scopus searches using Boolean operators and specific terms like "digital feedback" and "higher education" or "feedback" identified nine pertinent articles.

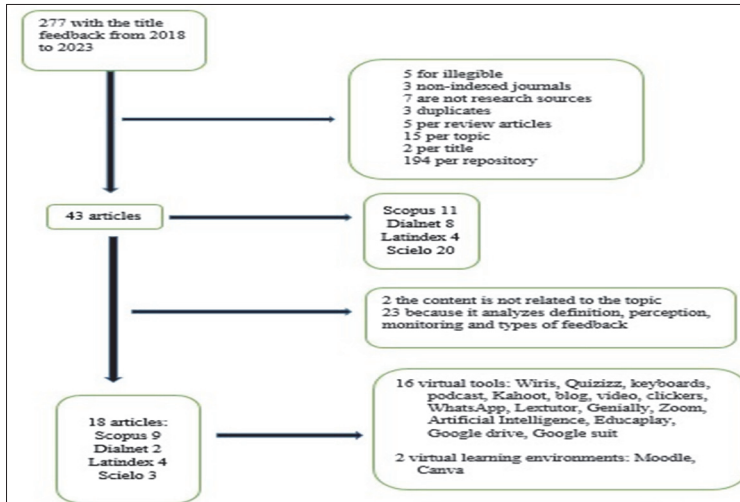
Table 3: Use of database

Base de datos	Artículos
Scielo	3
Dialnet	2
Latindex	4
Scopus	9

C. Inclusion and Exclusion Criteria

Articles were included based on a) Publication in indexed journals; b) Demonstration of ICT use for feedback; c) Publication between 2018 and 2023. Exclusion criteria encompassed: a) Illegible articles; b) Non-indexed journal articles; c) Non-research articles; d) Review articles; e) Articles focusing solely on concepts, classifications, or types. Figure 1 illustrates the article filtering process, identifying a total of 277 articles related to feedback, with 234 excluded due to various reasons including illegibility, irrelevance, duplication, thesis format, or focus on non-research topics. Ultimately, 43 articles were initially considered, with a further refinement resulting in a final sample

of 18 articles: 4 from Latindex, 3 from Scielo, 2 from Dialnet, and 9 from Scopus.



Note. Own elaboration

Figure 1: PRISMA Methodology

3. Results

Table 4: Classification of articles by year of publication

YEAR	NUMBER OF ARTICLES	PERCENTAGE
2019	3	18%
2020	1	6%
2021	2	12%
2022	5	40%
2023	2	12%
TOTAL	18	100%

Note. Own elaboration

Table 3 shows the distribution of articles from 2018 to 2023. It is noteworthy that in 2022, 5 articles on feedback and virtual resources were found, which can be attributed to the increased interest in ICT during the pandemic.

Table 5: Classification of articles by journal of publication

JOURNAL	NUMBER OF ARTICLES	PERCENTAGE
Veritas Journal	1	6%
Medical Education Journal	1	6%
Mendive Journal	1	6%
Medical Foundation Journal	3	17%
Journal of Studies and Experiences in Education (REXE)	1	6%

JOURNAL	NUMBER OF ARTICLES	PERCENTAGE
Hindawi Journal	1	6%
Journal of Research and Practice in Technology-Enhanced Learning	1	6%
The International Journal of Engineering Pedagogy (iJEP)	3	17%
Miscellany 66 Journal	1	6%
Knowledge Pole Journal	1	6%
Educational Perspective Journal. Teacher Training	1	6%
Pedagogical Reference Journal	1	6%
Educational Journal	1	6%
Transdigital Journal	1	6%
TOTAL	18	100%

Note. Own elaboration

Table 4 lists the journals where the publications were found, most of which have a 6% representation. However, Revista Fundación Médica and The International Journal of Engineering Pedagogy (iJEP) each have a 17% representation.

Table 6: Global analysis of studies

Article	Author(s)	Year	Key Contributions
Evaluation and feedback through Wiris quizzes in engineering	[1]	2021	This study applied Wiris alongside MathType and CalcMe, offering personalized feedback that enhances student motivation and interest, and improves course pass rates. However, it noted limitations in programming skills, requiring teachers to deepen their understanding of these tools.
Effect of immediate feedback using clickers or Immediate Feedback	[2]	2019	Effective use of WhatsApp for immediate feedback to address student questions and concerns.
Podcast as a feedback tool in virtual activity assessment	[5]	2019	Implementing podcasts as a feedback tool for virtual tasks had positive impacts on student performance, effectively reinforcing learning outcomes.
Analysis of online gamification tools Kahoot and Quizizz in the feedback process of student learning	[3]	2019	Using online gamification tools like Kahoot and Quizizz positively enhances feedback, with easy and dynamic management.
Peer feedback through blogging in second language English classes in support of inclusive education	[4]	2021	The blog as a Web 2.0 tool optimally fosters peer feedback, improving writing quality and promoting skills such as collaborative work.
Effective feedback in students from the teachers' perspective	[6]	2021	Emphasizes synchronous feedback in virtual learning environments (VLEs) through chat, assignments, and forums.
Student perception of using video as a distance feedback tool	[10]	2020	Video feedback also synchronously reinforces student knowledge.
Which technology do I choose for my class? Perception of medical students on clickers and Kahoot	[7]	2020	Clickers are physical devices that allow students to answer questions posed by the teacher and transmit them immediately through a system.
Results of training on effective feedback for clinical tutors of internships in Chilean universities	[9]	2021	Feedback is provided through the Moodle platform, which can also record video through Zoom, and the use of virtual tools like Genialy or interaction forums facilitates meaningful student learning.
Utility of feedback in students of special education pedagogy	[11]	2020	Among the most important digital tools for adapting to the new format, Zoom was used for direct interaction with students and Google Suite for presenting weekly tasks. This also involved rethinking how to provide feedback and assessment to configure a guided self-learning system.
Artificial intelligence for assessment and feedback to improve student success in higher education	[18]	2022	This study focuses on capturing a summary of the most-used artificial intelligence and machine learning algorithms for enhancing student success. I-FCN was found to perform better than other techniques (ANN, XG Boost, SVM, Random Forest, and Decision Trees) across all measured performance metrics.
Giving away some of their powers! Towards student agency in digital assessment and feedback	[15]	2019	Feedback using storytelling techniques and a mock-up of a digital assessment and feedback system discussed and critiqued an assessment scenario, aiming to gather perceptions and identify recommendations for improving digital assessment and feedback systems and practices.
The appeal of investing in teaching forms: Comments on an electrical	[17]	2020	Feedback through two software platforms: evaluating method relevance using the EvaSys tool, and CELENE, an online course platform facilitating teacher-student interaction and

Article	Author(s)	Year	Key Contributions
engineering course			access to educational resources.
Use of digital games to enhance grammar and vocabulary in higher education English as a Foreign Language	[8]	2020	Educaplay is useful for designing digital games like crosswords, matching games, cloze activities, and interactive maps. Canva facilitates storing assigned activities as virtual applications for student development.
Use of digital portfolios to enhance oral English skills in higher education	[13]	2020	Technological tools like Google Drive and Evernote for designing digital portfolios. Google Drive, favored by students for its storage capacity, cost-free nature, and user-friendly interface.
Use of a free corpus tool to save time in feedback on reports of foreign language English	[14]	2022	This method analyzed lexical variety (i.e., synonyms), textual cohesion, and evasive strategies, including modal verbs, in written productions of 93 participants in higher education. The Lextutor tool was used to analyze the corpus quantitatively.
Digital educational resource as a feedback tool in hybrid higher education	[16]	2023	The study aims to develop a website named "efiweb" as an educational resource for feedback in teaching and learning processes for high school students in Physical Education subjects.
Effect of digital feedback on improving drafts and its impact on achieved grades	[12]	2023	The study involved two stages of writing: formative feedback on a draft by teachers and summative feedback on a final version, both digitally provided via Google Docs comments.

Note. Own elaboration

Table 5 highlights the various ICT tools that have been used for feedback in different courses in higher education. It emphasizes gamifications, virtual resources such as video and blogs, as well as virtual environments.

4. Discussion and Conclusions

This systematic review began by sourcing original articles from reliable scientific databases, including Dialnet, Scopus, Latindex, and Scielo. Articles published between 2018 and 2023 in both English and Spanish were included. The research question addressed was: What virtual resources are effective for feedback? Various ICT tools were identified, such as WhatsApp, Wiris, blogs, Kahoot, and videos, as well as platforms incorporating tasks and forums for feedback, resulting in effective outcomes. Across all studies, the importance of feedback in enhancing student learning was highlighted, particularly in guiding students towards areas needing improvement. While there is diversity among virtual resources, their effectiveness is emphasized when applied in practical settings.

5. Limitations and Future Direction

This study contributed by highlighting various virtual resources for feedback. However, several limitations were identified, which need to be evaluated to propose improvements. Regarding virtual resources, there are numerous options available in remote contexts, but in face-to-face settings, due to the pandemic, research is scarce and limited to publications between 2018 and 2023, excluding feedback tools with artificial intelligence that have especially revolutionized this field in 2024.

As for databases, the study was limited to Scielo, Latindex, Scopus, and Dialnet, without considering others such as Web of Science, which could introduce information bias. The reviewed articles cover different academic levels to extract resources that could be applied to other areas; however, it is recommended to focus the analysis on a single context for more precise conclusions. Another limitation observed is the lack of depth in studying the development of competencies derived from the use of virtual tools.

Among the recommendations for future research, it is suggested to include in the analysis articles that apply emerging virtual strategies for feedback. Most of the studies reviewed were cross-sectional, but a longitudinal analysis would be valuable to assess the long-term impact, especially on retention and sustainability of acquired knowledge. Furthermore, it is recommended to include studies that analyze the impact of feedback in culturally diverse contexts. Another interesting research avenue would be to explore barriers and obstacles in using virtual feedback technologies.

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