The role of podcast as an innovative learning tool in health sciences education: Perceptions and impact

Marco Alonso Martinez-Guzman[1] (iD)
Alexandra Zairabel Lopez-Vazquez[2] (iD)
Isaura Araceli Gonzalez-Ramos[3] (iD)
María Valentina Toral-Murillo[4] (iD)

(Corresponding Author)

[1,2,3,4]*Unidad Académica de Ciencias de la Salud, Universidad Autónoma de Guadalajara, Av. Patria 1201, 45129, Zapopan, México.*
[1]*Email:* malonso.martinez@edu.uag.mx
[2]*Email:* alexandraz.lopez@edu.uag.mx
[3]*Email:* araceli.gonzalez@edu.uag.mx
[4]*Email:* valentina.toral@edu.uag.mx

Abstract

A podcast is a downloadable audio file with a significant impact on teaching due to its availability and repetitive on-demand playback. Educational podcasts are created through a didactic planning process to provide students with cognitive advantages, enhancing their analysis, selection skills, and content dissemination. The purpose was to determine the effectiveness of using podcasts compared to other teaching strategies for learning in health sciences students. The study was an analytical cross-sectional design conducted with a sample of 52 health sciences students, who were asked to develop a designated podcast, followed by answering a survey about their perception of using podcasts, as well as identifying strengths and weaknesses. Our findings indicated that most participants enjoyed using podcasts, highlighting their innovative characteristics and the opportunity they provide to spread information; they also reported increased learning. The advantages included the lack of need to record their faces, the ability to make several recording attempts, and the generation of their own knowledge. Disadvantages included the need for editing, the presence of visual or kinesthetic learning preferences, and stuttering while speaking. Therefore, practical implications suggest that podcasts stand out as an innovative educational tool among health sciences students, with clear perceived strengths and few weaknesses.

Keywords: Health education, Health sciences, Higher education, ICT-supported learning, Innovation education, Podcast.

Contents

Contribution of this paper to the literature
We analyzed the perceptions of Health Sciences students regarding the use of podcasting as an academic tool to enhance their learning. Our findings indicate that nursing and physical therapy students particularly enjoyed the process of research and scripting involved in developing their podcasts. These activities are essential traits aligned with contemporary pedagogical techniques aimed at fostering meaningful learning.

1. Introduction

The current population is experiencing a new technological revolution known as the digital era, and its impact has caused a significant shift in the speed of information production and dissemination, as well as technological development. In the same way, the use of new technologies in the field of education is emerging.

The evolution of these digital technologies represents a change in the paradigm of teaching and learning processes, with more indispensable changes in current educational methods, especially concerning the didactic strategies that teachers used to implement, which were centered on how the professor taught; whereas now the aim is to center the students and their approaches to learning, corresponding to their demands for knowledge (Girão et al., 2020).

To promote the required changes, the tools offered by Web 2.0 are particularly interesting as social educational technologies, which foster self-learning and the development of skills aimed at the transformation into self-taught students who are also efficient at the construction of knowledge. For instance, fully audible teaching and learning methods allow for the transmission and reception of instruments that maximize the advantages of technological advances for learning strategies (Neira, 2021).

The generation of audiovisual content offers important educational advantages, such as promoting the comprehension and acquisition of lecture topics, since it involves students in the creation of content about either the most challenging subjects for better comprehension or those that provoke the highest interest during class. Students are then encouraged to research further information and present a podcast on their own as a supportive source (Achalandabaso, 2022).

1.1. Podcast History and Definition

A podcast is an audio file that anyone can subscribe to or download on different mobile devices, such as computers or smartphones, whose content can be offered on demand and can be listened to whenever the client chooses (Saravia, Orejuela, & Fukuhara, 2020).

The etymological term "podcast" derives from the English words "iPod," an Apple MP3 player, and "broadcasting," meaning transmission or emission of content. Thus, it is the combination of transmittable audio content in a digital form that enables internet users to share and disseminate information, making it a well-established pedagogical option to improve the learning experience. It should adhere to specific structural characteristics such as:

- Type of contents: Narration, review and evaluation material, conferences, scientific information.
- Length: short, less than 5 minutes; medium, ranging from 5 to 15 minutes; and long, over 15 minutes.
- Author: Professor, student, and/or a guest.
- Style: formal or informal.
- Objective: Written according to Bloom's Taxonomy.
- Voice: Rhythm and tone.
- Merge with other materials: integration with other elements, such as in-person lessons, assignments, etc.
- Structure: Linear or in sequence
- Pedagogical approach: Transmissive, conference, constructionist, and constructive pedagogy.
- Subject: Thematic area.
- Media: Audio and occasional video.

These characteristics allow for a well-designed and, consequently, a good-quality podcast, as the combination of these elements aims at the dissemination and sharing of knowledge through internet audio files (Figueroa, Acosta, & Salazar, 2022). The history of the podcast must be understood as the legacy of radio. Various authors identify different phases from the birth of podcasting until its current state. Four key phases can be identified: the predigital phase, the arrival of radio to the web, the development of digital radio, and finally, the increase in interactivity and syndication (Portilla, 2019a). Therefore, the term "podcasting" is understood as the action of a person who creates audio files (Girão et al., 2020). Once the file is created, it can be stored on platforms such as Spotify, iVoox, Apple Podcasts, or Spreaker that enable wide distribution via the internet and/or downloading to a portable device (Portilla, 2019b). Indeed, podcasts have been proven to be cutting-edge technologies that provide flexible learning (Newman, Liew, Bowles, Soady, & Inglis, 2021).

1.2. Podcast in the Context of Health Sciences Education

The rapid evolution of higher education is fostering innovation and technology in pedagogy, which leads to a shared responsibility within the educational staff to embrace these technologies. In 2015, the United Nations set the goal for 2030 to achieve accessible, high-quality, technical, and vocational education that should lead to the creation of new study programs, encouraging curricular and extracurricular assignments to promote scientific, technological, and humanitarian skills and competencies; the latter has been proven to be particularly challenging in Health Sciences (Figueroa et al., 2022). To achieve this goal, academics must prepare students at all educational levels for full integration into an increasingly technological society that goes beyond merely the instrumental skills of technology needed in the healthcare field, where important changes in access to information and training have occurred and have led to programs based on simulation, remote education, and widely accessible content for learning (Cabero-Almenara, Barroso-Osuna, & Palacios-Rodríguez, 2021). In this complex process, educators must choose a didactic strategy aligned with the environment of students, such as a method that encourages the development of competencies

expected in class, shifting the role of the professor to a guide or facilitator who prompts the student to assume and hold responsibility for their own learning process and collaborate in solving problems and engaging in critical thinking. Throughout the education of healthcare professionals, formative development must implement strategies that focus on the ability of students to achieve transversal and specific competencies that lead them to become professionals with critical analysis, capable of making decisions that benefit healthcare users. In addition, these professionals can adapt to work with various learning strategies, such as problem-based, case-based, research, projects, service, and clinical simulation methods (Villalobos et al., 2022).

The above must lead us to understand that the development of technologies allows us to foster education with new tools that change pedagogical purposes used in all learning fields. In fields such as nursing and physiotherapy, the teacher-student relationship goes beyond other academic settings to mimic the relationship between the healthcare worker and the healthcare user. Therefore, the use of pedagogical technologies provides us with tools to enhance their training in practical skills by creating dynamic activities that bring students closer to real-life clinical situations, accompanied by the use of resources that promote engagement and interest among students, optimize their time, and cultivate the sense of responsibility for their own learning process (Girão et al., 2020).

1.3. Podcast as a Pedagogic Tool for Studying

The development of Web 2.0 and tools such as podcasts has allowed for the creation of strategies in the teaching-learning process that have yielded a new educational environment shared by teachers and students, where close interaction increases the experiences of sharing and acquiring new knowledge. This unique environment seeks to achieve the immersion of all the participants of the educational program through academic digitalization and innovation in several abilities and competencies.

The transmission of audio content has become a natural element of current social interactions and has further found its way into academics. The podcast possesses important characteristics that have allowed it to transcend these boundaries: online availability, unlimited and accessible reproductions, the ability to play it while performing other activities, and the capacity to strengthen remote education while maintaining the essence of the traditional teaching-learning process (Figueroa et al., 2022).

The employment of technological media with educative potential enables the building of a two-sided pathway for teaching and learning when students develop their podcasts, blogs, or wikis; the former mainly addresses the diffusion of scientific content and the instruction of institutional contents while exercising reflexive and critical analysis in their attempt to communicate through formal, non-formal, or informal channels (Celaya, Ramírez-Montoya, Naval, & Arbués, 2020). Therefore, the flexibility of this tool quickly impacted positively on teaching and provided a new dimension to academic workers on the matter of technology. The educational podcast is then created as an audio file designed with specific topics and recorded through a process of didactic planning. The analysis of the possibilities derived from this resource has highlighted that students must then be proficient in both the technological and pedagogic aspects of the subject for its recording. In this context, the teacher is a key participant in the process of teaching-learning in collaboration with the students, where the didactic strategies to consolidate the educational media are more relevant for learning than the media itself (González-Osorio, 2022).

One of the most remarkable advantages of developing podcasts is switching the student from a passive to an active role in the learning process. It also enables students to spread their academic products into a widely interconnected society where they may be played by anyone at any moment and place with an electronic device (M-learning). In addition, it fosters autonomous learning and impacts the development of other abilities by using a language that is already understood by the students in their daily activities (Saravia et al., 2020). Therefore, tasks that involve the development of podcasts may constitute important tools that help to improve the learning experiences of all students, clinicians, and patients, as well as deepen the participation and collaboration of students in digital learning environments.

Podcasting has proven to be a successful methodology when applied to programs in health sciences as well as other sciences. These technologies allow for a shift towards a characteristic educational paradigm due to the independence of physical and temporal constraints in the teaching-learning process, as well as providing students with more control over their learning (Girão et al., 2020).

1.4. Impact of Podcast as a Tool for Learning in Health Sciences

Several studies have pointed out that podcasting may be a tool that allows people to teach and learn in different contexts and purposes. Therefore, multiple international higher education institutes have implemented podcasting as a tool for learning derived from the cognitive advantages that it poses. It involves the development of important skills related to acquiring new information, such as analysis, selection, and spreading of contents, which actively involve the students in their learning by allowing them to choose the best moment to listen according to their style of study, to play and repeat contents as many times as they wish to acknowledge the key points, and also to provide them with educational content for their spare time and thus disrupt the classic process of teaching-learning. These reasons have appointed podcasting as a valuable resource for remote learning due to its low costs and easy accessibility (Portilla, 2019b).

The Technology Acceptance Model (TAM) and the Diffusion of Innovation theory (DOI) are key to understanding the factors involved in the use of podcasts by students at universities. The TAM and DOI theories explain why listening to audio inspires critical thinking and deeper reflection, which can be perceived as a more effective learning method than solely reading texts (Portilla, 2019b).

Successful cases of podcast implementation in health sciences include the Medicine School of the University of Pittsburgh, where pediatric hospitals employed podcasts during the COVID-19 pandemic. They achieved a global audience that logged into their podcasts to learn better management strategies for pediatric patients affected by the SARS-CoV-2 virus (Tarchichi & Szymusiak, 2021). In addition, a qualitative study conducted in Canada showed that medical students display a high preference for podcasts to stay updated on professional news and consider podcasts to be an excellent way to enhance their existing knowledge, enabling them to learn and perform critical analysis of new information (Malecki et al., 2019). Finally, the theoretical content of the lectures of Restorative Dentistry in the Integral Clinic II in Peru was fully converted into a 15-minute podcast and distributed to students via WhatsApp,

and they observed a high contribution to clinical performance. Students explained that the ease of playing the podcast enabled them to achieve a better learning experience in a reduced time, which supports the synergic approach for the teaching process of theoretical content with practical applications (Saravia et al., 2020).

2. Materials and Methods

This is a transversal study with an observational, descriptive approach. Study subjects were sampled by convenience.

Students pursuing a major degree in either nursing or physical therapy from the Universidad Autónoma de Guadalajara.

We performed an intentional sampling of young adults between the ages of 18 and 25 years old that matched our inclusion criteria. We selected 52 students in the third semester of both nursing and physical therapy from the private university Universidad Autónoma de Guadalajara in Mexico.

2.1. Podcast-Based Activity

We requested the participants to research an academic topic related to the course they were enrolled in. For the nursing students, the topic was related to the abuse of substances for the Pharmacology and Toxicology course; meanwhile, physical therapy students were asked to research nervous system diseases for the Neuropediatrics course. All the participating students were asked to target their research toward the development of a podcast.

2.2. Survey on the Perception of Podcasting

Participants were asked to answer a final survey via Google Forms with questions that aimed to recollect the general impressions of students on the use of podcasts as well as the identification of strengths and weaknesses. Questions allowed students to choose as many answers as they considered relevant. The questions of the survey are shown in Table 1.

Table 1. Questions of the survey.

Questions	Available options
Age	Open answer
Gender	• Male
	• Female
Career	• Physical Therapy
	• Nursing
Did you like using the Podcast as a learning tool?	• Yes
	• No
Do you believe that the use of a podcast enhanced your learning compared to a class presentation?	• Yes
	• No
Why?	1. It is an innovative tool for academic use
	2. It is just a paraphrasing exercise
	3. It is as hard as any new tool
	4. I need to design a structured script
	5. I prefer working on a class presentation
	6. It allows for a better spread of information
What strengths did you find in the use of a podcast?	1. It allows for several attempts.
	2. Showing my face is not required.
	3. I may read the script while recording.
	4. It allows me to generate my own learning.
	5. It allows for great information spreading.
	6. Asynchronous recording.
	7. Measuring of reproductions.
	8. I can evaluate the impact of the topic.
	9. It leads to the learning of new tools.
	10. I can use it to study over
	11. Podcasts can be played in many places.
	12. It can lead to economic profits.
	13. I am an auditory learner
What weaknesses did you find in the use of a podcast?	1. I feel anxious about recording myself.
	2. I am afraid of the spreading of my content.
	3. Others may make memes out of my content.
	4. I do not possess the proper tools for recording myself.
	5. It requires editing.
	6. I do not know how to use the recording tools.
	7. I do not like social media or diffusion platforms.
	8. I stutter and feel blocked while speaking.
	9. It generates additional spending.
	10. It requires a connection to the internet and devices.
	11. It requires a deep analysis of my research.
	12. I feel intimidated by my accent, speech, or idioms.
	13. My learning is either visual or kinesthetic.

2.3. Data Analysis

Results were exported from Google Forms to a comma-separated value (.csv) file and analyzed using Microsoft® Excel® for Microsoft 365. The answer options were converted into discrete numeric variables for frequency analysis. These options were evaluated based on the frequency of selection and divided by the total number of responses. Frequencies were compared using a chi-square analysis, with comparison groups categorized by age, gender, career, liking for the podcast, and perception of learning when using a podcast. Categories showing significant differences were further analyzed in contingency 2x2 tables to calculate the Odds Ratios (OR) and the Confidence Intervals (CI). The threshold for statistical significance was set at $p < 0.05$.

3. Results

In total, 52 students were included, of whom 21 were nursing students (40.4%) and 31 studied physical therapy (59.6%), both groups from the third semester of their respective programs. The participants developed a podcast centered on a Health Sciences topic according to their courses. Regarding gender, the population consisted of 32 female students (61.5%) and 20 male students (38.5%).

This study's results showed that the students mostly highlighted the innovative properties of the podcast (58%) and the ease it provides in spreading information (46%) (Table 2). We also analyzed their responses according to gender, career, liking for the podcast, and perception of podcast-induced learning. We did not find significant differences in the frequency of answers when comparing them by gender or career, which confirms that even though they are enrolled in different careers, the general population answers in a similar manner, and they represent a proper sampling from Health Sciences students. On the other hand, we found that the frequency of answers changes significantly depending on whether they liked developing the podcast as well as their perceptions of the podcast-induced learning.

Table 2. The general perception of using a podcast for learning.

Global answers	It is an innovative tool for academic use.	It is just a paraphrasing exercise.	It is as hard as any new tool.	I prefer working on a class presentation.	It allows for a better spread of information.
	58	29	13	23	46
Answers separated by career			$p = 0.91$		
Nursing	57	19	14	24	43
Physical Therapy	62	38	14	24	52
Answers separated by gender			$p = 0.80$		
Male	50	25	20	20	40
Female	63	31	9	25	50
Answers separated by appreciation of the podcast			$p < 0.001$		
Liked it	67	31	11	16	53
Did not like it	0	14	29	71	0
Answers separated by perception of podcast-induced learning			$p < 0.001$		
Perceived it	83	37	9	0	63
Did not perceive it	6	12	24	71	12

The table displays the answers regarding the general perception of the use of podcasts for learning, as well as their classification according to career, gender, appreciation of podcasts, and perception of podcast-induced learning among participants. The frequency of responses for each classification was compared, and the statistical differences are shown for each category. The p-value for groups with significant statistical differences is highlighted in bold text. * OR and CI > 1; ** OR and CI < 1.

We analyzed the global survey responses to understand the general appreciation of the technique. They mostly confirmed their liking for the podcast since 45 (86.54%) answered positively to that question, although only 35 (67.31%) perceived it to generate a better podcast-induced learning experience compared to traditional expositions by students. This difference highlights an interesting self-reflection from the students, who are aware that an enjoyable activity is not necessarily related to better learning. Derived from the contrast between their liking of the podcast and their perception of podcast-induced learning, we decided to split their answers into these categories for analysis. We found that the students who reported liking the podcast mostly highlighted it as an innovative tool for academic use (OR = 26, CI = 1.37 − 493.05) and were less likely to prefer traditional expositions by students (OR = 0.07, CI = 0.01 − 0.46). Similarly, when we analyzed the responses according to their perception of the podcast-induced learning, we observed an association between a positive response and the opinion of it as an innovative tool (OR = 77.33, CI = 8.54 − 700.22) and a low tendency to prefer expositions by students (OR < 0.01, CI = 0.00 − 0.12). Interestingly, we also found that the students who felt higher podcast-induced learning were attracted to the ease of spreading the information (OR = 1269, CI = 2.49 − 64.58), which marked them as students with a high level of academic initiative.

The participants in our study recognized that some of the biggest strengths of the Podcast were that recording their face was not a requirement (62 %), the possibility to attempt the recording several times (60 %), the feeling of generating their own learning (54 %), the possibility to use as a study over technique (54 %), and to be able to read their script while recording (52 %) (Figure 1). Interestingly, when we analyzed the identified strengths according to our previously defined categories, we were unable to find statistically significant differences in the frequency of each strength, which may indicate that podcasting offers multiple positive perspectives for students and that none of them is superior to the others, therefore pointing to the podcast as an attractive tool for a wide population of students.
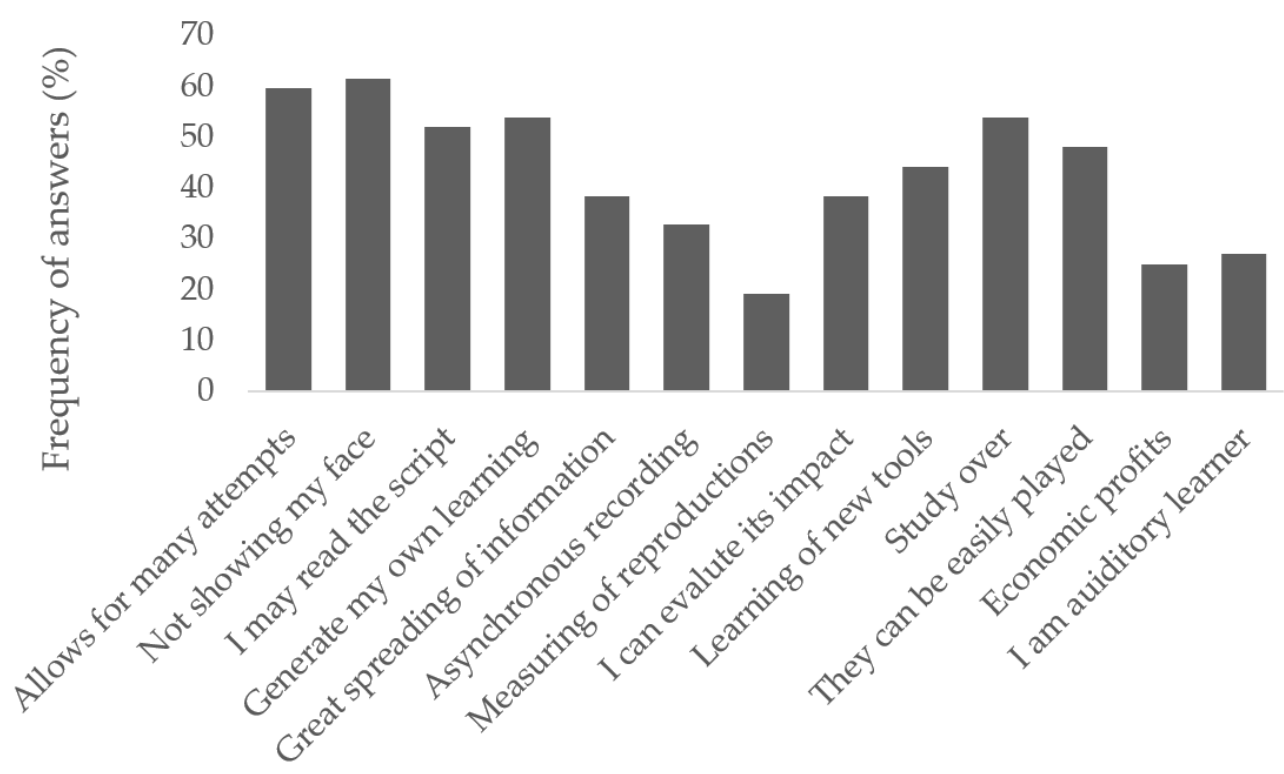
Figure 1. Perception of the students on the podcast's strengths. The graph shows the percentage of students (Vertical axis) who answered positively to each of the questions (Horizontal axis).

The participants have identified the main weaknesses that the podcast requires editing (35%), their learning being primarily visual or kinesthetic (31%), and their stuttering while speaking (29%) (Figure 2). However, the participants chose these weaknesses less frequently compared to the strengths, which suggests that the perceived weaknesses are not as relevant to the participants as the perceived strengths of podcasting. This tool is recognized with positive value by the Health Sciences students. Notably, no weakness was remarked with statistical significance when analyzing the frequency of answers according to the study categories.
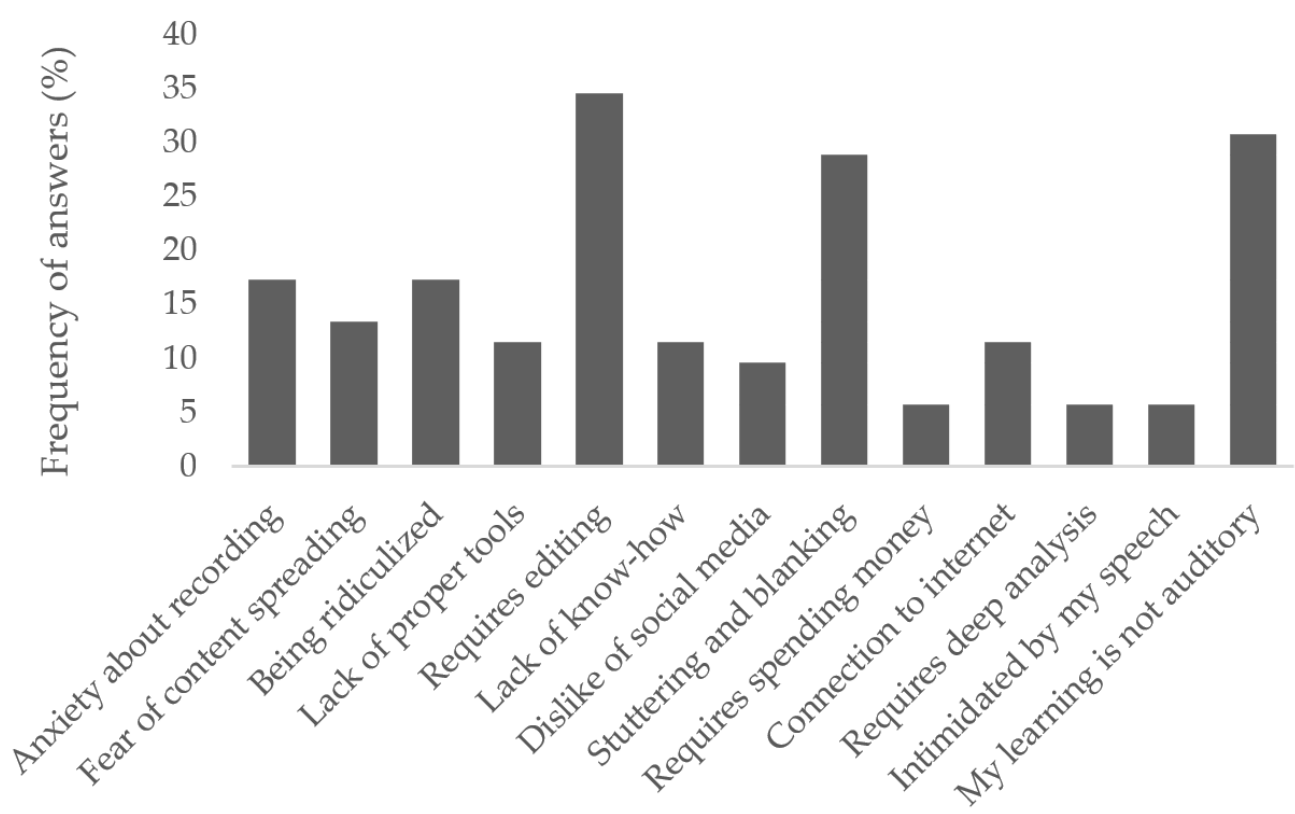
Figure 2. Perception of students on the podcast's weaknesses. The graph shows the percentage of students (vertical axis) who answered positively to each of the questions (horizontal axis).

4. Discussion

The functions of 21st-century teachers include the use of innovative and technological pedagogical tools to facilitate teaching and learning strategies for students. In Castillo-Prada (2022), it is explained that teachers focus on continuously designing different methods that can easily adapt to the current knowledge and context of students. Consequently, the use of podcasts as a learning tool fulfills three key actions: 1) it promotes the dissemination of knowledge within the community, 2) it breaks down barriers to access by transferring knowledge from higher education institutions to free-access platforms, and 3) it encourages students to conduct formative research to produce podcast content. These activities allow students to transform the newly acquired knowledge into their own and develop important communication skills for their future professional career (Castillo-Prada, 2022). Therefore, we believe that podcasts are an innovative tool for Health Sciences in the pursuit of meeting the goals of encouraging student protagonism and initiative in their process of acquiring new knowledge and motivation to achieve meaningful

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and personal understanding, which is a trending challenge in education. Indeed, our results show that students were 26 times more likely to perceive developing podcasts as an innovative tool. Additionally, students who reported perceiving podcast-induced learning were significantly less likely to prefer returning to traditional expositions by students (OR < 0.01); these students also highlighted the innovative properties of podcasts (OR = 77.33).

The development of podcasts was also evaluated in our work due to the influence they have on learning. Listening to podcasts has been shown to be a better strategy for studying orthopedic subjects as it provides better learning than reading texts (Lomayesva et al., 2020). Also, listening to podcasts is linked to higher income and status in both healthcare workers and caregivers. They reported that listening to podcasts provides an easy strategy for continuing medical education (Lee et al., 2022). These benefits have led to the inclusion of listening to podcasts as part of the curriculum, which has resulted in lower visual fatigue levels and allowed for cyclical listening, thereby enhancing the learning experience (Wang, Tang, Liu, Chuang, & Shih, 2023). Despite the reported benefits of implementing podcasts as a complement to lectures, few studies have addressed whether the development of podcasts improves the learning experience.

We analyzed our data to identify the leading strengths of podcasts according to our population of students, but we were unable to find statistically significant differences in the frequency of each strength. This may indicate that podcasting offers multiple positive perspectives for students and that none of them is clearly superior to the others. Accordingly, many advantages have been highlighted by other authors related to the use of podcasts. In Velasco, Rodríguez, Mejías, and Fernández (2023) described that while working on a specific subject, podcasts improve the communication skills of students and develop critical thinking, which represent skills that will help them to be more prepared to face scenarios in the work field. In addition, Velasco et al. (2023) also commented on the acquisition of clinical abilities by creating an environment of collaborative work that fosters active learning and deeper comprehension, with a critical appropriation of the information that leads to higher retention, which will finally enable teachers to update their content with more relevant and useful content. (Velasco et al., 2023). Indeed, García-Marín (2020) further details that the podcast is a support tool for collaborative learning when students share the contents that either they or their teachers have produced (García-Marín, 2020). These results coincide with those proposed by Ortiz and Paredes (2020), who consider podcasts a flexible and didactic tool that promotes the accessibility of educational information by generating content and publishing it on search engines that are easily accessible with any electronic device. When using this innovative approach, teachers have observed not only a perfect achievement of their curricular goals but also have found an enjoyable and fun activity for students while attaining the teaching-learning process (Ortiz & Paredes, 2020). Saravia et al. (2020) arrived at the same conclusions in 2020, when they affirmed that the new generations would rather choose flexible schedules that allow them to organize their activities, therefore preferring tasks that do not require their synchronous presence (Saravia et al., 2020). In addition, Prado (2020) also reported that the use of podcasts has produced significant changes in their learning sessions and has turned students into managers and producers of their learning process (Prado, 2020).

In this work, we surveyed 52 health sciences students regarding their experiences after developing a podcast as an educational tool. The two most notable characteristics that students identified included that developing podcasts favored their learning process much more than making traditional presentations (OR = 14.3) and the flexibility that the podcasts possess due to their wide availability, which enables easy access to knowledge and allows for widespread dissemination (OR = 1269). Our observations match those of Saravia et al. (2020), whose students defined podcasts as easy-to-access material and noted the advantages of repeating the conferences at any time and place that they preferred, thus becoming a great tool for studying (Saravia et al., 2020). In Mulero-Henríquez, Álamo-Bolaños, and Cobos (2024) received positive responses from their students after implementing the development of podcasts in their course; they described it as an innovative tool that is useful, simple, and intuitive, and even mentioned that they would like to use it more frequently and that other courses would implement it as well (Mulero-Henríquez et al., 2024).

The success of implementing podcasts will depend on factors such as length, creativity, selecting topics of interest, and the motivation of the students. In addition, teachers must consider processes of planning and reflection, as well as include a final evaluation of the produced podcasts. As such, there are three important questions we need to ponder while designing this activity: Who is it addressed to? What are the main objectives? And how is it going to be used? Therefore, the podcast assignment should be created as much by students as by the faculty (Saravia et al., 2020).

The inclusion of technology in the teaching-learning process may be accompanied by microlearning, which will contribute to developing different types of learning and favor practical interaction with the course contents. The benefits that students have highlighted about developing podcasts, such as widely available access and flexibility to study at their own pace, will have a positive impact on their satisfaction during the learning process.

5. Conclusions

Podcasts have emerged in the technology era, carrying the legacy of radio. They maintain the universal characteristics that propelled radio into a wide population, making it highly popular. Additionally, podcasting offers educational possibilities due to its ease of development, dissemination, and consumption, especially in a society where most individuals carry devices capable of playing podcasts. However, the perception of Health Sciences students regarding the use of podcasts as an educational tool has not been thoroughly analyzed. In this study, we demonstrate that participants primarily highlighted podcasts as an innovative tool that facilitates information dissemination. They identified several strengths, including the lack of necessity to record their faces, the opportunity to make multiple recording attempts, the ability to generate their own knowledge, the potential to review topics for study, and the option to read the script simultaneously with recording. These advantages provide significant benefits over traditional student presentations, aligning with new trends in Educational Sciences. We conclude that the perceived weaknesses are less relevant to participants than the strengths of podcasting, and this tool is viewed positively by Health Sciences students. Notably, no weaknesses were identified with statistical significance when analyzing answer frequency across study categories.

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