E-learning and its impact on health sciences education as a consequence of the COVID-19 Pandemic: Literature review

E-learning e seu impacto na educação em ciências da saúde como consequência da pandemia do COVID-19: Revisão de literatura

E-learning y su impacto en las ciencias de la salud como consecuencia de la Pandemia de la COVID-19: Revisión de la literatura

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Abstract
Objective: The objective of this study is to establish the importance of the E-learning system in health sciences as well as the impact that it generated due to the COVID-19 pandemic. Methodology: An exhaustive search strategy of the scientific literature was carried out using the PUBMED database, through the keywords "E-Learning", "Health Sciences" and " COVID-19", where a total of 20 scientific articles could be obtained. Results: E-learning education represented a fundamental tool to be able to fulfill several objectives of health sciences, however, there appeared several advantages and disadvantages during its execution. Conclusion: The usefulness of E-learning in the context of the COVID-19 pandemic was of great importance for the health sciences. However, based on this experience, several parameters can be established to take into account to improve and explore various fields of this educational system.
Keywords: E-Learning; Health Sciences; COVID-19.

Resumo
Objetivo: O objetivo deste estudo é estabelecer a importância do sistema E-learning nas ciências da saúde, bem como o impacto que gerou devido à pandemia de COVID-19. Metodologia: Foi realizada uma estratégia de busca exaustiva da literatura científica utilizando a base de dados PUBMED, através das palavras-chave "E-Learning", "Ciências da Saúde" e "COVID-19", onde foi possível obter um total de 20 artigos científicos. Resultados: O ensino a distância representou uma ferramenta fundamental para poder cumprir vários objetivos das ciências da saúde, no entanto, surgiram várias vantagens e desvantagens durante a sua execução. Conclusão: A utilidade do E-learning no contexto da pandemia COVID-19 foi de grande importância para as ciências da saúde. No entanto, com base nesta experiência, podem ser estabelecidos vários parâmetros a ter em conta para melhorar e explorar vários domínios deste sistema educativo.
Palavras-chave: E-Learning; Ciências da Saúde; COVID-19.

Resumen
Objetivo: El objetivo del presente estudio es poder establecer la importancia del E-learning en las ciencias de la salud como también el impacto que se generó a partir de la pandemia de COVID-19. Metodología: Se realizó una estrategia de búsqueda exhaustiva de la literatura científica utilizando la base de datos de PUBMED, donde por medio de las

palabras clave "E-Learning", "Health Sciences" y" COVID-19" se obtuvo un total de 20 artículos científicos. Resultados: La educación E-learning representó una herramienta fundamental para poder cumplir con varios objetivos de las diversas ciencias de la salud, sin embargo, existieron muchas ventajas y desventajas durante su ejecución. Conclusión: La utilidad del E- learning en el contexto de la pandemia de COVID-19 fue de mucha importancia para las ciencias de la salud, sin embargo, en base a esa experiencia se puede establecer varios parámetros a tener en cuenta que permitan mejorar y explorar varios campos de este sistema.
Palabras clave: E-Learning; Ciencias de la Salud; COVID-19.

1. Introduction

Health practitioners faced a new difficulty as a result of the COVID-19 pandemic, in addition to the effects on people's health: the shift from traditional classroom learning to online learning (Fitzgerald et al., 2022). Virtual education, which played a major role during the COVID-19 epidemic when institutions were forced to make drastic adjustments to the educational system, is one of the ways that education has evolved in recent years. education. New ideas, like e-learning (EL), have become important (Jaoua et al., 2022). Electronic solutions including meeting platforms like Zoom, G-suite, Google Meet, etc. have started to be employed to fill this vacuum since the pandemic's inception. Many medical institutions and other health sciences have closed across the globe since then. WebEx Meet, which became true protagonists of the teaching-learning process worldwide (Rani et al., 2021).

Due to the great drastic change in the change from face-to-face to virtual modality in health sciences, many problems were generated during the students' learning process, these problems translated into difficulty in receiving their classes and being able to learn satisfactorily. The main factor related to these inconveniences occurred with the practices of both undergraduate and graduate students in different areas of health, since there was a decrease in demand by patients and therefore their practices were nobly affected. pre-professionals (Sneyd et al., 2020).

E-learning is a term for an electronic teaching-learning system that uses technology to facilitate information and is an active, cooperative learning environment that is bolstered by the Internet (Chong et al., 2021). On the other hand, essential components for the E-learning system's operation include student engagement and preparation for electronic learning. These factors can help the E-learning system function more effectively (Jaoua et al., 2022). This is referred to be a combination of in-person learning, but with online information, it is crucial that teachers receive training in cutting-edge technologies (Chong et al., 2021).

Authors such as Patano A. et al., refer to the term E-learning as a generic term that includes modalities and terms of web-based learning, online learning, computer-assisted instruction, internet learning. This can be of a synchronous nature when all participants log in at the same time and allows students to interact with each other with the teacher. It can also be asynchronous or "pre-recorded" which is available to students at any time of the day from anywhere. Several studies have shown that e-learning is considered an effective reinforcement for medical training (Patano et al., 2021).

The global adoption of the E-learning educational system, which was initially approved to protect students from COVID 19, sparked much debate about its efficacy in helping students learn and, more specifically, about some of its limitations, including the lack of universal access to electronic devices like computers and smartphones as well as the absence of internet access globally. To examine fundamental ideas about what e-learning is, how it relates to health sciences, and its benefits and drawbacks, the goal of this review is to analyze numerous topics related to this teaching technique (Naciri et al., 2021).
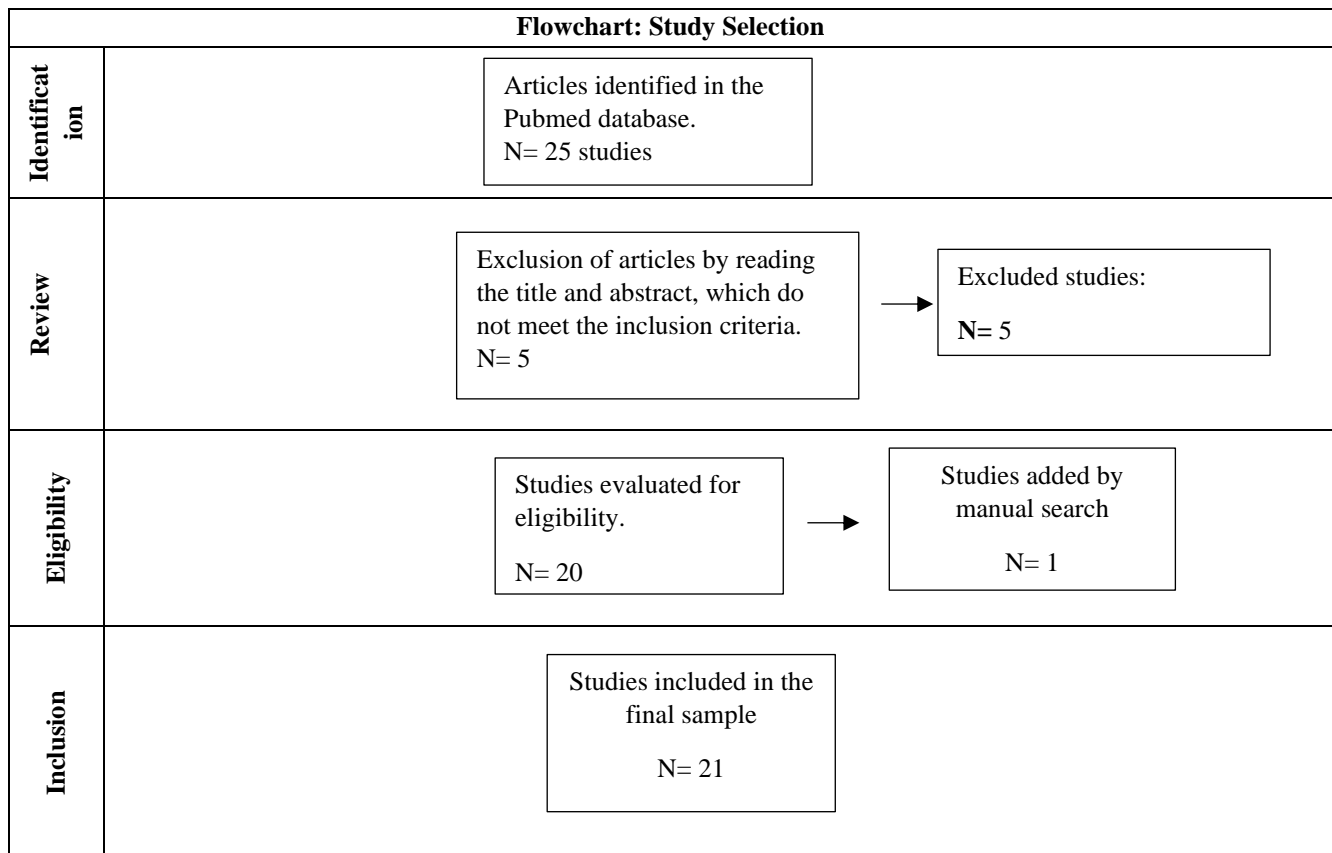
2. Methodology

A narrative review of the literature represents a critical and objective analysis of interesting knowledge of a specific topic in science (Baker, 2016). This review was done with an exhaustive search strategy of the scientific literature was carried

out using the PUBMED database, where through the keywords "E-Learning", "Health Sciences" and " COVID-19", and through the use of the Boolean operator "AND", a total of 20 scientific articles could be obtained.

The inclusion criteria were secondary scientific articles related to the main topic of the research present in the PUBMED database, also publications in English or Spanish. The research was limited to the years 2020 - 2022 because information that related E-learning education and COVID-19 were obtained in 2020. The exclusion criteria were studies based on case reports, protocols, opinions, letters and brief communications also with investigations without a clear methodology that could lead us to a bias in this research. At first, the articles were selected through their title, then we analyzed their abstracts and after reading the entire article, the theoretical framework was elaborated.

Figura 1 Diagrama de flujo Prisma de los registros recopilados para este estudio.

Flowchart: Study Selection		
Identification	Articles identified in the Pubmed database. N= 25 studies	
Review	Exclusion of articles by reading the title and abstract, which do not meet the inclusion criteria. N= 5 →	Excluded studies: **N= 5**
Eligibility	Studies evaluated for eligibility. N= 20 →	Studies added by manual search N= 1
Inclusion	Studies included in the final sample N= 21	

Source: Authors (2022).

3. Results and Discussion

3.1 Relationship of E-learning with health sciences

The medical education community joined together to address the need to sustain medical education and learner assessment by preserving teaching and developing emergency teaching (Fitzgerald et al., 2022).

Students in the medical field can research, train, and support resources for meaningful learning thanks to technical facilities, which were strengthened during the pandemic (Chong et al., 2021). In different medical areas, virtual learning was used, creating new models of continuous professional development and health care, such as in the area of pediatrics, where e-learning was implemented (Fitzgerald et al., 2022).

In the area of mental health, an application of the e-learning system was used to contribute to support sessions for health science workers (Drissi et al., 2021). Likewise, e-learning contributed greatly to the psychological support of students who were anxious and in high levels of stress due to isolation, contributing significantly to social interaction (Di Giacomo et al., 2021).

In the dental area, e-learning gained great strength through digital learning models in laboratory areas for subjects such as histopathology, where models and stained microscope sections were scanned and shared through computer networks (Khlem, Kannappan, & Choudhury, 2022). Likewise, in the restorative dental area, videos were uploaded where the process is explained so that the students can then simulate (Santos et al., 2021).

One of the great concerns in teaching-learning through the e-learning system was the interruption of laboratory, preclinical and clinical activities. How could students receive their theoretical-practical training without preclinical and clinical activities? Simulation slides were used for this, and in some cases, as in the dental area, simulation mannequins, although this means very high costs for the students (Machado et al., 2020).

Similarly, in different specialty areas of medicine, such as radiology, the implementation of a virtual learning system represented a great challenge not only for students but also for teachers, who had to be trained and able to adapt to the use of new technologies. as well as employing and developing various teaching strategies that could be significant in student learning, mainly in professional practice (Majumder et al., 2021).

In the same way, there are several factors to take into consideration to obtain a success of this learning method: Human factors such as teachers, technical competence, collaboration capacity and attitudes of students as well as teachers (Patano et al., 2021).

3.2 Advantages

- The ease of low costs, flexible hours, and avoiding traveling from one location to another (Nimavat et al., 2021).
- Students' worries about fundamental costs of in-person instruction, such as travel charges, clothing, and food in the location of the institution, have significantly decreased thanks to the usage of virtual platforms (Fitzgerald et al., 2022).
- Quickness of material processing and information acquisition using online databases and search engines (Machado et al., 2020).
- More people can be reached through the use of technology in education, and even countries with little resources where face-to-face instruction is inaccessible can receive high-quality medical education, such as cancer treatments (Asana et al., 2021).
- It is a student-centered approach in which the teacher merely serves as a mentor for the student's academic training process (López-Belmonte et al., 2021). It allows didactic spaces where through the use of audiovisual material, suitable learning spaces can be generated according to the needs of the students (López-Belmonte et al., 2021).
- Certain virtual platforms such as social networks can be used in a positive way during the learning process, since authors such as Al Kalbani et al. in 2019 they recommend the use of Facebook, Twitter or YouTube to be able to share their doubts and obtain new knowledge (Agarwal, 2020).

3.3 Disadvantages

- Teachers' scant expertise in technology subjects (López-Belmonte et al., 2021)
- The pupils' ability to switch between classes with a strong, reliable internet connection (Khlem et al., 2022; López-Belmonte et al., 2021; Santos et al., 2021).

- "Zoom fatigue," a reaction to the numerous educational sessions that take place on these platforms (Fitzgerald et al., 2022).

- The privacy of the students was compromised by issues with the control of noise and camera movement (Patano et al., 2021).

- Students' difficulties learning how to use various digital tools, as well as the stress, anxiety, and frustration associated with online learning (Khlem et al., 2022). University students experienced the most periods of extreme stress, which had an adverse effect on their mental health because of the new learning obstacles and the greater level of schooling (Cielo et al., 2021).

Santos N et al. claim in their study that consumers favored Zoom because of its synchronization and asynchronous interactions, conference recording, chats, screen sharing, and file sending and receiving capabilities (Santos et al., 2021). In order to gain meaningful learning through e-learning, student motivation is crucial (Asana et al., 2021). The team's quality system, information quality, service quality, interactivity, and resistance to change were the five pillars of the e-learning challenge (Jaoua et al., 2022).

Similarly, Rani R et al. reports that despite the importance and help provided by the use and implementation of new technologies as a short-term and emerging response to the pandemic crisis, several problems related to these electronic devices also arose. and internet applications, such as lack of familiarity with the application, lack of resources, electricity and time zone problems are among the most common problems inherent to e-learning (Rani et al., 2021).

Bartnicka J et al., mentions that in order to counteract the untimely effects of technological management, prior training should be carried out, facilitating the development of personnel. The post-training result showed new skills in the staff, due to this it is essential that the actors of the teaching-learning process dominate the technological bases to obtain a better quality of learning (Bartnicka et al., 2021).

Mheidly M. et al., describes the development of various pathological conditions related to the pandemic and the constant use of electronic devices. He describes stress as an emotional, physical or mental reaction that produces tension and also "Burnout" as a state of exhaustion in mental health which is related to work and produces behaviors such as cynicism and detachment. The correlation between the constant use of electronic and intelligent devices, the COVID 19 pandemic and e-learning represents being factors of interest which lead to stress and burnout, which can significantly affect the quality of life with deficiencies. psychological, cognitive and even musculoskeletal (Mheidly, Fares, & Fares, 2020).

4. Conclusion

On the basis of the information provided earlier, a thorough understanding of what the E-learning system stood for in the sphere of education can be attained. Its benefit is evident because many students in numerous health-related fields would not have been able to complete their education without its implementation. However, as this system evolved, a number educational issues emerged, chief among them the unequal access that different pupils had to modern technologies and the Internet network. Similar to this, psychological changes were the main players as they reflected a number of issues that both pupils and teachers displayed at such crucial times throughout the beginning of the epidemic. It is important to take this experience as a possible projection of the future of teaching, since, based on all the present errors, an organized plan can be established that allows the large-scale use of this innovative teaching-learning strategy.

As a recommendation it is necessary to apply TIC´s in education and also professors and pupils should accept these new paradigms that could lead to a new a better level in education, let's remember that the main objective of education is to guide people to get new tools and to have a correct behavior with their professional lives. We suggest that more studies be carried out in the area of virtual learning applied to new technologies.

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