




Virtual environments in cooperative learning: a contemporary innovative strategy

Entornos virtuales en el aprendizaje cooperativo: una estrategia innovadora contemporánea

Ambientes virtuais em aprendizado cooperativo: uma estratégia inovadora contemporânea

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KEYWORDS

cooperative learning,
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ABSTRACT. Accelerated changes in the educational field due to the Covid-19 crisis helped awaken and strengthen our technological skills. In this sense, the present study, through documentary research, based on an analytical-inductive and deductive method, aims to show the importance of using virtual environments as contemporary innovation. It seeks greater effectiveness in student learning cooperatively and innovatively. The text is structured by explaining how virtual environments contribute favorably to education in the face of the covid-19 crisis and considering the dimension: cooperative learning as a contemporary strategy. The results reveal that teachers and students need to integrate new technological and innovative methodologies for greater learning effectiveness.

PALABRAS CLAVE

aprendizaje cooperativo,
entornos virtuales,
estrategia de
aprendizaje, innovación
contemporánea.

RESUMEN. Los cambios acelerados en el ámbito educativo por causa de la crisis del Covid-19 ayudaron a despertar y fortalecer nuestras habilidades tecnológicas. En ese sentido, el presente estudio a través de una investigación documental, basado en un método analítico-inductivo y deductivo tiene como objetivo mostrar la importancia de usar los entornos virtuales como innovación contemporánea. Se busca una mayor efectividad en el aprendizaje del estudiante de manera cooperativa e innovadora. El texto se estructura explicando cómo los entornos virtuales aportan favorablemente a la educación frente a la crisis del covid-19 y considerar la dimensión: aprendizaje cooperativo como una estrategia contemporánea. Los resultados revelan que tanto docentes y estudiantes necesitan integrarse a las nuevas metodologías tecnológicas e innovadoras para una mayor efectividad del aprendizaje.

PALAVRAS-CHAVE

RESUMO. As mudanças aceleradas no campo educacional devido à crise da Covid-19 ajudaram a despertar e fortalecer nossas habilidades tecnológicas. Nesse sentido, o presente estudo por meio

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aprendizagem cooperativa, ambientes virtuais, estratégia de aprendizagem, inovação contemporânea

de pesquisa documental, com base no método analítico-indutivo e dedutivo, visa mostrar a importância da utilização de ambientes virtuais como inovação contemporânea. Busca maior eficácia na aprendizagem dos alunos de forma cooperativa e inovadora. O texto é estruturado explicando como os ambientes virtuais contribuem favoravelmente para a educação diante da crise de covid-19 e considerando a dimensão: aprendizagem cooperativa como estratégia contemporânea. Os resultados revelam que tanto professores como alunos precisam se integrar a novas metodologias tecnológicas e inovadoras para maior eficácia de aprendizagem.

1. INTRODUCTION

In the face of the Covid-19 crisis, the current situation forces a change in the role of the teacher, who seeks flexibility to adapt to a different teaching method. That is to say, and one must virtually migrate towards learning strategies, putting new challenges to teachers to adapt to a recent change most educators do not use. Therefore, it is necessary to develop pedagogical innovations accompanied by the mastery of technologies, thus changing our face-to-face classrooms into virtual learning environments (VLE). Although many educational institutions have closed their physical classrooms temporarily due to the pandemic, many of them have also prepared to continue offering their professional academic training, but with a newly incorporated modality such as virtual environments and various training resources synchronously and asynchronous. This allows evaluating how efficient digital technologies are in student learning at the higher level (Maldonado et al., 2020).

An alternative pedagogical solution amid the Covid-19 crisis, both in public and private education, was virtual education, using different tools and technological platforms synchronously and asynchronously, such as Google meet and Classroom. In addition, through an adequate learning follow-up, this methodological proposal would be of great help to avoid the risk of contagion from Covid-19.

Expósito and Marsollier (2020) Expósito and Marsollier (2020) identified that the use of virtual environments in higher education in the face of covid-19 was a very useful option in the teaching and learning process. The teachers resorted to using their institution's virtual platforms, as well as instant mobile messaging and other asynchronous means. Being in the middle of a pandemic has forced educational and teaching institutions at all levels and modalities to be challenged to migrate to virtual learning. Moreover, pedagogical innovation in times of Covid-19 generates in teachers the motivation to promote new educational and pedagogical changes, accompanied by students' technological skills.

An analysis of cooperative learning defines it as an evidence-based teaching strategy, where teachers structure student interactions, preparing them to work in small groups cooperatively and with mutual support (Abramczyk

& Jurkowski, 2020). Unfortunately, some universities or educational institutions are giving little emphasis to developing their students' social skills and incorporating them in teaching, serving this for their professional training. However, new methodologies must be implemented comprehensively in pedagogy through cooperative learning, with techniques that close gaps in the academic and business fields (Apte & Bhave, 2020).

One of the advantages of the virtual and cooperative learning methodology is when you want to take study programs abroad. In other words, it would no longer be essential for the student to have to travel to study, but now there are more significant opportunities for everyone. This is confirmed by studies on the effectiveness of this type of learning (Appiah & Annan, 2020).

The perception by students about the online teaching methodology is considered active, motivating, and adapted to their needs. A great help in learning to search for information. Assess the technological tools and the teaching process through fluid interaction and good accompaniment by the teacher and the students (Area et al., 2020).

Given this, this study aims to define and examine the effectiveness of virtual environments immersed in cooperative learning as an innovative contemporary strategy. In these times of pandemic, it is essential to resort to the construction of collaborative learning, supported by technological tools to reduce geographical differences and personal distance (Macías et al., 2020).

To achieve the purposes of this research, the following questions were raised: What is understood by virtual environments as contemporary innovation in the face of Covid19? How is the cooperative learning dimension conceived as a current strategy? What improvements should be innovated in virtual environments on collaborative learning to achieve greater effectiveness?

2. METHOD

The literature review on virtual learning environments was carried out in the Scopus database. This research is based on the systematic review as a methodological analysis strategy when studying the scientific literature. Which consists of identifying and analyzing relevant works for the subsequent evaluation in progress from the investigation in recognized journals and scientific rigor in the field of education with studies that relate virtual learning environments (VLE) and cooperative learning (Ruso & García, 2018).

For the Scopus review, descriptors such as "virtual environments" "virtual environments during covid 19", "virtual environment strategies" were used. This information was also crossed with "cooperative learning", "collaborative learning online", "cooperative learning effectiveness".

From this, a hermeneutical analysis was carried out that allowed us to interpret the concepts and models proposed by various authors about virtual environments, relating it to cooperative learning.

3. RESULTS

What is understood by virtual environments as contemporary innovation in the face of Covid19?

Teachers in the present century must adopt an environment enhanced by technology, such as virtual learning environments. Likewise, it is essential to consider that due to the global pandemic caused by Covid19, various educational institutions and universities have opted for teaching digitally. There is also a perceived dissatisfaction with the methodological development that teachers are using, and although the use of virtual environments stands out, in some cases, it does not meet all expectations (Rashid et al.,2021; Martín et al., 2021).

Blau et al., (2020) wonder if methodological changes are a blessing or a curse. The answer would be based on the perspective of both students and teachers. It is possible to affirm that both have developed new digital skills and are prepared for any learning change. Therefore, observing various studies on the subject, it is possible to highlight the importance of using the inverted classroom as a strategy through an innovative model such as the Flipped Class Room (FCR). This experience allowed many students to enhance their learning synchronously and asynchronously (Rehman & Fatima, 2021).

To maintain the continuity of educational processes, each educational institution in various countries chose to use new teaching methodologies through virtual platforms. Among which are the Teams platform in agreement with Microsoft Co. (Vivanco et al., 2020). Another reasonably practical platform used in times of pandemic is Google Classroom, very efficient for asynchronous classes, and the Zoom meeting platform for synchronous classes (Mellawaty, 2021). Also, a widely used platform was LMS Moodle, which allows organizing online learning, developing educational tasks, and evaluating the monitoring of student progress (Kerimbayev et al., 2020).

Based on the theory of connectivism and synchronous and asynchronous classes, the student needs other support tools. The platforms dedicated to searching for information sources through virtual library services stand out (Alenzuela & Kamilova, 2018).

How is the cooperative learning dimension conceived as a contemporary strategy?

Through a review of the literature on cooperative learning, the Scopus database showed a result of 148 articles, which included in its title “cooperative learning”, innovation in teaching practice, which generates students to be more aware of your responsibilities.

Learning is more meaningful when it is done cooperatively (Soria et al., 2019). In addition, any methodological strategy within a scenario based on research projects will give a favorable result in developing practical and mental abilities (Chen, 2021).

Bedregal et al. (2021) establish that cooperative learning organizes students into small groups that work together and coordinate. When working collectively, each working group member learns to help each other, developing transversal skills and social responsibility within them. An attractive model of this methodology is culturally receptive education in Sweden, where teachers serve newly arrived migrant students through cooperative learning (Zurita, 2020).

In addition to this review, it was also possible to examine the relationship between teacher strategies, processes, and collaboration results among students. It is the time where they interact and participate in activities that support their learning process. For example, various studies show how teachers focus on solving students' problems during cooperative learning (A. Van & Janssen, 2019).

Also, when students solve a collaborative task, they are committed to sharing ideas and participating in discussions. All those who make up a workgroup contribute cognitively, and when comprehension problems arise, they solve them immediately, otherwise, the cooperative process would be hampered (Anouschka Van et al., 2015).

The conceptual review of the cooperative learning methodology also discovers the great potential in higher education, establishing an adequate dynamic in the formation of groups, the role of the teacher, and autonomy

in the management of virtual learning. Likewise, it is essential to analyze the scenario of said learning, where there is the adaptive motivation of students and the regulation of emotions in the virtual classroom using technology (Järvenoja et al., 2020). This implies that there is a favorable and significant effect for the student through cooperative learning in the motivational, cognitive, individual, and group responsibility, interaction, and social ability aspects (Cecchini et al., 2020).

What improvements should be innovated in virtual environments on cooperative learning to achieve greater effectiveness?

The educational system in the country seeks to analyze the agents involved in the teaching-learning process from the perspective of the student and the teacher through the combination of various media platforms. Likewise, for an EVA strategy to be effective, it will depend on the type of population and its context because not everyone teaches in the best way, nor does everyone learn the same. The teacher must have a didactic, pedagogical, and ethical profile with planning activities that motivate self-learning.

The effectiveness of virtual learning environments is based on learning theories: cognitivism and constructivism. The student must dedicate himself to learning, obtain good marks of acquired knowledge, and build new understanding (Pérez et al., 2016).

Another perspective of the use of virtual environments and their diversity of learning methodologies is that, thanks to the review made of various research studies. It is important to note that individual online learning is not as effective and successful as it is collective or group. The results of the investigations show that when students actively virtually participate in cooperative activities, they can be more effective than when they only receive the materials and send their assignments; it would even be worse than working in person (Hiltz et al., 2019).

Finally, a learning strategy or method will be effective when the student is satisfied with what has been learned. He will be constantly motivated to use virtual platforms because he understands them. They become familiar with the virtual environment, as well as its tools to express their ideas freely and challenge the opinions of others (Shahbazi et al., 2021)

After reviewing studies on students' perception of the cooperative use of technology during the covid-19 pandemic, it was decided to highlight some results on the assessment of the tools that were considered helpful for teamwork in a school-cooperative work context (Hernández, 2021).

Table 1

Assessment of the technological tools that would be useful for teamwork

	NS/NC		Very low		Low		Medium		High		Very high		Medium	DT
	n	%	n	%	n	%	n	%	n	%	n	%		
Wikis	7.0	6.6	8.0	7.5	20.0	18.9	29.0	27.4	30.0	28.3	12.0	11.3	3.18	1.137
Social networks (Facebook, Google +, Twitter...)	2.0	1.9	5.0	4.7	16.0	15.1	27.0	25.5	25.0	23.6	31.0	29.2	3.59	1.204
Blogs	3.0	2.8	6.0	5.7	19.0	17.9	23.0	21.7	36.0	34.0	19.0	17.9	3.42	1.159
Videoconference / Audioconference	4.0	3.8	9.0	8.5	14.0	13.2	29.0	27.4	20.0	18.9	30.0	28.3	3.47	1.287
Collaborative concept maps.	6.0	5.7	7.0	6.6	8.0	7.5	33.0	31.1	26.0	24.5	26.0	24.5	3.56	1.166
Instant messaging (Google talk, Skype...)	2.0	1.9	1.0	0.9	2.0	1.9	10.0	9.4	25.0	23.6	66.0	62.3	4.47	0.824
Instant messaging through apps for mobiles and tablets (Whats app...)	1.0	0.9	2.0	1.9	1.0	0.9	4.0	3.8	22.0	20.8	76.0	71.7	4.61	0.778
Social bookmarks (Diigo, Delicious, Mr. Wong, etc.)	10.0	9.4	17.0	16.0	17.0	16.0	32.0	30.2	17.0	16.0	13.0	12,3	2.92	1.270

Source: self made

Given these results, it was possible to observe students' effort to use technology as a mediator of their learning despite the difficulties.

The author of the research emphasizes that what is redeemable in these results is that most students are satisfied with the videoconferencing system in the virtual context. However, it is also important to investigate those dissatisfied students to know their difficulties adapting to the design and what aspects they need to improve.

Another study done by the national council of scientific and technical research of Argentina showed the results of the application of an instrument to measure the use of technologies amid home confinement due to the Covid-19 pandemic (Expósito & Marsollier, 2020).

Table 2*Survey on technology used*

Tecnologías	Puntaje
a) Virtual platforms (Moodle®, Classroom®, etc.)	4.17
b) Virtual classroom General Directorate of Schools	2.66
c) Videoconferences (Zoom®, MeetHangouts®, etc.)	4.16
d) WhatsApp® groups	8.83
e) Online discussion forums	2.11
f) Social networks (Instagram®, Facebook®, etc.)	3.54
g) Elaboration of Blog or web pages with study content	2.24
h) Distribution of printed material	2.47

Source: self made

The highest frequency of use score was WhatsApp technology with 8.83 pts. Regarding the printed material (2.47 pts.), The teachers or an institutional person in charge took the documentation in paper format to the students' homes for them to work on. This situation occurred more in rural areas where there is no connectivity or where it is not accessible to students.

4. DISCUSSION

What aspects should be strengthened in the use of virtual environments that allow the student to achieve cooperative and innovative learning?

To affirm that a virtual environment will allow a tremendous pedagogical change in teachers and students at the higher level, it is required that students have a dynamic and interactive role through these virtual environments. In addition, a cooperative strategy should be considered, becoming producers and creators of content (Chong & Marcillo, 2020). Finally, the teacher must know and apply various thinking skills to adapt the technological tools to the chosen pedagogical approach.

The usefulness of virtual environments will imply that higher-level students identify in their virtual classroom a) virtual learning resources, b) virtual accompaniment by teachers, c) virtual collaboration as a didactic orientation, and d) the Competencies obtained after the virtual learning process. In addition, the effectiveness of these environments will depend on what type of expectation students have about a) the institution's quality, b) the student's expectation, and c) satisfaction with the teacher.

Therefore, it is essential to note that, due to the Covid 19 outbreak, there was an accelerated obligation to adjust or adapt to changes. New learning strategies began to be used, ensuring students' interest in learning their communication skills and interaction with their teachers and peers through project-based learning. A study allowed to compare the academic results and the perception of the students, making a parallel between the face-to-face modality with the virtuality in the development of their courses. The experiences of the students who created their virtual pages were observed to strengthen their learning, and the effect of these technological tools was evaluated through an online peer feedback system (Sevillano et al., 2021).

Given the results obtained, it was possible to know the acceptance of the students for being very effective in teamwork and the opportunity to provide feedback to their peers in a structured and dedicated environment. In addition, they concluded that this system benefits educational institutions since it permanently shows evidence of learning that also serves as a great help to teachers. Although this methodology later makes institutions dependent on computer-mediated technology, it is considered timely and essential in these times as a contemporary strategy.

The use of virtual environments brings multiple advantages to teaching and learning. Still, it is necessary to highlight some critical aspects, such as looking for or choosing virtual environments to construct knowledge accompanied by cooperative learning. One case was the study on the co-construction mechanism of online collaborative knowledge: Crowdsourcing Collaborative Learning Strategy (CCLS), a strategy designed for nursing students (Geng et al., 2021).

A review of the literature about the problems of studying at home during the pandemic showed results focused on six criteria: technological preparation, technological knowledge, financial, facilities, emotional, and domestic situations. The irruptions made by Covid 19 helped the effective incorporation of virtual environments. Digital tools stopped being just a complement to education and became unavoidable. This situation forced us to adapt to this modality, which was not very common in academic practice, both for teachers, students, and, of course, parents of the standard basic education level, who played an important role in accompanying students—their children.

A particular advantage of this learning modality is the diversity of technological tools used regarding cooperative learning, both for synchronous and asynchronous classes. On the other hand, there may be some limitations such as connectivity problems, the use only of cell phones with little memory capacity for online applications,

the imposition of the traditional model, etc. Indeed, all these challenges imply responses to adapt to changes, to collective work with other people from the entire educational community.

Indeed, the present study's analysis has led us to compare the events and measures also taken by other countries in the educational field in the face of a public health emergency. Similar research showed that in many countries, they chose to resort to virtual classes in order not to miss the school year. In addition, various technological resources were enabled, such as WhatsApp, videoconferences, etc. Similarly, in higher education, there were learning difficulties, especially in technical careers where the use of virtuality is not possible (Britez, 2020).

5. CONCLUSIONS

Virtual environments in education are based on the development of skills achieved by students through various technological resources, which each teacher implements in their teaching methodology.

It is possible to understand what cooperative learning means virtually to the organization and socialization of homogeneous and heterogeneous teams. Through planning, the members assume work roles to obtain optimal results.

Understanding teamwork is not always easy if the objective is not clear. It requires a good organization of the work to be done, establishing good communication and interaction, having a disposition of responsibility, and above all build good relationships between all team members, allowing individual and group cognitive development.

The new methodological strategies based on virtual environments help to improve communication and interaction between the student and the teacher. With these technological means, the barrier of shyness is overcome, and sometimes achievements are obtained that could not be achieved in face-to-face classes.

The literature review has confirmed the need to adapt to a new innovative learning methodology with a positive impact, which allows contributing effectively using virtual environments throughout the learning process. Although this learning methodology differs from face-to-face and with some disadvantages, especially in rural areas, it can be said that it will continue to be a modality as a positive response to an educational emergency.

For this reason, it is necessary to continue addressing with better proposals that serve the various academic levels of the country with new learning strategies and the implementation of various technological resources.

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