Revista Iberoamericana para la Investigación y el Desarrollo Educativo
ISSN 2007 - 7467

https://doi.org/10.23913/ride.v14i28.1821

Scientific articles

Percepción de los alumnos sobre el uso de Padlet en la licenciatura de Geografía considerando el algoritmo deep learning

Students' perception of the use of Padlet in the Geography Degree considering the Deep Learning Algorithm

Percepção dos alunos sobre o uso do Padlet na licenciatura em Geografia considerando o algoritmo de aprendizagem profunda

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Resumen

Actualmente, los muros virtuales están revolucionando la forma de organizar las actividades escolares. Algunos, como Padlet, son herramientas de comunicación ideales para el campo de educativo, ya que permiten compartir diversos recursos didácticos en tiempo real. Por tanto, el objetivo de este trabajo fue analizar el uso del muro virtual Padlet para promover el entusiasmo, el proceso de enseñanza-aprendizaje, la motivación y la satisfacción empleando el algoritmo *deep learning*. Para ello, la muestra estuvo conformada por 29 estudiantes de la asignatura Bases Metodológicas de la Investigación Geográfica. Aquí mostramos que la difusión de recursos e información en Padlet afecta positivamente el proceso de enseñanza-aprendizaje, la motivación, la satisfacción y el entusiasmo. Por eso, se puede afirmar que el muro virtual Padlet es una herramienta tecnológica que los educadores pueden emplear para transformar las actividades escolares y fomentar el rol activo a través de la difusión de los contenidos escolares. Asimismo, este estudio mixto recomienda que las universidades junto con los profesores utilicen los avances tecnológicos como el Padlet para crear y diseñar espacios virtuales de enseñanza-aprendizaje. En conclusión, Padlet facilita la organización e

implementación de nuevas actividades escolares donde el estudiante se convierte en el principal actor del proceso educativo.

Palabras clave: aprendizaje, docencia, educación, tecnología de la comunicación, tecnología educacional.

Abstract

Currently, virtual walls are revolutionizing the way school activities are organized. Virtual walls like Padlet are ideal communication tools for the educational field. In fact, this virtual wall allows sharing various teaching resources in real time. The objective is to analyze the use of the Padlet virtual wall for the enthusiasm, teaching-learning process, motivation, and satisfaction considering the Deep Learning algorithm. The sample is made up of 29 students of the Methodological Bases of Geographic Research course. Here we show that disseminating resources and information on Padlet positively affects the process of teaching-learning, motivation, satisfaction, and enthusiasm. The Padlet virtual wall is a technological tool that educators can use to transform school activities and encourage an active role through the dissemination of school content. This mixed method study suggests that universities together with teachers use technological advances such as Padlet to create and design virtual teaching-learning spaces. In conclusion, Padlet facilitates the organization and implementation of new school activities where the student becomes the main actor in the educational process.

Keywords: education, educational technology, information technology, learning, teaching profession.

Resumo

Atualmente, as paredes virtuais estão revolucionando a forma como as atividades escolares são organizadas. Alguns, como o Padlet, são ferramentas de comunicação ideais para a área educacional, pois permitem o compartilhamento de diversos recursos didáticos em tempo real. Portanto, o objetivo deste trabalho foi analisar a utilização do muro virtual Padlet para promover o entusiasmo, o processo de ensino-aprendizagem, a motivação e a satisfação utilizando o algoritmo de aprendizagem profunda. Para isso, a amostra foi composta por 29 alunos da disciplina Bases Metodológicas da Pesquisa Geográfica. Aqui mostramos que a divulgação de recursos e informações no Padlet afeta positivamente o processo de ensino-

aprendizagem, a motivação, a satisfação e o entusiasmo. Portanto, pode-se afirmar que o mural virtual Padlet é uma ferramenta tecnológica que os educadores podem utilizar para transformar as atividades escolares e estimular o papel ativo por meio da divulgação dos conteúdos escolares. Da mesma forma, este estudo misto recomenda que as universidades, juntamente com os professores, utilizem avanços tecnológicos como o Padlet para criar e projetar espaços virtuais de ensino-aprendizagem. Concluindo, o Padlet facilita a organização e implementação de novas atividades escolares onde o aluno se torna o ator principal do processo educativo.

Palavras-chave: aprendizagem, ensino, educação, tecnologia da comunicação, tecnologia educacional.

Reception date: September 2023 **Acceptance Date:** February 2024

Introduction

Currently, educators are taking advantage of technological advances to innovate in their courses, whether in face-to-face or distance modalities (Camps-Ortueta *et al*., 2023; Colaco and Antao, 2023; Kadioglu-Akbulut *et al.*, 2023; Kosmas and Zaphiris, 2023). One of these resources are virtual walls, which represent a technological alternative that can be implemented in any educational modality (Khamcharoen *et al*., 2022).

Indeed, virtual walls are transforming the organization of school activities because they facilitate the dissemination of course content at any time (Arouri *et al*., 2023; Khamcharoen *et al*., 2022; Ozdemir, 2021), as is the case with Padlet, which allows sharing videos, web links, images and comments between students and teachers (Arouri *et al*., 2023; Ozdemir, 2021).

Thanks to the use of this tool, students actively participate in school activities through virtual walls, since they can access various teaching resources from anywhere (Atan and Kocasarac, 2022; Atesli and Yildiz, 2022) using smartphones (Arouri *et al*., 2023), which facilitates access to course information in an easy, convenient, and simple way (Kharis *et al*., 2020).

The benefits associated with educational virtual walls include motivation, active student role, personalized learning, collaborative work, space flexibility, and student autonomy (Arouri *et al*., 2023; Khamcharoen *et al*., 2022; Salas-Rueda *et al*., 2022), hence several authors (for example, Arouri *et al*., 2023; Atesli and Yildiz, 2022; Khamcharoen *et*

al., 2022; Kharis *et al*., 2020; Ozdemir, 2021; Salas-Rueda *et al*., 2022) have used virtual walls to improve educational activities in different courses.

For example, Kharis *et al*. (2020) used Padlet in a foreign language course with the purpose of facilitating learning and developing writing skills in German. Similarly, Arouri *et al*. (2023) noted that integrating the Padlet virtual wall into a research methods course created a virtual teaching-learning environment that excited students. Likewise, at a university in Qatar, the use of the Padlet virtual wall promoted the development of critical thinking through collaboration and the expression of opinions (Arouri *et al*., 2023).

On the other hand, Khamcharoen *et al*. (2022) used Padlet to teach basic concepts about computers, viruses, and the operation of digital devices. Furthermore, students used this virtual wall to present assignments by disseminating images, comments, audios, and videos about the functions and benefits of computers (Khamcharoen *et al*., 2022).

Similarly, in the Faculty of Psychology, students played a main role and actively participated in the Clinical Method subject using tools such as Zoom, Moodle, audios and Padlet (Salas-Rueda *et al*., 2022). In fact, the use of the Padlet virtual wall had a positive impact on the assimilation of knowledge about clinical psychology and on the motivation of students (Salas-Rueda *et al*., 2022). In short, this resource is transforming the communication and interaction between teachers and students by allowing the consultation of various teaching resources, such as videos, images, audios, and infographics (Arouri *et al*., 2023; Khamcharoen *et al*., 2022).

The research aim is to analyze the use of the Padlet virtual wall in terms of enthusiasm, teaching-learning process, motivation and satisfaction, considering the *deep learning algorithm*. The study thus has two main research questions:

- How does disseminating resources and information on Padlet influence enthusiasm, the teaching-learning process, motivation, and satisfaction considering the *deep learning algorithm*?
- What is the opinion of Bachelor of Geography students about the use of the Padlet virtual wall?

Materials and methods

The objectives of this mixed method study are:

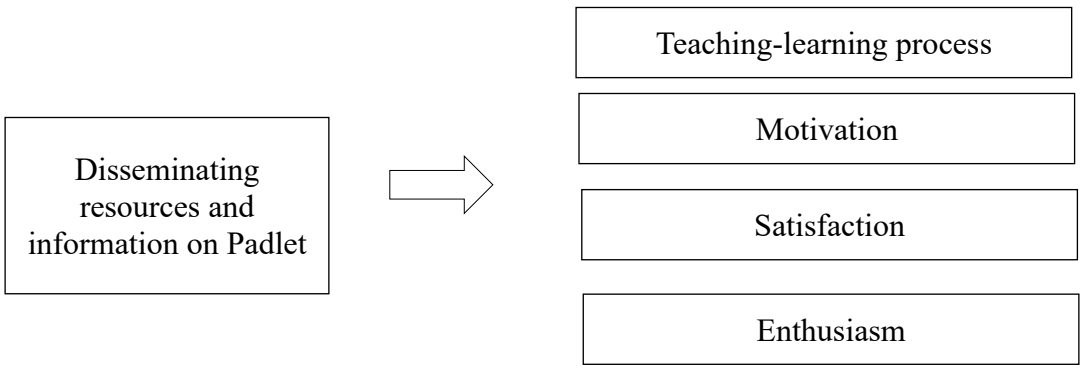
1. To analyze the students' perception of their use of the Padlet virtual wall in the subject *Methodological Bases of Geographical Research* in terms of enthusiasm, teaching-learning process, motivation, and satisfaction, considering the *deep learning algorithm*.
2. To analyze the Bachelor of Geography students' opinion about this virtual wall.

The study participants included 29 students who attended the subject *Methodological Bases of Geographic Research* at the National Autonomous University of Mexico during the 2023 academic year.

Procedure

Figure 1 shows the variables used in this mixed method study to analyze the perceptions of Bachelor of Geography students regarding the use of the Padlet virtual wall in the educational field. The independent variable was *disseminating resources and information on Padlet*, while the independent variables were *teaching-learning process*, *motivation*, *satisfaction,* and *enthusiasm.*

Figure 1. Model on the use of Padlet in the Bachelor of Geography



Source: own work

Hence, the research hypotheses were:

- Hypothesis 1: Disseminating resources and information on Padlet positively affects the teaching-learning process.

- Hypothesis 2: Disseminating resources and information on Padlet positively affects motivation.
- Hypothesis 3: Disseminating resources and information on Padlet positively affects satisfaction.
- Hypothesis 4: Disseminating resources and information on Padlet positively affects enthusiasm.

Data collection

Data collection was carried out at the National Autonomous University of Mexico (Mexico City), during the 2023 school year. Table 1 presents the questionnaire on the use of the Padlet virtual wall in the educational field.

Table 1. Questionnaire Items

No.	Research variables	Dimension	Question	Questionnaire response	n	%
1	virtual wall	Disseminating resources and information	1. Disseminating resources and information on Padlet facilitates participation			
				A great deal (1)	10	34.48%
				Considerably (2)	17	58.62%
				Moderately (3)	1	3.45%
				Slightly (4)	1	3.45%
		Teaching-learning process	Padlet virtual wall facilitates the teaching-learning process			
				A great deal (1)	4	13.79%
				Considerably (2)	21	72.41%
				Moderately (3)	4	13.79%
				Slightly (4)	0	0.00%
		Motivation	Padlet virtual wall increases motivation			
				A great deal (1)	6	20.69%
				Considerably (2)	14	48.28%
				Moderately (3)	9	31.03%
				Slightly (4)	0	0.00%
		Satisfaction	Padlet virtual wall increases satisfaction			
				A great deal (1)	6	20.69%
				Considerably (2)	17	58.62%
				Moderately (3)	6	20.69%
				Slightly (4)	0	0.00%
		Enthusiasm	Padlet virtual wall increases enthusiasm			
				A great deal (1)	6	20.69%
				Considerably (2)	15	51.72%
				Moderately (3)	8	27.59%
				Slightly (4)	0	0.00%
2	Opinion	Use	6. What is your opinion on the use of the Padlet virtual wall?	Open	-	-

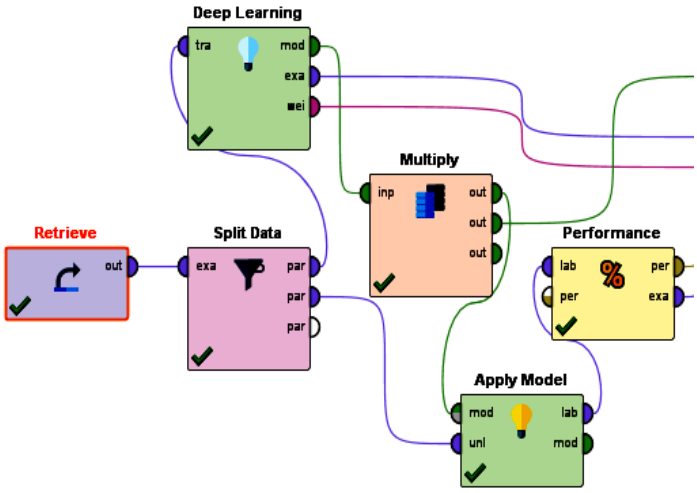
Source: own work

Analysis of data

Rapidminer tool and Word Cloud application were used to analyze the use of the Padlet virtual wall in terms of enthusiasm, the teaching-learning process, the motivation, and satisfaction.

Figure 2 shows the components of the Rapidminer tool to calculate the *deep learning algorithm*. In this study, 40%, 50% and 60% of the sample (training section) allowed the linear regression to be identified, while the evaluation section determined the squared error of the linear functions.

Figure 2. *deep learning* algorithm



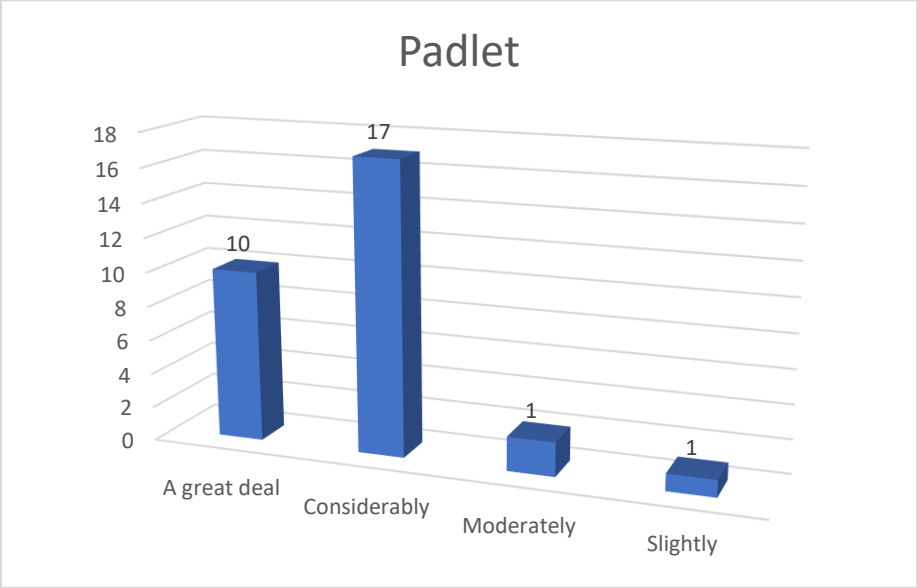
Source: own work through Rapidminer

Likewise, the Word Cloud application was used in this work to analyze the use of the Padlet virtual wall in the subject *Methodological Bases of Geographic Research*.

Results

Disseminating resources and information on Padlet facilitates the participation a great deal (n = 10, 34.48 %), considerably (n = 17, 58.62 %), moderately (n = 1, 3.45 %) and slightly (n = 1, 3.45 %) (Figure 3).

Figure 3. Resources and information on Padlet



Source: own work

Table 2 presents the results obtained from the *deep learning algorithm*. Disseminating resources and information on Padlet positively affects the enthusiasm, the teaching-learning process, the motivation, and the satisfaction.

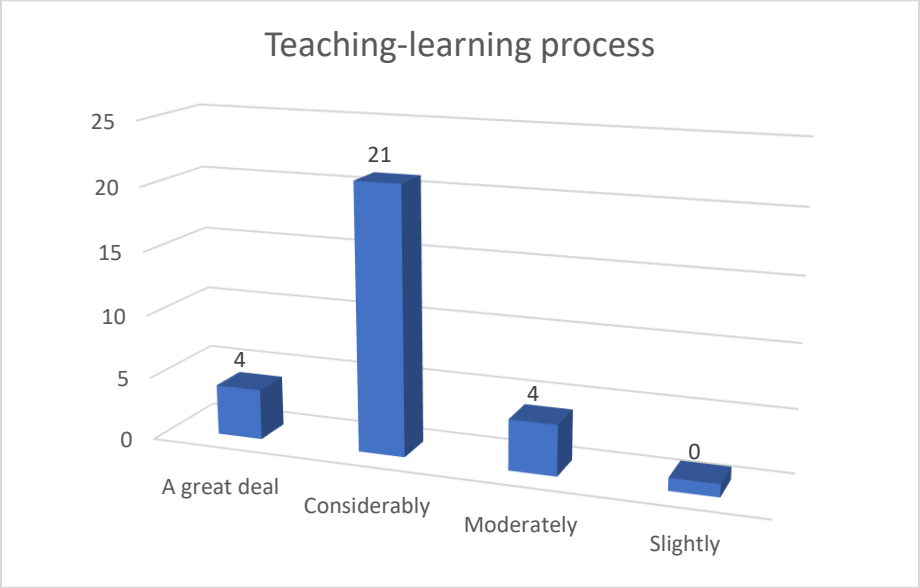
Table 2. Results of the *deep learning algorithm*

Hypothesis	Training	Function	p value	Result	Squared error
H1	40%	y = 0.291x + 1.523	0.000	Accepted	0.202
	fifty%	y = 0.155x + 1.734	0.000	Accepted	0.161
	60%	y = 0.152x + 1.667	0.000	Accepted	0.200
H2	40%	y = 0.289x + 1.598	0.000	Accepted	0.281
	fifty%	y = 0.389x + 1.303	0.000	Accepted	0.419
	60%	y = 0.041x + 1.987	0.000	Accepted	0.374
H3	40%	y = 0.076x + 1.897	0.000	Accepted	0.313
	fifty%	y = 0.048x + 1.798	0.000	Accepted	0.419
	60%	y = 0.059x + 1.643	0.000	Accepted	0.505
H4	40%	y = 0.220x + 1.659	0.000	Accepted	0.626
	fifty%	y = 0.181x + 1.582	0.000	Accepted	0.446
	60%	y = 0.131x + 1.683	0.000	Accepted	0.538

Source: own work

The Padlet virtual wall facilitates the teaching-learning process a great deal (n = 4, 13.79%), considerably (n = 21, 72.41%) and moderately (n = 4, 13.79%) (Figure 4).

Figure 4. Teaching-learning process through Padlet



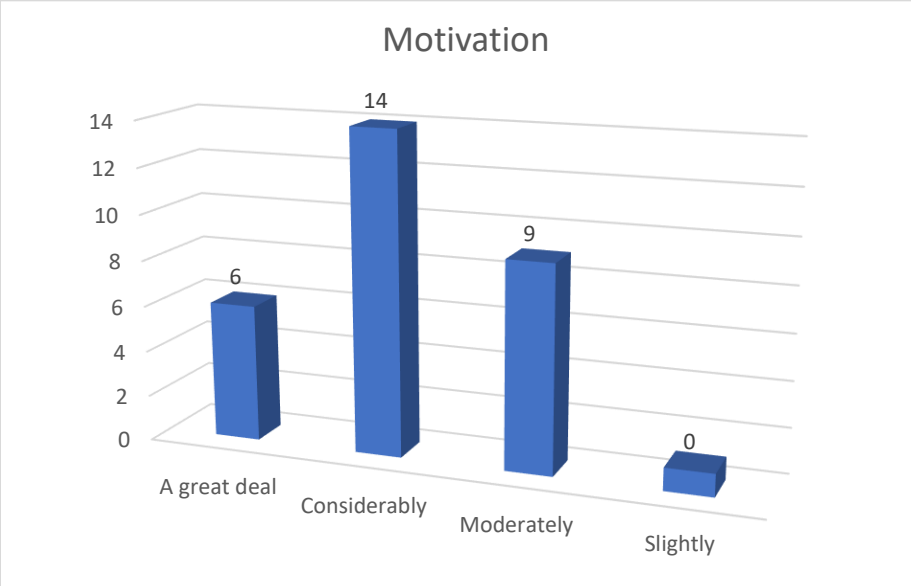
Source: own work

The results of Hypothesis 1 with the 40% (0.291, squared error = 0.2025), 50% (0.155, squared error = 0.161) and 60% (0.152, squared error = 0.200) of the sample show that disseminating resources and information on Padlet positively affects the teaching-learning process.

The *deep learning algorithm* identified that the function y = 0.155x + 1.734 has the smallest squared error at 0.161. Consequently, this linear function allows predicting the teaching-learning process.

Likewise, the Padlet virtual wall increases motivation a great deal (n = 6, 20.69%), considerably (n = 14, 48.28%) and moderately (n = 9, 31.03%) (Figure 5).

Figure 5. Motivation through Padlet



Source: own work

The results of Hypothesis 2 with 40% (0.289, squared error = 0.281), 50% (0.389, squared error = 0.419) and 60% (0.041, squared error = 0.374) of the sample indicate that disseminating resources and information on Padlet positively affects student motivation.

The *deep learning algorithm* identified that the function y = 0.289x + 1.598 has the smallest squared error with 0.281. Consequently, this linear function makes it possible to predict motivation. The Padlet virtual wall increases satisfaction a great deal (n = 6, 20.69%), considerably (n = 17, 58.62%), and moderately (n = 6, 20.69%) (Figure 6).

Figure 6. Satisfaction through Padlet

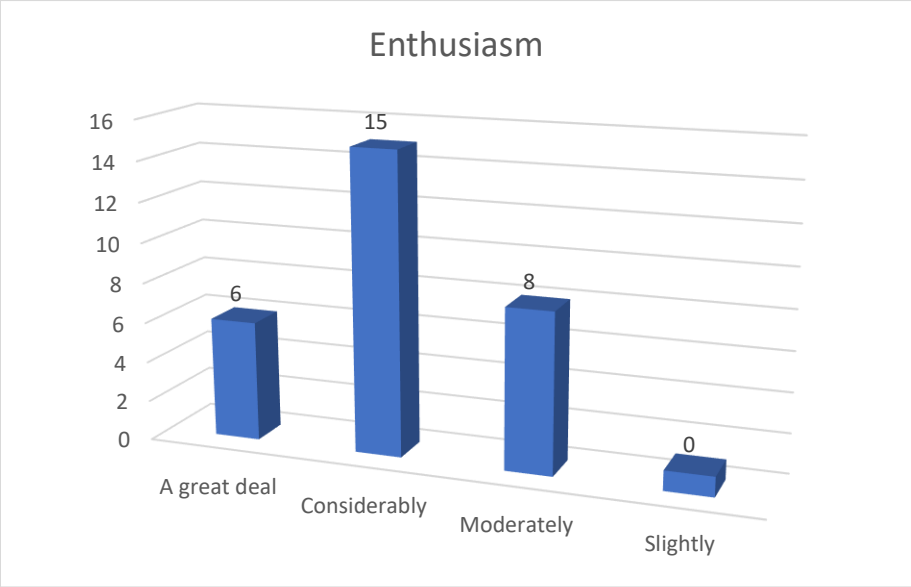
Source: own work

The results of hypothesis 3 with 40% (0.076, squared error = 0.313), 50% (0.048, squared error = 0.419) and 60% (0.059, squared error = 0.505) of the sample indicate that disseminating resources and information on Padlet positively affects student satisfaction.

The *deep learning algorithm* identified that the function y = 0.076x + 1.897 has the smallest squared error with 0.313. Consequently, this linear function allows predicting satisfaction.

The Padlet virtual wall increases enthusiasm a great deal (n = 6, 20.69%), considerably (n = 15, 51.72%), and moderately (n = 8, 27.59%) (Figure 7).

Figure 7. Enthusiasm through Padlet



Source: own work

The results of Hypothesis 4 with 40% (0.220, squared error = 0.626), 50% (0.181, squared error = 0.446) and 60% (0.131, squared error = 0.538) of the sample indicate that disseminating resources and information on Padlet positively affects student enthusiasm.

The *deep learning algorithm* identified that the function y = 0.181x + 1.582 has the smallest squared error with 0.446. Consequently, this linear function allows predicting satisfaction.

Student perception

According to the students of Bachelor of Geography, the Padlet virtual wall facilitates the dissemination and consultation of information. These are some of their opinions:

"It seems like an efficient way to share work" (student 1).

"It is a very useful tool, also to see the work of others" (student 19).

Respondents even mention that the Padlet virtual wall allows them to create useful and interesting spaces.

"It's useful" (student 2).

"I find it quite interesting and a very useful tool for teaching-learning among classmates" (student 11).

The Padlet virtual wall encourages creativity among participants of pedagogic processes.

"It's a very creative system" (student 3).

"It makes participation and creativity a lot easier" (student 7).

In the subject *Methodological Bases of Geographic Research*, the incorporation of the Padlet virtual wall promoted fun activities.

"A very fun learning dynamic" (student 18).

"For me it's pretty good, it's very educational" (student 22).

Lastly, the Padlet virtual wall encouraged participation and the interaction student-educator.

"It's a very useful tool to encourage participation" (student 21).

"It's interesting because all students can interact" (student 23).

Figure 8 shows a word cloud regarding the Padlet virtual wall, i.e., interesting (n = 7), tool (n = 5), more (n = 4), good (n = 3), didactic (n = 3), a lot (n = 3), platform (n =3) and useful (n =3).

Figure 8. Word cloud elements

Note: "interesante": interesting, "más": more, "plataforma": platform, "todos": everyone, "didáctico": didactic, "herramienta": tool, "buena": good, "útil": useful, "mucho": a lot (or considerably), "participación": participation, "trabajos": work, "compartir": share, "eficiente": efficient, "fácil": easy, "creativo": creative, "interactuar": to interact, "alumnos": students, "dinámica": dynamic.

Source: own work

Discussion

Technological development and educational strategies are changing the organization of courses (Mora- Vicarioli *et al.*, 2023; Puga-Peña *et al.*, 2023; Salas-Díaz and González-Bello, 2023; Zárate- Moedano *et al.*, 2023). According to Arouri *et al.* (2023), virtual walls allow educators to build virtual spaces intended for teaching. In this case, the Padlet virtual wall simplified dissemination and consultation of information for the *Methodological Bases of Geographic Research* subject.

Similarly, Kharis *et al.* (2020) explain that virtual walls promote learning and skill development. In the Bachelor of Geography, 93.10% of the participants express that disseminating resources and information on Padlet greatly facilitates participation. In fact, most participants have a positive comment related to this virtual wall.

Arouri *et al.* (2023) mention that posts on Padlet's virtual wall promote critical thinking and collaboration during the educational process. UNAM students even mention that the professor used the Padlet virtual wall to arrange useful and interesting environments.

86.21% of the participants consider that the Padlet virtual wall greatly simplify the teaching-learning process. In hypothesis 1, the results are greater than 0.152, with a value $p < 0.000$, therefore, disseminating resources and information on Padlet positively affects the teaching-learning process.

Likewise, the function $y = 0.155x + 1.734$ presents the smallest squared error, which allows predicting the teaching-learning process considering the use of the Padlet virtual wall. As mentioned by Khamcharoen *et al.* (2022), virtual walls allow students to share images, comments, audios and videos of the course on the internet. According to the Bachelor of Geography students, Padlet virtual wall encouraged creativity during the educational process.

68.97% of the participants think that the Padlet virtual wall increases motivation. In hypothesis 2, the results are higher than 0.040, with a $p < 0.000$ value, therefore, disseminating resources and information on Padlet positively affects motivation. The function $y = 0.289x + 1.598$ presents the smallest squared error, which allows to predict motivation when using the Padlet virtual wall.

Khamcharoen *et al.* (2022) explain that the Padlet virtual wall is an ideal means of communication for the education field. This technology tool caused fun and entertaining activities in the course of *Methodological Bases of Geographic Research*.

79.31 % of the participants mention that the Padlet virtual wall increases satisfaction *a great deal* and *considerably*. The results of hypothesis 3 are higher than 0.040, with a $p < 0.000$ value, therefore, disseminating resources and information on Padlet positively affects students' satisfaction. The function $y = 0.076x + 1.897$ presents the smallest squared error, which allows predicting satisfaction when using the Padlet virtual wall.

Arouri *et al.* (2023) point out that virtual walls are technology tools that increase students' enthusiasm. At UNAM, using the Padlet virtual wall encouraged participation and interaction.

In this work, 72.41% of the participants mention that the Padlet virtual wall increases enthusiasm *a great deal* and *considerably*. In hypothesis 4, the results are higher than 0.130, with a $p < 0.000$ value, therefore, disseminating resources and information on Padlet positively affects students' enthusiasm. Also, the function $y = 0.181x + 1.582$ presents the smallest squared error, which allows predicting satisfaction considering the use of the Padlet virtual wall.

In fact, the use of the Padlet virtual wall along with other technology tools such as Zoom, Moodle and audios facilitates the assimilation of knowledge and the interaction between students and educator (Salas-Rueda *et al.*, 2022).

Finally, Padlet is a virtual wall capable of transforming the functions of the participants through the dissemination of information and multimedia resources.

Conclusions

Virtual walls represent a technological alternative to transform the teaching-learning process. Results indicate that disseminating resources and information in the Padlet positively affects enthusiasm, the teaching-learning process, motivation, and satisfaction.

In the specific case of the *Methodological Bases of Geographic Research* subject, Padlet transformed the functions and roles of students and professor, since it encouraged participation and interaction between participants in the educational process through of entertaining activities.

The Padlet virtual wall, therefore, is a technology tool that educators can use to transform school activities and encourage an active role through the dissemination of school content.

Consequently, this mixed method study suggests that universities, alongside teachers, use innovative technological tools such as Padlet to create and design virtual teaching-learning spaces, since it facilitates the organization and implementation of new school activities where the student becomes the main actor of the educational process.

Future lines of research

Future research could analyze the incorporation of the Padlet virtual wall in various educational institutions such as junior high schools, high schools, colleges, and universities.

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