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The Jamboard tool in the improvement of university virtual exhibits

La herramienta Jamboard en la mejora de las exposiciones virtuales universitarias

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ABSTRACT

The purpose of the study was to evaluate the use of the virtual whiteboard Jamboard in virtual expositions with university students. The research was carried out through a pre-experimental study with a pre-test and post-test design in a sample of 102 students from the National University of the Peruvian Amazon. The techniques and instruments used in the research were the survey, the questionnaire, and direct observation with a data collection protocol. The most relevant results in the evaluation of the virtual expositions without the use of Jamboard were a low percentage of students who did a good job, while when using Jamboard as a strategy, this percentage increased considerably. The study led to the conclusion that the use of Jamboard as a tool to improve presentations in the university context is an indicator of quality in the execution of virtual presentations and contributes to their improvement.

Keywords: communication, group communication, information technology, educational technology.

JEL Classification: I21; I28

RESUMEN

El estudio tuvo como finalidad poder evaluar el uso de la pizarra virtual Jamboard en las exposiciones virtuales con estudiantes universitarios. La investigación se ejecutó mediante un estudio pre-experimental con diseño de pre-test y post-test, en una muestra de 102 estudiantes de la Universidad Nacional de la Amazonia Peruana. Las técnicas e instrumentos utilizados en la investigación fueron la encuesta, el cuestionario y la observación directa con un protocolo de recabado de datos. Los resultados más relevantes, en la evaluación de las exposiciones virtuales sin el uso de Jamboard, fue un bajo porcentaje de estudiantes que hizo un trabajo calificado como bueno, mientras que al aplicar el empleo del Jamboard como estrategia, este porcentaje subió considerablemente. El estudio permitió concluir que el uso del Jamboard como instrumento para perfeccionar las presentaciones en el contexto universitario es un indicador de calidad en la ejecución de las exposiciones virtuales y contribuye a la mejora de las estas.

Palabras clave: comunicación, comunicación en grupo, tecnología de la información, tecnología educacional.

Clasificación JEL: I21; I28

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INTRODUCTION

Currently, university students try as much as possible to avoid having academic and personal problems, but they usually end up involved in one way or another in various situations where their professional training is somehow affected (Maqableh & Alia, 2021; Sheldon et al., 2021). Among the set of related causes are the quality of the Peruvian educational system; the updating of subjects and curriculum; the infrastructure and materials that the educational institution has to provide its students; the insufficient importance of human resources training, in this case, of the teaching staff (Arrieta & Avolio, 2020; Kirby et al., 2020; Ríos et al., 2021).

However, the authors' experience suggests that students do not always adequately value the strategies that teachers use in their classes; it is also noted that there are teachers in the context studied who teach their classes in a traditional

manner. Although it cannot be said that they are "bad" teachers, it can be asserted that their methods are no longer adequate and that there are new technological tools that allow for better academic results (Alvarez-Risco et al., 2022; Arias & Mejía, 2021; Cavalcanti-Bandos et al., 2021; et al., 2023).

From the perspective of the 21st century teacher, it can be taken into account that younger teachers, i.e., those who in recent years have started their careers in the teaching sector, are usually the ones who are most concerned about trying to apply these new computer technologies to their classroom sessions (Castéra et al., 2020; Rubach & Lazarides, 2021; Starkey, 2020). According to the studies reviewed, they seek a more motivating way in their work as trainers of future integral men and women to achieve, in this way, an improvement in the levels of academic performance and personal development (Akram et al., 2021; Hämäläinen et al., 2021).

Although the literature gives great importance to the achievement of highly motivated students in the study of their subjects, educational diagnostics show that this is not always the case in the vast majority of contexts (Ajjawi et al., 2020; et al., 2020). In this regard, students would be expected to arrive with sufficient motivation to make the teaching-learning process effective, but dropout and school failure numbers tend to rise (Abdelrahman, 2020; Aina et al., 2022; De Oliveira et al., 2021).

Therefore, it is necessary to establish all possible aids for students to succeed in their studies and to complete their studies in the time foreseen in the curriculum. In this sense, it is of vital importance the creative and attractive work of the teaching staff, hence a great effort is required to achieve it. Today, there are many pedagogical tools designed for such purposes, which help students feel attracted to the subjects taught by the teacher. In that order, it is the teacher's job to properly select the tool that best fits his work and his objectives or goals.

Therefore, educational research is of utmost importance in order to test these pedagogical tools (Bruggeman et al., 2021; Szymkowiak et al., 2021). Thus, it is appropriate to validate a new study strategy that not only improves the development of the class but also attracts the student's attention so that he/she learns more simply and naturally, with all the essentials that this exercise entails. This approach is consolidated if we take into account that in public universities, the resources for these types of activities are very scarce, so it is necessary to look at all the educational computer tools that are free and feasible to use.

At the National University of the Peruvian Amazon, this situation occurs to some extent since the level of knowledge in terms of computer tools that teachers have in this institution has been diagnosed as a weakness. This is why, despite the constant training that the Senior Management has implemented, many teachers use ICTs to a minimum to develop their subjects. According to the experience of the researchers, the use is limited to working with word processors and slides for presentations, a shortcoming highlighted due to the fact that students -almost all of them- handle them very naturally.

Therefore, it is seen as an important need to recommend the use of viable strategies to improve the use of this type of modern tools, in this case, to improve remote work using the virtual whiteboard, which is very versatile for teaching use (Livy et al., 2022; McComb et al., 2022; Sullivan, 2022). This tool makes it possible to improve virtual classes because, although work is already done face-to-face, this does not imply giving up virtual activities; a fact endorsed by the relevance of blended learning models and distance work (Ayob et al., 2023; Truss & Anderson, 2023; Yang et al., 2023). In this case, both are understood as a way to facilitate education when it is not possible to reach face-to-face classrooms, especially in times when university students need these competencies to develop fully in society (Bizami et al., 2023; De Obesso et al., 2023; Podsiadlik, 2023).

In this regard, with the health emergency caused by COVID-19, great restrictions were imposed on the development of face-to-face classes, which showed that many universities and teachers were unprepared to face this emerging reality. As a strategy, quick trainings were offered to prepare teachers and adjust the technological means to develop virtual classes, which caused disparate results at the national and international level (Rosli and Saleh, 2023).

One of the alternatives explored was the use of virtual whiteboards, including Jamboard (Roman et al., 2022). This is a free tool that provides the Google© service to the entire educational community and allows virtuality not to be synonymous with presentations based only on slides. The Jamboard digital whiteboard is a component that can be used as a technological tool so that the teacher can develop his class almost in a natural way, where with the use of a computer he can write, figure, and draw what he wants to communicate to his students, making direct use of the screen. The experiences consulted suggest the usefulness of this resource since students will be able to visualize more easily what the teacher exposes and writes on screen, as well as its versatility for different modes of

use (Buck-Pavlick, 2022; Karlin et al., 2023; et al., 2023).

Virtual or digital whiteboards are online tools that allow the teacher to conduct their class remotely so they can include figures and enhance the experience with students. These virtual whiteboards are hosted in the cloud and it is feasible to design, save and share with students the information that is being worked synchronously (real time), just by having access to an email domain Gmail or institutional type G-Suite.

Similarly, these blackboards are platforms for the development of collaborative work, complemented with other tools, such as video calls and virtual classrooms (institutional platforms), because, due to their diversity of functions, it is effective in offering a variety of topics covered by the teacher. Likewise, this resource can be used from computers and on mobile devices or tablets, which highlights its flexibility and ease of use.

METHODOLOGY

The research was framed within a quantitative type of study since it sought, in the first instance, to describe reality using percentage results that reflected the behavior of variables that could be measured. Secondly, the study was experimental in scope since the use of the Jamboard was tested with a quasi-experimental design during classes with university students: to see what effect it had on their daily work, which denotes the intentional manipulation of the variables.

On the other hand, the design used for its execution was pre-experimental since the use of the Jamboard was applied with the purpose of studying the impact that could be reflected in the virtual exposures, but the degree of safety was limited by the non-randomness and the initial intra-group non-equivalence (Hernández Sampieri & Mendoza Torres, 2018). In order to collect the necessary information, a pretest-posttest design was employed with a single group.

As a population, all university students of the Professional School of Bromatology and Human Nutrition of the Faculty of Food Industries of the National University of the Peruvian Amazon, enrolled in semester II-2022, were identified as the population. For the execution of the design, the participation and consent of all the students was requested, so the sample was of the total possible (n=102) and we worked intentionally with 100% of the population.

For the development of the work and data collection, the survey and direct observation were used. The former was applied by employing a questionnaire to measure the students' perception of the work done with the Jamboard virtual whiteboard, and the latter using an observation sheet, where the work developed by the students in their virtual presentations could be evaluated.

These instruments were tested for validity and reliability; for the first one, by means of the expert judgment technique, which resulted in "Suitable for application". On the other hand, for the second, a pilot test was applied to 10 students in order to use Cronbach's Alpha reliability coefficient, which gave a result of 0.802, meaning "Excellent Reliability".

RESULTS

The main findings are presented below. For this purpose, they are represented in frequency tables and a synthesis of the assessments made is shared. Finally, the main results of the study are discussed.

Table 1 and Figure 1 show the perception of the students who were part of the sample about the use they can apply to the Jamboard virtual whiteboard in their class work, which allowed identifying that 70.6% of the students indicated that the interaction and collaboration of the application is "Good"; 22.7% of students that it is "Fair" and only 6.7% of them that it is "Deficient". On the other hand, regarding the pedagogical, technological and usability functions of the application, 65.5% of the students indicated that it is "Good"; 27.3% of the students that it is "Fair" and only 7.3% of the students that it is "Poor".

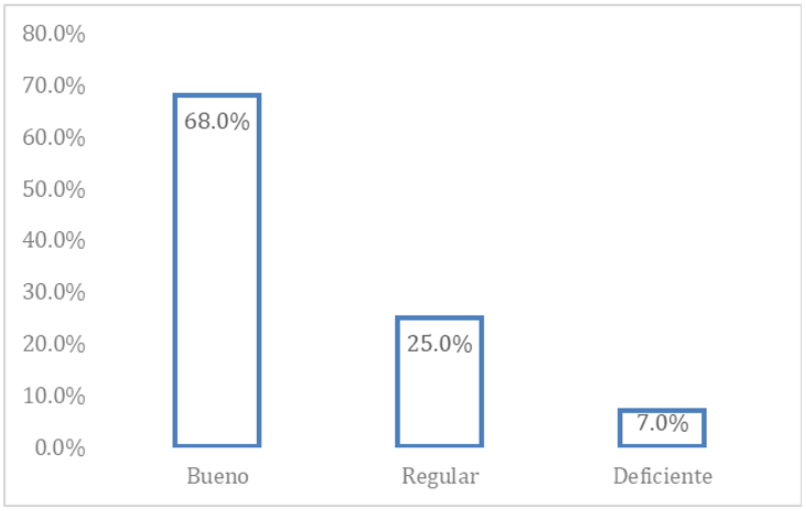
Table 2 and Figure 2 show the evaluation of the virtual presentations of the students who were part of the sample, where the work done virtually, without using the Jamboard, was appreciated; only the tools they knew up to that moment, that is, the slides and the video call. Therefore, the results -for the criterion regarding whether they have mastered the topic, explaining with coherence and examples, giving their own ideas, and providing additional information- were that 17.3% of the students had an "expected achievement", 74.3% of them were "in process" and 8.4% were "at the beginning".

Table 1.
Perception on the use of the Jamboard Virtual Whiteboard

The Jamboard virtual whiteboard and its features	Good		Regular		Deficient		Total	
	N	%	N	%	N	%	N	%
On the interaction and collaboration of the application.	72.0	70.6	23.2	22.7	6.8	6.7	102	100
On the pedagogical, technological and usability functions of the application.	66.8	65.5	27.8	27.3	7.4	7.3	102	100
AVERAGE	69.4	68.0	25.5	25.0	7.1	7.0	102	100

Source: own elaboration

Figure 1.
Perception of the use of the Jamboard Virtual Whiteboard



Source: own elaboration
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Table 2.
Achievement level of virtual exhibitions without using the virtual whiteboard Jamboard

Level of Achievement of the virtual exposures in the pre-test	Expected accomplishment		In process		At startup		Total	
	N	%	N	%	N	%	N	%
Has mastery of the subject matter, explaining with coherence and examples, giving own ideas and providing additional information, and applies good use of organization and structure.	17.6	17.3	75.8	74.3	8.6	8.4	102	100
He has the computer skills to be able to work with slides, present images, videos and audios, with a good control of the virtual platform, applying an efficient interaction and participation.	20.6	20.2	69.6	68.2	11.8	11.6	10.2	100
AVERAGE	19.1	18.7	72.7	71.3	10.2	10.0	102	100

Source: own elaboration

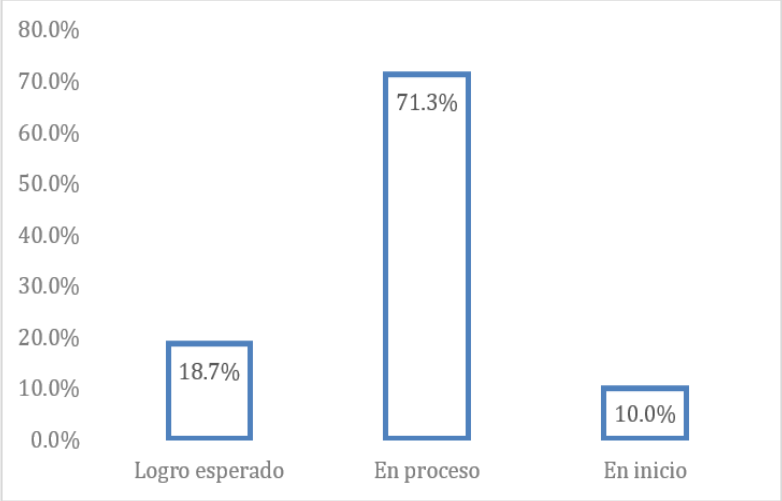
On the other hand, when evaluating their computer skills with the criterion of whether they have the computer knowledge to be able to work with slides, present images, videos, and audios, with a good control of the virtual platform, it was found that 20.2% of the students had an "expected achievement", 68.2% were "in process" and 11.6% were "at the beginning".

Table 3 and Figure 3 show the evaluation of the virtual presentations once they were trained in the use of the Jamboard tool, with which they were able to identify an application that they had not used before in their virtual

classes. When evaluated on whether they had mastery of the topic, explaining with coherence and examples, giving their own ideas and providing additional information, 79.0% of the students obtained an "expected achievement", 21.0% were "in process" and none were "at the beginning".

Figure 2.

Achievement level of virtual exhibitions without using the virtual whiteboard Jamboard



Source: own elaboration
Note: the figure appears in its original language

On the other hand, when evaluating their computer skills with the criterion of whether they have the computer knowledge to be able to work with slides, present images, videos, and audios, with a good control of the virtual platform, 76.3% obtained an "expected achievement", 23.7% of the students were "in process" and none of the students were "at the beginning".

Table 3.

Achievement level of virtual exhibits using the Jamboard virtual whiteboard

Achievement Level of virtual exposures in the post-test	Expected accomplishment		In process		At startup		Total	
	N	%	N	%	N	%	N	%
Has mastery of the subject matter, explaining with coherence and examples, giving own ideas and providing additional information, and applies good use of organization and structure.	80.6	79.0	21.4	21.0	0.0	0.0	102	100
He has the computer skills to be able to work with slides, present images, videos and audios, with a good control of the virtual platform, applying an efficient interaction and participation.	77.8	76.3	24.2	23.7	0.0	0.0	102	100
AVERAGE	79.2	77.6	22.8	22.4	0.0	0.0	102	100

Source: own elaboration

Table 4 and Figure 4 show the comparison of the pre-test and post-test evaluations, i.e., when the virtual presentations were first given without the use of the virtual whiteboard (only with what they knew up to that moment) and then when they used the Jamboard to optimize the virtual presentations, after training on the tool. This procedure yielded the following results: at first, 18.7% of the students had an "expected achievement", as compared to using the Jamboard. This figure rose to 77.6%, while, at first, the number of students who were "at the beginning" was 10.0% and, after the training, there were no students at this level.

Figure 3.

Achievement level of virtual exhibits using the Jamboard virtual whiteboard

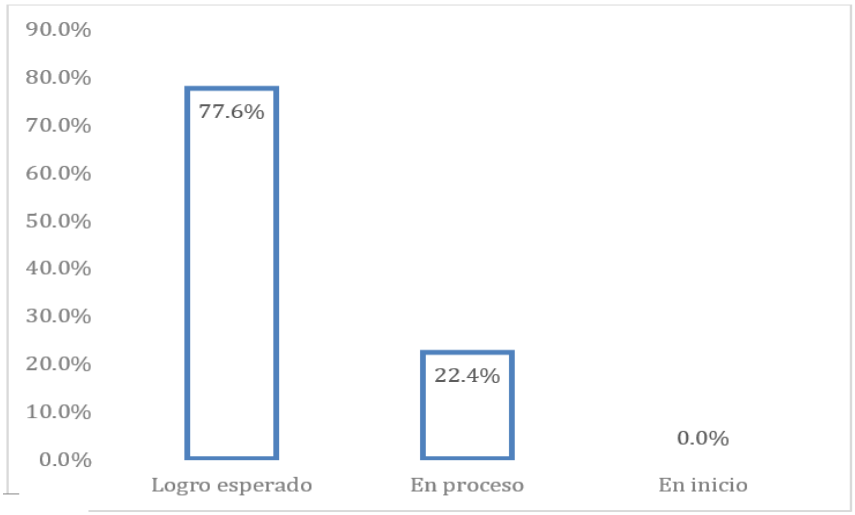


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Table 4.

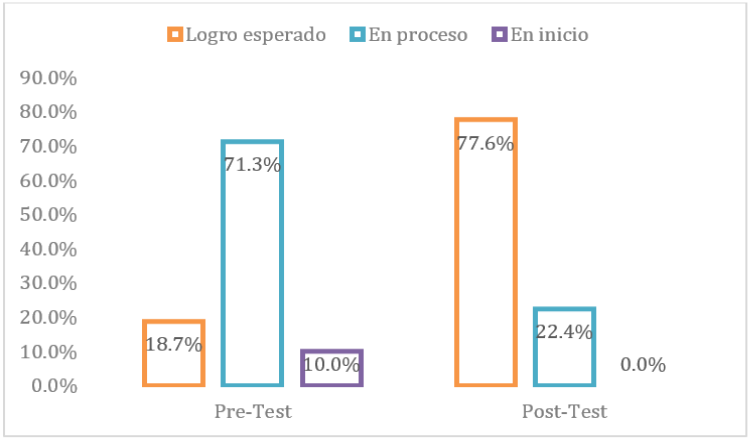
Comparison of evaluations in virtual exhibitions with and without the use of the Jamboard virtual whiteboard

	Virtual Expositions	
	Pre-Test	**Post-Test**
At startup	10.0 %	0.0 %
In process	71.3 %	22.4 %
Expected Achievement	18.7 %	77.6 %

Source: Own elaboration.

Figure 4.

Comparison of evaluations in virtual exhibitions with and without the use of the Jamboard virtual whiteboard



Source: own elaboration

Note: the figure appears in its original language

Consequently, analyzing the virtual exhibitions before the Jamboard virtual whiteboard training showed that only 18.7% of students achieved a qualitative evaluation of "A", as opposed to when analyzing the virtual exhibitions after the Jamboard virtual whiteboard training; a time when this value went up to 77.6%.

With the information collected on virtual exposures in university students, the normality test was performed; for this purpose, the Kolmogorov-Smirnov statistic was used since the sample was larger than 50 observation units, which determined that these distributions do not follow a normal distribution. Therefore, the hypothesis test for paired or related samples or Wilcoxon signed-rank test was determined, in order to contrast the hypothesis of the research using the SPSS package version 27, which gave a value of Z = -7.144 with a significance of 0.000; which indicates that with a significance level of 5%, there is a difference between the data and the virtual exposures

between the pre-test and post-test. Therefore, it can be affirmed with a 0 % level of error, that the application of the Jamboard virtual whiteboard has a positive impact on the virtual exposures of university students.

DISCUSSION

From the results obtained, it can be affirmed that the university students who were part of the sample, a total of 102, were able to manage very well with the Jamboard virtual whiteboard. The opinion expressed about this tool was very favorable, reaching a level of "good" in 68.0%. Regarding the interaction and collaboration of the application, a higher percentage was obtained in the perception of "good" (70.6%) and 65.5% on the pedagogical, technological, and usability functions of the application, which indicates that the Jamboard, when worked with students, is an effective tool for work within virtual exhibitions.

These results are due to several factors, such as high participation and interaction; fluid and effective collaboration; effective use of visual elements; constructive feedback, and relevant discussions. In addition, well-organized and structured information; easy access and wide availability; extensive use of functionalities; smooth and effective integration; intuitive and user-friendly interface; and, finally, optimal stability and performance of the tool were observed.

These results are similar to those reported by previous studies, which indicate that the interactive whiteboard is a tool that promotes learning in secondary school students (Alvarez et al., 2023) (Tan et al., 2022). On the other hand, it allows, due to its interactivity, the various topics discussed to be easily handled. Finally, it concludes that it is a resource that allows students to accelerate the teaching-learning processes (VanLangen et al., 2023).

The following evaluation indicators were taken into account in the virtual presentations: visual design; presentation structure; use of multimedia resources; verbal fluency and oral expression; presentation time; connection with the audience; questions and answers; use of interactive tools; constructive feedback and adaptation to the virtual audience. Thus, in relation to the level of achievement that students obtained in their virtual presentations in regular mode, using only slides and video calls, these were considered in a higher percentage as "achievement in progress", with 71.3%. This indicates that the students were doing them well but could be much better; another highlight is that only 18.7% had an evaluation of "expected achievement", with a remaining percentage of 10.0% that were "in beginning".

These data are comparable to those reported in the literature, specifically, in the occasions where it is noted that the use of interactive whiteboards improves the overall skills of students, especially in those who already have the ability to work without the tool (Figueroa and Shawgo, 2022). However, their performance aided on the Jamboard is much better and, therefore, the evaluations are also positively affected (Austin, 2022).

In addition, it was found that the level of achievement of the students once trained in the use of the virtual whiteboard Jamboard was as follows: 77.6% of the students obtained an "expected achievement", 22.4% were "in process" and, as a relevant fact, no student was at the level of "at the beginning". This indicates that, after having been trained and learned how to use the Jamboard tool, the students were much more fluent in developing their virtual presentations.

In this way, they were able to better apply their knowledge in the presentation and better conquer the subject matter. These results coincide with the findings of previous studies, which emphatically indicate that the application of digital whiteboards has a strong positive effect on the teaching-learning process of students. This is due to the fact that it promotes a special interest in learning and offers greater security or ease to make their ideas known when virtual classes are held; something that undoubtedly contributes to improving collaborative work.

CONCLUSIONS

There are virtual tools that can be used freely; that is, they are totally free so that they can be installed and used by the university system. In public universities, this is a great advantage for programs to improve the skills and abilities of their students.

The Jamboard virtual whiteboard, which is part of the Google® suite, is a free digital tool that students at the secondary level have rated as "good" for their higher educational development, in that it allows them to enhance their virtual exposures in a context where virtuality was very important for safeguarding health in times of pandemic. Before the students used the Jamboard virtual whiteboard in their virtual presentations, they used basic tools such as PowerPoint® slides and video calls.

When university students were trained in using the Jamboard virtual whiteboard, they learned to use a new tool; they enhanced other learning activities through interactivity and strengthened the presentation of their ideas, resulting in better results. Consequently, it can be affirmed that with this study, the use of the Jamboard virtual whiteboard effectively improved the virtual presentations, giving greater enhancement to this activity and providing an easily accessible tool to the entire Peruvian university system.

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