Evaluation of Online Learning Platforms in Latin America

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Abstract

Introduction: The use of online learning platforms has made a huge contribution to the online learning process. A key tool in this world is videoconferencing, which allows the efficient advancement of knowledge of a specific subject during synchronized timing. *Objective*: With this proposed context, the objective of this investigation is to determine which online video-conference platform has more benefits to be applied in Latin America. *Method*: A study was carried out with a quantitative method, transversal temporality, and a correlational and comparative process. There was a sample of 272 participants between 12 and 55 years old. *Results and conclusion*: It was found that the platform with the most benefits according to the analysis of gender, age, and profession is ZOOM. These results allow us to analyze the usefulness of this platform and its benefits in the learning process in Latin America.

1- Introduction

Online and distance learning are now better recognized in the current learning context. The technological advancement and the development of abilities with devices and multimedia spaces that students currently have are making the online learning platforms an essential tool in the teaching and learning process [1]. Previous research has reported that the use of online learning platforms improves students' performance. One of the reasons why this technological resource has been successful is the development of intellectual and motivational abilities that students find in this type of technological space [2]. The principal platforms of online learning that allow live interaction between teachers and students are Zoom, Google Meet, Microsoft Teams, and recently, the use of group videoconferencing on WhatsApp. These apps have demonstrated their efficiency in working with different academic content in universities, high schools, and primary schools [3].

One of the phenomena that generated a fast advancement in the use of online platforms and videoconferencing apps was the recent pandemic of COVID-19 that the world went through because what seemed impossible in the past (to have classes at home) is now a reality and has legitimized the use of technology to advance the planned educational contents [4]. The efficiency of online platforms as an additional option during the pandemic has been recently investigated, resulting in adequate satisfaction levels among the students who receive this type of education. Furthermore, the combination of active technological apps that allow interaction between the students and the learning content generates good student performance in the presented content. Hence, we can demonstrate the importance and benefits of online spaces in education [5].

Regarding previous research on online learning platforms, it has been found that: (a) virtual platforms can be used in favor of deep learning [6], (b) online learning can generate significant learning in times of pandemic [7], (c) there is a positive psychological response in favor of the use of the online learning platform [8], (d) virtual platforms are effective for learning a second language such as English [9], (e) they are successful in the educational process of classical sciences, such as medicine [10, 11], (f) virtual platforms increase educational performance, student engagement, evaluation methods, and collaborative learning [12, 13]; and (g) the contribution of the metaverse and augmented reality in student satisfaction and interaction in favor of the learning process [14].

In Latin America, the total implementation of technology in different private and public education institutions is still a challenge because the gap between them is big and the students in these types of education don't have the same opportunities [15]. One of the gaps identified in the review carried out is that in educational contexts in Latin America, it is necessary to identify which virtual platform is the most effective to be used and thus be able to use the most efficient option with the resources available in this context. The objective of the implementation of technological-educational resources in Latin America is to promote autonomous learning and the development of skills that benefit future professions [16, 17].

With the previously proposed context, the interest in analyzing which videoconferencing platform is the best to be used in Latin America rises because of the vital importance of identifying the successful technological tools that can be used in this region and at the same time optimizing the resources to complete the educational activities.

2- Method

2-1- Participants

The sample was formed with 272 participants, 157 women (57.7%) and 115 men (42.3%) between 12 and 55 years old (M = 17.66, SD = 8.57) all of them from the same Latin American city: Quito, in Ecuador. Regarding whom they were, 239 (87.9%) were students while 33 (12.10%) were teachers. Regarding the socioeconomic level, they were all middle class. Regarding the academic level, 10 (3.7%) are from primary school, 200 (73.5%) from high school, 47 (17.30%) from university and 15 (5.5%) postgraduates. Regarding the primary device the participants used to browse the internet 46.7% of them used a smartphone, 46.7% used their laptops, 17.6% used desktop computers and 1.1% used tablets. The majority use WI-FI connection (86.8%) and a 13.2% use a wired connection. Regarding the type of internet each participant has, 87.5% have fiber optic, 7.7% have a switched network and 4.8% use mobile data.

2-2- Measures

To measure which platform is preferred by teachers and students a 94-item ad hoc questionnaire in which we evaluated aspects such as usage, design, compatibility, benefits of learning and teaching, reliability, portability, and security was used (Appendix I). The psychometric properties of reliability are presented in the results. Furthermore, a socio-demographic instrument was applied to the investigation participants.

2-3- Data Analysis

Different statistical analyses were applied. First, descriptive frequency techniques were applied, also, percentages, minimums, maximums, averages, and standard deviations to characterize the samples and describe the values of each variable. For the analysis of the reliability of each tool, the Cronbach Alpha process was applied. To compare the app preference depending on the educational role the Student's t-test was applied, and to determine the most appreciated platform among all the participants we applied a multivariate repeated measures test.

2-4- Procedure

The investigation started with the corresponding ethical authorizations to execute the research. After that, the participants were chosen, and also the evaluation tools. Then, we proceeded with the informed consent signatures from the research participants. Questionnaires were massively sent through the digital Google Forms app. Once the applications were completed, a database was filled in, the statistical analysis was executed, and the research report presented in this article was made (Figure 1).
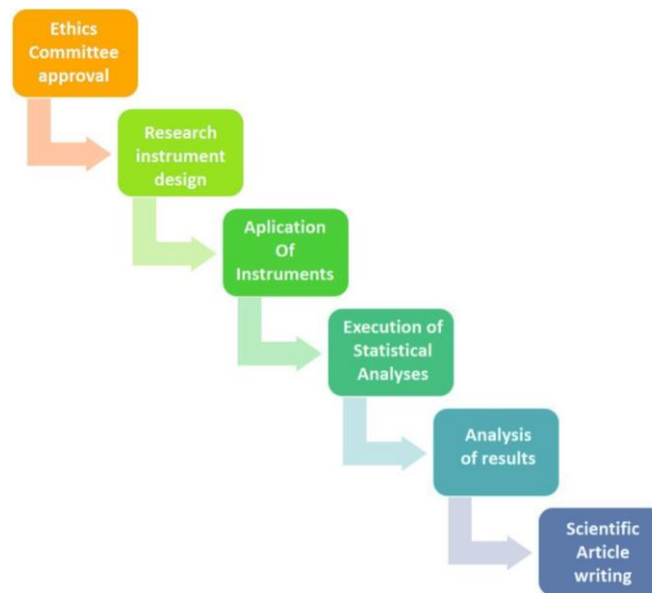
Figure 1. Scheme of the methodological process

3- Results

3-1- Measure reliability

Different aspects (usability, design, compatibility, reliability, portability, and security) of the four principal online learning platforms were evaluated in the research. In the measures of ZOOM with 23 items, an adequate reliability parameter was found α = 0.94, with correlations between the items of r = 0.43 y 0.77. All the measured items of the characteristics of ZOOM were correct and it wasn't necessary to eliminate any of them.

Regarding the measurement of the Microsoft Teams characteristics with 23 items, we found that the reliability was adequate α = 0.96, with correlations between the items of r = 0.55, y 0.81. All the items contributed significantly to the measurement of this platform, and it wasn't necessary to eliminate any of them.

Regarding the measurement of Google Meets with 23 items, we found an adequate reliability α = 0.97, with correlations between the items of r = 0.59, y 0.78. All the items in this measurement contributed significantly, so it wasn't necessary to eliminate any of them.

3-2- Descriptive Statistics

The first analysis made was to identify within the whole sample which is considered the best learning platform. ZOOM has 90.1% of acceptance, Microsoft Teams 4.8%, Google Meet 4.4%, and WhatsApp 0.7%. The relationship between the gender and measure of each platform was analyzed, and no significant association, statistic-wise, was found. The descriptive values and the relationship between gender and each platform are presented in Table 1.

Table 1. Descriptive values of each platform according to gender

	Gender	Average	Deviation	x^2
ZOOM	Men	96.55	14.61	$x^2{}_{(52)} = 52.53$
	Women	93.67	13.52	$p = 0.45$
TEAMS	Men	82.80	18.30	$x^2{}_{(68)} = 78.69$
	Women	80.15	16.12	$p = 0.17$
GOOGLE MEET	Men	78.71	18.63	$x^2{}_{(68)} = 79.56$
	Women	80.67	16.56	$p = 0.16$
WHATSAPP	Men	87.92	19.66	$x^2{}_{(63)} = 0.56.72$
	Women	86.96	14.47	$p = 0.69$

### 3-3- Comparison between Teachers and Students

A random selection of students was made in order to equate the number of students and teachers to make a comparative analysis and identify the preference between each of the platforms. In Table 2 the results of this analysis can be observed.

Table 2. Student and teacher comparison

	Role	Average	SD	T (DF)	p
ZOOM MEASUREMENT	Student	95.65	14.40	1.12 (62)	0.20
	Teacher	91.21	13.39		
TEAMS MEASUREMENT	Student	78.65	19.78	-0.94 (62)	0.34
	Teacher	82.62	13.23		
GOOGLE MEET MEASUREMENT	Student	76.40	18.62	-0.70 (62)	0.48
	Teacher	79.46	15.84		
WHATSAPP MEASUREMENT	Student	91.50	14.23	3.23 (62)	0.002
	Teacher	79.84	14.58		

3-4- Comparison between Learning Platforms

To identify the platform with the highest acceptance rate in education from students and teachers a comparison using the multivariate repeated measures test was made and a significative different in favor of the ZOOM platform was found $(F (1, 271) = 65.62, p = < 0.001)$. The descriptive values of each platform can be observed in Figure 2.
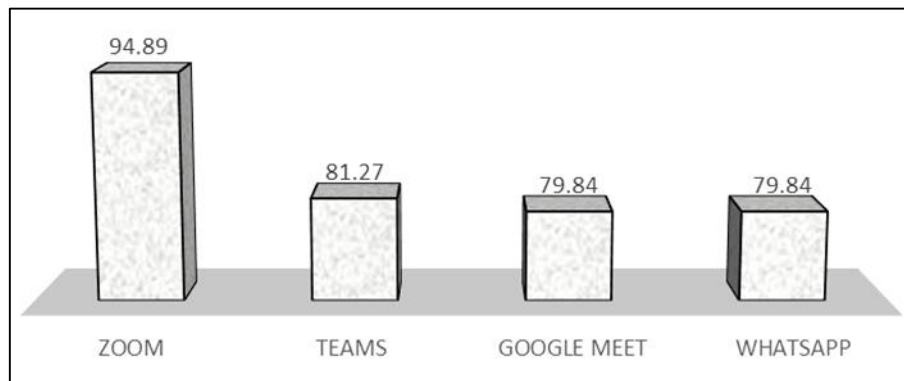
Figure 2. Descriptive values according to each platform

3-5- Correlation between Age and Use of Learning Platforms

In this analysis, we found that there is only one significant and inversely proportional relationship between age and the use of WhatsApp as the principal learning platform $(r = -1.41, p = 0.02)$. With the rest of the platforms no significant statistic associations were found. In Figure 3, the dispersion diagram of the found significant relationship can be observed.
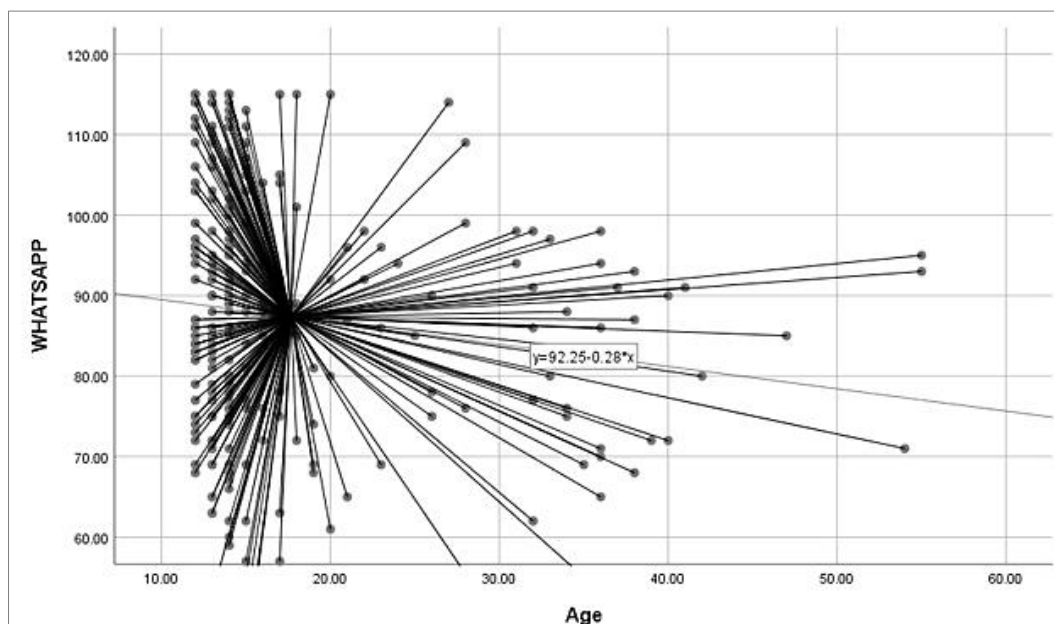
Figure 3. Dispersion diagram of the age and use of WhatsApp

4- Discussion

In this investigation, the preference of the online learning platform on behalf of students and teachers was analyzed. In order to achieve the objective of the investigation, a sample of 272 participants was applied to a measurement tool that evaluated aspects such as use, design, compatibility, benefits, reliability, portability, and security.

In the results, we found that the platform with the highest acceptance rate for education is ZOOM, with more acceptance from teachers and students. A big part of these results is justified because of the contribution to educational activities, regardless of the distance there could be [18]. During the pandemic, the online educational platforms became key tools to continue the teaching and learning processes, allowing children, teenagers, and adults to continue with their education. In the beginning, all types of tools such as Zoom, Teams, Google Meet, or WhatsApp were used because the educational processes couldn't be suspended [19].

With this information, the ZOOM platform has allowed us to successfully achieve the continuation of the educational process because the advantages of using it, such as the video transmission, camera configuration, window views, and multitasking that this platform allows, have made it the principal tool in online education [20]. One of the principal reasons why ZOOM is the main learning platform is the dissemination of technological tools that have become popular in education in the last few years. Another aspect is the familiarization that students currently have with technological devices, which makes online education as natural as possible for their learning [21].

Even though online learning platforms are a great tool to develop knowledge in education, they're not always the best way to get to the student. For example, there is research that has demonstrated that the face-to-face education process is indispensable to achieving significant learning and that it can be reinforced with online meetings through ZOOM, but it shouldn't be only online [22]. On the other hand, it's important to mention that the use of ZOOM is not completely perfect because fatigue comes as a result of the excessive use of these technological tools, as seen in the recent COVID-19 pandemic, where workers and students did all their activities exclusively through this virtual communication platform [23].

In relation to previous studies, the results of this study are consistent with previous reports, such as the one carried out by Ahmad & Siddiqui [24], where they made a comparison between the platforms Google Meet, Microsoft Teams, and Zoom and found that Zoom is the best platform for online learning. Another study that supports the data described in this article is the one carried out by Messina et al. [25], where it was found that the ZOOM platform has benefits for carrying out evaluation activities with students. Finally, the study by Li et al. [26] found that the ZOOM platform enables a successful transition from face-to-face to virtual education. The challenge we have in education is to design the correct environment to achieve significant learning with our students. In the same manner, in future investigations, we'll be able to analyze the acceptance of content on the different learning platforms and tools through which we can teach and learn.

Finally, as a limitation in this current study, we must state the subjective side that is always implied in a self-reported questionnaire. Nevertheless, the answers obtained by each participant were validated by the investigators to control for this possible bias. Furthermore, the sample was obtained in a specific Latin American city, which motivates us to make further investigations, including more cities and other regions, and obtain, with that, a better explanation of the addressed phenomenon.

5- Conclusion

In conclusion, this research allowed us to identify the most efficient videoconferencing platform in the Latin American context, where it was found that ZOOM is the best virtual platform in the teaching and learning process. The features that make ZOOM the best platform have to do with its goodness in favor of low system resource use, screen sharing functions, meeting rooms, polls, recordings, chat, evaluation, and interaction with participants. For these reasons, ZOOM is considered the best platform to be used in the Latin American context.

6- Declarations

6-1- Author Contributions

Conceptualization, C.R-G.; methodology, C.R-G., O.C-H., and J.C-C.; formal analysis, C.R-G., O.C-H., and J.C-C.; investigation, C.R-G. and O.C-H.; writing—original draft preparation, C.R-G. and J.C-C.; writing—review and editing, C.R-G. and O.C-H.; project administration, C.R-G. All authors have read and agreed to the published version of the manuscript.

6-2- Data Availability Statement

The data that support the findings of this study are available upon request from the corresponding author.

6-3- Funding

6-4- Institutional Review Board Statement

This research was approved by Comité de Ética para la Investigación con Seres Humanos, Universidad Tecnológica Indoamérica.

6-5- Informed Consent Statement

All participants provided their written consent to participate in this study.

6-6- Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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Appendix I

Questionnaire used in the investigation:

1. How easy is it to learn how to use each app?

	1-Very difficult	2-Hard	3-Neither easy nor difficult	4-Easy	5-Very easy
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

2. Based on your experience, how would you rate the ability of the platforms to be used by users with certain different characteristics and capacities. (Accessibility).

	1-Very difficult	2-Hard	3-Neither easy nor difficult	4-Easy	5-Very easy
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

3. Based on your experience, how do you rate the length of a videoconference that each platform provides for free?

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

4. Based on your experience, how would you rate the ease of operation and control of each platform?

	1-Very difficult	2-Hard	3-Neither easy nor difficult	4-Easy	5-Very easy
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

5. Based on your experience, how would you rate the operation of the platforms on a cell phone or tablet?

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

6. In relation to the platforms listed, how would you rate the aesthetics of the user interface.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

7. From his experience how to assess the execution of the listed platforms by sharing resources with other applications used at the same time.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

8. How would you rate the platform's ability to exchange information with other applications?

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

9. How would you evaluate the quality of the videoconference call in the development of a virtual class.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

10. How would you evaluate the degree of satisfaction of the video conference platforms to carry out activities proposed by the teacher in the class.

	1-Totally unsatisfactory	2-Unsatisfactory	3-Neutral	4-Satisfactory	5-Totally Satisfactory
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

11. How would you evaluate the degree of satisfaction with the video conference platforms to develop activities individually with students.

	1-Totally unsatisfactory	2-Unsatisfactory	3-Neutral	4-Satisfactory	5-Totally Satisfactory
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

12. How would you evaluate the degree of satisfaction with the video conference platforms to develop group activities with students.

	1-Totally unsatisfactory	2-Unsatisfactory	3-Neutral	4-Satisfactory	5-Totally Satisfactory
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

13. How would you rate the degree of satisfaction with the video conference platforms to develop assessment activities with students.

	1-Totally unsatisfactory	2-Unsatisfactory	3-Neutral	4-Satisfactory	5-Totally Satisfactory
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

14. Based on your experience, how would you rate the operation of the tools and functions such as screen sharing, audio, whiteboard, chat and creating work rooms offered by the different platforms.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

15. How each platform qualifies in relation to the usefulness for the development of a virtual class.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

16. How would you rate the ability of platforms to be available when you need to use them.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

17. How would you rate the recovery capacity of the mentioned platforms in case of interruption or failure.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

18. How would you rate the ease of installation of each platform.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

19. How would you rate the ease of uninstalling the platform?

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

20. How would you rate the adaptability to the different types of use of the videoconference.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

21. How would you rate the protection capacity against unauthorized access to data and information on the platform.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

22. How would you rate the security of the platform to prevent computer attacks.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					

23. How would you rate the ability to prove a person's identity on each platform.

	1-Very bad	2-Bad	3-Neither bad nor good	4-Good	5-Very good
Zoom					
Microsoft Teams					
Google Meet					
Video call by whatsapp					