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Use of Virtual Platforms and their Levels of Interaction in an Ecuadorian Higher Education Institution

Renny Geovanny Montalvo Armijos,¹ Silvia Rosa Pacheco Mendoza PhD², Espin Morejón Maricela Araceli, MsC³, Ribadeneira Ramos Edgar Patricio, MsC⁴

Abstract

In higher education, computer platforms have become essential tools to facilitate teaching and learning. Information and communication technologies (ICT) can enhance educational quality by providing new opportunities for access, interaction, and collaboration. This article seeks to analyze the evolution in the use of virtual platforms in the university community of Ecuador. The data collected from the Carlos Cisneros Higher University Institute (ISUCC) is included from July 2020 to April 2023. Overall, significant changes are revealed in the use of platforms pre- and post-pandemic (COVID-19), as well as during regular and extraordinary periods. It is necessary to adopt measures that allow for leveraging the knowledge and skills acquired by the university community regarding the use of virtual platforms and contribute to the optimization of resources in Ecuadorian Higher Education Institutions.

Keywords: *Academic community, virtual platforms, higher education, virtual education, COVID-19.*

Introduction

The use of online platforms enables the creation of virtual learning environments, expanding the scope of education and allowing students to access educational resources from anywhere and at any time. According to UNESCO, COVID-19 has led to the suspension of educational activities in over 100 countries (Alemán et al., 2020). The new scenario resulting from the prolonged pandemic has required teachers to devise and seek sources of information and strategies to enhance students' understanding of the proposed topics (Giraldo Ospina et al., 2021). Not everything should be seen in a negative light. The pandemic presents a crisis of opportunity for students themselves to engage in unique tasks specific to this context. It also challenges the education

¹ Programa de Maestría en Administración de Empresas. Dirección de Posgrado y Educación Continua. Universidad Estatal de Bolívar <https://orcid.org/0000-0001-9171-3628> renny.montalvo@ueb.edu.ec

² Programa de Maestría en Administración de Empresas. Dirección de Posgrado y Educación Continua. Universidad Estatal de Bolívar <https://orcid.org/0000-0003-4945-1489> spacheco@ueb.edu.ec

³ Programa de Maestría en Administración de Empresas. Dirección de Posgrado y Educación Continua. Universidad Estatal de Bolívar <https://orcid.org/0000-0002-7652-5490> mespin@ueb.edu.ec

⁴ Programa de Maestría en Administración de Empresas. Dirección de Posgrado y Educación Continua. Universidad Estatal de Bolívar <https://orcid.org/0000-0001-5436-2486> eribaden@ueb.edu.ec

system, which will not return to the same state and will be compelled to review its own practices (Núñez-Cortés et al., 2020)

Computer platforms have emerged as crucial tools in higher education, facilitating the process of teaching and learning. With the advent of information and communication technologies (ICT), these platforms offer unique opportunities to enhance the quality of education. They enable greater accessibility, allowing students to access educational resources regardless of their geographical location. Moreover, ICT promotes interaction and collaboration among students and instructors, fostering a dynamic and engaging learning environment. By harnessing the potential of computer platforms, higher education institutions can leverage ICT to improve educational outcomes and provide enriched learning experiences for students.

According to (Dziuban et al., 2018), online learning platforms can enhance the student experience by offering greater flexibility, interactivity, and personalized learning. Access to technology through mobile devices or computers facilitates its utilization (Sierra-Fernández et al., 2020). One way to access the training of these workers is through ICT, and the Virtual Learning Environment (VLE) becomes a pedagogical tool for the qualification of this population. It serves as a source of expectations that promotes education from pedagogical, social, and economic perspectives (Guerrero et al., 2017). One limitation of the present study is the virtual administration of the modified DREEM questionnaire, which may have introduced response biases. However, the construct validity and external validity of this modified instrument have been found to be highly adequate according to the statistical analysis (Sisniegas-Vergara et al., 2023).

Computer platforms play a vital role in higher education, serving as essential tools to enhance the quality of education and learning. Beyond facilitating access to educational resources and promoting interaction among students and instructors, these platforms also have the potential to improve the effectiveness of assessment methods. Through computer-based assessments, higher education institutions can leverage technological advancements to create more efficient and accurate evaluation processes. These platforms offer features such as automated grading, immediate feedback, and data analytics, allowing for personalized and targeted assessment strategies. By harnessing the capabilities of computer platforms, higher education institutions can optimize their assessment practices, leading to more effective and meaningful evaluation of student learning outcomes.

Online assessment platforms offer the advantage of delivering prompt and precise feedback to students, enabling teachers to effectively track educational progress. Moreover, these platforms have the potential to alleviate the administrative workload on teachers by automating tasks like grading and exam result tracking. By leveraging the capabilities of these platforms, educators can streamline the assessment process, saving valuable time and resources. This automation not only enhances efficiency but also ensures consistency and fairness in grading. Furthermore, online assessment platforms facilitate data collection and analysis, allowing teachers to gain insights into

student performance and tailor instruction accordingly. Overall, the adoption of such platforms can optimize assessment practices, benefiting both educators and learners in the educational ecosystem.

In the last decade, Digital Transformation (DT) has been recognized as a priority for Higher Education Institutions (HEIs). This process is necessary for all organizations aspiring to be change leaders and competitive in their respective fields. Several academics have focused on defining DT when it comes to the business realm (Wang et al., 2023). (Abreu et al., 2021) In the article, it is suggested that in the future, an equitable system of standards should be validated to assess student performance when evaluating them using the VIP (Virtual Interactive Platform). Additionally, a fair system of penalties for tasks that are incorrect or less profitable should also be considered.

Currently, there is a wide variety of computer platforms available for higher education, ranging from learning management systems to collaboration tools and online learning applications. The choice of the appropriate platform can have a significant impact on the effectiveness of online teaching, and educators must consider various factors when making their selection. These factors include ease of use, customization capabilities, security, and integration with other tools and systems. Computer platforms can also play a crucial role in improving accessibility and inclusion in higher education. For example, online learning platforms can offer accessibility features such as captions, language translation, and audio descriptions, enhancing access for students with disabilities, whether they are visual or hearing impairments.

According to (Pham et al., n.d.) it is necessary to establish good working conditions for the familiarization with organizational concepts, information processing, and mastery of new technologies to become basic conditions for actively participating in this scenario, where most relationships are built in a virtual environment.

(Nuryana et al., 2023) According to their study, the growing trend of studies on mental health issues during the COVID-19 pandemic shows that all parties must take the management of this outbreak more seriously. (Alam et al., 2022) In the virtual community (essentially not entirely virtual), the participation of its members can have potential consequences for their well-being not only online but also in the real world. An integral part of teaching is the objective assessment of learning through learning curves, practice quality auditing, and the construction of indicators for monitoring healthcare quality (Gempeler R., 2014)

Online or blended learning during the pandemic has received significant attention, and researchers worldwide have rigorously documented their practices to timely address the current crisis of online teaching (Ng et al., 2023). According to (Orsini et al., 2019), Students showed greater receptiveness to the perspectives of other professionals, being more willing to seek help in complex cases, admit mistakes, and accept feedback. The distribution and impact found in the activities that were part of this initial cycle reflect the concern of healthcare professionals to ensure academic continuity during the pandemic, as well as their commitment and involvement in raising awareness about the

rights of individuals regardless of race, gender, or social class (Valdez-García & Lopez, 2021).

Library resources have been the primary available support for students and are widely used by academics in teaching within higher education curricula. However, the current shift towards digitalization has led libraries to transform from conventional knowledge centers to cloud-oriented online learning spaces (Gomis et al., 2023). Despite the multitude of perspectives on how digital transformation is conceptualized, there is consensus on the reciprocal relationship between digital technologies and the transformation of multiple organizational dimensions (Antonopoulou et al., 2023). The disruptions caused by the pandemic to traditional models of academic teaching have led to significant changes in learning and reported student engagement (Martin et al., n.d.). The implementation of strategies that promote independent learning should be encouraged by optimizing time outside the classroom and hospital, particularly through research activities. Research has shown that such activities increase motivation, engagement, and the scientific and critical reasoning necessary for achieving adequate performance in any specialty (Sánchez-Duque, 2020).

(González de Dios & Hijano Bandera, 2018) It tells us that the knowledge revolution aims to bridge the gap between information and knowledge, and furthermore, between knowledge and practice, using the theoretical support of ICT (Information and Communication Technology) and the current resources available on the Internet.

The primary aim of this article is to assess the extent of interaction within the university community when utilizing virtual platforms in a higher education institution in Ecuador. The analysis seeks to identify usage patterns with the goal of enhancing the educational experience and fostering productive collaboration among students, teachers, and administrative personnel. By examining the levels of engagement and interaction, valuable insights can be gained to inform strategies for optimizing the use of virtual platforms, thereby promoting effective communication and cooperation within the academic community.

The objective of this analysis is to investigate the various dimensions of interaction within the university community when utilizing virtual platforms. This entails examining the frequency and quality of student engagement, assessing how teachers leverage the platform for instructional purposes and student assessment, and evaluating the involvement and support provided by administrative staff in platform management. By delving into these aspects, a comprehensive understanding of the dynamics and effectiveness of virtual platform usage can be obtained, facilitating the development of strategies to enhance collaboration and optimize the educational experience for all stakeholders involved.

Through the analysis of these usage patterns, it becomes possible to identify areas that require improvement and explore opportunities for optimizing the online educational experience. By promoting effective collaboration among all members of the university community, the aim is to enhance the teaching and learning process and cultivate a vibrant educational environment within

the virtual setting. This endeavor seeks to foster engagement, interaction, and knowledge exchange among students, teachers, and administrative staff, ultimately contributing to the overall quality and effectiveness of online education.

Methodology

The data was collected from the Carlos Cisneros Higher University Institute (ISUCC) during the period from July 2020 to April 2023.

The results extracted from the institutional platform based on MOODLE were organized and analyzed using Microsoft Excel LTSC Professional Plus 2021. Descriptive statistics such as means and standard deviations (SD) were calculated to analyze the data.

Table 1. Data Downloaded from the Virtual Platform from July 2020 to April 2023.

End of Period (Year)	Authenticated User	Guest	Student	Teacher without Editing Permission	Teacher	Course Creator	Administrator	All
2020	60775	654549	2560871	228	422111	814	6592	3704469
2021	145707	1321725	5721971	1979	1051114	15064	8415	8246561
2022	86930	778659	2826516	155	641596	4739	513	4313305
2023	30179	164682	603674	34	157244	5785	303	960659

Source: Own elaboration, based on statistics from the ISUCC MOODLE Virtual Platform.

Results and Discussion

The virtual platform at Instituto Superior Universitario Carlos Cisneros (ISUCC) in the city of Riobamba was introduced towards the end of the academic period, spanning from November 2019 to April 2020. However, due to the declaration of the pandemic and the subsequent suspension of activities starting from March 13, 2020, a decision was made to implement a solution to ensure uninterrupted educational activities.

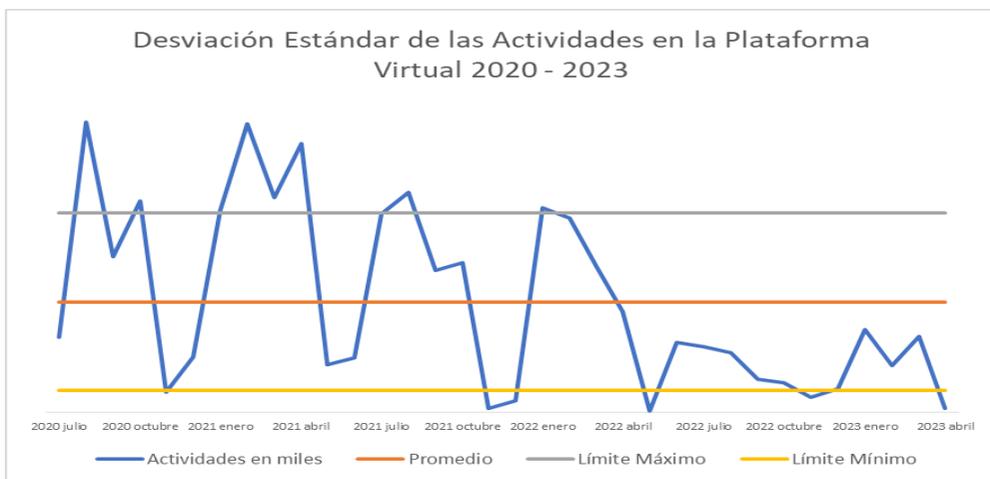
The virtual platform was implemented at Instituto Superior Universitario Carlos Cisneros (ISUCC) in Riobamba towards the end of the academic period, specifically in November 2019 to April 2020. However, with the declaration of the pandemic and the subsequent suspension of activities starting from March 13, 2020, it became imperative to find a solution that would enable the continuation of educational activities without interruption. According to **Figure 1**, the evolution of the usage of the virtual platform MOODLE at ISUCC can be observed since July 2020. This change has had a significant impact on the delivery of technical and technological education in higher education institutions and on education in general worldwide.

The current global situation has necessitated the exploration of alternative approaches to ensure uninterrupted academic preparation for students, particularly in higher education, and specifically in technical and technological fields. These disciplines often require hands-on practical experience to develop the necessary skills during their training. Finding solutions that enable students to continue their education and acquire practical skills in this new reality is crucial.

The findings indicate that the MOODLE platform experienced significant usage during the academic periods coinciding with the pandemic, specifically from July to October 2021. However, a complete lack of activity was observed during the academic recess periods when students concluded the semester and engaged in inter-semester activities such as enrollment for the upcoming semester. These results suggest that the platform's usage aligns closely with the academic calendar and underscores the importance of considering the specific context and academic schedule when analyzing platform engagement. In recent years, information and communication technologies (ICT) have experienced significant development, and online learning systems have become an important strategy to help students overcome issues such as geographical isolation from educational institutions and the need for constant knowledge updating and recycling imposed by the information society. Consequently, the main objective of our study has been to investigate the factors that influence the use of the Moodle virtual teaching system by students (Sánchez & Hueros, 2010).

Despite the aforementioned, it should be taken into consideration that, although the virtual platform was mandatory during the pandemic, its usage has decreased at the end of the corresponding academic periods. However, it is important to note that its utilization has significantly declined since the declaration of the return to in-person education in April 2022.

Figure 1 - Evolution of platform usage at IST Carlos Cisneros.



Source: Own elaboration, based on statistics from the ISUCC MOODLE Virtual Platform.

Figure 2 illustrates the significant variation in the number of activities carried out by teachers and students from month to month. The lowest values are observed in July and November 2020, with teachers conducting 25,219 and 10,866 activities respectively. On the other hand, August records the highest number of teacher activities, with a total of 172,302.

In the case of students, there is an overall upward trend in the number of activities conducted throughout the period. July marks the month with the lowest student activity, totaling 320,480, while October stands out with the highest number of student activities, reaching 827,715.

There are notable discrepancies in the monthly number of activities carried out by teachers and students. In July, there is an approximate ratio of 6 student activities to 1 teacher activity, while in November, this ratio increases to around 7 student activities per teacher activity. These findings indicate that students are engaging in a greater number of activities compared to teachers. Furthermore, December shows an increase in activities for both teachers and students compared to the previous month, which can be attributed to academic tasks related to year-end closing.

The graphical representation of activity interactions throughout the year 2021 reveals fluctuation in the proportion of student activities relative to teacher activities on a monthly basis. In May, the ratio indicates approximately 3 student activities for every teacher activity, suggesting a higher level of student engagement. On the other hand, in February, the ratio shows approximately 7 student activities per teacher activity, indicating even greater student participation. These variations highlight the dynamic nature of student involvement and emphasize the need to adapt teaching strategies accordingly.

During the months of November and December, there is a significant decrease in the number of both teachers and students compared to other periods. These months coincide with the inter-semester period, during which the institution primarily focuses on administrative tasks, and no academic activities are conducted. As a result, the virtual platform is not utilized during these months, leading to a decline in user activity. This pattern highlights the importance of considering the academic calendar and its impact on platform usage when analyzing engagement and interaction levels.

The data collected from July 2020 to April 2023 showcases the variation in the number of activities performed by teachers and students, displaying significant monthly fluctuations. These figures serve as a means to track the institution's progress, assess the workload of teachers, and examine periods of increased demand for academic services by students. The analysis of these statistics provides valuable insights into the dynamics of engagement and workload distribution within the educational setting, aiding in the evaluation and improvement of educational practices and resource allocation.

The Moodle Learning Management System at KAMK hosts over 1000 courses. The majority of courses are offered as regular face-to-face lessons, while only 10% are offered fully online. Approximately 90% of the respondents reported using Moodle to disseminate course materials

and relevant resources. 30% of them use it as a tool to track students' progress in a course. 25.8% of the teachers use it as a communication channel with course participants. 61% create and grade assignments in Moodle (Deepak, 2017).

As the academic period progresses, there is an increase in the number of activities and visits made by both students and teachers. This increase suggests a higher usage of the virtual platform during the months of the pandemic, as many educational institutions have adopted online platforms with the aim of facilitating teaching and learning.

The increase in the number of activities and visits reflects the adaptation of the educational community to new distance learning modalities. Students and teachers are increasingly taking advantage of the benefits and resources offered by virtual platforms to carry out their academic activities, such as submitting and reviewing assignments, participating in discussion forums, accessing study materials, and engaging in real-time communication.

This increase in the use of the virtual platform demonstrates the importance of these tools in ensuring the continuity of the educational process during crisis situations such as the pandemic. Educational institutions have recognized the need to adapt to circumstances and have promoted the implementation of online platforms as an effective means to ensure the continuity and quality of education in virtual environments.

Our research has demonstrated that the relaxation method yields comparable results to the logarithmic method, which is considered the most accurate method for comparing actual and planned values in the course of multiplication factors in the literature. The advantage of this method is the possibility to use it even when individual factor changes are negative (Dolinayová & Loch, 2015).

It is interesting to note that the proportion of activities carried out by teachers and students varies each month, indicating a differential adoption and use of the virtual platform by both groups. For example, if in a particular month the number of activities performed by students increases significantly compared to activities performed by teachers, it suggests a higher usage of the platform by students to access academic content and participate in online activities.

This difference in proportion can be attributed to various factors. On one hand, it may reflect that teachers are primarily using the platform to share content and assign tasks, while students are actively leveraging the platform to interact with the material and engage in collaborative activities.

Furthermore, the proportion may be influenced by the dynamics of the teacher-student relationship. Each teacher typically has a specific number of students under their responsibility, meaning that all students access the same activity proposed by the teacher. Therefore, if there is greater student participation and engagement in a specific month, it will be reflected in an increased proportion of student activities compared to teacher activities.

In summary, the variability in the proportion of activities carried out by teachers and students can

indicate patterns of differential adoption and usage of the virtual platform, as well as levels of student participation and engagement in relation to the activities proposed by teachers.

We collected 327 text submissions from the assignment module in the Japanese course during the academic years 2013-2015. These submissions are useful for improving the course, although they appear to be biased as they were not mandatory and were only received from 10% of the users (Ueda & Nakamura, 2017).

Los meses de noviembre y diciembre muestran una disminución significativa en la cantidad de actividades propuestas por los docentes y realizadas por los estudiantes. Esto se debe al período de descanso académico, lo que tiene un impacto directo en el uso de la plataforma virtual.

In Figure 2, there is an upward trend in the number of activities performed by teachers in the months of January, February, and March, reaching its peak in March 2022. However, from April onwards, there is a gradual decrease in the number of activities by teachers until December.

Regarding students, a similar trend is observed in the early months of the year, with a peak in March with 842,767 recorded activities. However, from April, the number of student activities also decreases significantly.

The months of May and June show a drastic decrease in both teacher and student activities. This is due to seasonal factors such as vacation or academic breaks.

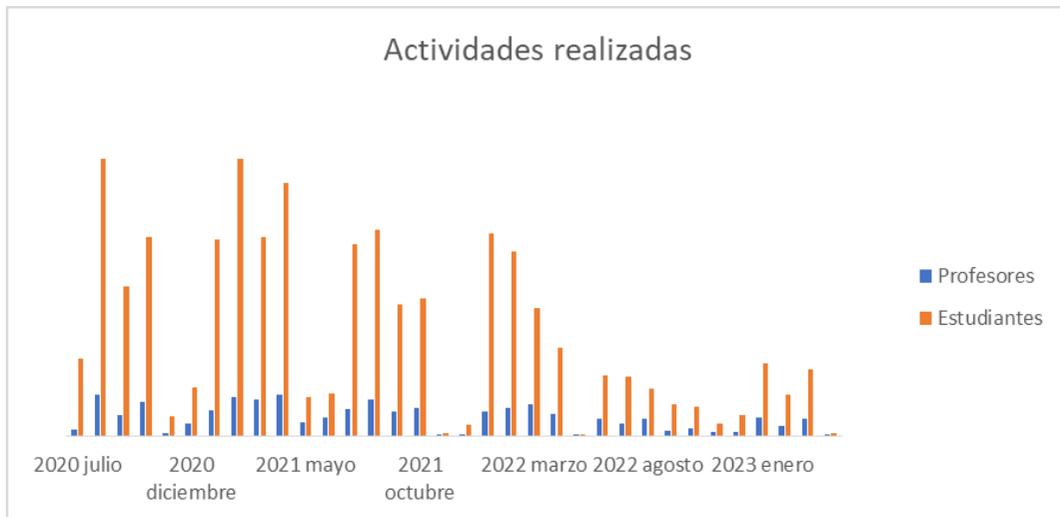
From July onwards, there is a slight increase in the number of activities by teachers and students compared to previous months. However, these numbers remain lower than those recorded in the early months of the year.

The data indicates variation in the number of activities performed by teachers and students throughout the year 2022. There is an increase in the early months, followed by a decrease in the middle months, and a slight increment towards the end of the year. These fluctuations are influenced by seasonal factors and specific academic events.

When asked about the MOODLE questionnaire, 78% of students expressed satisfaction with the questionnaire and its end results. 65% stated that answering multiple-choice questions is easier than subjective questions. However, 75% mentioned that MOODLE helps them obtain immediate feedback on their knowledge of the subject at the end of the questionnaire, which aids them in studying further and focusing on the topic.

73% believe that even for objective quizzes like the one on MOODLE, a good level of study is required to achieve good grades. Luck alone should not be relied upon. 57% of students are in favor of using other assessment components on the MOODLE platform, such as forums, blogs, online assignments, cases and group activities, debates, etc. (Barge & Londhe, 2014).

Figure 2 - Activities performed on the virtual platform



Source: Own elaboration, based on statistics from the ISUCC MOODLE Virtual Platform.

Table 2 displays the number of interactions conducted on the virtual platform of ISUCC from July 2020 to April 2023. These data reveal a decrease in platform utilization as the return to in-person education commenced in 2022.

When asked about assessment, students express considerable confusion on this matter. However, they also acknowledge that despite the need for sustained dedication, they prefer this type of evaluation in the end (Rodríguez-Izquierdo, 2014).

In general terms, the data indicate a decreasing trend in the metrics throughout 2022, suggesting a decline in activity and user engagement on the platform. It is important to consider other factors, such as academic context, vacation periods, or changes in course structure, which may influence these results.

To maximize the benefits of Moodle, we provide the design and a way to monitor student-centered learning paths (based on the initial background and learning objectives of the students) to deliver the best content to the right person. Specifically, by using a standard planner, we generate a plan, i.e., a learning path for each student, and monitor the execution of the plan by invoking the planner as many times as necessary (Caputi & Garrido, 2015).

Regarding specific results, there is an increase in the interaction of activities by both teachers and students starting from January 2023, reaching a total of 380,454 interactions. However, there is a significant decrease in the month of April, with only 17,198 interactions, indicating a reduction. This can be attributed to the end of the academic period, leading to a complete cessation of platform usage during the inter-semester months.

I apologize for the confusion. It is not that there has been a decrease in interest in teaching, neither for the teacher nor the student; it is rather due to the need to implement numerous changes to ensure the continuity of teaching or assessments. These changes may have impacted the level of activity and interaction observed during the specific period mentioned (Millán Núñez-Cortés, 2020).

In conclusion, while there is literature suggesting that 87.5% of dental students are dissatisfied with virtual education and two-thirds of them believe their practical training will be affected, we recommend adaptive learning with clinical cases for teaching clinical aspects to dental students, as long as it is supplemented with other educational strategies (Ladewig Bernáldez et al., 2022).

The results obtained showed that students in the experimental group, who created and participated in the use of the blog, were more successful in learning the subject compared to the control group, who strictly followed the course schedule (Rojano Ramos et al., 2016)

Table 2 - Interactions performed on the virtual platform during the year 2020.

End of Period (Month)	Views	Messages	Accesses	Activities
2020	3089891	614578	209590	3704469
2021	6713774	1532787	470251	8246561
2022	3331524	981781	270647	4313305
2023	672942	287717	68301	960659

Source: Own elaboration, based on statistics from the ISUCC MOODLE Virtual Platform.

Conclusions

The results indicate that the transition to in-person education has had a negative impact on the interaction of the university community with virtual platforms. It is crucial for institutions to consider strategies to promote user engagement and maintain the effectiveness of online teaching.

The findings highlight the importance of strategic planning in the adoption of virtual platforms in higher education. Abrupt transitions between in-person and virtual modalities can negatively impact user engagement, therefore it is essential to provide ongoing training and technological support for teachers and students.

Despite the decrease in interaction, the interest and willingness of both teachers and students to adapt to changes and ensure the continuity of teaching and assessments are noteworthy. This highlights the importance of implementing measures that facilitate the transition between in-person and virtual education, ensuring accessibility, personalization, and adequate technological support for an optimal educational experience.

Even with the decreased platform usage, it is necessary to recognize the potential of virtual

platforms to improve accessibility and inclusivity in higher education. The implementation of accessibility features, such as captions and translations, can benefit students with disabilities and promote a more equitable and accessible learning environment for all users. Additional strategies should be explored to maximize the positive impact of virtual platforms.

The findings highlight the importance of maintaining a flexible approach in education delivery, particularly during periods of transition between virtual and in-person learning. Adequate support and training should be provided to both teachers and students to facilitate a smooth transition and enhance engagement in virtual platforms.

These results emphasize the need for continuous monitoring and evaluation of virtual platform usage to identify areas for improvement and optimize the educational experience. Strategies should be implemented to promote active collaboration and effective communication among all stakeholders within the academic community.

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