Exploring the Role of Educational Digitalization in Advancing Inclusivity within Universities

Explorando el papel de la digitalización educativa en el avance de la inclusión dentro de las universidades

Resumen

Para un progreso continuo, la financiación gubernamental sostenida es esencial. Esta investigación examina cómo la integración de herramientas digitales en la educación superior puede desempeñar un papel en el avance de la inclusión social. El estudio emplea metodologías cuantitativas. Para establecer conexiones entre los participantes, se utilizaron técnicas de análisis descriptivo y agrupación de conglomerados. La encuesta recopiló datos de 516 estudiantes universitarios de diversas universidades del Perú, abarcando información sobre edad, nivel educativo y género. Los resultados revelan grupos distintos: Grupo 1 (chi-sqr = 29.78; p 0.001, máx = 5.1), Grupo 2 (chi-sqr = 99.6; p 0.001) y Grupo 3 (chi-sqr = 13.1; p = .001). Los resultados sugieren que la integración de herramientas digitales en la educación puede contribuir significativamente a mejorar la inclusión social en los entornos de educación superior. Sin embargo, el grado en que la digitalización fomenta la inclusión se ve afectado por factores como la calidad de la infraestructura digital, la competencia digital de estudiantes y educadores y el enfoque educativo elegido.

Palabras clave: Transformación digital, Equidad, Diversidad, Aprendizaje accesible, Tecnología educativa, Recursos digitales, Educación inclusiva

Abstract

This research examines how the integration of digital tools in higher education can play a role in advancing social inclusion. The study employs quantitative methodologies. To establish connections among participants, descriptive analysis and cluster grouping techniques were utilized. The survey collected data from 516 undergraduate students across diverse universities in Peru, encompassing information about age, educational level, and gender. The outcomes reveal distinct clusters: Cluster 1 (chi-sqr = 29.78; p .001, max = 5.1), Cluster 2 (chi-sqr = 99.6; p .001), and Cluster 3 (chi-sqr = 13.1; p = .001). The results suggest that integrating digital tools into education can significantly contribute to enhancing social inclusion within higher education environments. Nevertheless, the degree to which digitalization fosters inclusivity is impacted by factors such as the quality of digital infrastructure, the digital proficiency of students and educators, and the chosen educational approach.

Keywords: Digital transformation, Equity, Diversity, Accessible learning, educational technology, Digital resources, Inclusive education
Introduction

In recent years, the landscape of higher education has undergone a profound transformation fueled by the rapid integration of technology into pedagogical practices. This transformation, often referred to as educational digitalization, has brought about significant changes in the way learning and teaching are conducted within universities. Beyond its pedagogical implications, the impact of educational digitalization extends to the realm of inclusivity, fostering a newfound potential to address challenges related to diversity, equity, and access in higher education. This exploration delves into the pivotal role that educational digitalization plays in advancing inclusivity within universities, shedding light on its multifaceted dimensions, implications, and potential limitations.

The integration of digital tools and technologies has become an integral part of higher education, transcending traditional boundaries and reshaping the learning experience. Educational digitalization encompasses a range of practices, from incorporating online learning platforms and virtual classrooms to utilizing digital resources for teaching and assessment. As universities strive to cater to diverse student populations, the question of inclusivity becomes paramount. In this context, inclusivity refers to the ability of higher education institutions to provide equitable opportunities for learning, regardless of students' backgrounds, abilities, or circumstances.

Educational digitalization holds the promise of democratizing access to education by breaking down physical barriers and geographical limitations. Online courses and digital resources can be accessed by students regardless of their location, enabling individuals from remote areas or those with mobility challenges to engage in higher education. Additionally, digital platforms facilitate asynchronous learning, accommodating various learning paces and personal commitments. This flexibility can be particularly beneficial for non-traditional students, such as working professionals or individuals with familial responsibilities.

Beyond the potential for expanded access, educational digitalization offers a fertile ground for the development of inclusive pedagogies. Instructors can leverage a diverse range of digital tools to cater to different learning styles and preferences. For instance, multimedia content, interactive simulations, and gamified elements can engage students with varied learning preferences, making education more engaging and effective. Moreover, digital platforms can facilitate collaborative learning, where students from diverse backgrounds can collaborate on projects and share perspectives, enriching the educational experience.

Educational digitalization also presents an opportunity to address learning challenges faced by students with disabilities or specific needs. Digital resources can be designed with accessibility in mind, incorporating features like closed captions, screen readers, and adaptable interfaces. Such accommodations create a more inclusive learning environment, ensuring that students with disabilities can fully participate in the educational journey. Furthermore, digital tools can provide personalized learning pathways, allowing students to progress at their own pace and receive targeted support.

While the potential benefits of educational digitalization for inclusivity are undeniable, it is essential to acknowledge the potential limitations and challenges. The digital divide remains a significant concern, as not all students have equal access to reliable internet connections and necessary devices. This divide can exacerbate existing inequalities and hinder the
realization of inclusivity goals. Moreover, there is a need to ensure that the integration of technology does not lead to the marginalization of certain groups or perpetuate biases.

The exploration of the role of educational digitalization in advancing inclusivity within universities reveals a complex and dynamic landscape. As higher education institutions continue to embrace digital tools and technologies, they must remain mindful of the ethical, pedagogical, and practical considerations associated with fostering an inclusive learning environment. By leveraging the potential of digitalization to create flexible, engaging, and accessible learning experiences, universities can take a significant step toward realizing the ideals of diversity and equity in education. This journey demands a collaborative effort, involving educators, administrators, technologists, and policymakers, to ensure that educational digitalization truly becomes a catalyst for positive change within the realm of higher education inclusivity.

Literature Review

Inclusion has emerged as a fundamental concept in education, encompassing the principle of providing equitable access and opportunities for all individuals, regardless of their backgrounds, abilities, or circumstances. The promotion of inclusion within higher education institutions entails creating an environment that embraces diversity, fosters equity, and ensures that every student has the chance to thrive. This literature review delves into the multifaceted dimensions of inclusion and explores strategies for advancing its promotion within the context of higher education.

In the higher education landscape, inclusion goes beyond merely enrolling diverse student populations. It encompasses the provision of supportive environments that enable students from various backgrounds to engage in meaningful learning experiences. These environments should be sensitive to students’ identities, experiences, and needs. Inclusive institutions prioritize diversity in admissions, but they also implement policies, practices, and curriculum designs that accommodate diverse perspectives and ensure equal opportunities for academic success.

Research suggests that promoting inclusion within higher education institutions yields several advantages. An inclusive environment enhances the overall learning experience by exposing students to diverse viewpoints and preparing them for the realities of an increasingly interconnected world. Additionally, inclusion contributes to improved academic outcomes, as students from diverse backgrounds often bring unique insights that enrich classroom discussions and group projects. Furthermore, inclusive institutions foster a sense of belonging among students, which positively influences retention rates and academic engagement.

Despite the benefits, promoting inclusion in higher education is not without challenges. One significant barrier is the persistence of unconscious biases and systemic discrimination. These biases can manifest in classroom interactions, course materials, and institutional policies, hindering the development of an inclusive learning environment. Furthermore, a lack of awareness and training among faculty and staff members can impede efforts to create inclusive spaces. Addressing these challenges requires ongoing education, cultural sensitivity training, and a commitment to unlearning biases.
Several strategies have been proposed to advance the promotion of inclusion within higher education institutions. First and foremost, curriculum transformation is crucial. Incorporating diverse voices and perspectives into course materials can broaden students' horizons and challenge their preconceptions. Secondly, the provision of support services, such as mentoring programs and counseling, can offer targeted assistance to underrepresented students. Thirdly, creating inclusive classroom environments involves implementing active learning techniques that encourage student participation and collaboration, irrespective of their background.

The Role of Educational Digitalization in Advancing Inclusivity

The integration of digital technologies in education has brought about transformative changes, influencing not only teaching and learning methods but also the broader landscape of inclusivity within educational institutions. This literature review explores the multifaceted dimensions of how educational digitalization can advance inclusivity, focusing on its potential to enhance accessibility, provide personalized learning experiences, and promote diverse participation.

Digitalization and Accessibility

Educational digitalization has the potential to break down barriers to learning and participation for individuals with disabilities. Digital tools offer various modes of content presentation, catering to diverse learning styles and needs. Text-to-speech, captioning, and screen readers are examples of technological aids that make educational materials more accessible. Moreover, digital platforms provide the flexibility for students to engage in learning at their own pace and from remote locations, accommodating those who face physical or geographical constraints.

Personalized Learning and Inclusivity

Digitalization allows for the creation of personalized learning pathways, acknowledging that each student brings unique strengths and challenges. Adaptive learning platforms use data analytics to tailor content, pacing, and assessments to individual student abilities. This approach fosters a more inclusive environment by ensuring that students receive the support they need, regardless of their initial proficiency level. It also reduces the stigma associated with differing learning speeds, promoting a sense of belonging.

Diverse Participation and Digital Collaboration

Educational digitalization facilitates collaboration and engagement among diverse groups of students. Virtual classrooms, online discussion forums, and collaborative document sharing platforms enable students to contribute irrespective of their physical presence or geographical location. This fosters cross-cultural interaction and accommodates students who may feel marginalized in traditional classroom settings. Additionally, digital platforms can provide anonymity, allowing shy or introverted students to participate more comfortably.
Challenges and Considerations

While educational digitalization holds significant promise for advancing inclusivity, there are challenges that need to be navigated. Not all students have equal access to technology and the internet, potentially exacerbating existing inequalities. Furthermore, the digital divide can be particularly pronounced among marginalized communities. Institutions must ensure equitable access to devices, reliable internet connections, and digital literacy training to mitigate these disparities.

Culturally Responsive Digitalization

To truly advance inclusivity, educational digitalization should be culturally responsive. It involves incorporating diverse cultural perspectives into digital content and recognizing the varied sociocultural contexts in which students learn. This includes addressing potential biases embedded in algorithms used for adaptive learning and artificial intelligence, ensuring that they do not perpetuate inequalities.

Faculty Development and Technological Competence

The success of integrating digital technologies for inclusivity hinges on the technological competence of educators. Faculty development programs are vital to equip instructors with the skills to navigate digital tools effectively. Moreover, training should emphasize the ethical use of technology, including considerations of privacy, data security, and fostering respectful online environments.

Methods

This research employs a comprehensive quantitative methodology to yield a comprehensive and vigilant exploration. The recognition of the intricate and dynamic characteristics of the subject matter, situated at the crossroads of diversity and innovation, underscores the necessity for an integrative research perspective. This strategic method is widely acknowledged in the study of social phenomena as it allows for a more holistic understanding of the multifaceted nature of the topic. The convergence of diverse research methods serves to enrich the depth and breadth of insights into the complex interplay between educational digitalization and inclusivity within universities.

Participants

The participants in this study were 516 students at Mexico’s university. The selection of the sample of 516 Peruvian students was carried out using a non-probabilistic method, which means that a random process was not followed to select the participants. Instead, a specific approach was used to choose the students to be part of the sample. Here's how this process was done:

Convenience Sampling: In this type of non-probabilistic method, participants are selected based on their convenience and accessibility. In this case, students who were available and willing to participate in the study were chosen, which may have facilitated data collection.
Access to the population: Since the study focused on Peruvian students from several universities, it is possible that the researchers had easier access to certain educational institutions or to particular groups of students. This could have influenced the selection of the sample.

Instruments

In order to enhance the validity and reliability of this study, a meticulous approach was employed. A questionnaire was thoughtfully crafted and distributed randomly among students pursuing education in Lima, Peru. This comprehensive questionnaire encompassed 19 thought-provoking questions, along with an additional pair of queries designed to assess participants' perceptions of their digital proficiency both before and after the survey. The administration of the questionnaire was facilitated through Google Forms, ensuring the systematic collection of responses. Subsequently, the collected responses were meticulously transformed into the Likert scale format, facilitating a structured and quantifiable analysis.

To bolster the credibility of the findings, a vital step was taken. A team of three recognized experts in the fields of education and technology was engaged. These experts were tasked with rigorously reviewing the questionnaire for its content validity, ensuring that it effectively gauged the intended constructs. This critical scrutiny was aimed at eliminating any ambiguities or inaccuracies that might have arisen during the questionnaire design process.

Moreover, an additional element was introduced to enrich the insights. An open-ended question was included to delve deeper into the participants' perspectives on the role of technology in fostering diversity and inclusion in educational settings. This qualitative data gathering approach sought to capture nuanced viewpoints that might not have been fully addressed through the structured questionnaire.

To uphold ethical standards, formal permission to utilize the collected data for the purpose of analysis was duly obtained from the participating students. This step further enhances the trustworthiness of the study by ensuring that the data was handled responsibly and with the participants' consent.

Furthermore, the study underwent a comprehensive review of the collected narratives to maintain high standards of accuracy and consistency. This iterative process involved classifying the quotes extracted from the narratives into categories that revolved around classroom challenges, as established by Puma et al. (2022). Employing an inductive content analysis approach, the study was able to discern meaningful connections and patterns among the components extracted from the narratives.

By rigorously following these steps, encompassing expert validation, careful questionnaire design, and a thorough review of qualitative narratives, this study sought to uphold the validity and reliability of its findings, thus contributing to the robustness and credibility of its insights.
Results and discussion

With the help of critical discourse analysis, we investigate how preservice educators think about technology’s place in the classroom and how it may be used to advance the interests of all students. Examining student accounts reveals challenges in society, education, digital literacy, and student preparation. The findings are broken down into these four classes. An illustration of the content analysis’s findings, based on the most important categories and their interrelationships (as shown in Figure 1), follows.

Table 1
Cluster group effect

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>Cluster 3</th>
</tr>
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<tbody>
<tr>
<td>Digitalization proficiency</td>
<td>Maximum</td>
<td>Min</td>
<td>Chi-square</td>
</tr>
<tr>
<td></td>
<td>4.9</td>
<td>4.4</td>
<td>5.1</td>
</tr>
<tr>
<td>Economic considerations (expenses)</td>
<td></td>
<td></td>
<td>30.1</td>
</tr>
<tr>
<td>Social aspect (embracement)</td>
<td>4.1</td>
<td>3.9</td>
<td>4.0</td>
</tr>
<tr>
<td>Viewpoint</td>
<td>3.3</td>
<td>0.1</td>
<td>4.3</td>
</tr>
<tr>
<td>Real digitalization proficiency</td>
<td>3.1</td>
<td>3.01</td>
<td>4.1</td>
</tr>
</tbody>
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Cluster 1 ($chi − sqrt = 30.11; p .001), Cluster 2 ($chi − sqrt = 99.4; p .001), and Cluster 3 ($chi − sqrt = 15.1; p = .001), all demonstrated a noteworthy influence of the metric on their initial and final perspectives, as well as their correlation with the Digitalization Proficiency metric (Table 3). Hence, in Clusters 1 and 2, the perception significantly decreases from the beginning to the end, resulting in a substantial disparity compared to the Actual Digitalization Proficiency (Tables 3 and 4). In contrast, Cluster 3 exhibits a notable decline in perception from the test's commencement to its conclusion, implying an alignment (consistent outcomes) between Final Perception and Actual Digitalization Proficiency. Notably, Cluster 2 also witnessed an escalation in its perception from the initial to the final phase, thus accentuating the gap between its perception and Actual Digitalization Proficiency.

Upon scrutinizing the cluster analysis of societal factors, a conclusive inference can be drawn that the utilization of educational digitalization and TIC wields a substantial influence in fostering social inclusivity within university settings. This analysis underscores that the integration of digital tools and technology in education fosters an all-encompassing learning environment, fostering the spirit of acceptance and embracing diversity among students. Turning to the cluster analysis of economic factors, it can be deduced that the cost associated with educational digitalization and TIC could potentially hinder the drive towards promoting social inclusion in universities may not have the resources to afford these tools.
Table 2  
Cluster comparison

<table>
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<tr>
<th>Cluster N</th>
<th>CD vs. Perception</th>
<th>Perception vs. Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Z= -3.16 p=0.000</td>
<td>Z= -3.15 p &lt;0.001</td>
</tr>
<tr>
<td>C2</td>
<td>Z=-4.59p&lt;0.001</td>
<td>Z= -6.89 p&lt;0.001</td>
</tr>
<tr>
<td>C3</td>
<td>Z= -4.13 p= 0.000</td>
<td>Z= -0.17 p&lt;0.000</td>
</tr>
</tbody>
</table>

Cluster 3 participants, despite exhibiting the lowest levels of genuine digital proficiency, demonstrated the most pragmatic levels of perceived proficiency and a remarkably close correlation to actual proficiency. Notably, within this group, the gender distribution skewed towards women (4 out of 5), and the average age trended below that of the typical degree-seeking participant (2 out of 3). On the other hand, Clusters 1 and 2 encompassed individuals with digital competence values that fell within the intermediate range of the first and second categories. Cluster 2 displayed perceptions more aligned with reality than Cluster 3, with perceptual competence levels closely mirroring actual competence; Cluster 1 was the sole cluster that enhanced its perception from pre- to post-test. A majority of both groups were constituted by younger male college students.

As previously demonstrated in studies conducted by scholars such as Van Heerden & Goosen (2020), individuals tend to overestimate their level of digital proficiency. The imperative to foster lifelong training initiatives for cultivating strategies that attend to diversity and inclusion through ICTs becomes unmistakably clear. Such differentials are contingent upon the varied developmental aspects of competencies (Weller, 2014). By adopting this approach, we may facilitate the enhancement of students' deficient proficiencies in this domain and disseminate the advantages of leveraging technology for classroom inclusivity (Shams et al., 2020). Notwithstanding the appeal, financial gain, market share, and user engagement primarily fuel the commercial advancement of the technology we encounter, rather than addressing issues of ICT-mediated empowerment, inclusiveness, and civic participation.

While it remains valid that ICTs possess the potential to foster social inclusion and empowerment, observers often hesitate to acknowledge that people's actual utilization of ICTs is considerably shaped and constrained by less socially driven corporate and commercial structures. The casual utilization of Microsoft's Instant Messenger program among peers by a young individual contrasts sharply with their immersion in a cooperative and non-hierarchical online community (Tlili et al., 2021). The entitlement to download a ringtone for one's phone diverges from the right to peruse the complete Communist Manifesto or the entirety of Shakespeare's works. Despite scholars and commentators idealizing a public-spirited and transformative rendition of ICT, this perspective bears little resemblance to the reality of people's commercialized and frequently mindless engagement with ICT.
In the pursuit of understanding the intricate interplay between educational digitalization and the advancement of inclusivity within universities, this study adopted a mixed-methods approach that amalgamated both quantitative and qualitative methodologies. By employing such a comprehensive methodology, we aimed to provide a thorough and vigilant exploration of the research topic. This approach was chosen due to the multifaceted nature of the subject matter and its strategic position at the convergence of diversity and innovation, requiring a multifaceted lens to capture its nuances (Del Canto & Silva, 2013).

The quantitative element, implemented through a structured questionnaire, enabled us to quantify participants' perceptions and experiences, while the qualitative aspect, through open-ended questions, provided deeper insights into participants' perspectives and allowed for the emergence of novel themes. By triangulating these findings, we enhanced the robustness of our conclusions.

From a theoretical standpoint, this study adds to the growing body of literature that investigates the intricate relationship between educational digitalization and inclusivity. The findings underscore the importance of addressing digital competence as a pivotal factor in the quest for inclusivity. The overestimation of digital competence among certain clusters emphasizes the significance of comprehensive digital literacy training that considers various competencies (Van Heerden & Goosen, 2020; Weller, 2014). This has theoretical implications for the design of pedagogical interventions that target specific clusters and their unique needs, ensuring a more effective transition to an inclusive digital learning environment.

Practically, the study underscores the need for educational institutions to invest in enhancing digital literacy among students, with tailored approaches for different competence levels. It calls for the integration of digital literacy training into the curriculum, offering resources and support to bridge the gap between perceived and actual competence. Moreover, the identification of clusters with more realistic perceptions indicates the potential for peer-based learning and collaboration, where individuals with higher digital competence can mentor and guide their peers.

However, this study has its limitations. The sample was drawn from a specific geographical region, and therefore the findings may not be fully generalizable to other contexts. The reliance on self-reported data also introduces the possibility of response bias. Additionally, the study mainly focused on students' perceptions, leaving room for future research to investigate educators' perspectives and practices in promoting digital inclusivity.

Future studies could delve deeper into the contextual factors that influence perceived and actual digital competence, exploring cultural and socioeconomic dimensions. Furthermore, longitudinal studies could track changes in digital competence and perceptions over time, providing insights into the dynamics of digital literacy development. Additionally, investigating the impact of tailored interventions on enhancing inclusivity could yield practical strategies for institutions aiming to create more digitally inclusive learning environments.
Conclusions

Among the many difficulties that have been discussed, a significant underlying factor arises. Despite the plethora of proposed solutions, it is necessary to recognize that the extent of public sector support for individuals' ICT utilization is limited. In the context of our discussion on the fragmented nature of contemporary society, any government intervention aiming to bridge the digital divide must assume the proactive participation of individuals who are not only receptive to past experiences but also adaptable to new opportunities and shifting circumstances. Within this framework, users must adopt a reflective stance toward their use of ICT and assume ultimate responsibility for their participation. However, the question remains: how can individuals navigate their ICT decisions with the greatest degree of autonomy, knowledge, and efficacy?

To initiate a new discourse on the digital divide, it is essential that academicians, policymakers, technologists, and other stakeholders converge. This conversation should examine ways to empower individuals to make informed decisions and provide them with the necessary support to effectively utilize information and communication technologies (ICTs). It is essential to alter the prevalent narratives about ICTs at the public level in order to transition their use from prescriptive means to prescriptive ends, thereby empowering individuals with a sense of control over the tools and practices that shape their engagement.

The core of our efforts, however, lies in the initiatives that we must cultivate. There are numerous ways in which technology affects students' capacity for active participation in educational settings. In order to achieve social inclusion, the centrality of digital technologies in terms of citizens' access and competence is indispensable. Despite the significant potential of ICT to facilitate educational resources for inclusive learning, its misuse can exacerbate existing inequalities. Collaboration between governments, educators, and stakeholders is necessary to maximize the potential of ICT for promoting social inclusion. These efforts should include infrastructure improvement, equitable access to technology, the design of inclusive learning activities, and the provision of digital skills training.

The sociological and economic dimensions' cluster analysis reveals a nuanced perspective. Although the digitalization of education and the incorporation of TIC hold promise for enhancing social inclusivity in universities, the cost of these tools may pose a barrier. To ensure equitable access to education digitalization and TIC across all socioeconomic strata, governments and educational institutions must recognize and resolve sociological and economic aspects, thereby ensuring the potential for inclusivity is realized.
References


Nota del editor: la revista se mantiene neutral con respecto a las reclamaciones jurisdiccionales en los mapas publicados y las afiliaciones institucionales