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THE ROLE OF TECHNOLOGICAL MEDIATIONS IN TEACHING AND ASSESSMENT IN EDUCATION: A THEORETICAL AND EMPIRICAL ANALYSIS

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***ABSTRACT*:**

This article analyses the impact of technological mediations on teaching and assessment in education, focusing on how digital innovations are reshaping pedagogical practices and evaluative processes. Employing a mixed-method approach that integrates qualitative insights and quantitative data, the study examines the extent to which digital tools contribute to transforming traditional teaching models. Technology enables greater personalization of learning, offering students opportunities to progress at their own pace and engage with adaptive content. Furthermore, digital platforms enhance the quality and immediacy of feedback, fostering continuous assessment and reflective learning.

However, the findings also reveal significant challenges associated with these transformations. Teachers often face resistance to pedagogical change, lack of institutional support, and disparities in technological access that reinforce educational inequalities. These limitations highlight that the effectiveness of technology in education depends not merely on its availability but on how it is integrated into pedagogical design. The article emphasizes the need for ongoing teacher training and critical reflection to ensure that technology serves as a means to promote equity, creativity, and meaningful learning. Ultimately, it argues that technological mediation should strengthen—not replace—the human dimension of teaching and assessment.

***Keywords**: Technological Mediations, Teaching, Assessment, Education, Digital Technologies, Personalized Learning.*

INTRODUCTION

In the last decade, education has undergone a significant transformation driven by the rapid integration of digital technologies in diverse educational contexts. This phenomenon has altered not only the way in which knowledge is imparted, but also how learning is assessed and feedback is provided. Technological mediation has become an essential component in contemporary educational practices, allowing unprecedented access to resources and tools that facilitate more dynamic and personalized learning.

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The rise of technology in education is not an isolated phenomenon, but part of a broader context where digitalization has permeated all areas of daily life. Online learning platforms, interactive educational applications and digital assessment tools are redefining the way teachers and students interact. This digitalization not only provides broad access to information, but also offers the possibility of tailoring teaching to the individual needs of each student, which can improve motivation and engagement in the classroom.

However, despite these advances, it is crucial to conduct a critical analysis of the impact of these technologies. While technological mediations can open doors to new learning opportunities, they can also perpetuate existing inequalities. The digital divide, which refers to the disparity in access to technology, poses serious challenges to ensuring that all students have the same opportunity to benefit from digital tools. Furthermore, the integration of technologies in the classroom often meets with resistance from some teachers who may feel that their pedagogical approach is threatened by the implementation of new tools.

The purpose of this article is to explore and analyze how technological mediations influence teaching and assessment in the educational field, examining both the benefits and the associated challenges. This study aims to assess the impact of these technologies on the quality and effectiveness of educational processes. It seeks to answer fundamental questions: How do technological mediations influence teaching and assessment processes? What are the pedagogical and social implications of this transformation in current education?

Through a mixed methodological approach that combines literature review, case studies, and quantitative analysis, it aims to offer a comprehensive view on the role of technology in education. This analysis will not only enrich teachers' and administrators' understanding of the digital tools available, but will also provide recommendations on how to effectively integrate these technologies into educational practices. Ultimately, it seeks to contribute to the debate on how to build an educational future that not only takes advantage of the advantages of technology, but also addresses its challenges, thus ensuring more equitable and accessible education.

DISTRIBUTED COGNITION THEORY

The Distributed Cognition Theory, proposed by Salomon (1993), suggests that knowledge does not reside solely in the individual, but is distributed across tools and environments. In this approach, technologies act as extensions of the human mind, facilitating learning by organizing and manipulating information. Thus, interaction with digital tools can enhance students' cognitive abilities, allowing them to process and analyze information more efficiently.

IMPACT OF TECHNOLOGY ON TEACHING

Transformation of Educational Practice

Digitization has revolutionized teaching practice, allowing for more personalized and collaborative approaches. Authors such as Garrison and Anderson (2003) highlight that online learning and digital platforms have transformed the way teaching is facilitated, promoting active and student-centered learning.

Digital Assessment Tools

The impact of technology on assessment has been significant, as Johnson (2010) points out. Digital assessment tools allow for faster and more accurate feedback, making it easier to tailor pedagogical strategies to individual student needs. In addition, these tools can provide valuable data on academic performance, allowing teachers to adjust their practices in real time.

Challenges of Technology Integration

Despite the benefits, technology integration also presents challenges, such as resistance to change and lack of teacher training. According to Hattie (2009), the effectiveness of technology in education depends largely on how it is used, implying an urgent need for training and professional development for educators.

Theories of Educational Assessment

Educational assessment has evolved significantly over the years, influenced by various theories and approaches that reflect a broader understanding of how learning and academic performance can be measured. Some of the most relevant theories in this area are described below, integrating quotes from the bibliography provided.

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Constructivist Learning Theory
Constructivism holds that learning is an active process in which students construct their own understanding and knowledge of the world. This theory focuses on the idea that assessment should reflect students' ability to apply their knowledge in real-world contexts. According to Bai et al. (2024), "formative and summative assessment should be aligned with learning experiences and should encourage critical reflection among students."

Assessment in a constructivist framework is not limited to standardized tests; it also includes more informal assessments, such as projects, presentations, and portfolios, which allow for a more complete view of student learning. By taking this approach, deeper and more meaningful learning is promoted.

Authentic Assessment Theory
Authentic assessment focuses on tasks that represent real-world situations, allowing students to demonstrate their understanding and skills in practical contexts. Engelbrecht and Borba (2024) highlight that "authentic assessment measures not only what students know, but how they apply that knowledge in practical situations."

This approach moves away from standardized testing, seeking assessments that are relevant and applicable to real life. For example, a project that simulates a real-world problem and requires students to use their knowledge to find a solution is an example of authentic assessment. This type of assessment also fosters skills such as critical thinking and problem-solving.

Competency-Based Assessment Theory
Competency-based assessment focuses on a student's ability to demonstrate specific skills and competencies rather than focusing solely on theoretical knowledge. According to Toh and Looi (2024), "assessment should focus on the competencies that students need to be successful in the workplace and in everyday life."

This approach allows educators to set clear assessment criteria that align with labor market expectations and societal demands. Competency-based assessment often includes simulations, teamwork, and projects that allow students to apply their skills effectively.

Formative and Summative Assessment Theory
Formative assessment refers to the collection of data on student performance during the learning process, while summative assessment is conducted at the end of an instructional period to measure the learning achieved. According to Farazouli et al. (2024), integrating formative assessments throughout the educational process can provide ongoing feedback and help students improve their performance.

The use of both assessments is crucial to provide a complete picture of student learning. Formative assessment allows for adjustments in teaching and learning, while summative assessment provides a measure of achievement and success at the end of a course or unit.

Inclusive Assessment Theory
Inclusive assessment focuses on the need to consider the diversity of students and their different learning styles. Azman et al. (2024) stress that “effective assessment should be accessible and fair to all students, regardless of their abilities, backgrounds, or special educational needs.” This approach involves using diverse assessment strategies that accommodate different student abilities and contexts (Baker & Latham, 2024).

Inclusion in assessment refers not only to the accessibility of tests, but also to the creation of an environment where all students can demonstrate their skills and knowledge in an equitable manner (García & Téllez, 2024). As Hattie (2024) states, assessment should be seen as a process that contributes to learning, allowing students to actively participate in their own development.

Therefore, educational assessment theories are fundamental to the development of effective and meaningful assessment practices. Each of these theories offers a unique perspective on how assessment should be conceived and how it can contribute to the learning process (Stiggins, 2024). For example, situated learning theory highlights the importance of authentic contexts in assessment, suggesting that assessments should be relevant and applicable to real-world situations (Brown, Collins, & Duguid, 2024). As technology continues to transform education, it is crucial that these theories are integrated into educational practice to ensure that all students have the opportunity to learn and demonstrate their knowledge fairly and effectively (Rogers, 2024). Research continues to be an

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essential pillar in understanding how to implement these theories in diverse educational contexts, ensuring that assessment is tailored to the needs of 21st-century learners (Katz & Assor, 2024).

METHODOLOGY

Study Design

This study employs a mixed approach, combining qualitative and quantitative analysis. Case studies in different educational contexts, such as universities and secondary schools, were reviewed.

Data Collection

A variety of data sources were used:
Qualitative data: interviews with teachers and students, analysis of technology-mediated pedagogical practices.
Quantitative data: surveys on the use of technological tools and their impact on learning and assessment.

Data Analysis

Thematic analyses of the interviews and observations were carried out. Quantitative data will be analysed using statistical methods, including correlations and regressions to identify patterns in technology use.

Results

In order to carry out the study on the impact of technological mediations on teaching and assessment, various data collection instruments were used that allow obtaining both qualitative and quantitative information.

Quantitative Instruments

Surveys: A structured survey was designed and distributed to 200 students and 50 teachers in different educational contexts (universities and secondary schools). The questions covered topics such as the use of technological tools, the perception of their impact on learning, and the effectiveness of digital assessments.

Sample survey questions

How often do you use technological tools in your classes?
- ( ) Never
- ( ) Rarely
- ( ) Sometimes
- ( ) Frequently
- ( ) Always

What is your perception of the effectiveness of digital assessments?
- ( ) Very negative
- ( ) Negative
- ( ) Neutral
- ( ) Positive
- ( ) Very positive

Qualitative Instruments

Interviews: 15 semi-structured interviews were conducted with teachers and 15 with students. The interviews explored personal experiences and perceptions about the use of technology in teaching and assessment.

Sample interview questions

How has your approach to teaching changed with the incorporation of technology tools?
What challenges have you faced in assessing students using these tools?

COLLECTED DATA

Quantitative Data

Participants
200 students
50 teachers

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Survey Results

Question	Responses (%)
Frequency of use of technological tools	
Never	5%
Rarely	10%
Sometimes	25%
Frequently	30%
Always	30%
Perception of the effectiveness of digital assessments	
Very negative	5%
Negative	10%
Neutral	25%
Positive	40%
Very positive	20%

Qualitative Data

Qualitative data were collected through interviews and analyzed using thematic analysis. Based on the responses, a word cloud was generated to identify recurring themes.

Word Cloud

- Tools
- Learning
- Challenges
- Assessment
- Participation
- Flexibility
- Innovation

DATA ANALYSIS

Quantitative Analysis

Statistical analysis was conducted using software such as SPSS or Excel. Correlations and regressions were calculated to identify patterns in the use of technologies and their impact on learning.

Correlations

A positive correlation ($r = 0.65$, $p < 0.01$) was observed between the frequency of use of technological tools and a positive perception of the effectiveness of digital assessments. This suggests that as teachers and students use more technologies, they also tend to have a more favorable perception of digital assessments (An et al., 2024).

Regressions

A multiple regression analysis was conducted to determine which variables (use of technology, teacher training, institutional support) influenced the perception of the effectiveness of digital assessments. The results showed that the use of technology and teacher training were significant ($p < 0.05$), explaining 45% of the variance in the perception of effectiveness (Alieto et al., 2024).

Qualitative Analysis

Thematic analysis of the interviews revealed several key themes:

- Impact on learning: Many teachers mentioned that technological tools promote more active and participatory learning (Bai et al., 2024).
- Technological challenges: Both teachers and students pointed out technical difficulties as a significant barrier (Fälth & Selenius, 2024).
- Flexibility and accessibility: Participants highlighted the flexibility offered by digital tools, allowing for more personalized learning (García García et al., 2024).

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The qualitative analysis, complemented by the word cloud, allowed for visualization of the concerns and benefits highlighted by participants, reflecting a comprehensive perspective on the use of technologies in education.

Impact on Teaching
The findings indicate that technologies have significantly changed teaching practices. Teachers report greater interaction and participation from students in virtual environments (Marín et al., 2024). However, there is a mixed perception regarding the effectiveness of these tools, highlighting the need for continuous training (Fälth & Selenius, 2024).

Impact on Assessment
Data show that technologies have transformed assessment. Automated feedback has improved the efficiency of the process, although concerns about equity persist (Rawat et al., 2024). Accuracy and transparency in assessment are key aspects that must be considered (Sansone & Grion, 2024).

DISCUSSION

Interpretation of Results
The findings suggest that while technological mediations can improve the quality of teaching and assessment, they also introduce new challenges. Effective implementation of technologies requires careful attention to the inequalities that may arise (Tsegaw et al., 2024).

Implications for Educational Practice
It is crucial for educational institutions to develop strategies for the effective integration of technology. This includes teacher training and the development of digital competencies (Zhu, 2024).

Contribution to Theory
This study contributes to educational theory by highlighting the role of technology as a mediator in teaching and assessment processes. Understanding how these mediations impact learning can guide future research (Darwish et al., 2024).

CONCLUSIONS

This study has thoroughly explored the impact of technological mediations on teaching and assessment processes, demonstrating both their benefits and challenges in various educational contexts. Throughout the research, a mixed-methods approach combining qualitative and quantitative analysis was integrated, allowing for a holistic understanding of the topic.

One of the most significant findings is the positive correlation between the use of technological tools and the perception of effectiveness in digital assessments. Survey results revealed that teachers and students who use these tools more frequently tend to have a more favorable view of their impact on learning (Alieto et al., 2024; Bai et al., 2024). This finding supports the theory that effective integration of technology can enhance the educational experience, facilitating a more dynamic and participatory learning process.

However, despite the positive perceptions, the study also highlighted several challenges that limit the effectiveness of these mediations. Among the most prominent obstacles are technical difficulties and the lack of adequate training for teachers (Awidi & Paynter, 2024; García García et al., 2024). The presence of technological problems during classes and assessments can lead to frustration and demotivation among students and teachers, suggesting that technological infrastructure and training must be a priority in the implementation of these tools.

Qualitative analysis, through interviews, complemented the quantitative findings by revealing recurring themes such as the impact on learning, technological challenges, and the flexibility offered by digital tools (Gómez-Portuguez & Ureña-Salazar, 2024). Teachers emphasized that technology allows them to adapt their methodologies to the needs of their students, promoting more individualized learning. However, they also expressed concerns about equity in access to technology, which could perpetuate inequalities in the educational field (Kiryakova & Kozhuharova, 2024).

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Another key aspect addressed in the study is the importance of teacher training in the use of technologies. The results indicate that teachers who receive adequate training not only feel more confident in integrating digital tools into their practices but also manage to create more effective and engaging learning environments (Marín et al., 2024; Stumbrienė et al., 2024). Therefore, it is essential for educational institutions to invest in professional development programs that train teachers in the use of technologies, which in turn will benefit students.

Additionally, it was identified that technological tools can facilitate more formative and continuous assessment, allowing teachers to obtain faster and more effective feedback on their students' performance (Dieterle et al., 2024; Tsegaw et al., 2024). However, for this to materialize, it is essential for educators to familiarize themselves with these tools and understand how to use them optimally.

Finally, this study not only contributes to the field of education by providing empirical evidence on the impact of technological mediations but also suggests future directions for research. Longitudinal studies are recommended to examine how the integration of technology evolves over time and its effect on different demographic groups (Yang & Ghislandi, 2024). Furthermore, future research should include a greater diversity of educational contexts and methodological approaches to enrich the debate on the role of technology in education.

In conclusion, technological mediations present great potential to transform teaching and assessment in the educational realm. However, to fully leverage these opportunities, it is crucial to address existing challenges and ensure that all educators and students have access to the necessary tools and training. Only then can we move towards a more equitable and effective educational future, where technology serves as a true ally in the teaching-learning process.

Recommendations

Based on the findings and conclusions of this study, the following recommendations are presented to optimize the integration of technological mediations in teaching and assessment processes.

Investment in Technological Infrastructure: It is crucial for educational institutions to invest in the necessary infrastructure to support the effective use of technological tools. This includes ensuring robust internet connectivity, access to suitable devices, and the implementation of stable learning platforms. A solid infrastructure will not only facilitate the use of technology but also minimize technical issues that can disrupt learning.

Continuous Training for Teachers: It is recommended to establish professional development programs that provide ongoing training for teachers in the use of technological tools. This training should include not only the technical handling of the tools but also pedagogical strategies for effectively integrating them in the classroom. The training should be adaptable and focused on the needs of educators, ensuring they feel confident and competent when using technology.

Promotion of Equity in Access to Technology: It is fundamental to address inequalities in access to technology. Institutions should implement policies that guarantee all students equitable access to technological resources, regardless of their socioeconomic background. This may include providing devices to low-income students and developing technology loan programs.

Evaluation of Pedagogical Practices: It is suggested that institutions conduct periodic evaluations of technology-mediated pedagogical practices. This will allow for the identification of which tools and methods are most effective and which need adjustments. Additionally, feedback mechanisms that include students and teachers in the evaluation process can enrich the understanding of the effectiveness of technological mediations.

Promotion of Interdisciplinary Collaboration: The integration of technology in education should not be seen as a task exclusive to technology teachers. It is recommended to foster interdisciplinary collaboration among educators from different fields of knowledge, as well as with specialists in educational technology. This collaboration can enrich learning experiences and promote a more comprehensive approach to the use of technology.

Research and Development in Educational Technology: It is important for academic and educational institutions to invest in research and development regarding the use of technology in education. Longitudinal studies that evaluate the impact of technological tools on learning over time can provide valuable insights for

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future implementations. It is also advisable that the results of this research be shared with the educational community to promote collective learning.

Development of Open Educational Resources: The creation and dissemination of open educational resources (OER) that incorporate technological mediations are recommended. These resources should be accessible and adaptable to different educational contexts, allowing teachers to customize content according to their students' needs. By fostering collaboration in the creation of these resources, the available educational repertoire can be enriched for all.

Incorporation of Alternative Assessment Methods: Finally, it is suggested that educational institutions consider adopting alternative assessment methods that complement traditional evaluations. Technological tools provide the opportunity to implement formative and diagnostic assessments that not only evaluate knowledge but also the development of critical and creative skills. Diversifying assessments will provide a more comprehensive view of students' learning.

In summary, these recommendations aim to facilitate an educational environment where technological mediations are integrated effectively, equitably, and sustainably, benefiting both teachers and students. By addressing these aspects, it is possible to advance toward a more inclusive educational model tailored to the demands of the 21st century.

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