Enhancing Pedagogical and Digital Competencies through Digital Tools: A Proposal for Semi-Schooled Language Teaching Programs in Oaxaca, Mexico

José de Jesús BAUTISTA HERNÁNDEZ
Instituto Politécnico Nacional, Centro de Investigaciones Económicas, Administrativas y Sociales
Mexico City 11360, Mexico

Dr. Eduardo BUSTOS FARÍAS
Instituto Politécnico Nacional, Escuela Superior de Comercio y Administración Unidad Santo Tomás
Mexico City 11340, Mexico

Dra. Norma Patricia MALDONADO REYNOSO
Instituto Politécnico Nacional, Centro de Investigaciones Económicas, Administrativas y Sociales
Mexico City 11360, Mexico

ABSTRACT

This study aimed to strengthen the pedagogical and digital competencies of students enrolled in the semi-schooled bachelor's degree program in Language Teaching at the Universidad Autónoma "Benito Juárez" de Oaxaca (UABJO) through the context-sensitive integration of digital tools. The research responds to the technological limitations and digital divide that hinder academic performance in the state of Oaxaca, Mexico. Employing a mixed-methods action research design, the study combined surveys, interviews, direct observation, and analysis of digital outputs to iteratively evaluate the effectiveness of implemented instructional strategies. Preliminary findings revealed significant barriers, including unequal internet access, limited technological infrastructure, and insufficient teacher training. Despite these challenges, the appropriate use of ICT was found to enhance student motivation, autonomous learning, and instructional quality. The study's practical implications include the development of scalable and replicable strategies for similar educational contexts, along with policy recommendations aimed at fostering inclusive digital education. The value of this research lies in its situated approach, its potential for broader application, and its contribution to teacher preparation in underserved regions. Moreover, it offers a critical and innovative perspective on the transformative role of ICT in education, particularly in environments marked by structural limitations.

Keywords: English Teachers, Action Research, Information Technology.

INTRODUCTION

The research focuses on strengthening the pedagogical and digital competencies of students enrolled in the semi-schooled bachelor's degree program in Language Teaching at the Universidad Autónoma "Benito Juárez" de Oaxaca (UABJO). This study emerges in response to the technological and pedagogical limitations faced by future educators in contexts of high digital vulnerability, such as the state of Oaxaca, where only 55% of the population has access to the internet [1]. The COVID-19 pandemic further underscored the urgent need to integrate digital tools into teacher education, particularly in hybrid and distance learning programs.

The overarching objective is to design and implement ICT-mediated instructional strategies that enable students to develop both pedagogical and digital skills, thereby enhancing their academic and professional performance. The research is framed within the line of inquiry "Science and Technology in Context," adopting a CTS+I (Science, Technology, Society, and Innovation) approach. It seeks not only to reduce the digital divide but also to transform teaching practices through the critical and reflective use of technology.

Today's digital literacy is considered a foundational skill in modern education, it involves the ability to navigate, evaluate, and produce digital content while keeping track of rapidly evolving technological environments. Fraillon et al. argue that digital literacy is not simply a technical ability, but a crucial facilitator of innovative teaching methods [2]. Ertmer's observations reflect the kind of barriers one may encounter when integrating any kind of technology, in that they include first-order barriers such as lack of infrastructure, and second-order barriers such as unwillingness to change or lack of sufficient training [3]. In places like Oaxaca, it becomes apparent that looking for these barriers at the confluence of cultural and linguistic diversity should make any solution possible and practical.

This research analyzes the use of digital tools in teaching semi-school language programs at the Universidad Autónoma Benito Juárez de Oaxaca (UABJO). Although these programs are designed to engage and serve different

types of students, they are also characterized by limited access to adequate technology, limited opportunities for professional growth, and sociocultural constraints, among others. This research seeks to offer some pedagogical interventions to these problems to improve the practices of educators and students.

In addition, there is an additional evaluation of the training of trainers, which examines aspects of socioeconomic digital inclusion. The digital skill of the 21st century teacher is considered as the level at which he or she teaches by engaging students [2]. Also, new realities related to the scope and practice of online education are explored, as well as how teachers of semi-school language programs are trained or taught. The literature advocates for a more technologically-driven, self-regulatory and self-improvement approach to the self-provision of students' digital literacy [3].

Furthermore, as with any other major community, this analysis of the barriers and obstacles to the adoption of digital technologies in marginalized cultures is indisputably one of the most significant parts of this study. Effective integration of educational technology requires relevant socioeconomic opportunities, digital literacy, and reliable internet service. This study will explore best practices from other similar educational contexts in the hope that they will help develop specific strategies for Oaxaca.

Oaxaca's socioeconomic problems stem from historical and systemic injustices. High levels of poverty estimated at over sixty percent, poor internet connectivity, and a high level of Indigenous peoples in the area, the state shows the difficulties of

achieving social justice in education among resource-limited settings [4]. The COVID-19 pandemic made these challenges even worse, as the sudden shift to online learning painfully exposed the stark differences in access to devices. The present study delves into these problems by crafting a pedagogical approach suited to the characteristics of UABJO's semi-school programs. The framework is intended to address the challenges of the digital divide and pursue sustainable educational equity by simultaneously improving pedagogical and digital skills.

LITERATURE REVIEW

Among the main gaps in education that need to be addressed is the one resulting from the lack of digital competence. In this regard, Fraillon et al. observe that digital competence is not only about the technical aspects, but also includes a critical and evaluative disposition, the ability to perform tasks and collaborate in a computerized environment [5]. Such competences are crucial for educators who have the responsibility of integrating technology into their workflow. However, as Ertmer

points out, there are first-order barriers, such as devices and access to connectivity, and second-order barriers such as lack of evidence, change and motivation to learn new methods, which tend to affect the acceptance of digital tools in teaching and learning [6].

Research on culturally responsive pedagogy emphasizes the need to integrate the context of practice into educational processes. Where Indigenous communities, as in the case of Oaxaca, are predominant, there is a real need for digital content to be multilingual to spark interest and appropriate students' cultures [7]. It has been conceded that students exposed to culturally relevant practices are more likely to perform better than those who are not, especially within disadvantaged populations. For example, the use of Indigenous languages in the development of digital tools has proven successful in improving learning outcomes in rural Mexico, indicating strong potential for localized approaches [8].

Developed Knowledge Economies share the view that the adoption of Information and Communication Technologies (ICT) as a tool in the design of educational programs is a necessity. The introduction of computing and digital devices into the educational system has transformed the retrieval, processing, and application of information. As Atiaja (2021) points out, with the advent of technology, individuals can now access significantly more information without encountering traditional structural barriers. This advancement fosters global collaboration [9]. As Huth et al. (2017) say, ICTs include all means of communication, mobile phones, computers, the Internet, satellite technology, etc. In addition to providing immediate access to knowledge, these technologies encourage people to interact with content critically [10].

Additional findings on the effective use of digital tools in the educational process come from procurement and research being conducted in different countries. For example, in India there was talk about connecting and training teachers in rural areas under the "Digital India" program. Similarly, in sub-Saharan Africa, programs were implemented that used mobile phone technologies to bring educational materials to students living in remote areas of the country [11]. These examples underline how effective tools, even under conditions of scarce resources in countries, can be used, but considering local needs.

RESEARCH OBJECTIVES

The main aim of this research is to design and put into practice a teaching model that embraces digital tools at the UABJO semi-schooled language program. The identification of missing factors in the implementation, the development of recommendations for the implementation and the evaluation of the effects of the implementation for students. Establishing its objectives

will allow the investigated problem to be linked to a broader context of reducing the digital divide and increasing accessibility to education.

METHODOLOGY

The study adopted a mixed-methods approach grounded in action research, which enabled a cyclical and reflective educational intervention. This approach was structured into five phases: diagnosis, planning, action, observation, and reflection. The target population consisted of 277 students enrolled in the semi-schooled program, from which a representative sample of 160 students was selected and evenly distributed across the 1st, 3rd, 5th, and 7th semesters.

The data collection techniques included:

• Structured surveys to gather quantitative data on access to, use of, and perceptions regarding ICT.

• Semi-structured interviews with students and faculty to explore experiences and barriers in the use of digital tools.

• Direct observation within virtual learning environments.

• Analysis of digital outputs, such as collaborative projects and student presentations.

Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were examined through the Atlas.ti software. The triangulation of results served to validate the findings and enrich the overall interpretation.

The mixed methods approach is adopted in this concrete research. Studying the problem of technology integration in UABJO semi-school programs, the first stage provides for a diagnostic approach aimed at identifying barriers and opportunities. After that, students and educators will participate in surveys assessing their competencies in relation to technology and understanding of digital. These quantitative data will be enriched through qualitative data obtained from focus groups that will seek to understand how cultural and social factors, such as language, shape the technological experience [12]. In addition, institutional audits will enrich the research design by outlining the comprehensive perspective of infrastructural readiness through investigating the scope and efficiency of available digital resources [13].

This research analyzes and evaluates how digital literacy impacts language teachers and their ability to teach by examining the potential for innovation in the classes they teach. In addition, the analysis investigates whether teacher development programs adequately prepare teachers to use hybrid learning pedagogical techniques. A thorough review of existing literature seems to indicate that institutional availability and support have a substantial influence on a teacher's ability to employ digital technology in their teaching methods [14] [15].

In the second phase, a pedagogical framework will be designed incorporating the findings of the diagnostic assessment. This would include learning models that mix face-to-face teaching with online modules, engaging elements such as gamification to keep students engaged, and collaboration tools such as Google Workspace and Microsoft Teams. Attention will also be paid to the localization of the content, to ensuring its applicability to the ethnographic and linguistic characteristics of Oaxaca [16]. Instructional units will be created for teachers to improve their competence in using digital platforms, while for students such activities will be structured in a way that improves students' digital literacy skills and academic performance.

When planning the digital transformation of education in Oaxaca, the historical, cultural, and linguistic particularities of the region must be considered. Since a large portion of students are part of Indigenous groups, the use of digital tools must be done in relation to such factors, ensuring the availability of multilingual, culturally appropriate, and Indigenous-sensitive content and teaching materials. Furthermore, teacher training programs must go beyond ensuring that technology is used effectively and focus on training educators to be culturally sensitive to the extent that digital education is designed and implemented in the context of the student experience in Oaxaca.

The last phase concerns the incorporation of the framework to be evaluated by participants in target groups of UABJO's semi-curricular programs. Pre- and post-intervention assessments will be conducted to determine the results of the intervention in terms of digital competence, academic performance and teaching effectiveness. Qualitative feedback from participants will be collected to improve the framework and make it adjustable and scalable.

Case studies from other countries have also shown that successful digital integration in education correlates with the availability of training opportunities, institutional commitment, and culturally responsive pedagogy [17]. This research seeks to situate Oaxaca's semi-school programs in broader discussions about educational inequality and the digital divide by framing this within the context of global multiliteracies.

DISCUSSION

The findings confirm that the integration of digital tools in teacher education is not only necessary but urgent—particularly in contexts such as Oaxaca, where the digital divide directly impacts educational equity. The research demonstrates that, despite technological limitations, it is possible to design effective pedagogical strategies that foster the development of key 21st-century competencies.

The action research approach enabled the adaptation of interventions to the real needs of students, resulting in a model that can be replicated in other institutions with similar characteristics. Moreover, the combination of qualitative and quantitative methods provided a comprehensive understanding of the phenomenon, allowing for the identification of both obstacles and opportunities for improvement.

In terms of value and originality, this study offers an innovative and context-sensitive proposal for teacher training in semi-schooled environments. Its situated, ethical, and participatory approach makes it a relevant contribution to the design of inclusive and sustainable educational policies. Furthermore, it underscores the importance of preparing teachers who are critical, reflective, and competent in the use of technology—educators capable of transforming their communities through more equitable and digitally integrated education.

The research findings reaffirm the existence of several interrelated obstacles towards digital engagement in Oaxaca, hence the insistent need for a targeted approach to address infrastructural, cultural and pedagogical issues. Among the most critical barriers are infrastructural limitations, including lower broadband internet connectivity, lower penetration and access to devices, as well as disparities in the distribution of technological resources. These statistics are supported by INEGI on rural and Indigenous communities, where these constructs are worse off due to the dire consequences of poverty [18]. In these regions, unless aggressive infrastructural development plans are made, students and teachers will remain excluded from digital-age education, widening the educational gap that already exists.

Cultural resistance to the use of digital tools is an issue worth noting in this study. Indigenous communities that make up around 70 percent of the population in Oaxaca often view the provision of digital education as a concept alien to their language and culture. Note that this can also cause indifference towards using these tools in the first place, despite its apparent simplicity. The answer to this problem involves the use of Indigenous languages and culture within digital content [19]. For example, incorporating bilingualism into the user interface of the tools, along with their relevant educational content, can increase the acceptance and participation of these communities. These efforts not only help address the challenge of the digital divide but also enhance the collective identity of Indigenous peoples; therefore, technology does not supplant their culture but rather complements it.

Overcoming these barriers has been favored through teacher training as the most important factor. However, professional development programs should not be limited to technical aspects of teaching but should help develop critical thinking processes in relation to the use of digital

tools in stronger engagement and learning. It is argued that it is more effective for educators to go through training modules that mix theory with practical application components, so that they are equipped with the confidence and knowledge on how to practice technology in their teaching [20]. For example, workshops that simulate real classrooms and use collaborative problem solving can be used by teachers to evaluate different digital tools in a safe situation. An additional point is that these programs must be in place and flexible to support teachers in various contexts and situations as they arise in the digital education field.

Another important aspect of sustainable digital integration is the level of institutional and political support. Governors and educational authorities must make efforts to invest in broadband expansion, device distribution, and the creation of community learning centers with technologies. Such investments are even more necessary in underserved and disadvantaged communities that have limited access to connectivity and devices. In addition, policies designed to ensure equal opportunities to use digital resources are necessary, to ensure that all students and all educators from low-income families have advanced technology [21].

It is quite clear that public-private partnerships have a significant role in addressing resource gaps. Integration with technology providers, NGOs, and local communities can bring resources and skills to sustain the delivery of digital education projects. For example, mobilizing partnerships with technology companies can result in the provision of necessary devices and software, while NGOs can assist in the appropriate training that is needed. However, community engagement is critical as it ensures that digitized education is tailored to the needs of the local population. Involving community stakeholders in building and/or delivering these initiatives builds commitment and accountability that improves the chance of success of the initiatives.

Aside from overcoming existing limitations, this analysis details the broad ramifications of digital mainstreaming in relation to equity and social inclusion in education. Bringing technology into schools can truly transform them into more welcoming and engaging places that cater to the unique needs of every student. For those from disadvantaged backgrounds, having access to digital education can open doors to better economic opportunities and greater involvement in their communities, empowering them to play an active role in society. Furthermore, knowledge of technology is considered an essential requirement for employees in the current era, and therefore, imparting these skills to students is an important aspect for their employability in the future.

The findings also provide suggestions on the need to evaluate and document successful programs on a larger scale. Programs such as those in the present research are

useful in providing the necessary information on what to do and what not to do situations. But since these are currently focused and localized, it is essential to look for broader mechanisms for them to have greater impact. This means that systems for scaling up need to be thought out in advance, including the necessary monitoring and evaluation of progress and areas for improvement. It also includes long-term financial and organizational support, and good organizational adaptability.

Finally, the present study highlights the importance of a bigger picture perspective in the field of digital education. It is true that there are problems that demand immediate action, but substantial and long-term change can only be achieved by integrating constant changes. Educational entities cannot afford to be passive in their approach but rather must embrace new technologies and practices in view of the rapid evolution of the digital age. There must be interaction between policy makers, educators, and researchers, and any development related to the integration of digital elements must be at all levels, including resources and pedagogy.

Overall, the expanded view presents other integration problems in Oaxaca and, therefore, the need for comprehensive and contextualized approaches. By addressing the problems of infrastructural deficits, appreciating the cultural context, investing heavily in the professional development of teachers, and effectively engaging institutions, this study has contributed in the quest to advance digital equity in disadvantaged communities. These efforts have implications not only in classrooms but contribute to better and more equitable educational systems that allow communities to function in the digital age.

CONCLUSIONS

This research proposal highlights the appropriate context to address the integration of exceptional tools into broad semi-school language teaching programs along with digitalization in Mexico, especially in Oaxaca, where it contributes to educational inequity due to historical technological and socioeconomic inequalities. If students and educators are provided with the opportunities to develop digital and pedagogical competencies, the proposed framework aims to close the gap and build more equitable learning environments. There is a strong emphasis is placed on on both infrastructural and educational issues that promote the entire purpose of this research. Furthermore, there is great importance in adapting digital material effectively for learning and maintaining it in diverse local contexts of Oaxaca reflecting students' sustained interest in using these tools in the long term.

Due to the inclusion of mobile learning applications, cloud-based learning management systems, and AI educational tools, this study goes beyond conventional hybrid learning frameworks.

Furthermore, the results highlight the importance of establishing effective collaboration between the education and government sectors, as well as the private technology sector, for the digital interventions undertaken to be sustainable in the long term. A robust digital infrastructure that caters to the needs of both educators and students must be created to achieve greater impact in the future.

One of the objectives of the methodological framework designed in this study is to identify strategies to advance performance in metrics that specifically target digital literacy, including the diagnosis, design, and evaluation of the effectiveness of the designed educational interventions. These strategies have the potential to be effective in improving academic performance and reducing transition challenges within educational frameworks in the future. Incorporating hybrid learning delivery modes, gamified content, and customized teacher training modules underscores the need for contextually appropriate solutions. As evidenced, these strategies are consistent with global best practices and can potentially serve as a replicable model in similar educational settings. As for the anticipated outcome, the increased measurable outcomes obtained in educational processes emphasize the fact that systemic barriers can, in fact, be addressed through well-planned and targeted interventions.

Likewise, this research emphasizes the need for support at both institutional and policy levels to sustain ongoing digital integration efforts. For the integration and sustainability of these initiatives, it is particularly important to develop digital infrastructure, train teachers, and make free available teaching and learning materials. As digitalization continues to change the face of education systems around the world, this research offers pertinent insights into technology, teaching methods and cultural adaptation, thereby illustrating how educational equity can be achieved in regions that have previously been underserved.

Exploring the use of adaptive learning analytics as a means of improving instructional design is a future area of research to focus on, as well as developing specialized training programs for language teachers. Also, the study will be extended to other developing countries to uncover effective digital learning strategies for disadvantaged societies.

Lastly, the research shows the importance of institutional readiness and commitment to support as well as policy interventions to facilitate long-term digital transformation in education.

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