

Beyond Additive Trilingualism: Digital Equity and Translanguaging Pedagogies for English as a Third Language in Indigenous Communities of Latin America

Más allá del trilingüismo aditivo: equidad digital y pedagogías translenguaje para el inglés como tercera lengua en comunidades indígenas de América Latina

Oltre il trilinguismo additivo: equità digitale e pedagogie di translanguaging per l'inglese come terza lingua nelle comunità indigene dell'America Latina

Eduardo Andrés Rivadeneira Sornoza^I
erivadeneiras@unemi.edu.ec
<https://orcid.org/0009-0005-8287-2228>

Brigita Valerina Ledesma Acosta^{II}
bledesmaa@unemi.edu.ec
<https://orcid.org/0000-0002-5982-9273>

Jason Christopher Bravo Criollo^{III}
bravojason31@unemi.edu.ec
<https://orcid.org/0009-0003-3853-7399>

Yuleidy Valeria Salazar Vallejo^{IV}
ysalazarv@unemi.edu.ec
<https://orcid.org/0009-0001-4824-7040>

Correspondence: erivadeneiras@unemi.edu.ec

Research Article

*** Received:** April 10, 2026 ***Accepted:** July 30, 2026 *** Published:** August 11, 2026

- I. State University of Milagro (UNEMI), Milagro, Ecuador.
- II. State University of Milagro (UNEMI), Milagro, Ecuador.
- III. State University of Milagro (UNEMI), Milagro, Ecuador.
- IV. State University of Milagro (UNEMI), Milagro, Ecuador.

Abstract

The expansion of English in Latin America is often presented as a strategy for educational and economic mobility, but in Indigenous communities it may overlap with pre-existing linguistic and digital inequalities. This article analyzes the conditions under which technology can support the learning of English as a third language without weakening Indigenous languages or widening access gaps. Through a critical integrative review and comparative analysis of regional evidence, studies on intercultural bilingual education, translanguaging, teacher education, language revitalization, and digital education are brought together with cases from Uruguay, Chile, Mexico, Peru, and the Colombian Amazon. The results reveal a paradox: connectivity can offset teacher shortages and increase exposure to English, but its effect depends on strong literacy in the Indigenous language and Spanish, culturally situated content, teachers capable of managing multilingual repertoires, and community governance of digital resources. The Digitally Just Trilingual Ecosystem Model is proposed, integrating six conditions: L1 continuity, L2 strengthening, English as L3, resilient infrastructure, teacher mediation, and linguistic-digital sovereignty. It concludes that digitization without these safeguards may modernize inequality; with them, technology can become infrastructure for sustainable multilingual justice in the region.

Keywords: Indigenous education; English as a third language; digital equity; translanguaging; linguistic justice.

Resumen

La expansión del inglés en América Latina suele presentarse como una estrategia para favorecer la movilidad educativa y económica; sin embargo, en las comunidades indígenas puede superponerse a desigualdades lingüísticas y digitales preexistentes. Este artículo analiza las condiciones bajo las cuales la tecnología puede apoyar el aprendizaje del inglés como tercera lengua sin debilitar las lenguas indígenas ni ampliar las brechas de acceso. Mediante una revisión integrativa crítica y un análisis comparativo de evidencia regional, se articulan estudios sobre educación intercultural bilingüe, translenguaje, formación docente, revitalización lingüística y educación digital con experiencias de Uruguay, Chile, México, Perú y la Amazonía colombiana. Los resultados revelan una paradoja: la conectividad puede compensar la escasez de docentes y aumentar la exposición al inglés, pero su impacto depende de una sólida alfabetización en la lengua indígena y en español, de contenidos culturalmente situados, de docentes capaces de gestionar repertorios multilingües y de una gobernanza comunitaria de los recursos digitales. Se propone el Modelo de Ecosistema Trilingüe Digitalmente Justo, que integra seis condiciones: continuidad de la L1, fortalecimiento de la L2, inglés como L3, infraestructura resiliente, mediación docente y soberanía lingüístico-digital. Se concluye que la digitalización, sin estas salvaguardas, puede modernizar la desigualdad; con ellas, la tecnología puede convertirse en una infraestructura para una justicia multilingüe sostenible en la región.

Palabras clave: educación indígena; inglés como tercera lengua; equidad digital; translenguaje; justicia lingüística.

Riassunto

L'espansione dell'inglese in America Latina viene spesso presentata come una strategia per favorire la mobilità educativa ed economica; tuttavia, nelle comunità indigene può sovrapporsi a disuguaglianze linguistiche e digitali preesistenti. Questo articolo analizza le condizioni in cui la tecnologia può sostenere l'apprendimento dell'inglese come terza lingua senza indebolire le lingue indigene né ampliare i divari di accesso. Attraverso una revisione integrativa critica e un'analisi comparativa delle evidenze regionali, vengono messi in relazione studi sull'educazione interculturale bilingue, il translanguaging, la formazione degli insegnanti, la rivitalizzazione linguistica e l'educazione digitale con esperienze provenienti da Uruguay, Cile, Messico, Perù e Amazzonia colombiana. I risultati evidenziano un paradosso: la connettività può compensare la carenza di insegnanti e aumentare l'esposizione all'inglese, ma il suo impatto dipende da una solida alfabetizzazione nella lingua indigena e in spagnolo, da contenuti culturalmente contestualizzati, da docenti capaci di gestire repertori multilingui e da una governance comunitaria delle risorse digitali. Viene proposto il Modello di Ecosistema Trilingue Digitalmente Equo, che integra sei condizioni: continuità della L1, rafforzamento della L2, inglese come L3, infrastrutture resilienti, mediazione docente e sovranità linguistico-digitale. Si conclude che la digitalizzazione, in assenza di tali garanzie, può modernizzare la disuguaglianza; con esse, invece, la tecnologia può diventare un'infrastruttura per una giustizia multilingue sostenibile nella regione.

Parole chiave: educazione indigena; inglese come terza lingua; equità digitale; translanguaging; giustizia linguistica.

Introduction

The expansion of English language teaching in Latin America has repeatedly been linked to academic mobility, employability, access to scientific information, and participation in global economic networks. However, when this agenda reaches Indigenous territories, it does not enter an empty linguistic space: it overlaps with repertoires in which an Indigenous language may function as the first language (L1), Spanish or Portuguese as the language of schooling and administration (L2), and English as an additional language (L3). This linguistic architecture matters because Indigenous communities in the region continue to experience structural inequalities in school retention, infrastructure, teacher availability, and curricular relevance. The article by Fabre-Triana et al. (2025), which serves as the immediate antecedent to this review, argues that English can be incorporated additively when institutional safeguards exist for literacy in the Indigenous language and academic Spanish. The present study shifts the focus: it asks not only whether trilingualism is desirable, but whether the digital media now presented as a solution to teacher shortages can sustain that trilingualism equitably.

The digital dimension substantially changes the nature of the problem. In Latin America and the Caribbean, the adoption of platforms, videoconferencing, mobile resources, and educational artificial intelligence is advancing within a system where access remains deeply unequal. Based on PISA 2022, the World Bank reports that only 66% of students in the region attended schools with online learning platforms considered effective, and only about three in ten studied in schools where incentives existed for teachers to integrate technology into their practice (World Bank, n.d.). In Indigenous territories, the gap may be much wider: a World Bank survey in Colombia's Amazonas department found frequent internet access in only 6% of Indigenous households, compared with 22% of non-Indigenous households; moreover, during COVID-19 school closures, 85% of students in disconnected households studied independently using printed materials, 12% left the formal education system, and only 7% were able to attend online classes using public or borrowed connectivity (Comini et al., 2024). Thus, presenting technology as a neutral solution may conceal the fact that digital infrastructure reproduces territorial, economic, and ethnic inequalities.

The connectivity gap is compounded by a gap in linguistic representation. Language technologies and digital educational resources are more readily developed for languages with large corpora, standardized orthographies, abundant digital content, and large markets. Mager et al. (2018) documented that Indigenous languages of the Americas have received comparatively limited technological attention and face extremely low-resource conditions. UNESCO and Global Voices (Llanes-Ortiz, 2023) warn that digitization can contribute to language revitalization through software localization, content, archives, keyboards, dictionaries, and community networks, but it also requires governance, sustainable connectivity, and community control over linguistic heritage. This tension aligns with translanguaging: instead of treating L1, L2, and L3 as separate compartments, translanguaging pedagogy draws on the learner's full repertoire to build comprehension, metalinguistic awareness, and identity (García & Wei, 2014; Cenoz & Gorter, 2021). The challenge, therefore, is not simply to add devices to the English classroom, but to design an ecosystem in which technology expands opportunities to use all three languages and does not concentrate prestige, content, and assessment exclusively in English and Spanish.

The available literature provides pieces of this puzzle, but few studies simultaneously integrate linguistic justice, intercultural education, English language teaching, connectivity, teacher education, and digital sovereignty. The most frequently cited cases illustrate both opportunities and limits: Plan Ceibal demonstrates that videoconferencing can expand access when specialist teachers are scarce; the English Opens Doors program shows the importance of sustained professional development policies; Na’atik highlights the value of community spaces that connect English, Spanish, and Maya; and experiences in intercultural bilingual education in Mexico, Peru, and Chile remind us that the continuity of Indigenous languages depends on curricular, teaching, and policy decisions that connectivity alone cannot resolve (Matear, 2008; Liñán et al., 2023; Moya-Santiago & Quiroga-Curín, 2022). Based on these tensions, the question guiding this article is: under what conditions of L1 and L2 continuity, connectivity, teacher education, community governance, and pedagogical design can technology support the learning of English as L3 in Latin American Indigenous communities without deepening the digital divide or contributing to the displacement of Indigenous languages?

Methodology

A critical integrative review with comparative case analysis was conducted. The design was inspired by the argumentative procedure used by Fabre-Triana et al. (2025): prioritizing recent Latin American literature, selectively incorporating foundational works, and using emblematic programs as explanatory cases without presenting their institutional results as definitive causal evidence. Unlike a systematic review aimed at estimating effect sizes, the purpose was to integrate heterogeneous evidence peer-reviewed articles, academic books, documents from international organizations, and institutional reports to identify conditions for the transferability and sustainability of digital English-as-L3 teaching in Indigenous contexts.

2.1. Construction of the Documentary Corpus

The corpus was constructed in three layers. The first drew on the bibliography and cases from the antecedent article, particularly work on additive bilingualism, intercultural education, translanguaging, linguistic identity, teacher education, and English language policies. The second incorporated later sources or sources directly related to digital equity and technologies for

Indigenous languages, including UNESCO guidance on digital initiatives for Indigenous languages (Llanes-Ortiz, 2023), the global guidance on multilingual education (UNESCO, 2025), World Bank data on regional digital education and the connectivity gap in the Colombian Amazon (Comini et al., 2024; World Bank, n.d.), as well as literature on low-resource language technologies (Mager et al., 2018). The third layer recovered classic theoretical works essential for interpreting the problem—Lambert, Cummins, Hornberger, García, Ladson-Billings, Mignolo, and Quijano—even when they fell outside the prioritized time window.

2.2. Inclusion and Exclusion Criteria

Publications from 2015 to 2026 were prioritized when they addressed empirical evidence, policies, or recent technological developments; earlier works were admitted when they constituted theoretical foundations or regional antecedents not superseded by more recent literature. Studies concerning Indigenous peoples of Latin America, intercultural bilingual education, the teaching of English or additional languages, translanguaging, language revitalization, the digital divide, educational technology, and teacher education were included. Institutional documents were used for figures on coverage, program reach, and infrastructure conditions and were analytically classified as descriptive evidence. Impact claims that could not be traced to an identifiable source were excluded, and long-term effectiveness was not inferred from short-term internal metrics.

2.3. Extraction, Comparison, and Synthesis

Five dimensions were extracted from each source: (a) the function attributed to the Indigenous language; (b) the role of academic Spanish or Portuguese; (c) the place of English in the curriculum; (d) technological and teacher-education conditions; and (e) available evidence on access, learning, continuity, or revitalization. The cases were compared using a transferability matrix that distinguished scale, modality, linguistic architecture, strength of evidence, and implementation risks. The figures presented in the tables come from the cited sources and were not estimated. When a source reported institutional information without independent evaluation—for example, program reach or number of scholarships—that evidentiary nature was retained in the interpretation.

2.4. Analytical Strategy

The synthesis was conducted through explanatory comparison, seeking convergent patterns and contradictions across cases. The central criterion was to distinguish access from sustainability: a program may increase the number of students exposed to English without guaranteeing continuity of the Indigenous language, the quality of teacher mediation, or the durability of infrastructure. From this comparison, the Digitally Just Trilingual Ecosystem Model (DJTEM) was formulated as a conceptual proposal integrating six recurring conditions in the literature. The model is not presented as a validated scale, but as a design and evaluation framework that generates hypotheses open to empirical testing.

2.5. Methodological Limitations

This review is not a meta-analysis and does not claim bibliometric exhaustiveness. Regional evidence remains fragmented, few longitudinal studies focus specifically on English as L3 among Indigenous students, and several emblematic programs publish mainly institutional reports. Cross-country comparisons should be interpreted cautiously because the indicators come from different years, educational levels, and methodologies. Precisely because of this heterogeneity, the article emphasizes design conditions, risks, and transferability rather than rankings of effectiveness.

Results

3.1. Inequality Preceding English Is Cumulative

The first recurring pattern is that English language teaching does not begin from comparable conditions for Indigenous and non-Indigenous students. Regional literature had already documented gaps in school completion, teacher availability, and English provision (Cronquist & Fiszbein, 2017; UNESCO, 2020). Recent digital evidence adds a second layer of inequality: even within systems expanding platforms and devices, effective access declines in rural territories and Indigenous communities. In the Colombian Amazon, more than half of the households in the analyzed sample lacked an online connection, and service costs could reach 17% of the monthly income of households in the poorest segment (Comini et al., 2024). Consequently, a digital English policy may appear universal by design while remaining selective in practice.

Table 1. Verifiable Indicators Conditioning Digital English-as-L3 Teaching

Indicator	Scope	Reported data	Implication for the problem	Source
Secondary school completion	Panama	Indigenous: 21%; non-Indigenous: 61%	40-percentage-point gap	UNESCO (2020), cited and discussed by Fabre-Triana et al. (2025)
English provision in secondary education	Costa Rica	100% of secondary schools	High national coverage; does not imply intercultural relevance	Cronquist & Fiszbein (2017)
English provision in public schools	Panama	≈11%	Historically limited coverage, concentrated outside Indigenous regions	Cronquist & Fiszbein (2017)
Officially qualified English teachers	Peru, secondary education	27%	Bottleneck to expanding quality English provision	Cronquist & Fiszbein (2017)
Effective online learning platform	Latin America and the Caribbean	66% of students	School digitalization remains incomplete	World Bank (n.d.), based on PISA 2022
Teacher incentives to integrate technology	Latin America and the Caribbean	≈30% of students	Infrastructure does not ensure pedagogical integration	World Bank (n.d.), based on PISA 2022
Frequent internet access by ethnicity	Amazonas, Colombia	Indigenous: 6%; non-Indigenous: 22%	16-percentage-point gap	Comini et al. (2024)
Schooling during COVID-19 closures in disconnected households	Amazonas, Colombia	85% studied only with printed materials; 12% left the system; 7% accessed online classes	Disconnection disrupts continuity and retention	Comini et al. (2024)
Education in a language understood fluently	Global	40% lack access	Language of instruction remains a structural barrier	UNESCO (2025)

Note. The indicators are not directly equivalent because they come from different sources, years, and educational levels.

The table highlights a central point: disadvantage is not a single gap, but a chain of gaps. A student may face a lower probability of completing secondary education, receive English instruction from a non-specialist teacher, have intermittent connectivity, and also study materials in which their Indigenous language is absent. This combination challenges the assumption that bringing an

English platform into a school is equivalent to democratizing learning. Digital policy must recognize that technical access is only the first threshold.

3.2. Technology Can Expand Access, but It Cannot Replace the Teaching Ecosystem

Plan Ceibal provides the strongest case of technology being used to address a specific shortage of English teachers. The British Council reports that Ceibal in English uses videoconferencing to reach approximately 80,000 children aged 9 to 11 in more than 550 schools and to provide more than 3,000 lessons per week; available institutional evaluations have indicated performance at least comparable to face-to-face instruction (British Council, 2019). Its relevance lies less in videoconferencing as a device than in the combination of nationwide infrastructure, state coordination, remote teachers, and an adult mediator in the classroom. This architecture helps explain why transferring only the tool to territories with unstable electricity, expensive connectivity, or high teacher turnover may produce different outcomes.

Chile's English Opens Doors program offers another lesson: institutional continuity. Created in 2003, it brings together professional development, teacher networks, camps, workshops, and resources for students in grades 5 through 12 in public education (Ministry of Education of Chile, 2022). Matear (2008) had already warned that Chilean English policy could expand opportunities while also reproducing inequalities if benefits depended on territory and social capital. For Mapuche students, moreover, an intensive English policy that does not guarantee curricular space for Mapudungun risks reinforcing pre-existing hierarchies (Moya-Santiagos & Quiroga-Curín, 2022; Mansilla-Sepúlveda et al., 2025). English learning, therefore, needs to be evaluated alongside the vitality and school presence of L1, rather than through a separate metric.

Na'atik, in the Maya region of Quintana Roo, operates at a different scale: a community-based model linking English, Spanish, and Maya through a trilingual library and intercultural activities. Its institutional information reports an increase in scholarships for local students from 50 in 2023–2024 to 55 in 2024–2025 and 62 in 2025–2026 (Na'atik Language & Culture Institute, 2026). The analytical value of the case does not lie in causally demonstrating that the program improves long-term outcomes which would require independent evaluations but in illustrating a design principle:

English can occupy a space of opportunity without requiring the invisibilization of Maya language and culture.

Table 2. Comparison of Cases and Transferability to Indigenous Contexts

Case	Location	Architecture	Scale/verifiable data	Transferable contribution	Evidence limitation
Ceibal in English	Uruguay	Videoconferencing + local classroom	≈80,000 children; >550 schools; >3,000 lessons/week	Expanded access in response to teacher shortages	Favorable institutional evidence; limited longitudinal Indigenous evidence
English Opens Doors	Chile	National policy, training, and activities	Since 2003; grades 5–12 in the public system	Institutional continuity and teacher development	Limited long-term disaggregation for Indigenous students
Na’atik	Mexico, Maya region	Community school + trilingual library	Scholarships: 50 (2023–24), 55 (2024–25), 62 (2025–26)	Explicit coexistence of English, Spanish, and Maya	Institutional data; external outcome evaluation is needed
Educational connectivity in Amazonas	Colombia	School connectivity and territorial diagnosis	Survey: 504 households and 348 businesses; 70% of the sample Indigenous	Shows that connectivity is a baseline condition, not a pedagogical outcome	Strong diagnostic value; not an English program

Note. The reach data are those published by the institutions or cited sources.

3.3. From Additive Bilingualism to a Digitally Just Trilingual Ecosystem

The results make it possible to extend the logic of additive bilingualism. Lambert (1975) distinguished contexts in which a second language is added to the first from those in which it displaces it; Cummins (2001) argued that development of the home language can support subsequent learning; Hornberger (2003) conceptualized biliteracy as a continuum; and the translanguaging literature showed that multilingual speakers mobilize resources flexibly rather than as three hermetically separated systems (García & Wei, 2014; Hornberger & Link, 2012). In digital environments, these ideas require an additional condition: L1 must exist not only in the curriculum, but also in the devices, platforms, resources, tasks, and products that mediate the educational experience.

For this reason, the Digitally Just Trilingual Ecosystem Model (DJTEM) is proposed. The model holds that English-as-L3 teaching is sustainable when six dimensions operate jointly: L1 literacy continuity, academic consolidation of L2, functional incorporation of L3, resilient digital infrastructure, multilingual teacher mediation, and community linguistic-digital sovereignty. The final dimension extends the approach of the antecedent article: it is not enough to include Indigenous vocabulary on a platform; communities must participate in the selection, production, storage, circulation, and eventual reuse of their linguistic data and content. UNESCO and Global Voices (Llanes-Ortiz, 2023) emphasize that creating digital futures for Indigenous languages involves facilitating communication, multiplying content, normalizing online use, educating, revitalizing, creating media, defending rights, and protecting linguistic heritage.

Table 3. Digitally Just Trilingual Ecosystem Model (DJTEM)

Dimension	Operational definition	Observable indicators	Expected outcome
1. L1 continuity	The Indigenous language retains functions in literacy, knowledge, and academic/cultural production.	Materials in L1; curricular time; writing/orality; participation of expert speakers.	English is added without displacing domains of L1 use.
2. L2 strengthening	Academic Spanish/Portuguese is consolidated as a bridge rather than a substitute for L1.	Reading comprehension; academic writing; bilingual supports.	Reduces the double barrier when English enters as L3.
3. Functional English as L3	English is linked to communication, study, science, and mobility, while avoiding an exclusionary prestige logic.	Authentic tasks; projects; intercultural communication; contextualized assessment.	Creates value without turning English into a criterion of cultural superiority.
4. Resilient infrastructure	The solution works with the connectivity actually available and provides offline alternatives.	Cost, stability, electricity, devices, downloadable content, technical support.	Prevents innovation from benefiting only schools that are already connected.
5. Multilingual teacher mediation	Local and remote teachers coordinate the use of repertoires and technology.	Training in intercultural bilingual education, translanguaging, L3 pedagogy, and digital competence.	Transforms technology into pedagogy; reduces dependence on platforms.
6. Linguistic-digital sovereignty	The community participates in decisions about content, data, ownership, and representation.	Co-design, consent, archive control, attribution, licensing, and cultural protocols.	Prevents data extraction and protects cultural authority over L1.

Note. DJTEM is a conceptual synthesis developed from the literature reviewed.

Discussion

The most important finding is that digitization does not automatically correct inequity: it tends to amplify the quality or the precarity of the system into which it is inserted. Where stable policy, functional infrastructure, technical support, and teacher coordination exist, as in Ceibal, technology can offset a specific supply constraint. Where households lack affordable connectivity, as the evidence from the Colombian Amazon documents, the same strategy can turn digital English into a service available primarily to those who already have better conditions. This relationship requires a shift in the unit of analysis. The question should not be “does the platform work?” but rather “what human, linguistic, and material system makes it possible for the platform to work in this territory?”

This reframing also challenges a common narrative of educational modernization. English and technology often appear together as symbols of the future, while Indigenous languages are treated as heritage to be preserved. That division is problematic because it reserves the domains of science, mobility, and digitality for English, while assigning L1 to the domains of tradition and memory. The result may be a shift in prestige even when the Indigenous language formally remains in the curriculum. Evidence on Quechua, Mapuche, and Maya revitalization shows that vitality depends on minority languages maintaining and expanding real social functions, not on their ceremonial presence (Hornberger & Coronel-Molina, 2004; Romero, 2012; Moya-Santiagos & Quiroga-Curín, 2022). A just trilingual policy must therefore enable L1 to function as a language of digital creation, school-based research, audiovisual production, and contemporary knowledge as well.

Translanguaging provides a pedagogical mechanism for preventing the classroom from reproducing rigid boundaries. In a project on Amazonian biodiversity, for example, students could record local knowledge in L1, systematize it in Spanish, and produce a presentation or exchange in English; the three languages would perform different cognitive and social functions within the same task. Such a design is consistent with García and Wei’s (2014) notion of an integrated repertoire and with Cenoz and Gorter’s (2021) pedagogical translanguaging, but it requires one precaution: making boundaries more flexible does not mean abandoning deliberate protection of the minoritized language. Cenoz and Gorter (2017) propose sustainable translanguaging precisely to prevent the dominant language from absorbing every domain. In Indigenous contexts, such

protection must be explicit because Spanish already occupies a structurally dominant position and English adds a second high-prestige language.

Teacher education emerges as the point of articulation between language policy and technology. A teacher may have connectivity and materials, but if trained within a monolingual pedagogy, they may tend to interpret the use of L1 as interference, remedial translation, or lack of competence. By contrast, a teacher prepared in intercultural education, metalinguistic awareness, and translanguaging can turn lexical comparisons, community narratives, critical translation, and multimodal production into learning resources. Evidence from Peru continues to point to limitations in the preparation and availability of teachers in intercultural bilingual education (Liñán et al., 2023), while Chilean English policy demonstrates the value of networks and sustained professional development (Matear, 2008; Ministry of Education of Chile, 2022). Accordingly, DJTEM treats teacher development not as a supplementary activity, but as pedagogical infrastructure.

Linguistic-digital sovereignty also introduces an issue that traditional education policy rarely considers. The expansion of artificial intelligence, machine translation, and speech-recognition tools increases demand for linguistic data, yet Indigenous languages are precisely those with scarce corpora and culturally sensitive knowledge. Mager et al. (2018) demonstrate the shortage of technological resources for Indigenous languages of the Americas; UNESCO and Global Voices (Llanes-Ortiz, 2023) emphasize that heritage protection, ownership, consent, and community participation must accompany digitization. The goal should not be to extract voices, texts, or narratives to “feed” external systems, but to build resources governed by rules of use defined by communities. In educational terms, this means that an application may include L1 yet fail to respect control, attribution, or cultural protocols, making it linguistically inclusive while simultaneously politically extractive.

The comparison of cases also reveals a persistent weakness in the evidence: programs tend to report coverage more precisely than long-term outcomes. It is possible to know how many students receive lessons, how many schools participate, or how many scholarships are awarded, but longitudinal trajectories that simultaneously measure English proficiency, L1 maintenance, academic achievement, school retention, and linguistic identity are less common. Fabre-Triana et

al. (2025) had already identified this problem for Ceibal, English Opens Doors, and Na'atik. The future research agenda must move beyond one-dimensional evaluation. A program could increase English scores and still be problematic if it reduces L1 use; similarly, it could strengthen identity and participation yet fail if it does not develop functional English proficiency. Relevant evaluation must examine the complete package of outcomes.

For public policy, the implication is demanding: there is no single solution transferable to all Indigenous contexts in Latin America. Uruguay has a relatively centralized system and digital infrastructure that favors nationwide solutions; the Colombian Amazon combines distance, cost, and connectivity constraints that require offline alternatives, community networks, and territorial support; Mexico, Peru, Bolivia, Ecuador, and Chile have different configurations of intercultural education and language vitality. Scalability should therefore be defined as the capacity to preserve principles under local adaptation, not as the identical replication of a platform. The transferable principles are protection of L1, the academic bridge provided by L2, the functionality of L3, teacher mediation, appropriate infrastructure, and community governance. The specific technology may vary.

The theoretical contribution of DJTEM, then, is to replace the logic of “adding English through technology” with a logic of interdependent capabilities. The model’s strongest hypothesis is falsifiable: two programs with similar amounts of English instructional time and digital resources will produce different equity outcomes if one actively protects and uses L1/L2, has stable multilingual teachers, and grants the community the capacity to govern content and data, while the other does not. Longitudinal comparative studies can test this proposition using outcomes in all three languages, participation, retention, identity well-being, and digital practices. If the hypothesis is confirmed, English policy for Indigenous peoples should no longer be measured solely by coverage and CEFR level, but should also incorporate indicators of linguistic and digital justice.

Conclusions

The evidence analyzed makes it possible to answer the research question through one central condition: technology can support English-as-L3 learning in Indigenous communities only when it is integrated into an ecosystem that protects the languages already present. Connectivity alone

is not equity; expanding English alone is not inclusion. A sustainable combination requires literacy and knowledge production in L1, academic proficiency in L2, clear functional objectives for L3, infrastructure compatible with territorial conditions, and teacher mediation capable of working with multilingual repertoires.

The comparative data show why this architecture is necessary. Connectivity gaps by ethnicity in the Colombian Amazon, incomplete coverage of educational platforms across the region, and the historical shortage of specialist teachers reveal that an exclusively digital strategy risks concentrating opportunities. At the same time, Ceibal demonstrates that technology can address access problems when supported by strong institutional arrangements, while Na'atik and the intercultural literature show that English learning can coexist with Indigenous languages when curriculum design does not subordinate them. The lesson is not to choose between English and identity, but to prevent access to English from depending on the abandonment of one's own language.

The Digitally Just Trilingual Ecosystem Model synthesizes this proposal into six assessable conditions: L1 continuity, L2 strengthening, functional English as L3, resilient infrastructure, multilingual teacher mediation, and linguistic-digital sovereignty. For public policy, these dimensions can be used as prior design criteria and as evaluation indicators. For research, they open a longitudinal agenda that should jointly measure English learning, L1 maintenance or revitalization, academic development in L2, school retention, community participation, identity well-being, technological appropriation, and control over linguistic data.

The challenge of the next decade will not be to decide whether Indigenous communities should have access to English and technology, but to define the conditions under which that access expands capabilities without producing new forms of displacement. A genuinely innovative agenda will not treat Indigenous languages as an obstacle to be overcome in order to enter the digital world, but as part of the intellectual, cultural, and technological infrastructure from which students can engage with the world. In that scenario, English ceases to function as a substitute for the local repertoire and becomes a third tool; technology ceases to be an end in itself and becomes a means toward lasting multilingual educational justice.

References

- Ames, P. (2023). Indigenous youth in higher education in Latin America: A quest for equity and interculturality. *ReVista: Harvard Review of Latin America*.
- Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition*. Cambridge University Press.
- British Council. (2019). *Plan Ceibal: English via videoconferencing*. British Council Americas.
- Bucholtz, M., & Hall, K. (2005). Identity and interaction: A sociocultural linguistic approach. *Discourse Studies*, 7(4-5), 585-614. <https://doi.org/10.1177/1461445605054407>
- Busquets, M. B. (2009). Intercultural citizenship education: Maya educators of Chiapas in the bottom-up construction of alternative citizenships. *Revista Interamericana de Educación para la Democracia*, 2(2), 179-210.
- Cenoz, J., & Gorter, D. (2017). Minority languages and sustainable translanguaging: Threat or opportunity? *Journal of Multilingual and Multicultural Development*, 38(10), 901-912. <https://doi.org/10.1080/01434632.2017.1284855>
- Cenoz, J., & Gorter, D. (2021). *Pedagogical translanguaging*. Cambridge University Press. <https://doi.org/10.1017/9781009029384>
- Comini, N., Siegenthaler, P., & Cambreleng Contreras, J. (2024, April 3). The importance of connecting schools in the Colombian Amazon. *World Bank Blogs*.
- Córdova-Hernández, L., & Valtierra Zamudio, J. (2022). Language education injustices in Mexican indigenous communities during COVID-19 pandemic. *Apples - Journal of Applied Language Studies*, 16(2), 41-56. <https://doi.org/10.47862/apples.111986>
- Cronquist, K., & Fiszbein, A. (2017). English language learning in Latin America. *The Dialogue*.
- Cummins, J. (2001). Bilingual children's mother tongue: Why is it important for education? *Sprogforum*, 7(19), 15-20.
- Fabre-Triana, P., Faytong-Haro, M., Contreras-Falcones, A., Angulo-Prado, A., Paez-Tobar, A., & Fabre-Merchan, P. (2025). Beyond bilingualism: An additive trilingual equity agenda for Indigenous English education in Latin America. *Frontiers in Education*, 10, 1643377. <https://doi.org/10.3389/feduc.2025.1643377>
- Galla, C. K. (2016). Indigenous language revitalization, promotion, and education: Function of digital technology. *Computer Assisted Language Learning*, 29(7), 1137-1151. <https://doi.org/10.1080/09588221.2016.1166137>
- García, O. (2011). *Bilingual education in the 21st century: A global perspective*. Wiley-Blackwell.
- García, O., & Lin, A. M. Y. (2017). Translanguaging in bilingual education. In O. García, A. M. Y. Lin, & S. May (Eds.), *Bilingual and multilingual education* (pp. 117-130). Springer. https://doi.org/10.1007/978-3-319-02258-1_9
- García, O., & Wei, L. (2014). *Translanguaging: Language, bilingualism and education*. Palgrave Macmillan. <https://doi.org/10.1057/9781137385765>

- Hornberger, N. H. (Ed.). (2003). Continua of biliteracy: An ecological framework for educational policy, research, and practice in multilingual settings. *Multilingual Matters*.
- Hornberger, N. H., & Coronel-Molina, S. M. (2004). Quechua language shift, maintenance, and revitalization in the Andes: The case for language planning. *International Journal of the Sociology of Language*, 2004(167), 9-67. <https://doi.org/10.1515/ijsl.2004.025>
- Hornberger, N. H., & Link, H. (2012). Translanguaging and transnational literacies in multilingual classrooms: A biliteracy lens. *International Journal of Bilingual Education and Bilingualism*, 15(3), 261-278. <https://doi.org/10.1080/13670050.2012.658016>
- Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, 32(3), 465-491. <https://doi.org/10.3102/00028312032003465>
- Lambert, W. E. (1975). Culture and language as factors in learning and education. In A. Wolfgang (Ed.), *Education of immigrant students*. Ontario Institute for Studies in Education.
- Liñán, H. F., Gamarra Sano, J., Mamani Paucar, C. J., & Vilcarromero Tafur, L. (2023). Intercultural Bilingual Education (EIB) in Peru. *Research in Subject-Matter Teaching and Learning (RISTAL)*, 6, 84-95. <https://doi.org/10.2478/ristal-2023-0006>
- Llanes-Ortiz, G. (2023). Digital initiatives for Indigenous languages. UNESCO & Global Voices. ISBN 978-92-3-100617-3.
- López, L. E. (2010). Reaching the unreached: Indigenous intercultural bilingual education in Latin America. Background paper for the Education for All Global Monitoring Report 2010. UNESCO.
- Mager, M., Gutierrez-Vasques, X., Sierra, G., & Meza-Ruiz, I. (2018). Challenges of language technologies for the indigenous languages of the Americas. In *Proceedings of the 27th International Conference on Computational Linguistics* (pp. 55-69). Association for Computational Linguistics.
- Mansilla-Sepúlveda, J., Pozo-Menares, G., & Valoyes-Chávez, L. (2025). The historical inclusion of Mapuche children in the educational system: Challenges and tensions in policy and practice. *International Journal of Inclusive Education*, 29, 398-412. <https://doi.org/10.1080/13603116.2022.2127496>
- Matear, A. (2008). English language learning and education policy in Chile: Can English really open doors for all? *Asia Pacific Journal of Education*, 28(2), 131-147. <https://doi.org/10.1080/02188790802036679>
- Mignolo, W. D. (2007). Delinking: The rhetoric of modernity, the logic of coloniality and the grammar of de-coloniality. *Cultural Studies*, 21(2-3), 449-514. <https://doi.org/10.1080/09502380601162647>
- Ministry of Education of Chile. (2022). English Opens Doors Program. Government of Chile.
- Moya-Santiagos, P., & Quiroga-Curín, J. (2022). An overview of indigenous peoples in Chile and their struggle to revitalise their native languages: The case of Mapudungun. *London Review of Education*, 20(1), 10. <https://doi.org/10.14324/LRE.20.1.10>

- Na'atik Language & Culture Institute. (2026). *Donate & impact: Maya Youth scholarships and trilingual library*. Na'atik Language & Culture Institute.
- Paris, D., & Alim, H. S. (Eds.). (2017). *Culturally sustaining pedagogies: Teaching and learning for justice in a changing world*. Teachers College Press.
- Pennycook, A. (2002). *English and the discourses of colonialism*. Routledge.
- Phillipson, R. (1992). *Linguistic imperialism*. Oxford University Press.
- Quijano, A., & Ennis, M. (2000). Coloniality of power, Eurocentrism, and Latin America. *Nepantla: Views from South*, 1(3), 533-580.
- Romero, S. (2012). 'They don't get speak our language right': Language standardization, power and migration among the Q'eqchi' Maya. *Journal of Linguistic Anthropology*, 22(2), E21-E41. <https://doi.org/10.1111/j.1548-1395.2012.01146.x>
- Romero, S. (2015). *Language and ethnicity among the K'ichee' Maya*. University of Utah Press.
- Sumida Huaman, E., & Valdiviezo, L. A. (2014). Indigenous knowledge and education from the Quechua community to school: Beyond the formal/non-formal dichotomy. *International Journal of Qualitative Studies in Education*, 27(1), 65-87. <https://doi.org/10.1080/09518398.2012.737041>
- Trapnell, L. A. (2003). Some key issues in intercultural bilingual education teacher training programmes—as seen from a teacher training programme in the Peruvian Amazon Basin. *Compare: A Journal of Comparative and International Education*, 33(2), 165-183. <https://doi.org/10.1080/0305792032000070083>
- UNESCO. (2020). *Global education monitoring report 2020: Inclusion and education: All means all*. UNESCO.
- UNESCO. (2025). *Languages matter: Global guidance on multilingual education*. UNESCO.
- United Nations Department of Economic and Social Affairs. (2017). *State of the world's Indigenous peoples, Volume III: Education*. United Nations.
- World Bank. (2015). *Indigenous Latin America in the twenty-first century: The first decade (Report No. 98544)*. World Bank.
- World Bank. (n.d.). *Digital education: Latin America and the Caribbean*. World Bank Group. Data cited from PISA 2022.
- Wortham, S. (2008). Linguistic anthropology of education. *Annual Review of Anthropology*, 37, 37-51. <https://doi.org/10.1146/annurev.anthro.36.081406.094401>
- Zsögön, M. C. (2025). Between assimilation and recognition of indigenous peoples: The role of intercultural bilingual education in Latin America. *International Journal of Social Pedagogy*, 14(1), 22. <https://doi.org/10.14324/111.444.ijsp.2025.v14.x.002>