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SYSTEMATIC REVIEW

Social sustainability and user centered design: technological requirements for educational inclusion

Sostenibilidad social y diseño centrado en el usuario: requerimientos tecnológicos para la inclusión educativa

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ABSTRACT

In this research, a study of scientific production on social sustainability, user-centered design and technological needs oriented to educational inclusion in the period from 2016 to 2026 was carried out. Methodology: A systematic review was carried out according to the PRISMA approach based on articles published in journals indexed in Scopus or SciELO. Equations were made on inclusive education, assistive technologies, digital accessibility, universal design for learning, social sustainability, educational inclusion in Spanish and English. After the identification and screening procedures, 25 articles were located for subsequent qualitative synthesis. Results: The qualitative synthesis shows that technology-mediated educational inclusion is possible thanks to usability, accessible feedback, personalization of learning, interoperability, multimodal accessibility, technical-pedagogical support, and institutional sustainability. Educational barriers have been identified, such as the digital divide, poor teacher training, deficient infrastructures or poor involvement of users in the design of technologies. Conclusion: inclusive educational technologies must be developed based on the needs of students, teachers and institutions, considering accessibility, equity and social sustainability and participation.

Keywords: educational inclusion, social sustainability, user-centered design, digital accessibility, educational technology.

RESUMEN

En esta investigación de producción científica acerca de la sostenibilidad social, diseño centrado en el usuario y necesidades tecnológicas orientadas a la inclusión educativa en el periodo de 2016 a 2026. Metodología: se hizo una revisión sistemática según el enfoque PRISMA a partir de artículos publicados en revistas indexadas en Scopus o SciELO. Se realizaron ecuaciones sobre educación inclusiva, tecnologías asistivas, accesibilidad digital, diseño universal para el aprendizaje, sostenibilidad social, inclusión educativa en lengua española y en lengua inglesa. Tras los procedimientos de identificación y cribado se llegaron a localizar 25 artículos para la posterior síntesis cualitativa. Resultados: la síntesis cualitativa pone de manifiesto que la inclusión educativa mediada por tecnología es posible gracias a la usabilidad, retroalimentación accesible, a la personalización del aprendizaje, a la interoperabilidad, a la accesibilidad multimodal, al soporte técnico-pedagógico y a la sostenibilidad institucional. Se han localizado barreras educativas como la brecha digital, la escasa formación del profesorado, infraestructuras deficientes o escasa implicación de los usuarios en el diseño de las tecnologías. Conclusión: las tecnologías educativas inclusivas deben desarrollarse a partir de las necesidades del alumnado, profesorado e instituciones, considerando la accesibilidad, equidad y la sostenibilidad social y la participación.

Palabras clave: inclusión educativa, sostenibilidad social, diseño centrado en el usuario, accesibilidad digital, tecnología educativa.

INTRODUCTION

Educational inclusion is currently one of the major challenges faced by educational, school, and university systems, particularly in contexts where social, economic, territorial, linguistic, cultural, and functional differences serve as barriers to integrative and equitable education. Social sustainability should not be viewed merely as a dimension of sustainable development, regardless of its integrative nature, but rather as a prerequisite for ensuring that educational innovations have an equitable impact on all students, not just those with greater resources, better connectivity, or advanced digital skills. In this context, educational technology is meaningful only if it contributes to reducing barriers, broadening participation, and improving learning experiences in terms of accessibility, flexibility, and relevance for diverse populations (Passey et al., 2018; Ramírez-Correa et al., 2025).

In recent years, the digital transformation of education has promoted the use of virtual platforms, open resources, mobile applications, assistive technologies, intelligent learning environments, artificial intelligence, collaborative tools, and multimedia resources. However, the adoption of these solutions alone does not guarantee inclusive educational processes. Several studies indicate that digitalization can perpetuate inequalities if the actual needs of users, institutional conditions, teacher training, content accessibility, and the availability of technological infrastructure are not addressed (Chiu & Lim, 2020; Castaño-Muñoz et al., 2025; Peruzzo & Allan, 2024). Therefore, educational inclusion requires a shift from an instrumental view of technology to a user-centered approach, in which the design of solutions considers the characteristics, limitations, expectations, and contexts of students, teachers, families, and institutions.

El diseño centrado en el usuario se relaciona directamente con la sostenibilidad social porque promueve tecnologías más justas, utilizables, accesibles y adaptadas a las condiciones de quienes participan en el proceso educativo. En el ámbito de la inclusión, este enfoque permite identificar requerimientos tecnológicos asociados con la accesibilidad, la usabilidad, la personalización, la interoperabilidad, la participación estudiantil, la retroalimentación, la autonomía y la continuidad pedagógica. Choi y Seo (2024) sostienen que la accesibilidad, la usabilidad y el diseño universal para el aprendizaje constituyen elementos esenciales para construir experiencias educativas inclusivas, debido a que permiten que los recursos digitales sean comprensibles, operables y significativos para usuarios con distintas capacidades y necesidades.

En esa misma línea, el Diseño Universal para el Aprendizaje se ha consolidado como una perspectiva relevante para orientar la creación de entornos educativos flexibles. Su aporte principal radica en proponer múltiples formas de representación de la información, múltiples vías de acción y expresión, y diversas estrategias de implicación del estudiante. Basham et al. (2016) destacan que los entornos digitales y combinados deben ser evaluados según su capacidad para alinearse con estos principios, mientras que Oliveira et al. (2019) señalan que el diseño universal permite articular inclusión educativa, planificación pedagógica y accesibilidad desde una perspectiva preventiva, no reactiva. Esto significa que las soluciones tecnológicas no deberían adaptarse únicamente después de detectar exclusiones, sino diseñarse desde el inicio para responder a la diversidad.

Las revisiones recientes muestran que las tecnologías inclusivas pueden favorecer la participación de estudiantes con discapacidad, dificultades de aprendizaje, barreras comunicativas o condiciones de vulnerabilidad social. Fernández-Batanero et al. (2022) evidencian que las tecnologías asistivas contribuyen a mejorar la accesibilidad y la inclusión de estudiantes con discapacidad, aunque su efectividad depende de factores como la formación docente, la disponibilidad institucional y el conocimiento sobre su uso pedagógico. De forma complementaria, Zhang et al. (2020) advierten que los recursos educativos abiertos y las prácticas digitales deben cumplir criterios de accesibilidad para evitar que los materiales virtuales excluyan a estudiantes con discapacidad visual, auditiva, motora o cognitiva. Por tanto, la inclusión tecnológica no se limita al acceso a dispositivos, sino que implica asegurar que los contenidos, plataformas y actividades puedan ser utilizados por todos los estudiantes.

Otro aspecto importante se relaciona con las brechas digitales. La educación digital inclusiva no depende únicamente de la existencia de herramientas tecnológicas, sino también de las condiciones sociales que permiten utilizarlas. La conectividad, el acceso a dispositivos, el acompañamiento institucional, la alfabetización digital y la pertinencia cultural de los recursos influyen directamente en la experiencia de aprendizaje. Castaño-Muñoz et al. (2025) destacan que los contextos escolares de bajos ingresos presentan necesidades específicas que suelen quedar invisibilizadas en los procesos de diseño tecnológico. Esta situación refuerza la necesidad de establecer requerimientos tecnológicos que no respondan solo a estándares técnicos, sino también a criterios de equidad, justicia social y sostenibilidad educativa.

La pandemia de COVID-19 hizo más visibles estas tensiones. Aunque aceleró la adopción de herramientas digitales, también evidenció las limitaciones de muchos sistemas educativos para garantizar inclusión en entornos virtuales. Alshawabkeh et al. (2021) muestran que estudiantes sordos enfrentaron dificultades específicas en el uso de tecnologías de información en línea, especialmente cuando los recursos no incorporaban apoyos comunicativos adecuados. Del mismo modo, Peruzzo y Allan (2024) plantean que la experiencia pandémica obliga a repensar la inclusión digital desde tecnologías más conviviales, es decir, herramientas que fortalezcan la colaboración, la participación y el reconocimiento de las diferencias. En consecuencia, la tecnología debe evaluarse no solo por su disponibilidad, sino por su capacidad para sostener vínculos educativos significativos.

En el nivel institucional, la adopción de tecnologías inclusivas también requiere políticas, liderazgo, planificación y cultura organizacional. Cheng et al. (2025) señalan que la integración de EdTech inclusiva en educación especial depende de impulsores y barreras políticas que condicionan su adopción. Esto evidencia que los requerimientos tecnológicos no pueden formularse únicamente desde el aula, sino que deben comprenderse como parte de un ecosistema educativo más amplio, donde intervienen normativas, financiamiento, capacitación, soporte técnico, evaluación y sostenibilidad de las soluciones. En este sentido, la sostenibilidad social demanda que la innovación tecnológica sea viable en el tiempo y no dependa de acciones aisladas o proyectos de corta duración.

A pesar del crecimiento de estudios sobre educación inclusiva y tecnología, todavía existe dispersión en torno a los requerimientos tecnológicos necesarios para articular sostenibilidad social, diseño centrado en el usuario e inclusión educativa. Algunas investigaciones se enfocan en tecnologías asistivas, otras en diseño universal, accesibilidad digital, recursos abiertos, entornos inteligentes o políticas de adopción tecnológica. Sin embargo, se requiere una revisión que integre estas líneas y permita identificar qué condiciones tecnológicas resultan más relevantes para diseñar soluciones educativas inclusivas, sostenibles y centradas en las personas. Navas-Bonilla et al. (2025) indican que las tecnologías pueden transformar los entornos de aprendizaje cuando se orientan a la participación de estudiantes con necesidades diversas, mientras que Yang et al. (2025) resaltan la necesidad de avanzar hacia marcos educativos sostenibles e inclusivos.

En función de lo anterior, este artículo de revisión tiene como objetivo analizar la producción científica publicada entre 2016 y 2026 sobre sostenibilidad social, diseño centrado en el usuario y requerimientos tecnológicos para la inclusión educativa. Para ello, se plantea identificar los principales enfoques conceptuales, tipos de tecnologías, criterios de accesibilidad, barreras de implementación y aportes del diseño centrado en el usuario en contextos educativos inclusivos. El estudio se desarrollará mediante una revisión sistemática con orientación PRISMA, a partir de artículos publicados en revistas indexadas en Scopus o SciELO, con el fin de ofrecer una síntesis rigurosa que contribuya al diseño de tecnologías educativas socialmente sostenibles.

METHODS

This study employed a qualitative, documentary, and descriptive approach, utilizing a systematic literature review guided by the PRISMA model. This review enabled the identification, selection, analysis, and synthesis of scientific research related to social sustainability, user-centered design, and technological requirements for educational inclusion. The review was limited to articles published between 2016 and 2026, as this period reflects significant growth in studies on digital accessibility, universal design for learning, assistive technologies, inclusive education, and digital educational transformation.

The search was conducted in the Scopus and SciELO databases, which are recognized sources for retrieving indexed scientific literature. Priority was given to articles published in peer-reviewed academic journals with a DOI or verifiable link. The unit of analysis comprised scientific articles, systematic reviews, empirical studies, and theoretical works addressing the relationship between educational technologies, inclusion, accessibility, universal design, social sustainability, or user-centered design. Theses, books, book chapters, editorials, conference proceedings, and institutional documents were excluded to ensure greater academic rigor in the selection of documents.

The search strategy combined terms in Spanish and English to broaden the retrieval of relevant studies. Search equations were constructed using Boolean operators, considering the following main combinations: “inclusive education” AND “educational technology” AND “accessibility”; “user-centered design” AND “inclusive education”; “universal design for learning” AND “digital education”; “assistive technology” AND “students with disabilities”; “social sustainability” AND “digital education” AND “inclusion”; “educación inclusiva” AND “tecnología educativa” AND “accesibilidad”; “diseño centrado en el usuario” AND “inclusión educativa”; and “diseño universal para el aprendizaje” AND “tecnologías digitales”. These equations were adjusted according to the advanced search options of each database.

The selection of documents was carried out in four phases. In the first phase, records available in Scopus and SciELO were identified based on the defined equations. In the second phase, duplicate documents and those not corresponding to the 2016–2026 period were eliminated. In the third phase, titles, abstracts, and keywords were reviewed to verify their relevance to the study topic. In the fourth phase, the full texts were analyzed, considering their relevance to the central categories of the review: educational inclusion, social sustainability, digital accessibility, educational technologies, universal design for learning, assistive technologies, user-centered design, and technological requirements.

The inclusion criteria were as follows: articles published between 2016 and 2026; research disseminated in journals indexed in Scopus or SciELO; studies related to inclusive education, accessibility, educational technologies, or user-centered design; documents with a DOI or verifiable link; and texts published in Spanish, English, or Portuguese. The exclusion criteria were: non-scientific documents, duplicate publications, studies outside the established period, articles not directly related to educational inclusion, research focused solely on technical aspects without pedagogical or social connection, and publications without evidence of indexation or without access to verifiable bibliographic data.

The final documentary sample consisted of 25 scientific articles. These documents were selected for their contributions to the analysis of the technological requirements necessary to promote inclusive and socially sustainable educational processes. The review included studies on Universal Design for Learning, assistive technologies, open educational resources, intelligent learning environments, inclusive digital education, accessibility, experiences of students with disabilities, teacher training, and technology adoption policies. This diversity enabled the construction of a broad perspective on the issue and facilitated the recognition of both the advances and limitations of technology in diverse educational contexts.

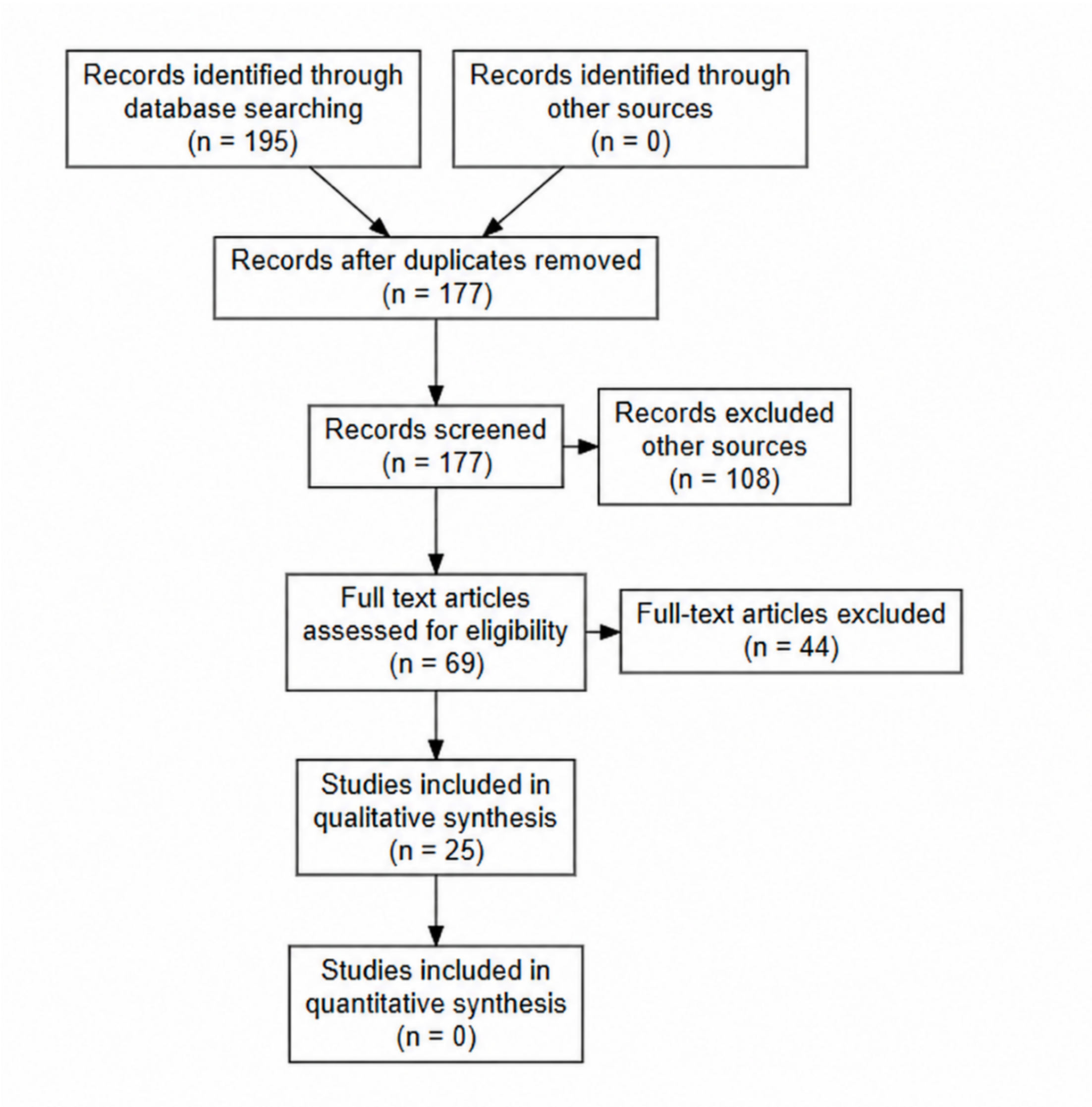
The documentary screening process was organized using the PRISMA flow. Initially, 195 records were identified in the consulted databases: 164 in Scopus and 31 in SciELO. Subsequently, 18 duplicate records were removed, leaving 177 documents for the initial review. After screening titles and abstracts, 108 documents were excluded for not directly addressing the objective of the review. Next, 69 articles were evaluated in full text. Of these, 44 documents were excluded for presenting approaches unrelated to educational inclusion, lacking relevance to user-centered design, low relevance to social sustainability, lack of full access, or insufficient evidence of indexation. Finally, 25 articles were included for qualitative analysis.

For the information analysis, a documentary extraction matrix was designed and organized into eight fields: author and year, journal, indexing database, study objective, type of technology addressed, population or educational context, main findings, and contribution to the review topic. This matrix enabled an orderly comparison of the studies and the identification of common patterns among the investigations. The analysis was conducted through thematic synthesis, grouping the findings into interpretative categories related to technological accessibility, usability, personalization of learning, assistive technologies, Universal Design for Learning, digital divide, teacher training, and social sustainability.

The methodological quality of the articles was assessed based on four criteria: thematic relevance, clarity of the objective, methodological consistency, and contribution to the field of educational inclusion. A quantitative quality scale was not applied due to the diversity of included designs; however, studies with a clear scientific structure, verifiable results, reasoned discussion, and direct relevance to the research problem were prioritized. In this way, the review was not limited to compiling articles but aimed to critically interpret the technological conditions that facilitate or hinder educational inclusion.

The synthesis of results was organized according to the general objective of the study. First, the most commonly used technologies in educational inclusion processes were identified.

Figure 1. PRISMA flow diagram of the documentary selection process



Note. The diagram presents the process of identification, screening, eligibility, and inclusion of scientific articles according to the PRISMA methodology. Own elaboration.

Then, the technological requirements associated with accessibility, user-centered design, and social sustainability were analyzed. Afterwards, the main implementation barriers were examined, especially those related to the digital divide, teacher training, infrastructure, institutional policies, and resource adaptation. This organization established an analytical basis for understanding how technology can contribute to more inclusive education when it addresses concrete human, pedagogical, and social needs.

RESULTS

The systematic review integrated 25 articles published between 2016 and 2026 in journals indexed in Scopus or SciELO. The selected studies revealed that technology-mediated educational inclusion is organized around four main axes: digital accessibility, Universal Design for Learning, assistive technologies, and social sustainability. Collectively, the findings indicate that technology contributes to inclusion when it addresses the real needs of students, teachers, and institutions, rather than being incorporated solely as a technical resource.

Characterization of the included studies

The reviewed articles demonstrate a growing scientific interest in inclusive digital education, particularly since 2020. Initial research focused on universal design, equity, and accessibility, while more recent studies have incorporated social sustainability, emerging technologies, institutional policies, and user experiences in diverse educational contexts.

Table 1. Characterization matrix of included items

Author(s) and year	Main focus	Contribution to the review topic
Basham et al. (2016)	Universal Design for Learning	Establishes criteria for evaluating inclusive digital materials.
Passey et al. (2018)	Digital equity	Relates technology, participation, and reduction of educational gaps.
Oliveira et al. (2019)	Universal design and inclusion	Links pedagogical planning with educational accessibility.
Zhang et al. (2020)	Open educational resources	Highlights the need for accessibility in open digital materials.
Chiu and Lim (2020)	Strategic educational technology	Analyzes institutional conditions for effective digital inclusion.
Alshawabkeh et al. (2021)	Deaf students	Documents communicative barriers in virtual education.
Fernández (2021)	Collaborative technology	Describes inclusive digital practices in higher education.
Fernández-Batanero et al. (2022)	Assistive technologies	Synthesizes support tools for students with disabilities.
Almeqdad et al. (2023)	Effectiveness of UDL	Presents evidence on the benefits of Universal Design for Learning.
Mikropoulos and Iatraki (2023)	Disability and science	Reviews digital technologies for inclusive science education.
Bray et al. (2024)	UDL and technology	Analyzes technological applications of universal design.
Choi and Seo (2024)	Accessibility and usability	Identifies key components for inclusive digital experiences.
Castellano-Beltran et al. (2024)	Technology and disability	Describes teaching experiences with inclusive technology.
Fälth and Selenius (2024)	Digital reading and writing	Emphasizes the teacher's role in inclusive contexts.
Mintz et al. (2024)	Inclusive digital education	Synthesizes current perspectives on inclusion and technology.
Peruzzo and Allan (2024)	Post-pandemic inclusion	Proposes collaborative and socially relevant technologies.
Bešić et al. (2025)	Inclusive schools	Compares technology use in educational institutions.
Castaño-Muñoz et al. (2025)	Vulnerable contexts	Identifies digital needs in low-income schools.
Castellano-Beltran et al. (2025)	Emerging technologies	Examines benefits and challenges in universities.
Cheng et al. (2025)	EdTech policies	Identifies institutional barriers and facilitators.
Dhouib et al. (2025)	Smart environments	Reviews inclusive technologies for students with disabilities.
Navas-Bonilla et al. (2025)	Technology and inclusion	Classifies tools and features for educational inclusion.
Ramírez-Correa et al. (2025)	Sustainable education	Examines the relationship between digitalization, sustainability, and social inclusion.
Yang et al. (2025)	Sustainable inclusive education	Proposes a framework for future inclusive education.
Daniela (2026)	Socio-ethical sustainability	Integrates technology, pedagogy, and educational sustainability.

Note. Synthesis matrix of the included studies. Own elaboration.

Identified thematic categories

The analysis enabled the grouping of findings into six categories. These categories explain how technology can promote educational inclusion when designed with pedagogical, social, and institutional criteria.

Technological requirements for educational inclusion

The reviewed studies concur that educational inclusion does not depend solely on access to devices or platforms.

It also requires accessible, usable, and adaptable technologies supported by institutional policies. From a user-centered design perspective, technological requirements must address the needs of students with disabilities, students from vulnerable contexts, teachers, and families.

Table 2. Analytical categories derived from the review

Category	Description	Related studies
Digital accessibility	Resources that are usable by students with diverse abilities and conditions.	Zhang et al. (2020); Choi and Seo (2024); Castellano-Beltran et al. (2024)
Universal Design for Learning	Flexibility in content, activities, and assessment methods.	Basham et al. (2016); Oliveira et al. (2019); Almeqdad et al. (2023); Bray et al. (2024)
Assistive Technologies	Tools that support autonomy, communication, and academic participation.	Fernández-Batanero et al. (2022); Mikropoulos and Iatraki (2023); Dhouib et al. (2025)
User-Centered Design	Technological development based on users' actual needs.	Fernández (2021); Castaño-Muñoz et al. (2025); Castellano-Beltran et al. (2025)
Social Sustainability	Continuity, equity, and relevance of inclusive solutions.	Passey et al. (2018); Ramírez-Correa et al. (2025); Yang et al. (2025); Daniela (2026)
Institutional Barriers	Teaching, technical, regulatory, and organizational limitations.	Chiu and Lim (2020); Cheng et al. (2025); Bešić et al. (2025); Fälth and Selenius (2024)

Note. Categories derived from the documentary analysis. Own elaboration.

Table 3. Identified technological requirements

Requirement	Description	Educational Implication
Multimodal Accessibility	Use of subtitles, alternative text, contrast, and accessible navigation.	Expands access to digital content.
Usability	Clear, simple, and intuitive interfaces.	Promotes autonomy and reduces operational barriers.
Personalization	Adjustment of pace, formats, and levels of difficulty.	Enables flexible learning pathways.
Interoperability	Compatibility with platforms, devices, and assistive technologies.	Prevents exclusion due to technical limitations.
Accessible Feedback	Comprehensible, timely, and adapted responses.	Improves student monitoring and participation.
User Participation	Inclusion of students and teachers in technological design.	Increases relevance and acceptance of tools.
Technical-Pedagogical Support	Continuous support for users and institutions.	Strengthens adoption and effective use.
Institutional Sustainability	Policies, funding, ongoing training, and continuous evaluation.	Ensures continuity of technological inclusion.

Note. Technological requirements identified in the review. Own elaboration.

The results indicate that user-centered design serves as a connecting axis between technology and educational inclusion. When tools are designed with consideration for accessibility, usability, and context, the opportunities for participation among students with diverse needs are enhanced. Conversely, when implemented without proper assessment or support, such tools may perpetuate existing barriers.

Social sustainability emerges as a cross-cutting condition. Merely incorporating platforms or digital resources is insufficient; it is necessary to ensure that solutions are relevant, continuous, and adaptable. Therefore, technological requirements must be integrated with teacher training, institutional support, and educational policies oriented toward equity.

In summary, the review demonstrates that inclusive educational technology must be accessible, flexible, interoperable, and socially sustainable. These elements enable technological design to address the needs of individuals rather than solely technical or administrative criteria.

DISCUSSION

The results obtained in the review support the assertion that inclusive education through technology does not depend solely on the availability of platforms, devices, and connectivity.

The most relevant and significant finding is that technology can become inclusive when it is designed according to user experience and addresses barriers to access, participation, and learning. Therefore, user-centered design becomes a strategic aspect, as it recognizes that students, teachers, and families do not constitute a homogeneous group when interacting with technology.

This finding supports the assertions of Bray et al. (2024), who state that technological implementations using Universal Design for Learning (UDL) require pedagogical planning rather than merely instrumental adaptation. Almeqdad et al. (2023) justify the inclusion of UDL in improving learning opportunities when these are defined through multiple means of access, expression, and participation.

Digital accessibility emerges as one of the most relevant criteria, but the discussion indicates that it should not be limited to the formal fulfillment of standards. A tool may be technically accessible yet have limited utility if it does not address the educational context in which it will be applied. Choi and Seo (2024) argue that accessibility, usability, and user experience should be analyzed in an integrated manner, as inclusion depends on students being able to understand, navigate, and use resources autonomously. This reinforces the need to evaluate technologies based on real practice rather than solely on their declared design.

Assistive technologies represent another important contribution to inclusion, particularly for students with disabilities. However, the reviewed studies show that their impact depends on teacher mediation, institutional training, and continuity of technical support. Fernández-Batanero et al. (2022) highlight that these tools promote academic participation, while Dhouib et al. (2025) caution that inclusive smart environments require effective implementation practices. This demonstrates that assistive technology should not be considered an isolated solution, but rather as part of a broader educational system.

A relevant aspect of the review is that social sustainability broadens the traditional understanding of educational inclusion. Incorporating digital resources to address specific needs is not sufficient; it is also necessary to ensure that solutions are equitable, permanent, contextualized, and sustainable over time. Daniela (2026) argues that technological integration must consider pedagogical, technological, and socio-ethical dimensions, which is consistent with the findings of this review. From this perspective, inclusive technology not only facilitates learning but also contributes to reducing structural inequalities.

User participation in the design and evaluation of educational tools is a critical factor. Castellano-Beltran et al. (2025) show that emerging technologies can generate benefits in higher education, but also new challenges when student perspectives are not considered. Similarly, Fernández (2021) highlights the value of collaborative digital practices for building more inclusive educational spaces. These contributions support the assertion that user-centered design should include processes of consultation, validation, and continuous improvement with educational stakeholders.

Institutional barriers shape the environment for the effective implementation of inclusive technologies in educational settings. The lack of initial teacher training, insufficient technical infrastructure, poor connectivity, or the absence of long-term policies for implementing inclusive technologies all influence their potential use. Bešić et al. (2025) consider the inequalities among schools in the use of inclusive digital technologies, leading to the conclusion that institutional conditions have an immediate impact on the outcomes of their implementation. Fälth and Selenius (2024) further argue that teachers' conceptions influence the use of digital tools, depending on the approach they take to teaching and learning processes in reading and writing.

Therefore, the discussion allows us to conclude that the requirements for technology in inclusive education are multidimensional, referring, among others, to accessibility, usability, personal adaptation, interoperability, technical features, proposed teacher training, and institutional sustainability.

CONCLUSIONS

The review specifically considered that social sustainability and user-centered design are both fundamental pillars guiding the development of inclusive educational technologies. The analyzed studies position inclusion as extending far beyond the mere incorporation of platforms, devices, or digital resources, indicating that digital solutions must be genuinely suited to the actual needs, abilities, and contexts of students.

The identified technological requirements include multimodal accessibility, usability, personalized learning, interoperability, accessible feedback, technical-pedagogical support, and institutional sustainability. These factors enable the use of digital tools to support the participation of students with disabilities in vulnerable contexts, as well as in educational communities where access conditions are met.

User-centered design is recognized as a primary approach to prevent technological solutions that are either favored or irrelevant to the content of educational activities. Its application allows students, teachers, and families to participate in the design, testing, and improvement of educational tools, thereby promoting the acceptance, usefulness, and sustainability of inclusive technologies.

The review also revealed that the main barriers to the inclusion of educational technologies are the digital divide, limited teacher training in technology use, insufficient infrastructure, inadequate content adaptation, and the absence of institutional policies for continuity. Therefore, technologies should be integrated as part of a comprehensive educational strategy, supported by training, planning, evaluation, and funding.

It is concluded that socially sustainable educational technology must be accessible, flexible, contextualized, and participatory. Its contribution to educational inclusion will be greater when its design is centered on people rather than solely on technical, administrative, or commercial criteria. Future research should therefore validate these requirements in specific educational institutions, particularly in those with greater digital and social inequalities.

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