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From access to agency: exploring the synergy of openness, inclusion, and equity in education

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Open education has emerged as a promising approach to addressing persistent disparities in access to learning and knowledge creation. When thoughtfully aligned with principles of inclusion and equity, it offers meaningful possibilities for shaping more just and responsive educational environments. Yet such alignment is neither automatic nor guaranteed. While Open Educational Resources can extend the reach of education, they may also inadvertently reinforce structural inequalities if not designed with sufficient attention to accessibility, learner diversity, and contextual relevance. This study draws on a participatory consultation conducted during the 2025 Open Education Week in connection with the UNESCO Open Education Fellowship. Educators and researchers reflected on priority areas for advancing inclusion and equity within the open education movement. Their responses underscored the urgency of improving support for neurodiverse learners, advancing adaptive learning strategies, and addressing the needs of marginalized communities. These insights served as a point of departure for a broader discussion on inclusive pedagogical design, with particular attention to integrating evidence-based learning techniques and frameworks. Efforts to embed inclusion and equity into open education demand more than the availability of resources. They require ongoing pedagogical reflection, intentional design, and institutional support for those historically underserved by educational systems. As emphasized by the Dubai Declaration, openness becomes meaningful when it is grounded in shared responsibility and enacted through concrete practices. The reflections gathered here aim to contribute to that effort, pointing to practical considerations for fostering learning environments that are more inclusive, adaptive, and attentive to diverse learner realities.

KEYWORDS

open education, higher education, equitable education, inclusion, educational innovation

1 Introduction

Open education is a term that emerged from the first Global Forum on Open Educational Resources (UNESCO, 2002) and has gradually consolidated as a useful movement for promoting inclusion and equity.

According to the Open Education Consortium (2025), open education is a set of teaching and learning practices that use Open Educational Resources (OER), thereby fostering collaboration and knowledge sharing. Open Educational Resources (OER), in turn, are identified by UNESCO (2012) as a fundamental component of open education, referring to “any teaching, learning or research material that is in the public domain or that has been released under an open license that permits its use, adaptation, and redistribution.” The Basic Guide to Open Educational Resources (UNESCO, 2015) offers a core reference for OER and includes detailed appendices on specific areas relevant to their adoption.

The foundations of open education, as articulated by the UNIÓN EUROPEA (2013), are grounded in four interrelated principles. First, accessibility emphasizes the elimination of economic and geographic barriers that restrict access to education, striving to make free and high-quality educational materials widely available. Second, collaboration fosters learning environments where educators and students can openly share resources, ideas, and experiences, thereby enriching the educational process. Third, flexibility enables learners to progress at their own pace and according to their specific needs, allowing resources to be adapted to different learning styles. Finally, innovation promotes the transformation of teaching and learning practices through the use of digital technologies and the cultivation of online learning communities.

Open education first took root within higher education (Open Education Global Strategic Plan, 2008; UNESCO, 2012), which has often served as a testing ground for exploring new technological and pedagogical approaches (Compagnucci and Spigarelli, 2020; Bovill, 2020). This environment has proven particularly conducive to piloting innovations, as adult and lifelong learners generally possess the autonomy and digital literacy to engage with emerging tools without the developmental considerations required for younger students (Moriña, 2019). As such, higher education continues to play a pivotal role in advancing and refining open education practices before they are adapted for broader educational contexts, a progression that can also enable institutions to address issues of inclusion and equity, offering insights that may inform the expansion of open educational practices beyond the university campus (Barletta, 2023).

Inequities, however, persist across educational systems, hindering access, participation, and success in higher education (Duk and Murillo, 2024; Saka and Celik, 2024). While open education holds significant potential to expand learning opportunities, achieving its inclusive and equitable promise remains a challenge. In principle, OER provide affordable and scalable means to advance Sustainable Development Goal 4 by promoting universal access to quality education (Mullens and Hoffman, 2023). Yet the persistence of the digital divide reminds us that access to technology and digital literacy are unevenly distributed (Sezgin and Firat, 2024; Villao Salinas and Matamoros Dávalos, 2024). Much of today's open content is produced within

contexts that already possess robust infrastructure, linguistic dominance, and cultural representation (Cummins and Mason, 2023). Consequently, openness does not automatically guarantee inclusion or fairness; it must be deliberately designed and supported to serve diverse learners and communities. These enduring disparities underscore that while open-resource-oriented models hold promise, they must be grounded in inclusive and equity-centered design (Clinton-Lisell et al., 2023). Recognizing this tension provides the foundation for the present study, which examines how educators and researchers might prioritize inclusion and equity within open education, seeking pathways to make openness genuinely transformative.

Building on this premise, the ongoing expansion of digital education and the integration of accessible technologies into teaching practices are transforming the possibilities for educational inclusion (Ramírez-Montoya et al., 2021; UNESCO, 2024). More than ever, ensuring equitable participation in virtual learning environments has become both a fundamental imperative and a tangible opportunity, particularly as collaborative practices and technological innovations reshape how learning content is designed and shared (Cubides et al., 2024; Wilkinson and Nagar, 2025). As educational ecosystems evolve, it is crucial to critically examine how open education, inclusion, and equity intersect and reinforce one another in shaping more just and accessible learning experiences (Bovill, 2020; Fuentes et al., 2021). The following sections explore these constructs individually and collectively, providing a framework to understand their synergy in advancing inclusive and equitable education for all.

1.1 Open education

The open education movement has gained growing relevance in recent years, especially within a digital landscape that simultaneously enables new connections while exposing a widening digital divide. In the aftermath of the COVID-19 pandemic in 2020, which triggered a surge in the production and dissemination of digital educational resources, academics and institutions increasingly turned to Open Educational Resources (OER) as a means of supporting learners who faced significant barriers to accessing traditional forms of education. It was in this context that the UNESCO (2019) recommendations on OER took on renewed urgency and global significance.

Although the origins of the open movement can be traced back to the 1970s (Rathbone, 1972), the articulation of open pedagogy with student-centered approaches and digital resources is a more recent development (Wiley and Hilton, 2018). The open movement has since evolved to encompass related domains such as Open Science (Foster and Deardorff, 2017) and Open Innovation (Chesbrough, 2006), which share a commitment to democratizing access to knowledge. A milestone in this trajectory was the launch of the “MIT OpenCourseWare” initiative in the early 2000s, through which the Massachusetts Institute of Technology released the core materials of its courses freely to the public. This pioneering act set a precedent that was gradually followed by many other institutions worldwide, contributing significantly to boosting lifelong learning across borders (Carson et al., 2012).

The conceptual and practical shift introduced by open education has brought about deeper transformations within the

broader educational landscape. To implement open education effectively, institutions must build supportive open learning environments that integrate elements such as institutional policies, robust technological infrastructure, and sustained capacity development (Carson et al., 2012). These environments also place a central emphasis on the learner's active role, particularly regarding self-regulation and meaningful engagement with learning processes (Hannafin et al., 2013). While this dynamic poses challenges for learners, it also demands a sustained and thoughtful commitment from content creators, who are responsible for designing OER that support the cognitive and reflective processes necessary for learning to occur (Pitt and Carless, 2022; Rivera-Vargas et al., 2021).

Creators of OER are therefore expected to uphold the core principles known as the "5Rs": Retention, Reuse, Revision, Remixing, and Redistribution (Wiley and Hilton, 2018). Open licenses such as those provided by Creative Commons (CC) facilitate this process, allowing materials to be freely used, adapted, and shared by diverse users.

Yet while open licensing is a foundational mechanism for expanding access, it is not by itself sufficient to ensure educational inclusion. Numerous organizations and initiatives have emerged to address this gap by promoting the development of OER specifically tailored to support learners in situations of vulnerability or marginalization (Drane et al., 2021). One notable example comes from the Instituto Nacional de Tecnologías Educativas y de Formación del Profesorado in Spain, which has developed over 250 OER with built-in cognitive accessibility and pedagogical supports. These resources have been primarily designed to enhance participation for students with special educational needs (INTEF, 2023).

Complementing these efforts, UNESCO has played a pivotal role through its international recommendations, strategic reports, and most recently, the Dubai Declaration (UNESCO, 2024), which calls for stronger institutional and national commitments to open education. This includes the integration of emerging technologies such as Generative Artificial Intelligence (GenAI) as tools to enhance the accessibility, personalization, and quality of educational resources (Mills et al., 2023).

In light of these developments, the potential for open education to foster greater inclusion is expanding. However, the promise of equitable access through technology alone is not enough. Achieving this goal requires deliberate strategies that address both the design and availability of open resources and broader technological, infrastructural, and sociocultural conditions that enable learners to benefit from them meaningfully.

1.2 Inclusion and equity in learning

The concepts of inclusion and equity have become central pillars in the ongoing efforts to democratize education and address systemic inequalities in both traditional and digital learning environments. Although deeply interconnected, they embody distinct meanings and entail different practical implications. Inclusion refers to the creation of educational environments where all students—regardless of their individual characteristics, backgrounds, or circumstances—are welcomed, respected, supported, and provided with meaningful opportunities to

participate fully. UNESCO has extensively addressed this principle through a series of key documents and guidelines aimed at embedding inclusion within educational systems (UNESCO, 1994, 2000, 2001, 2009, 2011).

In contrast, equity focuses on ensuring that each student receives the particular support necessary to thrive, recognizing that equal treatment does not always result in fair outcomes. Equity moves beyond merely providing access; it involves actively dismantling systemic barriers and allocating resources differentially to achieve truly fair and meaningful participation for all learners. Both terms are underscored in the 2023 Agenda for Sustainable Development, which defines education as a right that must guarantee that no child is excluded from an inclusive, equitable, and quality education. Achieving this objective requires educational institutions to implement robust policies and frameworks for continuous improvement, enhancing student presence, participation, and learning outcomes (Ainscow et al., 2006; UNESCO, 2021).

Inclusion, recognized globally as a human right, demands the construction of educational environments that support the cognitive, emotional, and social development of students while honoring the diversity of individual educational trajectories (Dueñas, 2010). This comprehensive approach integrates cultural contexts, personalized pedagogical models, and tailored student support systems. It also fosters the development of critical soft skills such as communication, leadership, resilience, teamwork, and problem-solving, emphasizing the need for authentic learning communities where students are active agents in their educational journey.

Nevertheless, it is important to recognize that the interpretation of inclusion varies significantly across cultural, political, economic, and socio-historical contexts, resulting in divergent practices and tensions at the international, national, and institutional levels (del Gutiérrez and Maz, 2004; Ainscow, 2020). In such pluralistic environments, inclusion must be understood not as a final achievement, but as an evolving process. As emphasized by Ainscow and Miles (2008), inclusive education requires strengthening collaboration among schools, building stronger connections with local communities, fostering networks that span different educational settings, and gathering and applying evidence that reflects the specific needs of each context.

Also, equity in learning compels educational systems to adopt innovative pedagogical paradigms and diverse strategies aimed at enabling profound, lifelong learning for all students. Strategies include the use of emerging tools such as generative Artificial Intelligence (Giray, 2024), the promotion of complex thinking (Ramírez-Montoya et al., 2022), and the application of the Universal Design for Learning (UDL) framework. UDL, in particular, offers a flexible approach to designing curricula that accommodate the varied needs of learners, encouraging active participation and accessibility. Its successful implementation relies on the orchestration of internal factors, such as leadership and organizational climate, as well as external resources (Pin et al., 2024).

Bridging inequities in educational outcomes requires more than broad frameworks or declarations of intent; it demands sustained, targeted action across multiple levels of educational practice. This involves implementing timely interventions that address emerging needs, applying formative assessments that

guide learning dynamically, fostering student autonomy and self-regulated learning, and cultivating habits that sustain lifelong educational engagement. Addressing structural disparities is equally essential. In particular, advancing gender equity remains a pressing challenge, requiring efforts to ensure the full participation of women in historically underrepresented fields such as the exact sciences, and to promote intergenerational fairness in educational achievement (Hopkins, 2017; Sandoval, 2023).

Thus, promoting inclusion entails facilitating students' access to educational institutions while ensuring their sustained engagement and success within them. It requires enabling all learners to acquire knowledge and skills in environments that recognize diversity as a strength and adapt pedagogical practices to meet varied needs. In this process, accessible technologies emerge as critical tools, transforming diversity from a potential barrier into a source of collective enrichment.

However, the transition to digital education introduces both new opportunities and significant risks for inclusion and equity. Although the expansion of digital platforms and accessible technologies offers unprecedented potential to design more inclusive learning environments, these advances alone are insufficient. As emphasized by the Commonwealth of Learning (Commonwealth of Learning, 2021), unless digital educational initiatives are intentionally designed to address exclusion, they risk reproducing, or even amplifying, the entrenched biases of traditional education systems.

1.3 Intersection between open education, inclusion, and equity

The intersection of openness, inclusion, and equity in education presents a valuable space for educators and policymakers to reflect on how to broaden access and improve fairness in learning environments. Though each of these principles brings its own focus, they converge in ways that offer a shared framework for rethinking how education can better serve diverse learners in evolving social and technological contexts (see Figure 1).

Open education emphasizes access, flexibility, and collaboration. It aims to dismantle economic, geographic, and legal barriers through the use of openly licensed materials and digital infrastructures. At its core is the belief that knowledge should be freely available and co-created. Inclusion highlights the importance of creating educational settings that are welcoming and supportive of all learners, especially those historically marginalized. It embraces diversity in ability, language, culture, and identity, promoting full participation, accessibility, and a sense of belonging. Equity adds the recognition that achieving fairness often requires differentiated support and targeted interventions. It addresses structural obstacles that hinder student success and calls for responsive policies, resource allocation, and inclusive instructional strategies.

As a first step, it is important that inclusion and equity become more intentionally embedded in the open education movement, particularly in the design of Open Educational Resources (OER) and that these efforts extend beyond higher education to effectively address the needs of diverse learners across different educational levels and community contexts. Without

deliberate attention to accessibility, cultural relevance, and learner diversity, OER risk reproducing the same inequities they aim to overcome. Then, addressing these concerns requires more than technical solutions. Designing inclusive and equitable open learning environments depends on understanding students' social, linguistic, and cognitive profiles, as well as the institutional settings in which they learn (Zavala Baque et al., 2023). This intersection invites strategies such as culturally responsive pedagogy, formative feedback, community-based learning, and inclusive instructional design. Frameworks like Universal Design for Learning (UDL) and differentiated assessment show how educational systems can adapt to learner variation rather than treating it as a constraint (Tenorio et al., 2020; Silva et al., 2021). Moreover, this vision calls for adjustments in pedagogy, educator/faculty preparation, and resource development. Educational systems must treat diversity not as an obstacle, but as a foundation for designing more meaningful and effective learning.

The following sections aim to contribute to this ongoing discussion. Drawing on a webinar organized by the Open Education Global network¹ after the Ramírez Montoya (n.d.) Open Education Fellowship², we present a set of reflections from educators and researchers on current priorities for promoting inclusion and equity within the open education movement. These inputs are followed by a series of actionable recommendations that emerged from our engagement with the topic. While limited in scope, these contributions aim to offer a grounded starting point for further dialogue and action.

2 Assessment of policy priorities and implications for inclusive open education

This study employed a participatory, small-scale qualitative approach to explore emerging priorities related to inclusion and equity within the open education movement. The activity took place during a live webinar titled “Luces de educación abierta para la Declaración de Dubái: aportaciones desde la Estancia Ramírez Montoya (n.d.)” held on 6 March 2025, as part of the global Open Education Week. Organized within the framework of the Ramírez Montoya (n.d.) Open Education Fellowship, the event was conceptually aligned with the 2019 UNESCO Recommendation on Open Educational Resources (OER) and the 2024 Dubai Declaration on Open Education and Artificial Intelligence. The whole event, Open Education Week, hosted participants from 29 countries and was conducted in 21 languages. The responses analyzed here were gathered during a Spanish-language webinar that presented ten projects developed during the UNESCO Stay: Open Movement for Latin America (Ramírez-Montoya et al., 2025). The webinar featured brief presentations of ongoing research projects aimed at addressing action areas from the UNESCO OER Recommendation, followed by an interactive segment designed to engage attendees in reflecting on pressing challenges within the open education landscape. The sample consisted of

¹ <https://www.youtube.com/watch?v=n82ooXJ1ukA>

² <https://hdl.handle.net/11285/703131>

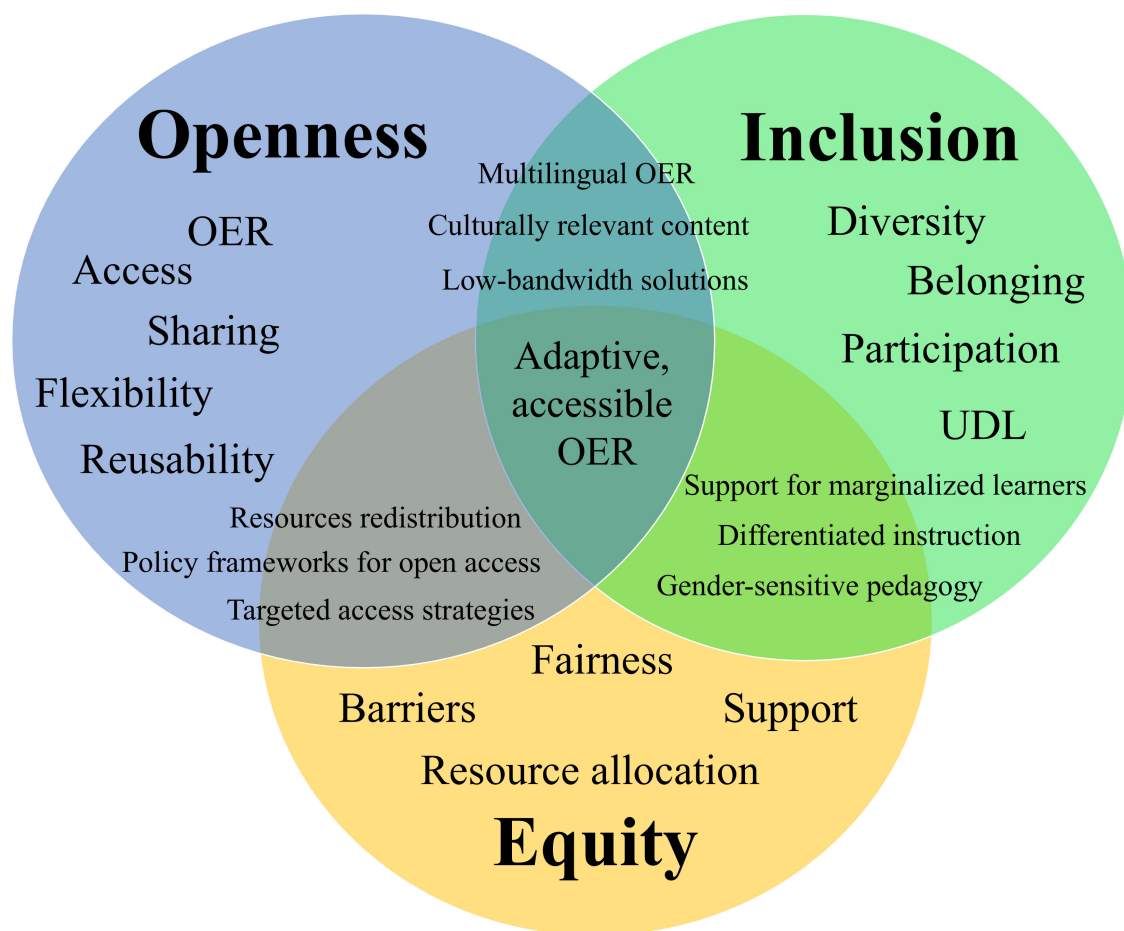


FIGURE 1

Venn diagram illustrating key concepts associated with openness, inclusion, and equity in education, as well as the overlaps that highlight their interrelated dimensions.



FIGURE 2

Distribution of responses according to participants' perceptions.

22 participants, most of whom held postgraduate degrees and had extensive experience in education, with an approximately equal gender distribution (~12 women). Participants included educators, researchers, faculty members, and graduate students with demonstrated interest in educational innovation and open education practices. While this convenience sample provided valuable expert perspectives, it does not represent the full diversity of the open-education community.

Participants in this study were volunteers whose engagement in the interactive segment was subsequently made publicly available via a video platform (YouTube). Responses to the task were anonymous, with no personal data being requested or collected

from the audience. Accordingly, all data analyzed derive exclusively from publicly accessible sources. In line with established practices for research using publicly available and non-identifiable data, no formal ethical approval was required.

Data collection was facilitated through Mentimeter³, a real-time polling tool that allowed participants to respond live to a multiple-choice question focused on Action Area 3 of the UNESCO OER Recommendation: fostering inclusive and equitable access to OER.

³ <https://www.menti.com/>

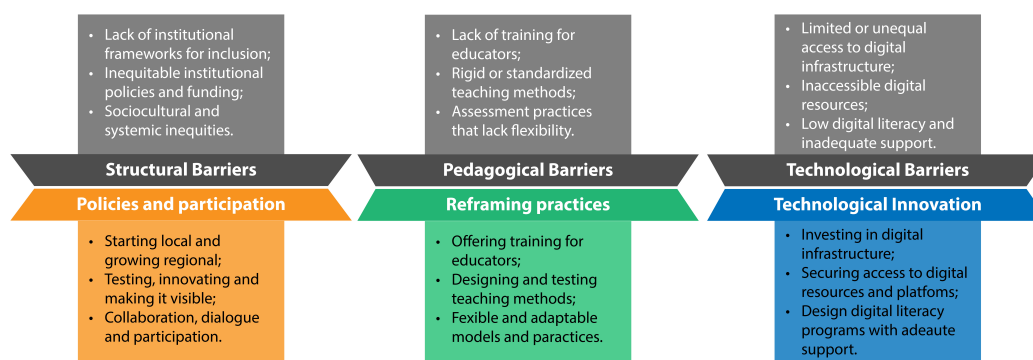


FIGURE 3
Barriers for inclusion and responses to overcome learners' limitations.

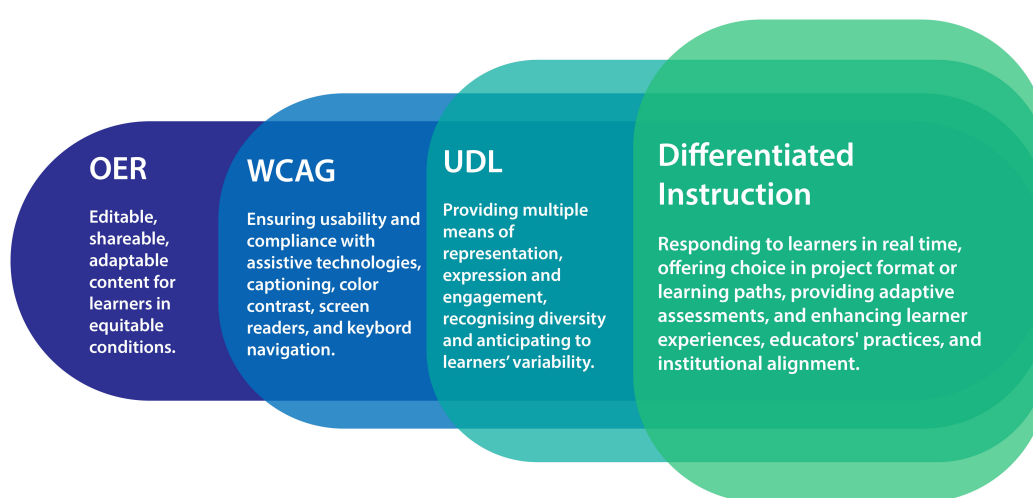


FIGURE 4
Integration of the OER-WCAG-UDL frameworks for an inclusive and equitable education.

The prompt asked:

"Which of the following challenges for inclusion and equity in education should be prioritized for more urgent resource allocation?"

Response options:

- Accessibility and support for individuals with neurodiversity and disabilities.
- Implementation of adaptive learning strategies and assessment methods.
- Promotion of the inclusion of women from communities in vulnerable situations.
- Support for victims of forced migration through alternative credentialing pathways.

These response options were selected because they reflect priority actions identified in the Dubai Recommendation (UNESCO, 2024), each addressing groups that must be explicitly considered in the design of OER and inclusion strategies to

foster educational equity. While not an exhaustive list, these options were crafted to be understandable and relatable to a broad audience, allowing us to gather practical insights to inform project planning (Alvarez-Icaza, 2023). The first option addresses support for individuals with disabilities or neurodiversity, including conditions like Autism Spectrum Disorder (ASD) and Attention-Deficit/Hyperactivity Disorder (ADHD), through tools and strategies that adapt learning environments. The second emphasizes equity in learning and assessment, recognizing diverse learning paces and the need to rethink evaluation approaches. The third focuses on gender, highlighting the importance of prioritizing women's inclusion to achieve educational equity. Finally, the fourth option encompasses groups affected by linguistic and cultural diversity, particularly in the context of growing migration, underscoring the complexities of addressing these needs through targeted educational actions.

While the number of responses reached was modest and not intended to yield generalizable data, the activity served as a reflective prompt and a way to surface practitioner and researcher insight. The results, which were briefly discussed during the webinar, are treated in this study as part of a priority-mapping

exercise, offering a snapshot of current concerns among a community engaged in open education with a focus on equity and inclusion. In this sense, the methodological design was intentionally kept straightforward, aligning with the article's purpose as a reflective piece aimed at fostering collective dialogue and guiding project ideation in line with emerging policy priorities, rather than seeking empirical generalizations or the depth expected of formal empirical studies. Thus, rather than drawing definitive conclusions, we interpret the data as indicative of relevant concerns that merit further dialogue and inquiry. In the sections that follow, we reflect on these inputs and propose a set of practical considerations and recommendations grounded in the priorities expressed during this participatory consultation.

3 Actionable recommendations

3.1 Prioritized challenges for inclusion and equity

The central question posed to participants during the webinar aimed to elicit opinions on which areas of inclusion and equity in education should receive greater resource allocation. The multiple-choice prompt presented four specific challenges, each reflecting pressing concerns to be addressed via the Action Area 3 of the UNESCO OER Recommendation. This part of the results presents the outcomes of the consultation before turning to broader reflections and recommendations.

The distribution of responses is presented in [Figure 2](#):

While this consultation was small in scale, the results reveal a clear emphasis on the importance of inclusive design and differentiated pedagogical support. The two most selected priorities, accessibility for neurodivergent and disabled learners, and adaptive learning approaches, suggest that participants are especially attuned to the diverse learning needs within increasingly heterogeneous student populations.

This emphasis may reflect growing awareness within the open education community that universal access to content is insufficient unless it is matched by meaningful pedagogical adaptation and support structures. In particular, the strong support for accessibility points to the need for more deliberate integration of assistive technologies, inclusive instructional design, and neurodiversity-sensitive approaches in OER development.

The relatively lower, but still meaningful, support for the inclusion of women in vulnerable communities, and for the educational needs of forcibly displaced persons, highlights additional equity gaps that remain under-addressed. These responses suggest areas where open education policies and practices might further evolve, particularly in contexts where gender inequality and forced migration intersect with limited educational access.

Notably, these priorities also hint at a focus that reaches beyond the traditional sphere of higher education, where much of the early work in open education has taken place. They underscore the value of considering diverse learning needs across different educational stages and community settings. This may point to opportunities for further exploring inclusive and adaptive open educational practices in primary, secondary, and lifelong adult

education, helping ensure that equity considerations are not limited to higher education alone.

Thus, the prioritization pattern indicates that participants are broadly aligned with a vision of open education that moves beyond access alone, calling for environments that adapt to learners rather than expecting learners to conform to fixed systems. These insights inform the reflections and recommendations offered in the following section.

3.2 Enabling inclusive and equitable open education: from needs to design

3.2.1 Understanding barriers and grounding design in learning science

The strong interest shown by participants in adaptive learning strategies and assessment methods highlights a clear expectation that inclusive and equitable open education moves beyond broad principles to practical, context-sensitive implementation. This begins with understanding the structural, pedagogical, and technological barriers that different learners face, and continues with designing learning environments and digital resources that intentionally reduce those barriers. [Figure 3](#) illustrates some of the barriers and the strategies to overcome the limitations for learners.

Identifying these needs involves more than abstract commitment. Localized assessments, through surveys, interviews, or demographic analyses, help surface inequities related to access, participation, and learning outcomes. Such diagnostics are especially necessary in open and digitally mediated environments, where differences in connectivity, digital literacy, and cultural background can quietly exacerbate exclusion.

Designing instruction that responds to learner diversity requires integrating evidence-based strategies known to foster engagement, retention, and deep understanding. Among the most consistently effective techniques are practice testing and distributed practice, both of which have demonstrated robust benefits across varied learner profiles by enhancing long-term retention and knowledge transfer ([Dunlosky et al., 2013](#); [Donoghue and Hattie, 2021](#)). Other moderately effective methods, such as elaborative interrogation, self-explanation, and interleaved practice, can further support comprehension when applied with intentionality. Yet, despite their lower impact, less effective strategies like rereading and highlighting remain dominant in learners' habits. This gap highlights the importance of instructional design that not only embeds high-utility strategies into open educational contexts but also makes them visible, accessible, and teachable, particularly for students who may lack prior exposure to effective learning techniques.

3.2.2 Designing for inclusion: accessible OER and structural realities

Equally important is the inclusive design of Open Educational Resources (OER). As emphasized in recent findings from [Alvarez-Icaza et al. \(2025\)](#), strategies such as Accessible Design and Design for All offer frameworks for creating digital learning content that accommodates neurodiversity, functional diversity, and contextual variability. Their participatory study, conducted with educators and researchers during a UNESCO-aligned Bootcamp, underscores

TABLE 1 Possible risks arising from the inadequate use of technologies.

Inadequate accessibility: technological tools not designed following accessibility guidelines. Websites that fail to comply with accessibility standards and guidelines for people with disabilities.
Technological dependence: excessive use of technologies may reduce social and communication skills. Dependence on devices and digital resources can hinder the development of manual, communication, and analytical skills.
Social isolation: Technologies can contribute to isolation if they replace face-to-face interactions. Digital platforms that substitute community activities may foster isolation and loneliness.
Privacy and security: vulnerable individuals are more susceptible to privacy issues and cyberbullying. The collection of personal data without consent can expose them to risks.
Misuse of technology: technology can be misused to manipulate or exploit vulnerable individuals or people with disabilities.
Lack of training: without proper training, users may employ technology ineffectively and unsafely. Individuals without training in the use of technological devices may fall behind.
Rapid obsolescence: the fast-paced evolution of technology can leave behind those who, for various reasons, cannot easily adapt themselves or their devices.
Stigmatization: the use of certain technologies, such as assistive devices, can lead to the stigmatization of individuals with functional diversity, resulting in discrimination.

how well-designed OER can advance equity, so long as they integrate multiple formats, align with Web Content Accessibility Guidelines (WCAG), and consider the linguistic and cultural backgrounds of learners. Universal Design for Learning (UDL), in particular, was identified as a key enabler in structuring content around diverse modes of representation, engagement, and expression. Figure 4 illustrates the incremental impact of introducing these dimensions in an overlapped manner, demonstrating the effects of each of the frameworks outlined for the benefit of diverse learners in every sociocultural context towards a differentiated and inclusive instruction.

However, even the most carefully designed resources remain ineffective if they are not supported by adequate infrastructure. Persistent digital and structural gaps, especially in low-income or marginalized communities, constrain learners’ ability to participate in open education (Sezgin and Frir, 2024). As UNESCO (2023) reports, over 40% of students in low-income countries lack reliable internet access. Without addressing these realities, digital openness risks becoming aspirational rather than actionable.

Moreover, technologies themselves are not value-neutral. When poorly implemented, they may reinforce inequalities or introduce new risks—such as privacy violations, social isolation, or the stigmatization of assistive technology users. These risks, as detailed in Table 1, call for thoughtful regulation, user-centered design, and institutional safeguards.

Moving from design to implementation, inclusive open education requires continuous cycles of monitoring, reflection, and improvement. Classroom observation, feedback from students, especially those with underrepresented needs, and community consultation all serve to illuminate what is working and where attention is still needed. As Alvarez-Icaza et al. (2025) argue, collaboration among educators, learners, and accessibility experts is central to producing holistic and responsive educational environments.

Finally, enabling this work at scale depends on sustained professional development. Educators and designers must be equipped not only to use inclusive resources but to contribute to their ongoing refinement. Training in OER development, accessibility standards, and inclusive pedagogy can help cultivate a culture where open education truly fulfills its potential as a democratizing force.

In sum, ensuring that openness leads to inclusion and equity requires an ecosystem-wide approach, one that integrates effective pedagogies, inclusive design principles, infrastructure readiness, and collaborative governance.

4 Discussion

The convergence of open education, inclusion and equity is conceptually powerful, morally commendable and yet operationally challenging. This paper has explored how these dimensions intersect and how their synergy can be better realized through informed pedagogical practices, accessible resource design, and systemic support. In doing so, it reaffirms that openness is not inherently equitable nor inclusive, but that it can become so when driven by intentional strategies, collaborative effort, and a nuanced understanding of learners’ diverse contexts.

The reflections gathered from educators and researchers during our participatory consultation suggest a growing consensus: the future of open education may involve more than widening access, as it must also adapt meaningfully to learner variability. Priorities such as accessibility for neurodivergent learners and the implementation of adaptive learning strategies emerged not only as points of concern but as indicators of what is still underdeveloped in open education practice. These insights align with broader literature emphasizing that pedagogical effectiveness and inclusion are inseparable (Alvarez-Icaza et al., 2025; Dunlosky et al., 2013; UNESCO, 2019).

Throughout this manuscript, we have argued that inclusive and equitable open education requires an ecosystemic approach, one that combines effective pedagogical design, culturally and cognitively responsive OER, robust digital infrastructure, and continuous feedback mechanisms. Frameworks such as Universal Design for Learning (Meyer et al., 2025; Pin et al., 2024), Accessible Design (Alvarez-Icaza et al., 2025), and Differentiated Instruction (Tenorio et al., 2020; Zavala Baque et al., 2023) offer conceptual and methodological anchors for this transformation. Yet, these frameworks are impactful only when they are known and consistently practiced, which demands institutional commitment to professional development, participatory governance, and ongoing monitoring.

Higher education continues to serve as a critical arena for advancing these discussions, not only because of its longstanding role in piloting technological and pedagogical innovations (Compagnucci and Spigarelli, 2020), but also due to the relative autonomy and digital readiness of adult learners (Moriña, 2019). This positions universities to model practices that integrate openness with intentional strategies for inclusion and equity. However, the influence of higher education goes beyond its own institutions, as the practices developed there often guide broader educational policies. This makes it important to also test and

apply these approaches with other groups, especially the vulnerable learners highlighted in our consultation, such as neurodiverse younger students, displaced populations, or communities facing gender-related educational barriers.

Moreover, this work must be grounded in ethical awareness. As shown in Table 1, technology (e.g., artificial intelligence) is a critical enabler, but it can also introduce new vulnerabilities (Shoval, 2025). The risks of exclusion via widening even more the digital gap, stigmatization, and privacy violations are not secondary concerns; they are central challenges that must be addressed if open education is to fulfill its democratizing purpose.

Inclusion and equity are not optional additions to open education. They are essential conditions for any initiative that seeks meaningful transformation. Without them, openness risks replicating structural inequalities under the appearance of accessibility. With them, openness offers the potential to create educational environments where participation, adaptability, and relevance support educational justice.

This paper does not claim to offer definitive solutions. Rather, it seeks to contribute to an ongoing dialogue that calls for further empirical research, deeper engagement from practitioners, and stronger alignment between educational innovation and social responsibility. Advancing inclusive and equitable open education will require coordinated institutional action, sustained investment in infrastructure, and deliberate attention to the voices and needs of those most often left at the margins.

This article is limited by the small scale of its participatory consultation and the exploratory nature of its design, which do not allow for broad generalizations. In addition, the study is subject to self-selection bias, as participation was voluntary and likely attracted individuals with a pre-existing commitment to inclusion and equity in education. This may have led to an overrepresentation of such perspectives. Moreover, since the data were collected through Mentimeter, the format allowed for concise but context-limited responses, restricting opportunities to explore participants' reasoning or situational nuances. These limitations highlight the need for future research involving more diverse samples and mixed-method approaches. However, the insights gathered highlight pressing concerns within the open education community, including the need to strengthen support for neurodiverse learners, advance adaptive assessment strategies, and address equity gaps related to gender and migration. These areas clearly merit deeper empirical study. Future research could build on these insights by first developing and implementing OER intentionally designed to support neurodiverse learners, promote adaptive assessment, and address gender and migration-related equity needs at scale. This could then be complemented by systematic studies evaluating the effectiveness of such initiatives in enhancing learner engagement, inclusion, and success across diverse educational contexts.

As emphasized by the Dubai Declaration (UNESCO, 2024), the future of open education depends on a shared commitment to access, equity, and collaboration. These principles must be realized through concrete decisions, persistent effort, and responsive practice. For those of us involved in education, whether as researchers, teachers, designers, or leaders, this work is both urgent and ongoing. We offer these reflections not as a conclusion, but as an invitation to keep listening, adapting, and building alongside the learners whose futures depend on the choices we make today.

Author contributions

IA-I: Conceptualization, Funding acquisition, Investigation, Project administration, Supervision, Visualization, Writing – original draft, Writing – review & editing; BM-B: Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Supervision, Visualization, Writing – original draft, Writing – review & editing; PA-A: Conceptualization, Writing – original draft, Writing – review & editing; AS-L: Conceptualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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