World Institute on Disability

Empowering People With and Without Disabilities About Open Educational Resources: Bridging the Educational Gaps with Inclusive, Accessible, and Innovative Practices

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"Change never happens at the pace we think it should. It happens over years of people joining together, strategizing, sharing, and pulling all the levers they possibly can. Gradually, excruciatingly slowly, things start to happen, and then suddenly, seemingly out of the blue, something will tip."

--Being Heumann: An Unrepentant Memoir of a Disability Rights Activist

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Sponsored By: Wells Fargo

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Introduction

Education is a fundamental right for everyone; however, individuals with disabilities face significant challenges in accessing education. The crushing reality of higher expenses of learning resources, lack of availability of inclusive and accessible resources, financial barriers, educational inequality and discrimination, and limited networking opportunities deter individuals with disabilities from becoming active contributors to knowledge.

Open Educational Resources (OER) can bridge educational gaps, accelerate collaboration, increase active learning, support creativity, and allow individuals with and without disabilities to access, create, and share open resources with global communities.

The higher education system in Pakistan is committed to inclusive learning; however, learners with disabilities face persistent challenges in educational institutions, including limited access to accessible learning resources, a lack of trained teachers, low digital literacy, and weak digital infrastructure. Within this context, this paper discusses the academic and associated challenges faced by adult learners with diverse disabilities. It also highlights how OER has been used by or for people with disabilities and what barriers exist to using OER by people with and without disabilities. Finally, it offers OER solutions to address the educational challenges faced by adult learners.

Problem Statement

The rapid advancement of digital technology increases educational accessibility and collaboration among global learning communities. However, many people with disabilities lack access to basic education due to rising costs and limited access to academic books and learning resources. Consequently, their active participation in knowledge creation remains a distant goal.

Limited recent studies explore the higher educational challenges people with disabilities face in Pakistan (e.g., Hussain, Shahzadi, and Khan 2020) and beyond (e.g., AlTaleb et al. 2024; Subu et al. 2025; Brewer, Urwin, and Witham 2023; Heffernan 2023; Kuriakose & Amaresha 2024; Li et al. 2021; Seale et al. 2021; Warick 2004; Zhou 2023).

The development of OER accelerates innovation, but not necessarily for learners with disabilities. Available open platforms and resources are scarce and do not meet the academic needs of individuals with diverse disabilities. Furthermore, it is assumed that learners with disabilities lack participation in developing academic and non-academic open resources because of a lack of OER awareness and limited collaborative opportunities.

OER is an emerging concept in many countries, including Pakistan, particularly for people with disabilities.

While technology can meet educational needs, the lack of digital literacy and OER awareness among people with disabilities limits its potential impact. Furthermore, collaboration between people with and without disabilities in developing open resources is limited by inadequate networking opportunities, leaving them as passive recipients rather than active knowledge contributors.

This white paper explores the social, academic, and technological challenges faced by higher-education learners with disabilities. It also explores how people with disabilities use OER globally and notes the barriers preventing OER from being used to its full potential.

Background

The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) defines persons with disabilities as those with physical, mental, intellectual, and/or sensory impairments (United Nations 2006). An estimated 1.3 billion people worldwide experience some form of disability (WHO 2023), with nearly 240 million being children (UNICEF 2023). The Asia-Pacific region has the highest number of persons with disabilities, with an estimated 650 million women, men, and children (UNESCAP, n.d.).

In low-and middle-income countries, disability is more widespread than in high-income countries because of poor water quality, sanitation, child labor, health emergencies, climate change, and armed conflicts (UNDESA 2024; World Bank 2023).

TABLE 1: Number of Children Aged 0 to 17 Years with Disabilities

Region	In Millions
South Asia	64.4
East Asia and the Pacific	43.1
West and Central Africa	41.1
Eastern and Southern Africa	28.9
Middle East and North Africa	20.9
Latin America & the Caribbean	19.1
Europe and Central Asia	10.8
North America	8.0

Source: UNICEF Fact Sheet, 2022

Children are more likely to face malnutrition, unsafe environments, and a lack of early healthcare, increasing their risk of disability and limiting their access to educational opportunities. In contrast, adults often face disabilities due to hazardous working conditions, natural disasters, chronic illnesses, and limited access to healthcare.

The rights of people with disabilities have been historically protected by laws, policies, conventions, and frameworks.

The UNCRPD is the first international instrument to catalyze disability rights. Likewise, the Sustainable Development Goals (SDGs) are 17 goals adopted by the United Nations to promote global peace, justice, and sustainability by 2030. It includes around fifty-two disability-related indicators that reference the rights of people with disabilities, ensuring their integration across global development priorities (UNESCWA 2022).

While a few countries have successfully accommodated the rights of people with disabilities through global commitments, regional and local policies, and advocacy, other countries struggle to find ways to support the disabled community, highlighting a broader gap in the equal recognition of their rights.

> ***"Disability only becomes a tragedy for me when society fails to provide the things we need to lead our lives-job opportunities or barrier free buildings."***
> ***– Judith Heumann***

People with disabilities in many parts of the world, particularly in Asia, face considerable institutional and attitudinal barriers to accessing education, health care, and employment, which means they are at a higher risk of poverty, inequality, and discrimination (Asian Development Bank, 2022; Department for International Development, 2000, 2022; United Nations, 2018, 2024a; WHO, 2022; 2023). Addressing these issues would improve inclusion, accessibility, participation, and well-being.

Education and Disability

Education empowers people with disabilities towards social inclusion and economic participation; however, children and adults with disabilities have lower literacy and educational attainment than those without disabilities, mainly in developed and underdeveloped countries.

Children

It is estimated that nearly 11% of children with disabilities at the primary and 32% at the upper-secondary level are not in school. Over half of children with disabilities lack access to educational materials aligned with their disability, and 62 percent do not have access to schools (UNDESA 2024).

One report analyzed data on education and disability from forty-nine countries and territories, confirming educational inequalities, high dropout rates, and limited basic literacy skills among primary and secondary learners (UNESCO Institute for Statistics 2018).

Another report analyzed the educational outcomes of children with and without disabilities in 19 countries. Findings reveal lower educational enrolment, attainment, and literacy of children with disabilities than non-disabled children in primary and secondary education (Male and Wodon 2017).

"Achieving inclusive education requires teacher training, accessible learning materials, adaptive infrastructure, and supportive policies." (UNICEF 2025, 17).

The participation of children with disabilities in primary and secondary education remains low in many Asian and Pacific countries compared to developed nations (UNICEF East Asia and Pacific Regional Office 2023).

Children with disabilities from disadvantaged communities lack access to education due to weak infrastructure, stigma, discrimination, and inaccessible teaching and learning resources (World Bank 2022b). This discrimination is doubled for female learners living in a patriarchal culture (UNESCO 2024a; UNGEI 2021a, 2021b; United Nations 2024a, b). Learning disruption is further magnified for children living in emergency and disaster-affected areas.

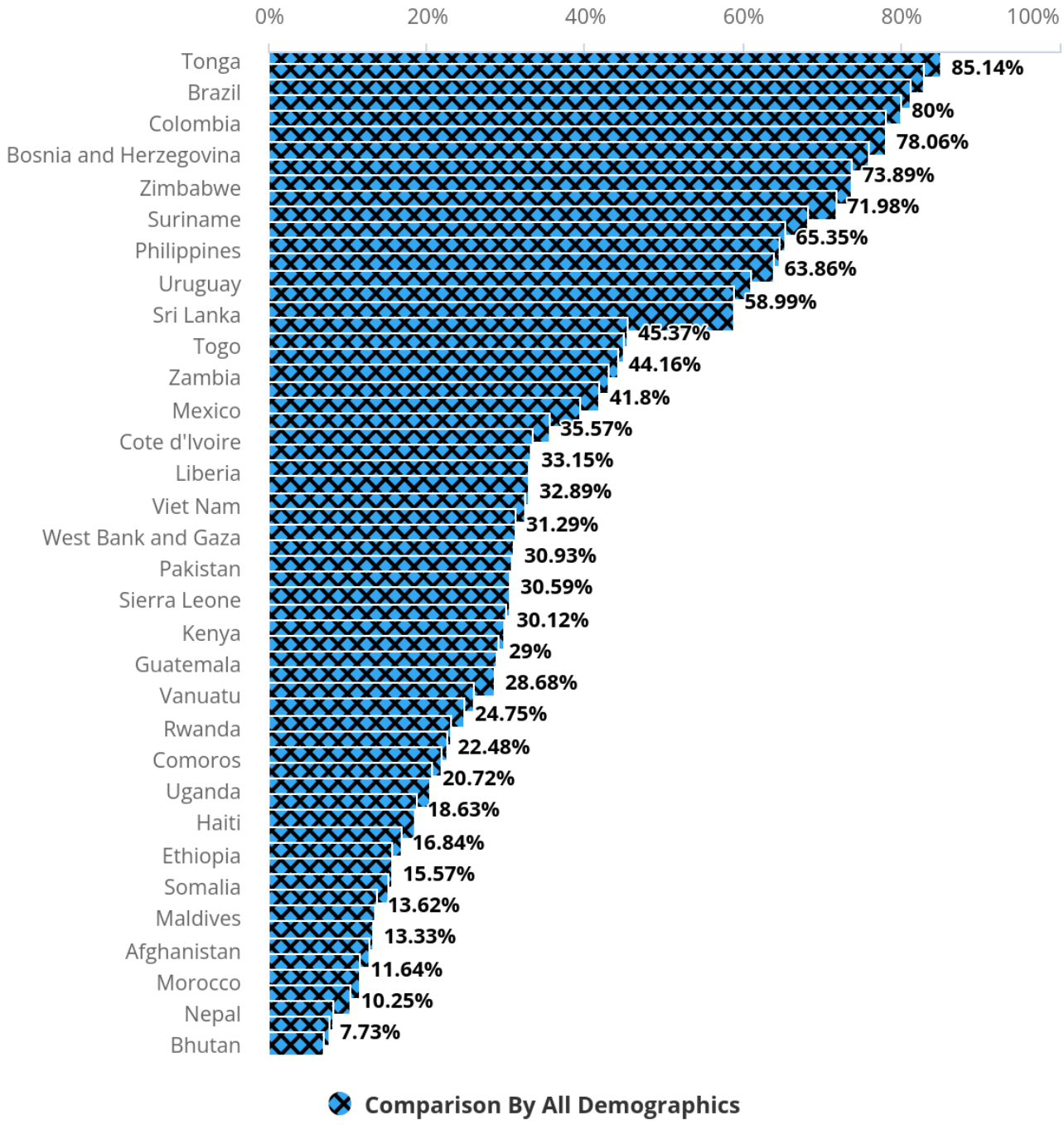
"Multiple factors of discrimination intersect, such as gender, disability, age, socio-economic and migratory status" (Handicap International 2023, 5).

Overall, children with disabilities who lack access to education are likely to encounter multidimensional poverty and social exclusion (International Finance Corporation, 2024). There is a need to offer cost-effective learning approaches to improve enrolment and literacy.

Adult

According to the United Nations Development Programme, "the global literacy rate for adults with disabilities is as low as 3 per cent" (United Nations, 2020).

CHART 1: Percentage of People with Disabilities with at Least Primary Education



Source: Disability Data Hub, The World Bank, 2025

There is a wide disparity in higher education accessibility between people with and without disabilities (UNESCO and Global Education Monitoring Report 2020). Fewer students with disabilities attend university than non-disabled students do. They face discrimination and barriers to exercising their educational rights (United Nations, 2021). Limited educational opportunities severely threaten their financial independence and labor market visibility (OECD, 2022).

Multiple factors deter learners with disabilities from pursuing higher education, including financial insecurity, a lack of accessible educational facilities, pedagogical barriers, entrenched societal beliefs, cultural and academic ableism, a lack of awareness of diverse disabilities, and attitudinal barriers (International Finance Corporation, 2024; UNESCO IESALC 2023). Overall, adults with disabilities who have limited educational opportunities face social and economic exclusion. Introducing supportive educational policies, increasing accessibility, and implementing low-cost educational interventions can help learners with disabilities integrate more effectively into society.

Technology and Disability

Technology positively affects the education, skills development, employability, and social lives of individuals with disabilities. With the arrival of AI, there are more opportunities to enter the labor market and sustain educational visibility. However, learners with disabilities face barriers to its full utilization.

"For most of us, technology makes things easier. For a persona with a disability, it makes things possible."
--Judith Heumann

Over 1 billion children and adults with disabilities lack access to assistive devices (WHO & UNICEF, 2022). This issue is more prominent in low- and middle-income countries because of to high costs, security concerns, and a lack of supportive mechanisms (GSMA 2022; Raja 2016).

Learners with disabilities have lower digital skills than non-disabled learners because of the digital divide and limited

exposure to digital literacy (UNDP 2021). They are also at digital risk due to digital isolation and privacy concerns, such as cyberbullying (OECD 2023). The available technologies and learning modalities are usually inaccessible because of errors or associated costs. Even if accessible, the resources lack quality (WEBAIM 2024).

The use of open-access digital tools and resources could broadly bridge some of these gaps.

Disability and Education in Pakistan

Pakistan has a population of over 241.5 million (Pakistan Bureau of Statistics 2023a). An estimated 7.45 million residents live with disabilities (Pakistan Bureau of Statistics 2023b).

Pakistan is a signatory to the Universal Declaration of Human Rights (UDHR) and UNCRPD. The social, economic, and educational rights of people with disabilities are protected through national and provincial strategies, including but not limited to the Disabled Persons (Employment and Rehabilitation) Ordinance of 1981 (The National Assembly 1981) [amended in 2014], and the National Policy for Persons with Disabilities (Government of Pakistan 2002).

Educational accessibility at all levels is highlighted in various disability acts and education policies. For example, the National Education Policy 2009 equalizes access to education for diverse populations, including females and males, disabled children and adults, and other marginalized groups. The policy also emphasizes measures to include people with disabilities in mainstream education and Technical Vocational Education (TVE) programs (Ministry of Education, Government of Pakistan, 2009).

Similarly, Pakistan's National Education Policy 2017 emphasizes policy actions that add to the 2009 policy to increase the number of educational institutions, equip existing and new academic institutions with modern educational technology and teaching aids for diverse disabilities, increase resources for in-service training and staff development, improve transport and hostel facilities, and provide scholarships (Ministry of Federal Education and Professional Training, Government of Pakistan 2017). And the latest iteration, the National Education Policy Development

Framework 2024, highlights the importance and need for special schools (Ministry of Federal Education and Professional Training, Government of Pakistan 2024).

The literacy rate in Pakistan is low (World Economic Forum 2024). Although the literacy rate among individuals with disabilities is unknown, the current state of education is inadequate (Shaukat 2023; Social Protection Resource Centre Pakistan 2021). There are a limited number of inclusive schools in the country. Education is further inaccessible to children with disabilities in rural and far-flung communities, which constitute approximately 51.5% of Pakistan's total population.

The National Education Policy of 2017 highlighted challenges such as a lack of awareness, training, and rehabilitation, non-availability of statistics on the number of children with disabilities and the number of particular education institutions and their enrollment, lack of coordination and linkages between formal and special education, and failure to adopt technology to promote inclusivity in classrooms. It also sheds light on the misalignment between formal curricula and teaching-learning materials and the needs of children with disabilities.

Individuals with disabilities participate the least in higher education. The Higher Education Commission of Pakistan has passed a policy granting equal educational opportunities for people with disabilities (HEC 2021). The policy states:

- free transport within campuses
- allocation of special funds
- availability of digital devices, including e-books, audiobooks, and accessible lecture notes

Nevertheless, more awareness and disability-inclusive institutional practices are required for effective implementation.

A limited number of studies identify the educational challenges university learners with disabilities face (e.g., Ayub 2021; Hussain, Shahzadi, and Khan 2020). These studies are limited in number and do not offer in-depth narratives, highlighting the need to gather lived experiences and offer contextual, sustainable solutions.

CHART 2: Literacy Rates by Gender and Urban/Rural Breakdown

Region/ Province	Male			Female			Overall		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Pakistan	78.13	61.02	68.00	69.71	41.67	52.84	74.09	51.56	60.65
Punjab	80.37	65.91	71.98	74.01	50.51	60.19	77.30	58.37	66.25
Khyber Pakhtunkhwa	75.06	62.55	64.57	55.39	33.76	37.15	65.55	48.35	51.09
Sindh	76.27	48.06	64.23	67.80	27.52	50.21	72.26	38.14	57.54
Balochistan	64.51	44.16	50.50	46.49	26.59	32.80	55.86	35.74	42.01
Islamabad	87.19	89.13	88.23	77.87	80.16	79.13	82.91	84.88	83.97

Source: National Census Report, Pakistan Bureau of Statistics, 2023

Pakistan ranked 68th out of 77 in the Global Digital Index, a benchmark that assesses countries' digital transformation (HUAWEI, 2024). Similarly, it ranked 66th out of 133 in Knowledge and Technology outputs, an index that assesses a country's technology outputs through innovation (World Intellectual Property Organization, 2024). Likewise, the ICT Development Index, a platform that measures progress towards digital connectivity, placed Pakistan at 55.6 (International Telecommunication Union 2024). These indexes highlight a broader gap in digital infrastructure and technological accessibility.

Lack of digital literacy, weak technological infrastructure, high costs, sociocultural barriers, resource inaccessibility, and gender, disability, and geographic digital divides are the biggest barriers to the use of technology in Pakistan (Asian Development Bank, 2025).

Assistive technologies help users communicate, move, and perform daily

tasks independently. These emerging technologies can make education accessible to all. For example, a screen reader helps people with visual impairments access digital resources. A limited number of people with disabilities in Pakistan have access to assistive technologies.

A recent national rapid Assistive Technology Assessment (rATA) determined that only 22% of the population that needs an assistive device has had their needs met (Khan et al. 2024). Even for those with access, its use in education remains limited due to a lack of training, making students passive recipients of knowledge.

The Digital Pakistan Policy 2018 includes several provisions to support digital accessibility for people with disabilities (Ministry of IT & Telecom, Government of Pakistan 2018). However, Pakistan's education policies do not specifically highlight the significance of technology in supporting the education of people with disabilities. An exception is the higher-education disability policy, which highlights the use of digital and assistive technology.

Open Educational Resources (OER) can be deployed to bridge the gap between technology and people with disabilities in a learning environment. OERs have significant potential to accelerate collaboration, increase active learning, and support creativity.

Introduction to Open Educational Resources

Open Educational Resources are textbooks, videos, software, and other materials in the public domain, that are free to use, share, and redistribute. The copyright owner grants an open license, such as Creative Commons, granting access to users across the globe (UNESCO, 2024b). OERs are widely available through open repositories and institutional websites, offering numerous resources on various subjects and educational levels. It provides low or no-cost learning materials in low-income regions, thereby reducing the cost of education.

OER has emerged as a movement to increase educational accessibility, reduce costs, foster collaboration, and expand learning circles for all populations across the globe.

OER offers a multidisciplinary approach to the SDGs. It can contribute to

- SDG 4 by increasing access to free, quality OER
- SDG 5 by addressing gender disparities and promoting equitable access to OER
- SDG 10 by reducing educational inequality and making OER accessible to all
- SDG 17 by strengthening global collaborations to develop and share OER with all

Students, parents, teachers, and academic institutions can save billions of rupees on learning materials by using free resources such as OER. OERs can also extend the life cycle of educational resources beyond their original design and purpose, allowing wider adaptation and the creation of educational materials with up-to-date information. Further, OERs:

- facilitate collaboration between instructional designers, experts, and learners in creating, adapting, or translating learning content
- promote lifelong learning
- ensure a wider distribution of resources
- enhance the institution's public image (UNESCO and Commonwealth of Learning 2019)

From the students' perspective, OERs:

- save money on educational materials
- ensure access to content on diverse disciplines
- shift learning from a passive to active

From the teachers' perspectives, OERs:

- help gather free educational resources
- prepare lectures and activities
- allow collaboration and revision to fit the diverse needs of their students

From the researchers' perspective, OERs:

- allow experimentation with digital materials
- more comprehensive data collection
- wider outreach
- stimulate institutional innovation
- encourage inter-institutional learning
- support cross-institutional collaboration and cooperation

From the perspectives of inclusion, diversity, and equity professionals, OERs:

- ensure access to culturally relevant resources in accessible and adaptable formats
- enhance resource quality by promoting broader peer review and ongoing resource development

For people living in remote or rural areas or affected by disasters and who lack financial resources, OER may offer free learning opportunities and encourage community sharing.

OER's do not automatically lead to quality, efficiency, and cost-effectiveness; much depends on the procedures put in place.

Overall, OERs highlight creativity, allowing individuals to create and share resources across various multidisciplinary areas for academic, professional and other purposes. This exchange of ideas resonates with the concept of an intellectual barter system[1], making knowledge accessible to the world.

OERs, Disability, and Education

OERs catalyze innovation but not necessarily for people with disabilities. The Recommendation on OER emphasizes inclusive access, ensuring that resources are shared in open formats to maximize access, co-creation, and curation (UNESCO 2019).

The European Commission's Practical Guidelines on Open Education for Academics highlights that individuals with specific learning needs or disabilities can improve their digital competence and adapt educational resources through open learning opportunities (Inamorato dos Santos 2019). The revised guidelines on learners with disabilities in open and distance learning (ODL) provide strategies for using technology-driven approaches, such as OERs, to support inclusive education (UNESCO 2023a).

[1] Term coined by Dr. Munir Moosa Sadruddin. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4574322

The Dubai Declaration on Open Educational Resources underlined the need to support the development of AI-enabled OERs to enhance resource accessibility among vulnerable groups, including those with disabilities, and to ensure privacy and data protection during the production, use, and sharing of these resources (UNESCO 2024c).

Malaysia is the first to adopt a National Inclusive Open Educational Resources (iOER) policy.

This policy ensures inclusive and equitable access to OER for all learners, including those with disabilities (Ministry of Higher Education, Malaysia 2020). More efforts are needed to recognize the importance of OER and adopt inclusive OER policies in all countries to achieve better educational outcomes for people with and without disabilities.

The concept of OER is emerging in Pakistan and has not yet been explored on a wider scale, largely due to a lack of awareness. Pakistan's recent Open and Distance Learning policy for higher education emphasizes the adoption of OER in existing course materials (HEC 2024). However, it does not highlight the importance of this for learners with disabilities.

OERs can support the education of people with disabilities in various ways:

- reduce the cost of education by making educational resources accessible
- empower users to be active contributors of knowledge
- allow creative minds to curate open and accessible resources
- for their community and beyond
- Encourage collaboration within their community
- publish open content on diverse topics
- increase visibility

If introduced at the higher education level, OERs have the potential to revolutionize education, enabling all people, including those with disabilities, to contribute to the knowledge-sharing community.

Research Questions

1. What social, academic, and technological challenges do people with disabilities encounter?
2. How is OER being used globally by or for people with disabilities?

3. What are the barriers to the use of OER for people with and without disabilities?

Research Design

This study adopts a qualitative research approach. It uses a combination of phenomenology and semi-systematic review methods.

Phenomenology gathers individuals' in-depth lived experiences (Neubauer et al. 2019). In contrast, a semi-systematic review tracks the development of selected themes conceptualized differently and studied by various researchers and organizations across diverse disciplines (Snyder 2019).

To uncover the challenges and perspectives of people with disabilities, phenomenology was selected as the model. A systematic review was conducted to understand the use of OERs by or for individuals with disabilities and to identify potential barriers.

Using kaleidoscopic phenomenological perspectives, 20 participants from Karachi, Pakistan, who were directly or indirectly connected with diverse disabilities were selected through criterion sampling. The research participants were categorized as 'students with disability,' 'general university students,' 'university teachers,' and 'representatives of disability-led organizations.'

Phenomenological data were gathered through interviews using conversational and exploratory interviewing techniques. The semi-systematic literature review data were collected from available publications from various sources.

The informed consent forms included the study purpose, data collection process, and privacy protocols. No potential risks were associated with this study. Power dynamics were navigated by:

1. allowing participants to decide the date, time, and venue
2. building rapport and explaining the purpose of the research
3. allowing participants to add or omit questions at their discretion, reinforcing their role as co-creators of knowledge
4. allowing participants to ask questions during the interview and provide feedback on the interview process

To mitigate the language barrier, the researcher used a bilingual approach. A sign language expert was hired for the deaf participants.

Interview data were transcribed and analyzed using narrative analysis, and data from the semi-systematic review were analyzed using thematic analysis.

Phase 1 – Narrative Analysis

In consultation with the participants, interviews were arranged across different venues, dates, and times. A translator and an assistant supported the process to ensure inclusive communication. Each interview lasted approximately 60 minutes and was video recorded. The interviews were later transcribed and analyzed (See Appendix 1).

Social Challenges

There is a lack of awareness in society regarding people with diverse disabilities, their rights, and how to support them socially and academically.

Participants highlighted that using stigmatized words like ‘mentally retarded’ is a common practice, which reflects negative social attitudes. It hurts the sentiments of people with disabilities, contributes to low self-esteem, and drives them toward minimal social participation.

A communication gap was also highlighted as a barrier, leading to social isolation and misconceptions. Participants shared that society lacks awareness of inclusive language, which limits their interaction with people with disabilities. Participants pointed out that inaccessible infrastructure such as public transportation restricts their free movement, which eventually affects their social well-being. Additionally, participants reported that society often assumes people with disabilities to be illiterate or incapable, failing to recognize their skills.

“When people see us in society, they perceive us as illiterate. Deaf and hearing are same. Don’t think that we are disabled, and we don’t know anything. We have skills as well as experiences” (Deaf Participant).

People with disabilities lack equal employment opportunities. It is a common misconception that they are incompetent due to their age. If they are employed, they often experience

discriminatory workplace practices and are offered lower positions.

> ***"We don't have equal opportunities when it comes to job market… People still hesitate to employ a visually impaired person due to lack of acceptance" (Visual Impaired Participant).***

There is limited parental awareness of disabilities. Participants shared that some parents feel embarrassed taking their children out in public, reflecting stigma and lack of understanding.

Participants called for equal treatment, respect, and acknowledgment of their abilities to increase their social participation.

Academic Challenges

Participants expressed dissatisfaction with the education system in addressing the educational and employability needs of learners with disabilities. They highlighted that, in most cases, learners with disabilities are not welcomed into the mainstream education system due to the unavailability of inclusive infrastructure, resulting in social exclusion, and limited learning opportunities.

Participants view that a limited number of universities have adequate inclusive facilities. Structural barriers, such as the absence of ramps and railings, restrict participation in campus life for students with disabilities.

> ***"No ramps and no proper facilities are obstacles at every step. How can a person in a wheelchair climb to the upper floor? And when others pull them up, it's not just their body that is lifted- their dignity that is bruised" (University Teacher).***

Across groups, participants reported limited access to assistive equipment, accessible training materials, and essential educational resources because of their high cost.

Participants described curricula and textbooks as non-inclusive and lacking disability perspective. Students struggle to access technology, interpreters, and adapted learning materials, which limits their learning outcomes. The lack of

disability representation in academic content also prevents non-disabled students from developing an understanding of and empathy toward the disability community.

Discriminatory attitudes from teachers and management have been widely reported, which barricade their academic progress.

“When I wanted to take mass communication as a major subject, I was discouraged by the department. They said, since you're visually impaired, how will you survive in mass communication? How will you pursue your career in mass communication? After much debate and discussion, I had to prove myself and was given a chance. And, today, I've done a master's in mass communication” (Visual Impaired Participant).

There is a communication gap between learners and teachers due to the lack of inclusive language skills. For example, one of the participants noted that students with hearing impairments require interpreters to fully participate in lectures; however, such support is rarely available at any university. As a result, even highly capable students struggle academically due to lack of appropriate input support.

The contribution of higher education institutions to creating awareness about disabilities is limited. Inclusive higher education policies are not prioritized in the country. Participants noted that institutions often design solutions and policies for learners with disabilities without consulting them, resulting in ineffective support systems.

There is a shortage of teachers trained in inclusive practices. Many educators lack effective strategies to support learners with diverse needs. Higher education institutions offer limited training, primarily focused on special education, reflecting the absence of a comprehensive, inclusive curriculum. Concerns were also raised regarding teachers’ attitudes and professionalism.

Participants noted restricted subject choices for learners with disabilities, who often pursue arts-related degrees due to limited options and inadequate support. Traditional assessment methods further hinder academic achievement.

Participants reported that when learners with disabilities leave formal education,

opportunities for skill building and future employment become limited because of fewer vocational and technical institutions that offer skill-development programmes, restricting their economic and social inclusion.

Participants emphasized raising awareness, increasing resource accessibility, bridging communication gaps, improving institutional infrastructure, introducing inclusive teacher training, creating collaborative opportunities, and involving learners with disabilities in decision-making to expand inclusive educational practices.

Technological Challenges

Most participants highlighted that learners with disabilities have limited access to digital devices and assistive technology, which is a key barrier to digital inclusion. Assistive tools such as Braille devices and advanced screen readers are expensive, and not all learners can afford them.

"Blind students rely on screen readers to access text, but many educational resources are not designed to support them. We can't even understand the videos that the teachers provide us…" (Visual Impaired Participant).

Participants added that higher educational institutions have weak inclusive digital infrastructure. There is a lack of assistive technology labs. Computers in institutions do not have accessibility software installed on them. Furthermore, university systems, apps, and websites lack accommodation features. Digital learning materials are often incompatible with screen readers.

Participants indicated that digital learning resources in various digital formats, such as audio and Braille books, were limited. Content on a variety of subjects and themes is unavailable. The breadth of subject matter available is often not widely available in local languages.

Due to the limited integration of inclusive languages in educational technology, receiving training in technology can be challenging for some learners with disabilities. For example, one participant shared that she initially discontinued a computer graphics design course

because of the absence of sign language support and difficulty understanding content in an all-hearing environment. However, when she later found a program offering technology training in sign language, she successfully completed a four-month course.

Overall, participants emphasized the need for accessible and compatible technology, low- or no-cost tools, and continuous technology training. and a variety of digital learning resources to ensure wider digital accessibility.

Active Contributors or Passive Consumers of Knowledge

Learners with disabilities are creative and capable of actively contributing to knowledge-sharing. They often demonstrate strong imaginative and critical thinking skills. However, their contributions to educational spaces remain largely invisible. Instead, they primarily receive information without having equal opportunities to engage in knowledge creation processes.

"When other people see you as a third-class citizen, the first thing you need is a belief in yourself and the knowledge that you have rights."
--Judith Heumann

Participants reported minimal interaction between learners with and without disabilities in higher education institutions. They expressed that learners with disabilities are often found to be passive recipients rather than active contributors of knowledge owing to limited opportunities to interact, communication barriers, technological accessibility challenges, and negative social attitudes.

"When we assign group work, people without disabilities usually don't want to include individuals with special needs in their groups. They may include them but don't give them responsibilities because they believe they are incapable" (University Teacher Participant).

From the interviews, it was found that some learners with disabilities want to contribute their knowledge and skills but are often not encouraged to do so. Opportunities for meaningful interaction are limited at the university level, which affects students' ability to understand and benefit from each other's learning.

Across responses, participants stressed the need for inclusive learning environments, collaborative opportunities, and inclusive language training for non-disabled students and teachers.

Collaboration Among People With and Without Disabilities

Many participants pointed out that students with disabilities are often not visible in mainstream social and academic spaces because families tend to keep them isolated. Consequently, opportunities to build networking and collaborative skills are limited even before reaching university.

Collaboration between learners with and without disabilities is often missing in higher education institutions, as many non-disabled learners are reluctant to collaborate, often believing that it may be difficult to communicate. Negative attitudes and a lack of disability awareness among non-disabled learners reinforce this separation.

"…People without disabilities are sometimes hesitant to collaborate with us. People with disabilities are also introverted in some cases and don't want to be included, keeping themselves left out" (Visual Impaired Participant).

The participants strongly expressed a desire for inclusive collaboration. They highlighted the potential benefits of joint academic work, particularly in developing educational materials, curricula, and policies.

"If deaf and non-deaf individuals work together to develop curricula and textbooks, the quality of educational materials will improve significantly, and new ideas can emerge. A unified textbook can be created that meets the needs of both communities. Since deaf individuals understand the correct signs for specific words, something non-disabled individuals may not, this collaboration would be a great initiative for inclusive and effective education" (Deaf Participant).

Participants believed that structured opportunities for collaboration, combined with communication support and disability awareness initiatives, could help break down barriers.

Participants lacked awareness and skills regarding OER. They were unaware of the OER as a potential collaboration opportunity. They were briefly

introduced to this idea to explore whether they saw it as a possible avenue for collaboration, innovation, and creativity.

Participants shared their talents in art, writing, and other creative areas and expressed interest in developing open resources. For example, one participant hoped to create an open English course and an audio production course, another aimed to develop open-source educational software, and one planned to design accessible OER on the psychological challenges faced by visually impaired individuals.

“I do Heena tattooing. If I publish a book on Heena tattooing designs, people can learn from it. I am also good at cooking; writing recipes can go viral. If we want to adapt books, training is essential. Creating a book on henna tattooing or cloth stitching will be useful and supportive for people” (Deaf Participant).

Participants underscored that awareness of OER should be provided to both learners with and without disabilities so that they can share ideas, collaborate, and produce innovative resources to benefit the world. They also expressed the need for a creative platform to showcase their skills.

Phase 2 – Semi-Systematic Review

The use of OERs reduces the cost of education, but not necessarily for those with disabilities.

The involvement of individuals with disabilities and disability-led organizations in the OER movement remains unreported. This exclusion mainly stems from the concept of ‘open’ in education associated with broader outreach efforts by and for the general population, in contrast to the relatively minor disabled population.

Understanding OER potentials and challenges is crucial for exploring diverse global perspectives on OER use for and by people with and without disabilities. Using a focused approach, the researcher has primarily gathered

1. OER practices that enabled an understanding of the opportunities associated with these practices by and for people with disabilities.
2. Barriers through the lens of people with and without disabilities as both may encounter unique accessibility

barriers that may impede collaborative practices.

OER Good Practices

The following elements helped gather good OER practices by and for people with disabilities: usage, creation, and initiatives.

Usability

In this research, 'usability' refers to accessing and using OERs by or for people with disabilities.

OER inherently enhance the accessibility of learning resources for persons with disabilities because they are openly licensed (Chambers, 2023).

The researcher initially scrutinized thirty-three documents, of which six were finalized based on the following criteria: any study that reflects the (1) favorable accessibility/availability of open resources for people with disabilities, (2) promising findings regarding the use of open resources by or for people with disabilities in educational settings.

Accessible OERs allow individuals with disabilities to access open content without financial or technical challenges. In contrast, accessible digital OER refers to the usability of digital products, services, or environments with the broadest range of capabilities without barriers (UNESCO 2022a).

WCAG 3.0 offers a wide range of guidelines to make web content more accessible for users with disabilities.[2] Similarly, the Universal Design for Learning (UDL)[3] is a set of principles that optimizes the usability and accessibility of learning resources in diverse contexts for all, including learners with disabilities.

Various recommendations and guidelines have been proposed to make OER accessible to individuals with disabilities. (e.g., Cape Town Open Education Declaration 2007; European Agency for Special Needs and Inclusive Education 2015; Martins et al. 2020; UNESCO and Commonwealth of Learning 2019; UNESCO 2012, 2019, 2022a). For example, the Cape Town Declaration emphasized making OER available in accessible formats for people with disabilities and offline users.

[2] https://www.w3.org/TR/wcag-3.0/

[3] https://www.cast.org/what-we-do/universal-design-for-learning/

Similarly, UNESCO recommends ensuring equitable access to quality OER in open formats and standards for vulnerable groups and people with disabilities.

However, their integration, implementation, outcome, and sustainability remain undocumented.

The accessibility of OERs for people with disabilities largely depends on the availability of accessible platforms and expert competence in designing inclusive open platforms.

Previous studies have not identified accessible OER platforms designed exclusively for or by people with disabilities. Similarly, the available studies did not highlight the direct engagement of individuals with disabilities in web accessibility checks. Navarrete and Mora (2015a) evaluated selective OER websites from the perspective of users with disabilities and found only one website with a few accessibility features.

It is still unclear whether individuals with disabilities can access open platforms independently, and the intensity of challenges remains the same with and without facilitation. In addition, it is unclear whether all available open platforms have accessibility features that meet the needs of diverse disabilities.

"…The research on OER and OEP for disabled learners is still in its infancy, since most researchers have focused on a rather superficial analysis that does not rely on rich datasets" (Zhang et al. 2020, 12).

The accessibility of open platforms depends on designers'/creators' knowledge, understanding, and competence in inclusivity. Research efforts in this domain are limited. One study interviewed individuals creating and implementing OERs at the higher education level. The findings suggest that while OER creators are aware of some accessibility issues that individuals with disabilities face, they acknowledge that further training is needed to explore and address other accessibility challenges effectively (Pierrès and Darvishy 2022).

Another accessibility perspective is the direct assessment and

interaction/engagement of disabled individuals with OERs. The limited number of available studies indicates positive interactions between individuals with disabilities and the OER.

For example, one study assessed the interaction of fifty-one postgraduate and research scholar-disabled students (physically challenged, visually impaired, and hearing impaired) with OERs at Alagappa University and Bharathidasan University, India, within an inclusive education context. The findings indicate that the students were satisfied using OERs (Muniyasamy et al. 2022).

Similarly, another study examined the effects of multimedia open resources for education on the mathematics performance and motivation of high school learners with learning disabilities. The course interest survey results showed a statistically significant difference in motivation between the two groups in all four motivational components: attention, confidence, relevance, and satisfaction (Park and McLeod 2018). The available studies provide positive insights but focus more on passive usability than on fostering independence.

Perryman and de los Arcos (2016) surveyed 7,000 respondents from 175 countries regarding their OER use, including 11.3% of those with a disability. Compared with those without disabilities, individuals with disabilities were more likely to have tried OER before enrolling in formal studies. Trying OERs increased their satisfaction and confidence, although they did report challenges.

The findings of a scoping review conducted by Moon and Park (2021) indicate that OER supports learner-learner interaction via peer collaboration, but this varies across different OER platforms. OER also boosts learner–instructor interactions. It further endorsed learner–interface interactions related to learners' hands-on practices and self-regulated learning through the OER.

The limited number of studies makes it difficult to generalize the findings. However, the available studies have shown:

1. OER enhances accessibility for persons with disabilities through open licensing

2. Accessible OER removes financial and technical barriers for learners with disabilities
3. International frameworks emphasize accessible and open formats for the inclusion of people with disabilities
4. Evidence on the actual implementation and long-term sustainability of accessible OER remains limited
5. No accessible OER platforms created specifically for or by people with disabilities were found
6. Limited research directly involves people with disabilities in testing OER accessibility

OER can benefit learners in various contexts. Nevertheless, the discussion does not adequately emphasize the explicit utilization of OER by learners with disabilities, particularly regarding their overall educational needs and, more specifically, in the context of personalized learning.

Creation

In this study, 'creation' refers to the adaptation or development of OERs by or for people with disabilities.

Active OER users' access, adapt, create, and share open resources with others for possible collaboration and broadening knowledge outreach. In contrast, passive OER users access open resources but do not adapt them. In general, most users remain passive in part due to a lack of motivation (Orr et al. 2015).

The researcher initially scrutinized twenty-eight documents, of which six were finalized based on the following criteria:

1. participation of people with disabilities in the adaptation or creation of OER
2. the development of OER platforms/apps by others for people with disabilities with positive impact or outcomes

To create OERs, people with disabilities must:

1. have OER knowledge and skills
2. be aware of their potential
3. show willingness to adapt or create OER

There is a lack of evidence regarding OER awareness among people with disabilities. Furthermore, research on OER training is lacking.

Evidence regarding the participation of people with disabilities in creating or adopting OER is unavailable. An exception is a survey by Perryman and de los Arcos (2016), which found that nearly 80% of people with disabilities (11.3% of 7000 participants) adopted OER. Few have created resources and published them under an open license. However, the type of resources created, and their sources of availability were not mentioned.

A limited number of individuals and organizations have developed or initiated OER applications, platforms, games, courses, and websites targeting people with disabilities, as well as impact assessments. For example, Kourbetis and Boukouras (2014) developed OERs, including bilingual hybrid books and interactive online videos tailored for deaf elementary students in Greece.

The efficacy of the application was assessed by fifty-one teachers who teach deaf learners. Overall, they found these digital resources to be interactive and accessible. The design has the potential to support deaf learners' memory, positively reinforce correct choices, and support story sequence skills.

Navarrete and Mora (2018) proposed an accessible design for OER websites for all users, including those with visual and auditory disabilities. The creators personalized the OER environment to meet their sensory and cognitive needs. Based on this, an Open Educational Resources for All (OERfAll) website was created, allowing for the customization of the interface and content. The researcher then conducted user experience (UX) tests on the website with users with various disabilities to confirm the design's accessibility, practicality, and effectiveness.

Five smartphone-based open-source games to train working memory, including behavioral preferences and sensorimotor abilities, in children with Autism Spectrum Disorder (ASD) were created by Wagle et al. (2021). These games were later piloted with 14 autistic children from the Amrita School for Special Education in Kanpur, India. A positive correlation was observed between children's game performance and working memory improvements.

> ***"Learning ecosystems have to be carefully crafted, to empower teachers and learners, while ensuring an overall stability of the system and a predictability of outcomes for beneficiaries (direct and indirect) of an education system."***
> ***--Janssen, Schuwer & Orr 2023***

Similarly, an interactive communication platform and 3D virtual physics laboratory were established using open-source software for students with learning disabilities. The purpose of this study was to improve their cognitive skills in physics experiments. Forty female middle school students with learning disabilities from Ranyah-Taif, Saudi Arabia, participated in the study.

The results showed significantly improved cognitive skills in physics in the experimental group of students with disabilities compared to the control group (Elfakki, Sghaier, and Alotaibi 2023).

A team of researchers in France developed an e-learning system, an accessible MOOC player and evaluated its impact on the learning experience of people with disabilities. The platform was designed and tested with 46 participants who had cognitive, sensory, or motor disabilities. The platform positively impacted the participants' learning experience. Its inclusive design effectively removed participation barriers and improved MOOC accessibility and retention, demonstrating its potential to enhance educational opportunities for people with disabilities (Cinquin, Guitton, and Sauzéon 2023).

Overall,

1. There is no evidence that people with diverse disabilities have created or adapted OER
2. Most documented OER initiatives are created for, not by, people with disabilities
3. The essential requirements for OER creation have not been widely established

OER knowledge, skills, and willingness are central to the creation of open resources.

Initiatives

The 'initiatives' are viewed as any OER development to support people with disabilities that have either not yet been

implemented or whose outcomes are not documented, highlighting emerging trends.

The researcher initially scrutinized thirty-three documents and finalized nine that matched the following criteria: any open initiative taken by or for people with disabilities, but there is no record of how it was carried out or what difference it made.

A few OER initiatives have been undertaken to bridge accessibility gaps. However, these initiatives have not been applied, and their outcomes have not been documented in real settings. For example, Zervas, Kardaras, and Sampson (2014) built an OER-based inclusive portal to support students with visual and hearing disabilities to access educational content. However, it has not yet been tested. Similarly, Altinay et al. (2018) proposed an open-source education course for orthopedically disabled learners in Northern Cyprus.

This online training course was designed to support learners and their families in professional development through counseling and guidance for the same. Initially, workshops and meetings were organized to develop the course content within a lifelong learning framework. The course also includes exercises and social activities. Since the course has not yet been tested with disabled learners due to the project's limited scope, its impact is unknown.

I-Stem, supported by UNICEF’s Innovation Fund, has designed an AI-powered platform to address the lack of available learning resources for learners with disabilities in India and beyond. It provides accessible document conversion for visually impaired learners, real-time captioning for hard-of-hearing learners, and service management for educational institutions. It aims to empower 1.3 billion people with disabilities globally through technology and open-source resources (UNICEF 2020).

NonVisual Desktop Access is a free, open-source screen reader designed for Windows that enables visually impaired users to engage with technology. Similarly, Gnome's Orca project empowers visually impaired individuals to navigate Linux desktops more effectively, fostering a more inclusive user experience (Psicosmart Editorial Team 2024).

The University of Michigan's TIKTOC Rehabilitation Engineering Research Center has developed open-source software that helps youth with disabilities develop scheduling independence (Computer Science and Engineering, University of Michigan 2020). Similarly, EyeMine is an open-source interface designed to help people with disabilities play Minecraft using their eyes (Melanson 2023). Likewise, The Disability-Helper project has developed five open-source apps to help people with disabilities for various purposes. For example, “Speak Helper helps people convey a message by converting typed text into audio output using TTS” (GITHUB 2024).

A Greek non-profit group worked with partners, alongside students and teachers, to create free, open-source audio-based games to improve the sensation of depth, movement, and speed among visually impaired children (Donohoe 2021). Similarly, the i-Game project, an open-source platform, allows people from underrepresented groups, including those with disabilities, to build and market their inclusive games (Raising the Floor 2025).

These initiatives symbolize the growing trend of facilitating learners with disabilities' use of OER to improve their academic and social skills. However, further efforts are needed to evaluate and validate their impact.

Barriers to Realizing the Potential and Adoption of OER

The challenges that OERs carry revolve at the micro- (teacher, learner, support staff), meso- (institution or department), and macro-level (national and global) (Janssen, Schuwer, and Orr 2023). These may hinder its full realization by people with and without disabilities. Some of the significant barriers are highlighted below.

Digital Poverty

Digital poverty refers to a lack of access to technology, digital devices, and ICT skills. Unless learners with and without disabilities have accessibility, OER adaptation and creation remain challenging.

Regarding technology and device accessibility, 4.6 billion people worldwide use Internet connectivity on their devices. However, approximately 350 million people (4% of the world’s

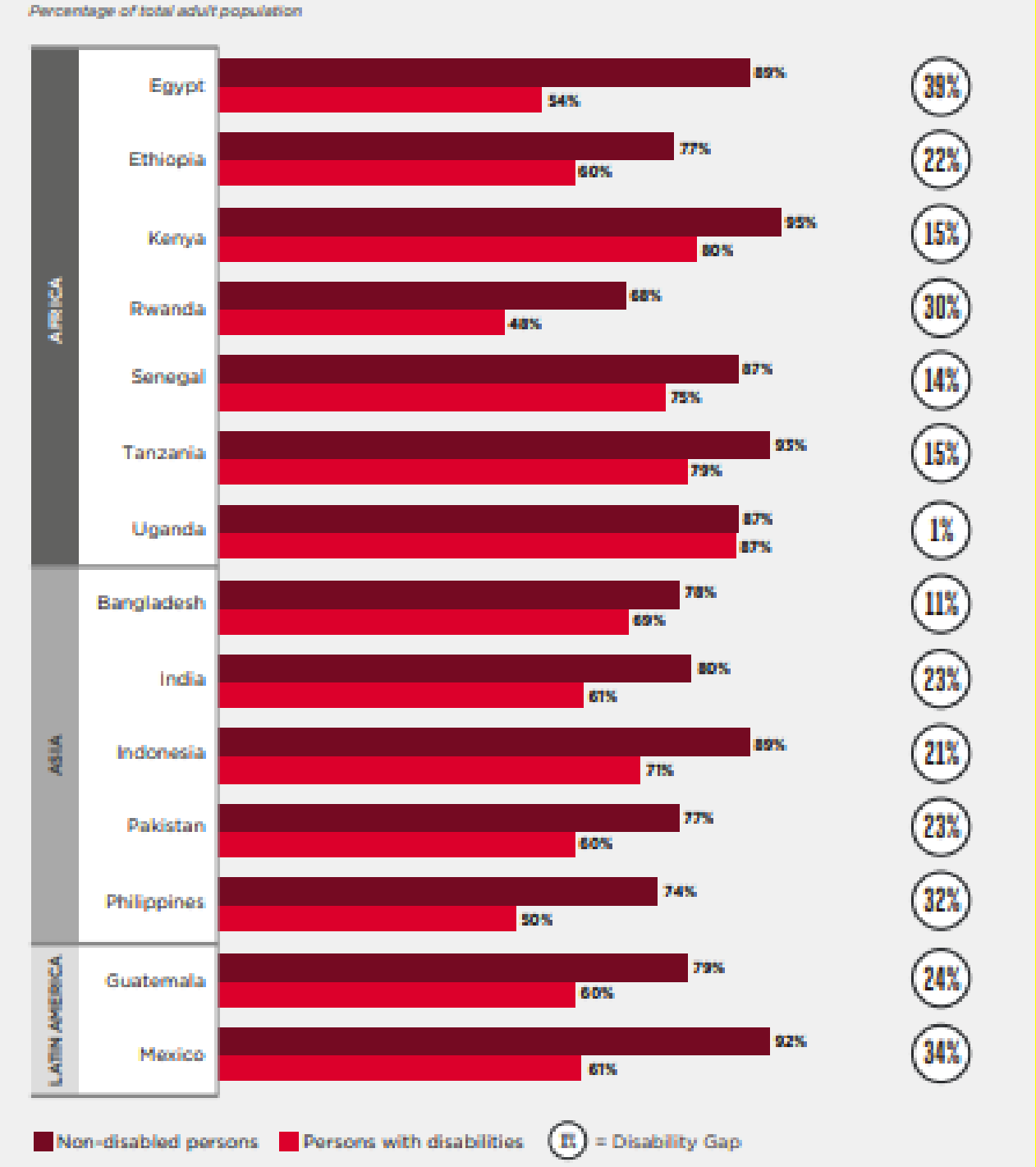
population) are disconnected from mobile broadband (GSMA 2024). People with disabilities are less likely to own smartphones than the non-disabled population.

Approximately 2.5 billion people worldwide require assistive devices, including smartphones for cognition, communication boards, books, cards, simplified mobile phones, smartphones for vision, communication software, recorders, and screen readers. However, accessibility remains challenging for the disabled population due to low affordability and device accessibility (World Health Organization and UNICEF 2022). Similarly, there is a notable disability gap in access and use of the Internet across European OECD countries and beyond (ILO and OECD 2022). Key barriers include low digital literacy and financial constraints (GSMA 2021).

Limited access to technology and devices remains a key gap in the effective use of OER. A review-based study highlighted a lack of basic knowledge of technology and infrastructural facilities as obstacles to the use of OER in higher education (Swain and Pathak 2024). One systematic review identified technological limitations as a barrier to the use of OER by instructors, learners, and researchers for academic purposes (Adil et al. 2024). One report stressed the importance of viewing digital disruptions in light of higher education's broader purpose beyond just teaching technical skills (Global Education Monitoring Report Team 2023).

Digital skills remain low among people with and without disabilities, particularly in low- and middle-income countries (GSMA 2020; GSMA 2022; UNESCO 2023b, 2023c; UNDESA 2024). Females with disabilities are mostly affected by digital exclusion (UNICEF 2023). Digital inclusion is also

CHART 3: Disability Gap in Mobile Ownership



Source: GSMA 2025

challenging for learners from regions affected by crises, conflicts, or natural disasters.

There is a gap in the accessibility of devices, technology, and digital skills among learners with and without disabilities. It is significant to highlight that learners with access to technology and digital skills do not necessarily use digital devices for educational purposes and collaborate mainly to develop OER, as these practices are primarily associated with OER awareness, motivation, and ownership.

Lack of Awareness about Disability

Discriminatory attitudes towards disabilities in the educational community mainly derive from a lack of awareness of diverse disabilities. The discrimination serves as the root cause of misconceptions among non-disabled individuals, hindering interaction and collaboration with the disabled community.

A study from a Saudi University found a lack of disability awareness among university graduates (Madhesh 2022). Similarly, selected undergraduate participants in Padang, West Sumatra, lacked awareness a disability (Kusumastuti, Mahdi, and Muspita 2019). Likewise, a study by the University of Malaya revealed that student participants exhibited moderate disability awareness (Nor Azizi, Rabun, and Badarin 2018). Correa et al. (2021) examined awareness, knowledge, and perceptions regarding the accessibility of higher education among selected students and teachers at a private college in Santo Andre, Sao Paulo, Brazil. Although participants were reasonably informed about individuals with disabilities, most were unable to explain the key elements of assistive technology.

Professors lack adequate knowledge of diverse disabilities in various settings (Korthals Altes et al. 2024). One study examined the factors shaping university faculty attitudes toward inclusive education for students with disabilities in Greece. The findings revealed a willingness to provide resources but a reluctance to adapt teaching methods (Papadakaki et al. 2022). Another study found that 448 teacher participants in Jordan lacked knowledge of the characteristics of disorders and

developmental disabilities (Alali et al. 2020).

Similarly, a survey of 719 faculty members from five Saudi universities showed a positive attitude toward students with disabilities but a lack of awareness. All participants confirmed that they had not received training to support students with disabilities (Alrusaiyes 2024).

The findings cannot be generalized because of geographical, methodological, and sampling limitations. In addition, awareness of diverse disabilities remains undocumented across regions, cultural settings, and academic disciplines in higher education. It is also uncertain whether increased awareness has led to a rise in collaborative activities, as previous studies did not document this instance.

Overall, there is limited awareness of diverse disabilities among non-disabled learners and instructors.

Lack of Awareness about OER

Awareness of OER combines knowledge, skills, willingness, and ownership in adapting and creating OER. This awareness is crucial for policymakers, developers/designers, teachers, learners (with and without disabilities), parents, and everyone who wishes to participate in knowledge sharing.

The Paris OER Declaration encourages governments to spread awareness of OERs. The recommendation emphasizes building awareness among relevant stakeholders to increase access to open educational and research resources. Limited studies suggest spreading OER awareness among disabled and non-disabled learners and teachers (Adil et al. 2024; Commonwealth of Learning 2015; 2017; 2022; Janssen, Schuwer, and Orr 2023).

Some studies highlighted no or moderate levels of OER awareness and skills among non-disabled learners (e.g., Logo and Umar 2023; Gunasekara 2019; Ismail et al. 2019; Majeed 2018; Pierrès and Darvishy 2022; Prasad 2022). In contrast, some other studies have found that students are, in fact, aware of OER (e.g., Arcebuche 2022; Obinyan, Okoroafor, and Ezenwuzor 2023). However, the available studies do not address participants from across geographical locations and disciplines,

making it challenging to generalize the claims. Furthermore, OER creation is sparsely documented, highlighting passivity even among those aware of OER.

Certain factors build positive perceptions and motivate non-disabled learners to use and adapt OER. For example, cost, preferences, quality, usefulness, and a sense of connectivity (Fine and Read 2020; Hilton 2020; Howard and Whitmore 2020; Snyder et al. 2023).

Previous studies did not assess and document knowledge competence and awareness of OER among learners with disabilities. Further studies are needed to examine factors that motivate disabled learners to use and adopt OER remain undocumented. From this, we can assume that learners with disabilities lack awareness of OER and competence.

Teachers' awareness is essential for effectively disseminating OER knowledge and skills to learners. A cross-comparative analysis examined faculty awareness, perceptions, and use of OER in higher education, with data drawn from nine expert reports across selected countries. The findings revealed low levels of awareness and inadequate institutional policies regarding the OER (Marín et al. 2022). Moon and Park (2021) underlined that instructors have limited familiarity with assistive technologies and OER, and the absence of proper guidance leads to frustration among them.

In Turkey, one study found that while teachers were somewhat aware of OER, they often confused digital content with open-licensed resources due to a lack of understanding of licensing mechanisms (Ozdemir and Bonk 2017). Similarly, another study's findings revealed that although higher-education participant teachers in India had positive attitudes towards using and sharing OER, a lack of understanding of licensing and copyrights and the current workload were barriers to their adaptation (Mishra 2017).

A few other studies highlight a positive perception among faculty members and teachers regarding using OER, mainly when they receive adequate information and training (e.g., Jung, Bauer, and Heaps 2017; Okwu, Ogunbodede, and Suleiman 2023; Panda and Santosh 2017). Other studies have conflicting

findings, reporting either a lack of or moderate-to-high levels of awareness among teachers (e.g., Altawalbeh 2023; Fadehan and Okiki 2023; Rolfe 2012).

Studies on teachers' awareness of OER across disciplines are limited. For example, one study found a lack of OER awareness among selected music faculty participants in the United States (Allen 2023).

There is insufficient evidence across disciplines and regions to determine whether teachers actively disseminate knowledge and develop OER, creating uncertainty about their active contribution to generating contextual resources for teaching and learning.

Overall, awareness of OER among non-disabled learners remains limited. Cost, preferences, quality, usefulness, and a sense of connectivity influence the use of OER. There is a significant gap in understanding OER knowledge and competence among people with disabilities. Teachers lack awareness of OER due to misconceptions, limited training, time constraints, and low levels of engagement.

Accessibility Issues

The use of OER for learning purposes has grown over time. Despite this, OER content and platforms lack compliance with accessibility principles and pose accessibility challenges for people with disabilities (Brahim et al. 2020; Clinton-Lisell et al. 2021).

Zhang et al. (2020) systematically reviewed thirty-one papers to identify functional diversity and OERs accessibility features and practices for disabled learners, including those with visual, hearing, motor, speech, cognitive, and aging-connected disabilities. The findings revealed that the OER has compatibility issues with assistive devices and operating systems.

One report highlighted accessibility barriers, including language barriers, issues with alternative text, lack of transcripts and closed captions, poor assistive technology compatibility, and challenges locating open resources (UNESCO 2022b).

Ingavélez-Guerra et al. (2022) conducted a study with students with disabilities to identify barriers in a virtual environment. There is limited and

inconsistent use of accessibility metadata and standards in OER, with insufficient research involving students with disabilities to ensure reliable data.

One scoping review identified that learners with disabilities will likely experience challenges interacting with OER due to modality constraints, such as inappropriate formats, limited representation of accessible interfaces, technical problems in managing assistive technologies, lack of multimedia stimuli adapted to learners with various disabilities, and challenges in attempting highly complex learning tasks (Moon and Park 2021).

Navarrete and Mora (2015b) gathered user experiences on OER websites and found web accessibility and usability issues for people with disabilities. Majeed (2018) examined the challenges and barriers faced by learners with hearing, visual, and physical disabilities in the usability and accessibility of OERs and MOOCs in a distance-learning environment. Key issues included problems in using assistive technologies, navigation, and online collaboration skills.

Deaf students showed the least interest in OERs because of the lack of captions for video content. Similarly, physically disabled learners faced challenges with assistive devices, whereas visually impaired students struggled to access e-content because of non-compatible talking software.

One study assessed three hundred and fifty-five open textbooks, revealing that most fell short of fundamental accessibility standards (Azadbakht, Schultz, and Arellano 2021). Likewise, Brahim, Khribi, and Jemni (2017) examined the accessibility features of 20 different OER delivery systems for individuals with disabilities. They concluded that learners with disabilities experience exclusion from accessible learning content. Additionally, the compliance of some systems with WCAG was limited to their website pages, losing effectiveness when the content was stored on external sites.

Navarrete and Mora (2015a) assessed web accessibility, usability, and information architecture of three open resource websites using automated tools (AChecker, eXaminator, and TAW). None of the websites provided barrier-free access for users with

disabilities, resulting in poor resource findability and navigation issues. Inconsistent content categorization and labeling across these sites also created confusion, especially for visually impaired users. The same authors conducted another study to address the issue of OER findability in selected OER repositories from the perspective of users with disabilities. None of the platforms guarantee barrier-free access, identifying problems such as insufficient contrast ratios.

Ali (2023) conducted an accessibility and usability check on Arab and foreign open educational platforms for users with disabilities. None of the platforms met the AA accessibility level[4]. Only seven foreign platforms, including Coursera and FutureLearn, and four Arab platforms, including Moltaka al-Dareen and Edrak, met the A-level. Overall, the platforms showed low support for the usability criteria. Weber and Skyer (2022) constructed a framework for OER and e-books in deaf education and gathered survey responses from 20 nations, including teachers, students, and others. The findings confirm insufficient accessibility in OER and e-book design and point out the inefficacy of Universal Design Principles in meeting the needs of deaf students.

Disabled users face significant challenges in navigating Open Course Platforms (OCPs). One study examined the accessibility of MOOCs on the Coursera platform for users with disabilities, including those who were visually impaired, had motor disabilities, or had multiple disabilities affecting vision and movement. The participants chose a course, completed it, and shared their observations. Despite these efforts, they faced accessibility barriers due to the platform's non-compliance with accessibility guidelines (Królak and Zając 2024).

Perifanou and Economides (2023) analyzed the usage, reputation, and accessibility of 13 OER repositories. While most repositories were technically

[4] Details about levels, https://www.w3.org/WAI/WCAG2AA-Conformance

accessible for users with disabilities, some were challenging to navigate.[5]

OER platform designers are assumed to have limited interaction with people with disabilities to understand their accessibility requirements. Navarrete and Luján-Mora (2018) rightly point out that accessibility and usability[6] are essential in the development process, which is often ignored and considered an afterthought due to a lack of awareness of the issues that students with disabilities face (Pierres, and Darvishy 2022).

OER accessibility remains challenging for individuals living in underserved remote regions, conflict zones, and refugee communities.

Thus, overall, OER compatibility issues primarily stem from accessibility challenges across devices, browsers, assistive technologies, and platforms that affect learners with disabilities. Studies have highlighted problems with modality constraints, such as inappropriate formats, limited assistive technology integration, and non-compliance with accessibility regulations and principles. These barriers reduce usability and increase navigation difficulties for learners with diverse disabilities.

Limited OER Development in Local Context

"Nearly 90% of the content in higher education repositories with open education resource collections was created in Europe and Northern America…Massive open online courses (MOOCs) mainly benefit educated learners and those from richer countries" (UNESCO 2023c, 4).

Content localization refers to adapting resources to fit the cultural context and needs of an audience from a specific region. Local resources are important for people with diverse disabilities because they ensure that learning materials are accessible and relevant within their local cultural, linguistic, and technological contexts. For example, people with disabilities from

[5] Issues pertaining to OER are highlighted in the second section.

[6] Accessibility ensures inclusivity for people with disabilities, while usability focuses on efficiency and ease of use for all users.

disadvantaged communities often lack access to advanced technologies. Developing materials that rely on such technology can make access difficult. Similarly, Pakistan Sign Language has its own signs and grammar reflecting the local culture and linguistic context; creating resources in other sign languages may hinder their learning.

OER development in local contexts remains challenging in the Global South. “It assumes that OER, often developed in affluent, Western contexts, is universally applicable and pedagogically effective across different cultural and socioeconomic backgrounds, or that it would be easy to remix Western content into non-Western learning environments. It assumes that the development of OER alone can create greater access to education” (Flinn and Openo 2024).

The benefits of localizing educational content can be drawn from one of the studies, where three high school teachers in the KwaZulu-Natal province of South Africa collaborated and authored open textbooks, later distributed through the South African initiative ‘Siyavula.’ Teachers who adopted open textbooks in their classes found them helpful as these high-quality free resources were rooted in cultural and geographic contexts (Jimes, Weiss, and Keep 2013).

Although content localization seems promising, it also presents challenges. For example, researchers in Ghana localized a human rights manual on EdTech Books, an open platform. Although they found the overall process interesting, they described localizing content as burdensome, facing linguistic, cultural, and technological challenges in adapting the available resources (Bradshaw 2022). Similarly, a group of researchers localized OER-based human rights courses for youth and young adults in Ghana. Two main challenges emerged: lack of awareness to localize content and burdensome efforts (Bradshaw, Kimmons, and Bondah 2024).

Thus, the localization of OER content and platforms remains limited in academic settings, especially for people with disabilities. From a social justice perspective, people with disabilities are neither engaged in localizing OER nor is there sufficient availability of OER in their local context.

Unavailability of OERs in Inclusive Languages

OERs remain unilingual, dominated by English, with the fewest resources developed in native and Indigenous languages. Language in OERs can be examined through three dimensions:

1. competence in global languages
2. availability of OER in national and regional languages
3. inclusive languages, that is Braille, sign language, etc.

The number of OER materials produced or translated into different languages is limited.[7] Albright (2005) highlighted that the English language dominates OER content, but much of it is not relevant in local settings due to cultural differences. This reality may incline individuals from less developed countries to become OER consumers rather than contributors.

Rets et al. (2020) analyzed the readability of 200 OER courses in English on two major platforms in detail. They found that most courses required advanced English proficiency, which posed a significant challenge for non-native speakers.

The International Decade for Indigenous Languages (IDIL 2022-2032) Global Action Plan calls for adapting OERs and including indigenous peoples' culture, history, and knowledge in educational curricula. The availability of OERs in most Indigenous languages has not been well documented. Countries such as Ecuador, New Zealand, Norway, Malawi, and the Central African Republic are translating some OERs (Mncube 2024). However, contextual resources in Indigenous languages remain unavailable.

UNESCO's 2019 Recommendation on OER describes the need for inclusivity. However, OER in inclusive languages such as Braille and sign language are limited. For example, the Academic Senate for California Community Colleges, Open Educational Resources Initiative curated some OERs in American Sign Language (ASL) (Open

[7] For example, https://conncoll.libguides.com/OER/Languages; https://whittier.libguides.com/c.php?g=118511&p=7769306; https://scert.cg.gov.in/ict2014/pdf/NROER.pdf

Educational Resources Initiative 2024), which may not be applicable in all cultural settings. The lack of involvement of people with disabilities in the translation or production of OER highlights a significant gap, calling into question the true inclusivity of OER.

Thus, language barriers significantly limit OERs inclusivity and global reach. Efforts to promote linguistic diversity are insufficient.

Insufficient Repositories

"An important precondition for the common use, adaptation and creation of OER at national and institutional levels is that OER be stored in an integrated repository or platform, where they are easily discoverable and openly accessible" (UNESCO and COL 2019, 62).

The number of available OER repositories is limited, making it difficult to adapt or curate them effectively. When available, they carry findability and accessibility issues. Several factors contribute to their low availability. For example, one study found technological, financial, sociocultural, pedagogical, and legal challenges in developing OER repositories in Vietnam (Truong, Denison, and Stracke 2021).

"An important precondition for the common use, adaptation and creation of OER at national and institutional levels is that OER be stored in an integrated repository or platform, where they are easily discoverable and openly accessible." (UNESCO and COL 2019, 62).

OER Commons, OpenStax, GALILEO Open Learning Materials, Open Textbook Library, and MERLOT are common OER platforms that offer limited learning resources (Swain and Pathak 2024). However, their effective utilization has not been documented.

For example, OER on disaster awareness among people with disabilities, OER on refugees' awareness, OER on learning inclusive languages, OER on AI skills for disabled learners, and OER on well-being and self-empowerment are missing. Furthermore, open resources on specific subjects are insufficient, difficult to locate, and lack context within existing

repositories (Belikov and Bodily 2016), bringing the challenge of adaptation to the forefront.

Perifanou and Economides (2022) analyzed 13 well-known OER repositories and found a variety of OERs in accessible formats with collaborative features used by thousands of visitors. However, it is unknown how it has benefited people with diverse disabilities. In contrast, Santos-Hermosa, Ferran-Ferrer, and Abadal (2017) analyzed 110 EOER and found that educational aspects have not yet been firmly embedded in ROER.

Implementing OER has certain limitations for small countries and remote locations due to the limited availability of contextual resources, support for customizing and creating OER, and a trend of traditional educational practices with occasional use of digital content and ICT (Krelja Kurelovic 2016).

Overall, there are limited platforms and repositories available for adapting OER. There is an absence of repositories created by, for, or with individuals with disabilities to disseminate collaborative academic work.

Quality Issue

Sustainable OER development depends on supporting higher-education institutions to create, share, and ensure the quality of resources (UNESCO and COL 2015).

The number of OERs is growing over time and they are freely accessible on various platforms and repositories; however, quality remains a challenge (Commonwealth of Learning 2022; Zawacki-Richter, Müskens, and Marín 2023).

Limited quality assessment practices and a lack of standardized quality mechanisms in OER could hinder its wider adoption. Orr, Rimini, and Van Damme (2015) state that,

“[OER] are frequently decentralized resources, which is a challenge for the hierarchical management of updates and a common argument used against OER by the publishing industry. The dynamic characteristics of OER lead to questions regarding how the process can be made transparent and how quality can be maintained over time” (64).

Swain and Pathak (2024) highlighted that:

"proper institutional policy, financial support, basic knowledge of technology, lack of awareness and proper peer feedback, and lack of cooperation from institutions are the major constraints for the development of quality OER resources" (1).

One project compared OER digital infrastructures in higher education across ten countries and identified quality issues in OERs at the macro, meso, and micro levels (Marín et al. 2020). Minimal initiatives have been taken to ensure the quality of OERs (e.g., Almendro and Silveira 2018; Dos Santos, Santos, and Ciferri 2023; Elias et al. 2020; Kawachi 2014; Lübben, Müskens, and Zawacki-Richter 2023; Mishra and Kanwar 2015). Achieving a uniform consensus on its implementation remains a significant challenge.

However, the available repositories cannot track the adoption of OERs across regions and disciplines. No centralized repositories are available for peer-reviewed open resources. A limited number of OER experts volunteered for quality checks. Most platforms have no defined review process for publishing OERs, increasing the chances of publishing unauthentic resources (Bates et al. 2007; Clements, Pawlowski, and Manouselis 2015).

"The low usage rate of OER is often linked to the question of quality. There is an unmanageable variety of OER materials and repositories, so teachers are confused when choosing materials. Interestingly, no widely used instrument for evaluating OER has been systematically developed and meets scientific quality criteria" (Zawacki-Richter, Müskens, and Marín 2023).

People with disabilities are not involved in quality assessment checks, highlighting the segregation of OER-inclusive practices.

Overall, ensuring the quality of OER is a challenge for their practical use and adaptation.

Copyright Challenges

OERs rely on a Creative Commons (CC) license. Previous studies confirm a lack of understanding and clarity around copyright issues and associated ownership and intellectual property claims (e.g., Creative Commons 2022;

Kruger and Abramovich 2018; Skidmore and Provida 2019; McGill et al. 2013). It carries complex license options, formats, and versions, which makes it difficult to apply to documents. Dulong (2010) emphasized the need to assess the nature and impact of CC licenses.

Open licenses can be misused or misapplied, potentially infringing on copyright laws and undermining their credibility (Koščík and Šavelka 2013; Lamlert 2014). Furthermore, its increasing variety and lack of understanding of obligations and rights can lead to confusion among users (Koutras 2019, 230). Another barrier is the incompatibility of a country's copyright laws with CC licenses, highlighting the complexity of CC in establishing a clear standing.

Thus, a lack of understanding of CC licensing, incompatibility, and potential misuse of licenses hinders the creation or adaptation of OER.

Sustainability of OERs

OER sustainability refers to the effective long-term utilization of open resources in various ways for educational purposes. This can be viewed from financial, individual, and institutional perspectives.

UNESCO highlights the importance of OER sustainability models in its OER Recommendation. Koohang and Harman (2007) stated:

"The sustainability is driven by factors that relate to the scalability of an OER – the ability of OER to function properly when modified on an on-going basis" (541).

The terms 'open' and 'open education' vary in their conceptual, operational, and metaphoric definitions. OER is not always free. For example, openly accessible research papers and books may be available at a low cost rather than for free, bringing financial challenges to the forefront.

The sustainability of OER is jeopardized by financial constraints associated with infrastructure, maintenance, updating resources, Internet access, digital devices, and a lack of adequate incentives (Atkins, Brown, and Hammond 2007; OECD 2015; Peneder and Walcher 2020).

OERs are primarily adapted rather than created, and even then, they are adapted at a slow pace, as they require

significant effort and time. A lack of financial incentives or motivational factors discourages individuals and organizations from continuing to develop OERs.

Institution-led repositories sometimes provide open access but often restrict OER sharing or collaboration outside the community (Santos-Hermosa et al. 2020). Coyne and Fitzpatrick (2021) confirmed that most OER materials come from higher education institutions.

South Africa, France, the USA, and some European countries have adopted OER policies[8] in different sectors, including education. However, the adoption of OER by many low- and under-developed countries remains undocumented, raising questions about their outreach and sustainability.

Ethical Issues

OERs present ethical challenges, such as data security and privacy. For example, MOOC platforms track students' learning and could breach their privacy by sharing personal information with third parties. Similarly, collaborative OER platforms may have weak authentication systems, which could allow the misuse of information.

There is a gap in institutional OER policies and guidelines related to ethics, which could perpetuate potential ethical problems, such as plagiarism. Without OER guidelines and awareness, students at the higher education level may find OER overwhelming and view it as an easy source for completing assignments without proper attribution or genuine intellectual effort.

The overwhelming nature of OERs and weak licensing mechanisms might encourage copying and misusing others' data. Mncube and Mthethwa (2022) gathered data from OER developers regarding ethical issues in creating OERs in virtual spaces such as social media and learning management systems. The study identified three primary factors:

- non-compliance with openness
- transactional purchases of OER
- insufficient incentives for developers

[8] See https://oerworldmap.org/resource/

Artificial Intelligence (AI) is a catalyst for the OER movement. It has emerged as a promising tool for learners with disabilities. It can:

- reduce the cost of education
- increase educational accessibility
- offer personalized learning opportunities
- improve collaboration.

However, it can accelerate algorithmic discrimination against people with disabilities. Due to its overwhelming features, it might decrease human interaction and pose the risk of developing less creative open content. This also increases the risk of academic data misuse. Furthermore, there is a risk of breaching or misquoting digital licensure in the absence of standard AI copyright rules (Bozkurt 2023).

Thus, OER and GenAI pose greater ethical risks at the personal and institutional levels.

Findings

Narrative Analysis

1. *Social Challenges:* Society lacks awareness of diverse disabilities. There is a growing negative societal attitude and behavior and a lack of acceptance of people with diverse disabilities. In addition, limited accessibility hinders social participation. Furthermore, employment opportunities are limited for this group.
2. *Academic Challenges:* People with disabilities face a number of academic challenges including:
    a. infrastructural barriers
    b. unavailability of accessible learning resources
    c. discriminatory attitudes from students, teachers and administration
    d. communication gap
    e. lack of inclusive curriculum and textbooks
    f. lack of representation of people with disabilities in policy, curriculum, and textbook design
    g. inaccessible assessment/examination system
    h. limited options for subject-specialization
    i. lack of inclusive teacher training
3. *Technological Challenges:* People with disabilities have inadequate

accessibility to digital devices, tools, and software because of affordability and compatibility issues. Online learning resources are also limited. Furthermore, opportunities for digital skills training are limited. When available, it lacks inclusivity due to language barriers.

4. *Collaboration Challenges:* Academic collaboration between people with and without disabilities is limited, stemming from social isolation, misconceptions, and communication barriers.
5. *Knowledge Contribution Challenge:* People with disabilities are passive recipients of knowledge due to limited collaborative and networking opportunities, negative attitudes, social stigma, limited access to technology, and inadequate educational opportunities.
6. *OER Awareness:* People with disabilities lack OER awareness and training.

Semi-Systematic Review

Good Practices

1. Research on OER usability for individuals with disabilities lacks comprehensive analyses. While studies suggest that OERs can enhance learning experiences for individuals with disabilities, there is insufficient focus on addressing their unique educational needs, requirements, and usability experiences. The limited availability of accessible platforms, lack of direct involvement of people with disabilities in assessing open platforms, and limited competence of designers towards inclusive approaches are potential barriers to usability. The further application of OERs across various academic disciplines for diverse disabilities has not been recognized.
2. Currently, there is no evidence that confirming the contribution of people with disabilities to the creation or adoption of OERs. While individuals with disabilities may have created OERs, a lack of exposure and documentation makes it difficult to confirm this. The overall trend indicates limited awareness of OER development among this group, suggesting that they may not have actively participated in OER adaptation or creation. Although while a few initiatives have been

launched to create platforms for individuals with disabilities, particularly open-source software, these efforts are limited in scope and do not involve people with disabilities in the process.

3. There is a significant gap in addressing the needs of people with disabilities in OER initiatives. Few initiatives have developed OER platforms and applications to support the academic and social skills of individuals with diverse disabilities. Notably, no OER initiatives have been led by people with disabilities for their community or beyond, underscoring their limited participation and involvement in these efforts.

Challenges

1. People with and without disabilities have limited access to assistive devices and the Internet. Their digital skills remain low, and digital inclusion is challenging.
2. There is limited awareness among teachers and students of diverse disabilities.
3. There is limited awareness of OER among non-disabled learners and teachers. Previous studies did not assess and document the knowledge competence/awareness about OER among learners with disabilities.
4. OER platforms face numerous accessibility challenges, including modality constraints, navigation difficulties, contrast problems, and interface compatibility issues. These platforms are not tailored to meet the needs and expectations of learners with disabilities.
5. OER content development lacks localization, both culturally and in terms of inclusivity.
6. People with disabilities are not involved in the curation of OER.
7. Language barriers significantly limit OERs inclusivity and global reach. Most available OER lack content in regional, Indigenous, and inclusive languages, such as Braille. The absence of documented involvement of people with disabilities in the translation of OER exposes a significant gap.
8. There is an absence of repositories created by, for, or with individuals with disabilities to disseminate collaborative and creative work.

Where available, they offer accessibility, findability, and sustainability challenges to researchers.

9. A clear OER quality review mechanism and implementation procedures are lacking.
10. There is a lack of understanding of the application of CC licensing, incompatibility, and the potential misuse of open resources published under CC.
11. OER sustainability faces financial, individual, institutional, policy, scalability, and accessibility challenges.
12. OER and GenAI bring ethical issues to the forefront, including plagiarism, data misuse, data privacy issues, and discrimination.

Proposed Solutions

This study identified the social, academic, and technological challenges faced by people with disabilities. It also explored the use of OER by and for people with disabilities in a global context. Furthermore, this study highlighted the barriers to OER use among people with and without disabilities. Based on the findings, the following solutions are proposed:

1. Terms such as ‘mental,’ ‘marginalized’, and ‘disadvantaged’ reinforce inferiority, powerlessness, and exclusion and should not be used for individuals with disabilities. Disability-inclusive neutral words must be introduced into educational policies, curricula, and textbooks to foster dignity, respect, and social respect. Available documents must be reviewed, and negative terminologies must be replaced with empowering ones.
2. Individuals with disabilities in Pakistan and across the globe are creative and talented. However, they are often unnoticed because of negative perceptions and misconceptions. Awareness of diverse disabilities among non-disabled learners and teachers should be disseminated by introducing subjects or content related to disability at the university level across disciplines. Disability practices and processes in the course/curriculum should be infused from the global South and North perspectives. Grech and Soldatic

(2016) argued that resources published in the Global North are limited in scope and do not explore localized practices and processes. “Empirical work often excludes the voices of disabled people in the Global South, especially those living in poverty, and mainstreaming discourses largely dominated by the Global North... In the bid to simplify and contain, some discourse has become legitimate and hegemonic and is sometimes used to push aside and resist knowledge and perspectives that are constructed differently, that put forward uncomfortable questions and create epistemic unease…” (xiv).

The creative side of individuals with disabilities should be documented in textbooks with chapters on their success stories. Furthermore, the participation of individuals with disabilities must be ensured in decision-making, and their views must be incorporated into institutional policies. In addition, inclusive societies should be established by teachers and learners with diverse disabilities for cross-collaboration and the exchange of creative ideas.

3. To normalize interaction, bridge communication gaps, and increase academic collaboration among people with and without disabilities, teachers and learners should learn and practice inclusive language. Inclusive languages like Braille and sign language, should be introduced in undergraduate and teacher education programmes. Establishing an inclusive language centre may further accelerate the inclusive language research culture.
4. The definition of OER(s) should be inclusive and comprehensive, encompassing all possible areas that can bring its potential to the forefront for people with and without disabilities. I propose OER as a no-cost academic and non-academic creative resource that is available in accessible formats and mediums, compatible with low-cost technologies, and released under an open license.
5. Hodgkinson-Williams and Arinto (2017) expressed that bringing OER to the forefront is based on structural conditions such as government and

institutional policies, systems, infrastructure, geographical contexts, and platforms; cultural factors such as language; and agential factors such as individuals, and institutions. There is a need to develop OER awareness among stakeholders. For this purpose, an OER forum must be formed with like-minded individuals who can volunteer their knowledge and skills to train others on OER and engage in collaborative OER practices. It is also proposed to plan, design, and pilot OER awareness courses, both in-person and online, for people with and without disabilities. These courses must be offered for free and published as OER in multiple accessible languages and formats.

6. With changes in the ongoing labor market, increased automation, flexible work culture, and the promotion of digital inclusion, individuals with and without disabilities need to learn, maintain, and upgrade new skills such as digital literacy, OER, and Artificial Intelligence. In this regard, OER should be introduced as a subject across disciplines in higher education institutions to expand their potential and reach a broader learning community.
7. An inclusive OER policy must be designed by involving people with disabilities to recognize their educational rights and needs. Accessibility, digital literacy, artificial intelligence, and open education should be emphasized.
8. Individuals with disabilities should be recognized in the history of Inclusive OER, as their representation remains largely absent. This can be achieved by establishing an OER alliance of people with and without disabilities, where like-minded people can develop resources for their communities and beyond. In addition, an OER virtual and on-site research lab should be established where creative learners with and without disabilities can research, experiment with innovative OER ideas, and create content, such as open e-books on topics of their choice. This initiative accelerates funding opportunities, expands networks, and fosters further research. Achieving this vision is a long-term endeavor that requires

strategic planning, collaboration and sustained efforts.

9. Develop Inclusive OER educational repositories where learners with and without disabilities can localize the available OER, translate them into inclusive languages, and publish their creative work.
10. An Inclusive Massive Open Online Course (IMOOC) platform must be launched, where accessible training on disability awareness and development of supporting learners with disabilities must be offered to teachers/educators. Courses on creating open coursework and materials, career planning, academic counseling, AI, well-being, disaster risk reduction, emergency management, climate change, and other topics of interest must also be offered.
11. Instructional designers and experts should collaborate with learners to develop materials and encourage them to collaborate with others to develop their own learning resources (UNESCO and Commonwealth of Learning 2019). Platform designers should involve learners with disabilities as co-creators in developing OER platforms, apps, and games to shift their passivity to active contributions. It is also suggested that individuals with disabilities should be trained as designers to lead the development of OER platforms and applications.
12. To facilitate knowledge sharing and the exchange of ideas, an active intellectual sharing forum should be created for parents, teachers, design experts, and learners with and without disabilities. They can discuss successful OER practices for adaptation in different contexts and share their experiences. In addition, they can discuss educational challenges and brainstorm OER solutions.
13. Technology is still not fully accessible in Pakistan, which challenges the effective use of OER. Low-cost and no-cost technological solutions should be proposed for OER adaptation in underdeveloped, developing, and developed countries. For example, OER should be developed in print, USB, and CD formats for individuals living in remote locations or without Internet access.

14. Quality parameters for OER should be defined with minimal standards in consultation with people with disabilities. They must also be involved in assessing the quality of available OER. For this purpose, it is proposed that all available OER platforms be revisited to ensure accessibility, usability, and compatibility with diverse disabilities.
15. An inclusive ethical OER framework must be developed for the effective use of OER by people with and without disabilities.
16. With the growing use of AI, there is a need to introduce and Inclusive AIOER policy that could help people with disabilities to personalize learning, automate accessible resource creation, and participate in global collaboration and open knowledge sharing.

Conclusion

People with disabilities face numerous educational challenges in Pakistan that hamper their active participation and contribution to knowledge acquisition. OER can open avenues by making education accessible, fostering a more equitable, collaborative, inclusive, and sustainable educational environment for all. Individuals with disabilities can also collaborate and create open resources on innovative topics to benefit their communities and beyond. Awareness, skills, opportunities, ownership, and availability of OER platforms are the keys to bridging educational gaps and bringing creativity to the world.

About the Author, Dr. Munir Moosa

Dr. Munir Moosa is a Global Heumann Fellow at the World Institute on Disability, USA. He is a university teacher, researcher, and educational theorist. Currently, he serves as an Assistant Professor of Education at SMI University.

Munir has developed global educational models, theories, and frameworks, including the intellectual barter system and minimal intelligence theories. He has delivered guest lectures at various global institutions, including The Open University (UK), the School of Education at UC Berkeley, Northampton University (UK), and Leuphana University of Lüneburg (Germany).

As a Global Heumann Fellow, he presented White Paper findings at conferences at the University of Waterloo, the Open University UK, and Ontario Tech University. He also proposed an inclusive ethical framework for research involving people with diverse disabilities through a poster presentation at the Research Ethics Colloquium, Department of Continuing Education, University of Oxford. Furthermore, he submitted Recommendations for Open Consultation on the UNESCO Dubai Declaration on Open Educational Resources (OER). He has also edited an open book on teachers' inclusive narratives. Alongside, he prepared a documentary film with the Disability Justice Project Team. He can be reached at munirmoosa@yahoo.com

About the Mentor

Tara Miller is a dynamic education leader with a proven track record of advancing student success through innovative support systems and inclusive learning environments. As the Managing Director of Student Support at KIPP DC, she spearheads the development and execution of comprehensive programs that address the diverse academic, social, and emotional needs of students.

With a strategic vision and hands-on approach, Tara ensures that every learner has access to the resources and guidance necessary to thrive. Tara's expertise is rooted in a strong academic foundation and a commitment to educational equity. She earned a Bachelor of Arts in Political Science and Economics from California State University, Los Angeles, where she developed a keen understanding of systemic challenges in education.

She further honed her skills with a Master of Arts in Teaching from The Johns Hopkins University, specializing in evidence-based instructional strategies. Additionally, she holds a Master's Degree in Special Education Leadership from George Mason University, equipping her with the leadership acumen to drive impactful programs that support students with diverse learning needs. Throughout her career, Tara has been a catalyst for meaningful change in education, leveraging her expertise in program development, team leadership, and student advocacy.

About The Global Heumann Fellowship

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The WID Global Heumann Fellowship Program honors WID co-founder Judy Heumann's enduring legacy by empowering disability leaders and advocates worldwide to advance disability rights and justice within their regional communities. Through this program, fellows will work on impactful projects aimed at fostering equity, inclusion, and justice globally. Their responsibilities include conducting research, drafting a white paper, cultivating relationships, driving collaborative opportunities, and contributing to program development aligned with WID's mission and strategic focus areas.

During a twelve-month fellowship term, each fellow will engage in a unique combination of opportunities for thought leadership on national and global policy, research strategies, advocacy, program development, and contributions to initiatives aimed at advancing the rights of persons with disabilities globally. Fellows will focus on identifying and leading research with the support of WID, as it regards the fellow's respective region, expertise, and collaboration with WID.

For more information on the Global Heumann Fellowship's Requirements, Eligibility, and to Apply, visit: https://wid.org/global-heumann-fellowship/ or to become a Corporate Sponsor, please visit: https://wid.org/corporate-partnerships/

About World Institute on Disability

The World Institute on Disability (WID) was established in 1983 as one of the first global disability rights organizations founded and continually led by people with disabilities.

We are proud of our history, including our founders – Disability Rights Movement leaders Ed Roberts, Judy Heumann, and Joan Leon. We are dedicated to designing, building, and supporting whole community solutions by removing barriers to include people with disabilities.

To build a more inclusive global society, the World Institute on Disability (WID):

- Helps assure that products and services are more accessible
- Promotes equity policies
- Provides consulting services
- Offers training and tools
- Supports emergency, disaster, and climate efforts

Our Mission is to, on a global scale, to continuously advance the rights and opportunities of more than one billion people with disabilities.

Our Vision is a world in which people with disabilities live freely where access, inclusion, equity, and resilience are embedded throughout every global community.

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https://www.linkedin.com/company/world-institute-on-disability/

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Appendix 1: Excerpts from Select Interviews

Social Challenges

“People feel pity for us. They show sympathy. If our fellow takes any disabled person to the class, the motivation is to get blessings. Such motivation is not bad, but don’t you think it would be good to consider them friends or fellows and take it as a responsibility to treat them well? Show empathy, not sympathy, because sympathy lowers our morale…We have many abilities and skills that can be utilized to make better things and serve society well” (Visual Impaired Participant).

“People lack sensitivity and don’t realize that they, too, could become disabled one day. I spent 17 years among non-disabled people, but after becoming disabled, I couldn’t accept how to live life as part of the disabled community. If I, as a disabled person, struggled to accept myself, how could non-disabled people accept us? People are constantly chasing their future and looking to make a difference in society, but what do they think about those with disabilities?” (Physically Challenged Participant).

“Non-deaf people often make fun of deaf people, saying that we can’t speak, which makes me feel sad and ashamed. Many deaf people ignore it, while others feel hurt. Please don’t criticize us. If you can speak, we can communicate through sign language and writing” (Deaf Participant).

“A non-disabled person uses transport independently, goes to university, and feels good enough. However, a person with a disability has to shift to a wheelchair and groom themselves, and when they go outside, people look at them with pity. As they move forward, public transport does not stop for them, making them feel like they are nothing. This leads to increased depression. When they finally reach university, college, or school, people run away from them because they feel they must help them regularly. This negative social attitude deeply hurts, impacting their performance and well-being” (Participant from Disability-Led Organization).

Educational Challenges

“The educational books in braille and assistive technology are provided at some schools that offer education to visually impaired students, but when they enter college or university, there are no audiobooks available. Even access to research journals is limited. Screen readers are not installed on the computers” (Visual Impaired Participant).

“We seldom interact with hearing students. When we do, they ignore us. If they know a little bit of sign language, it’s better… There should be no ignorance. Hearing learners should support deaf learners” (Deaf Participant).

“The biggest challenge in higher education is that problems are solved in meetings without engaging people with disabilities. How is it possible that the problem is mine without asking or sitting with me to discuss my reasonable accommodation? They don’t consider us capable of discussing problems or finding solutions. No one can better explain my problem or provide a better solution than myself” (Visual Impaired Participant).

“Physically challenged people are mentally fit. They can study and do all the tasks like non-disabled people. But education is not accessible to them…They think, write, and speak like normal people…They can’t reach higher levels due to attitudinal behaviors” (Physically Challenged Participant).

“I want to learn new things, but if we ask others for help, they reply, "What’s the use of giving education when you don’t know anything?" People don’t want to make us learn. We are good at art, but education is not good. Teachers don’t teach or guide us well... Deaf individuals want to move ahead. They have the desire, but if we offer them a good education, they can progress” (Deaf Participant).

“One of my classmates was physically challenged. I witnessed students stare at and label him whenever he entered the classroom. He was stigmatized and marginalized…If you want to know about their challenges, you must work with them” (Non-Disabled Student Participant).

“Unless non-disabled and disabled sit and study together, they can’t understand issues faced by people with disabilities and how they live their lives. People think we are aliens, but that is not true. We think, speak, eat, and drink like normal people and want to do work like normal people. Unless we bring inclusive education in the country, people with a disability will not move forward…” (Physically Challenged Participant).

“Unless the infrastructure is accessible, people with disabilities will fear attending [classes in educational institutions]. This is especially true for females, who often avoid attending university because they feel they are entering between enemies or aliens. As a result, the concept of higher education for females with disabilities is almost nonexistent. Only a handful manage to attend, while most do not” (Participant from Disability-Led Organization).

Technological Challenges

It is challenging to visit the market and purchase books in a wheelchair… If there were an app on mobile devices, it could have made life easier and allowed us to study more effectively. Even when books are available, some subjects are not clearly explained. However, if they could be accessed through a mobile app, learning would become much easier” (Physically Challenged Participant).

“Assistive technology devices, screen magnifiers, and hearing aids are unavailable at the universities... We don't even have access to suitable chairs to address balance issues in children with autism” (Non-Disabled Student Participant).

“People with disabilities may have devices and technologies, but it is difficult for many people to access them due to financial barriers. I believe that low-cost solutions can be found if we work on it. If we think outside the box, these solutions are achievable. But someone needs to take the initiative to make it happen. I believe that people with disabilities themselves can do this if they put their minds to it. We need to foster an entrepreneurial spirit and ensure they have access to the technology necessary to mainstream it for society” (University Teacher Participant).

“When I had to prepare for the exam, I requested somebody to record books and read out content for me. So, there is no automated system. There are challenges of digital and accessible resources” (Visual Impaired Participant).

Collaboration among People with and Without Disabilities

“People without disabilities are sometimes hesitant to collaborate with us. People with disabilities are also introverted in some cases and don’t want to be included, keeping themselves left out” (Visual Impaired Participant).

“Non-deaf people communicate their ideas, but we are isolated. I want to help with textbook design or other things. They think deaf people have no good minds and are not that knowledgeable. People make us feel different and left out. Even if we wish to share our ideas, they ignore us. We are not involved in course design, policy making, and book writing. We want to highlight many mistakes. A team of deaf and hearing people should sit together and talk” (Deaf Participant).

“Disabled people are hidden away in their homes. They are not coming forward because their own families are keeping them unseen. So, if you have never seen or interacted with that person, how will you collaborate with them?” (University Teacher Participant).

Active Contributors or Passive Consumers of Knowledge

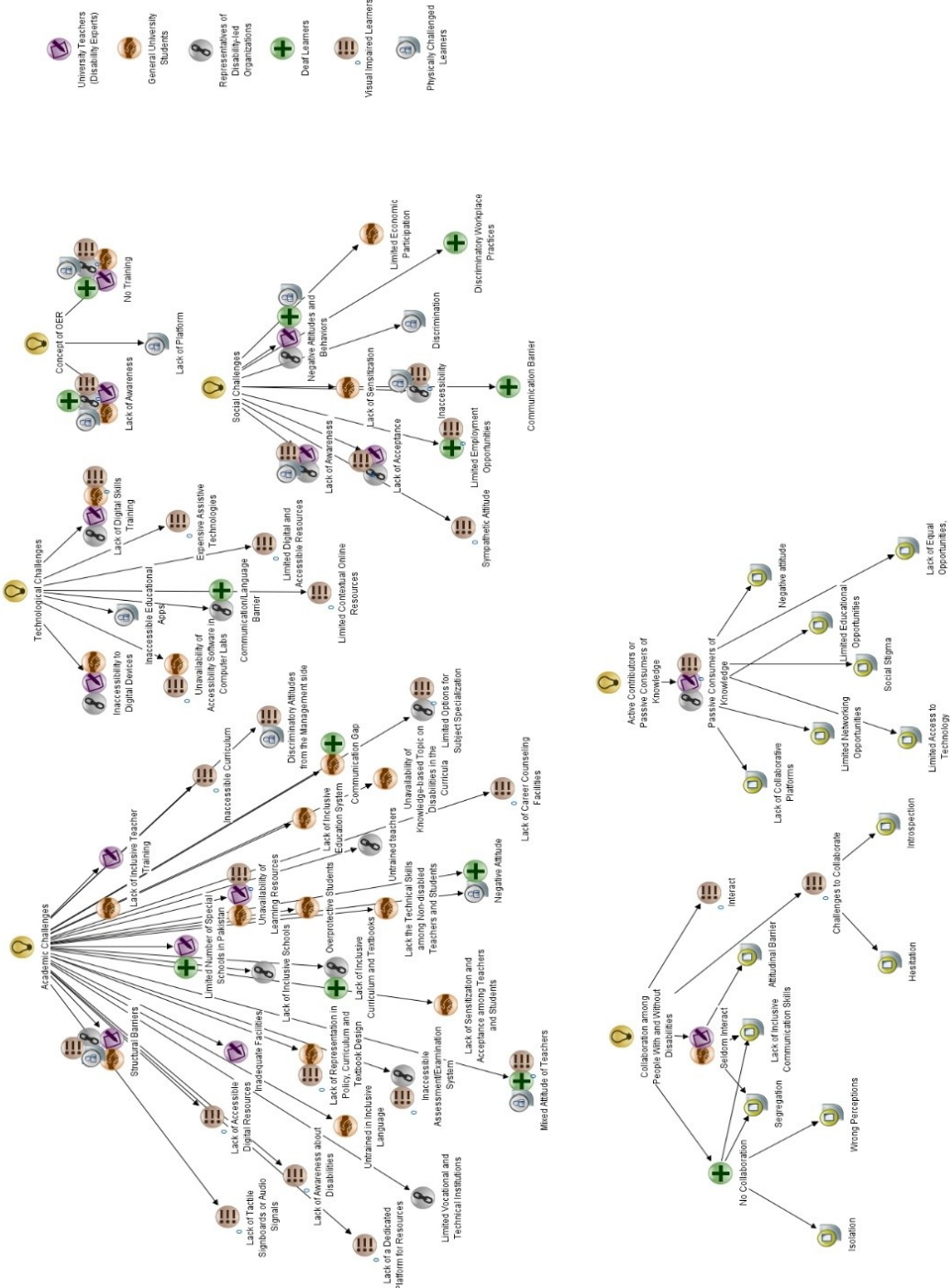
“[People with visual impairment] are passive contributors of knowledge, and I think that this is because of the social stigma and the negative opinion that most of the members of society have about visually impaired people. They cannot equally participate, or people need to change their mindset if they want visually impaired people to come forward. They should give them equal opportunities” (Visual Impaired Participant).

“[People with disabilities] cannot understand how to communicate, deal with each other, sit together, or collaborate- they simply don’t know. Social gatherings and activities for people with disabilities are very limited, and there is no interaction. Suppose the education system is structured to allow people with disabilities to study together with people without disabilities at the school level. In that case, awareness will develop, and

they can collaborate, work together, and complete education together" (Participant from Disability-led Organization).

"Awareness about OER should be given to both with and without disabilities. They can write many books, paint together, and do many creative things…" (Physically Challenged Participant).

"I think we should promote the OER, and we should encourage people with disability to actively contribute in this area because there are people who are working in this area in isolation, but when it comes to open resources and open educational resources, I think the world can benefit" (Visual Impaired Participant).

"We can add our ideas, bring changes, and use the resources. We should learn [about OER], as it benefits the deaf community. In the coming days, different people will have different ideas, and through open resources, we can gain many benefits" (Deaf Participant).

Appendix 2: Collective Themes