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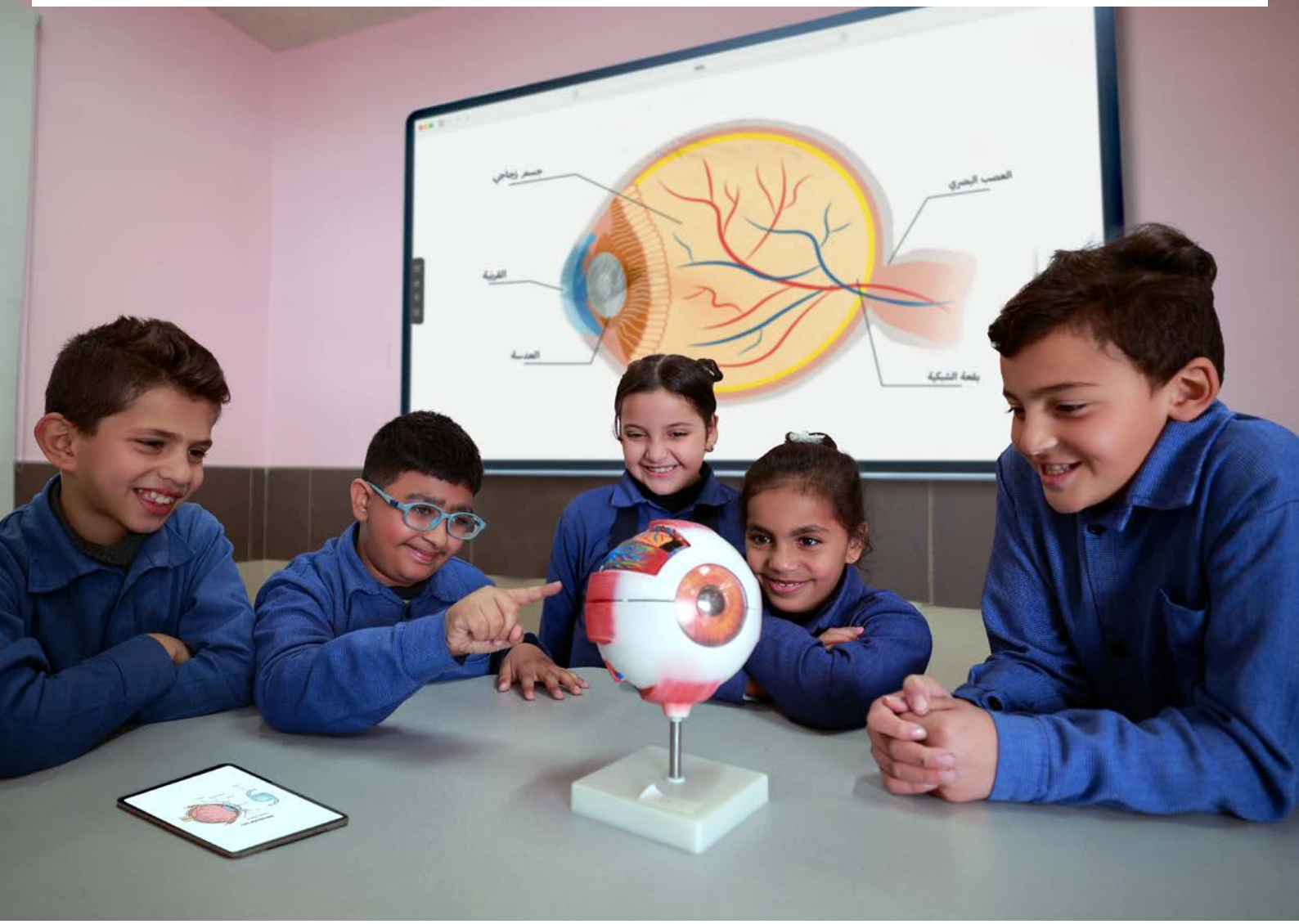

Bridging Barriers with Technology

Leveraging Educational Technology for Learners with Disabilities in Jordan and Beyond

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Contents

List of Abbreviations

AI	Artificial Intelligence
DAISY	Digital Accessible Information System
DI	Differentiated Instruction
EdTech	Educational Technology
FTK	Future Teacher Kit
FM Devices	Frequency Modulation Devices
GDS	Global Disability Summit
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HCD	Jordanian Higher Council for the Rights of Persons with Disabilities
IDA	International Disability Alliance
IES	Ten-Year Strategy for Inclusive Education
KII	Key Informant Interviews
LMICs	Low- and Middle-Income Countries
LMS	Learning Management System
MoE	Ministry of Education
NCCD	National Centre for Curriculum Development
NVDA	Non-Visual Desktop Access
OPD	Organisation of Persons with Disabilities
Open EMIS	Open Education Management Information System
PROMISE	Promoting Quality in Inclusive Education in Jordan
UDL	Universal Design for Learning
UNCRPD	United Nations Convention on the Rights of Persons with Disabilities
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNICEF	United Nations International Children's Emergency Fund
WCAG 2.2 AA	Web Content Accessibility Guidelines 2.2 AA (second level)

Glossary

Ableism	Ableism is a bias against persons with disabilities and in favour of nondisabled norms. It can be amplified by digital technologies as it could manifests in the design, development, and discourse around technology. It is the belief that technology should be used to eliminate disability, often reinforcing the idea that being without a disability is the default or desired state.
Amman-Berlin Declaration	The Amman-Berlin Declaration is the outcome document of the third Global Disability Summit 2025 and sets goals for an inclusive international development cooperation.
Artificial Intelligence	AI is interpreted as systems with the ability to process data in a way, which resembles intelligent behaviour.
Braille Displays	Braille Displays or Refreshable Braille Displays are hardware devices focused on output that connect to mobile devices or computers and translate text into tactile braille. Users can read one line at a time by feeling raised pins.
Braille Touchscreens	Braille Touchscreens or Braille Notetakers are specialized devices that combine a touchscreen interface for braille input (typing) with a built-in braille display for reading, offering both tactile and digital interaction – often supporting more advanced functions than a standalone braille display.
Differentiated Instruction	DI is a responsive practice where adjustments are made based on the individual needs of the learners. This strategy involves tailoring educational content, processes and learning environments to accommodate individual learning styles and abilities, rather than age or grade level.
Digital Accessible Information System	DAISY is a technical standard for digital audiobooks, periodicals and computerised text designed to be used by persons with disabilities such as blindness, impaired vision and dyslexia.
EasyReadTogether.ai Initiative	The EasyReadTogether.ai initiative is a cooperation between GIZ and UNICEF, which uses AI to make information more accessible for persons with intellectual disabilities.
Educational Technologies	Inclusive and Assistive Technologies refer to any device, equipment, software, or system designed to enhance the functional abilities of persons with disabilities. It includes a broad spectrum of tools, from traditional aids like wheelchairs and hearing aids to advanced technologies such as screen readers, magnifiers, and alternative input devices. In this study, we only refer to digital technologies as EdTech.
EduWave	EduWave is a web-based comprehensive e-learning and educational management platform for schools and universities, which combines LMS, Student Information System and Communication and Collaboration.

Frequency Modulation Devices	FM devices are assistive listening tools that transmit a speaker's voice directly to a listener's receiver, improving speech clarity for people with hearing loss, especially in noisy settings like classrooms.
Future Teacher Kit	The FTK is a scalable, cost-effective teacher training solution that taps the potential of scaled low-tech solutions such as mobile phones and messenger services. It equips teachers with 21st century skills on the go whilst giving them access to collaborative community of practice.
Inclusive Education	Systems, political will, and commitments by all key partners and stakeholders are in place to guarantee that all learners regardless of their gender, abilities, disabilities, backgrounds, and circumstances have equal and equitable access to quality education in their home or host communities, with learning environments that embrace diversity and support their participation and achievements towards reaching their full social, emotional, physical, and cognitive potentials (MoE, 2025)
Marrakesh Treaty	The Marrakesh Treaty is an international copyright treaty to facilitate access to published works for persons who are blind, visually impaired, or otherwise print disabled.
Non-Visual Desktop Access	NVDA is a free, open-source screen reader for Windows that allows blind and visually impaired people to access computers with Microsoft operating systems. It supports speech output and Braille display in many languages.
PROMISE	PROMISE is a project by GIZ and the Jordanian MoE, funded by the German Federal Ministry for Economic Cooperation and Development, to improve the education for all learners in public schools and to specifically promote the inclusion of learners with disabilities.
Universal Design for Learning	UDL is an educational framework that recognizes that all learners learn in different ways and benefit from different learning techniques in the classroom.
Web Content Accessibility Guidelines	WCAG are multi-level guidelines aiming to make IT applications as accessible as possible for persons with disabilities. The current version of WCAG is 2.2, published in December 2024. There are three conformity levels: A, AA and AAA. The success criteria of conformity level AA represent the standard in the European Union. Insufficient accessibility assessed with own testing via **WAVE Web Accessibility Evaluation Tools**.

Executive Summary

Globally, around 16 % of the world's population or 1.3 billion people live with at least one disability. 80 % of them live in low and middle-income countries (LMICs) (WHO, 2023). Educational Technologies (EdTech) can be crucial to support learners with disabilities in all their diversity. However, digital inclusion of learners with disabilities in Jordan remains a challenge, despite high rates of internet connectivity in schools. Investments in hardware – such as tablets and computers – alone are often an inefficient use of resources, as they do not automatically translate into improved learning outcomes.

While EdTech remain highly underutilized tools both globally and in LMICs such as Jordan, their effectiveness is not determined solely by their availability. The impact of EdTech for inclusion depends on how teachers, learners, parents, and administrators use it to support and enrich teaching and learning, rather than to replace teachers.

To address these challenges, EdTech initiatives for inclusion should be thoughtfully implemented, taking into account local needs and resources, with a focus on supporting both teachers and learners.

Key Recommendations for Using Educational Technologies for Inclusive Education in Jordan

1. Strengthen Policy Implementation

Building on the considerable achievements in including EdTech within Jordan's education policies, the focus should be on advocating for stronger implementation of the substantial commitments by the Jordanian Ministry of Education (MoE). An update of the 2021 EdTech Strategy could be an important step explicitly including all learners, the role of EdTech and detailing implementation in an action plan with clear responsibilities.

2. Improve Technical Infrastructure and Use Context-Sensitive Educational Technology

Although Jordan enjoys high rates of internet connectivity nationally, this has not yet translated into reliable, equitable access to the internet across most classrooms. While it is important to expand reliable connectivity, it is also important to adapt to existing circumstances and promote offline-capable EdTech for inclusion. Whenever possible, EdTech for inclusion should be cost free and non-commercial. Moreover, they must be adapted to local contexts and support Arabic language.

3. Advance Digital Access and Accessibility

Zero-rated data agreements mean that certain public websites are excluded from data costs that mobile providers charge. This is a key lever to **increase access to key e-learning platforms** (such as EduWave) and public websites (such as National Center for Curriculum Development (NCCD)). Building on previous examples of zero-rated data agreements implemented in Jordan during the COVID-19 pandemic can be a promising example. In addition, **all educational content on public websites and e-learning platforms** (such as EduWave and NCCD) **should be made accessible** according to Web Content Accessibility Guidelines 2.2 AA (WCAG 2.2 AA) and Universal Design for Learning (UDL) principles.

4. Use of shared devices

Indeed, given resource constraints related to device management, costs and digital infrastructure, it seems more effective to prioritize a smaller number of well-maintained, shared devices rather than providing every learner with an individual device. It is essential to involve persons and ideally learners with disabilities in the design and testing of solutions following the principle “Nothing about us, without us.” Finally, solutions must be tailored to the diverse spectrum of disabilities to ensure that EdTech are adaptable to all learners’ needs.

5. Build Teacher Capacity and Strengthen Inclusive Pedagogy

There is a need to establish **accredited teacher pre- and in-service training programs** focused on the effective use of EdTech for inclusive education. These programs should address the spectrum of disabilities, employ blended learning approaches to maximize accessibility and impact. Low-tech teacher training solutions that are cost-efficient and scalable can be a promising approach in resource-constrained settings such as Jordan. Teachers should be empowered not only to **integrate EdTech into inclusive pedagogy** but also **create accessible learning content** and ideally transfer these skills to the learners.

6. Leverage and Scale Mainstream and Existing Technologies

Generally, the use of **mainstream devices**, such as smartphones and tablets should be preferred wherever possible as they increasingly **incorporate built-in accessibility features**. They can also be used to download cost-free, open source EdTech for inclusion and are easier to maintain than specialized devices. Wherever needed, they can be complemented by specialized assistive devices, which are needed by some students with disabilities. In the Jordanian context the ban of smartphone usage in classrooms could be re-evaluated and the usage for inclusion could be tested with a clearly defined scope. Existing technologies like **interactive whiteboards** should be piloted and assessed for their inclusive potential, while evaluating existing pilot projects such as the ones using Frequency Modulation devices (FM devices) to support learners with hearing impairments.

7. Ensure Sustainability Through Maintenance and Community Engagement

Ongoing **maintenance, recurring costs, and software licensing fees** must be addressed from the outset. Piloting **peer-to-peer support models** among learners and community members can help maintain devices and encourage ownership.

1

Introduction

This study explores how EdTech can bridge gaps for learners with disabilities in Jordan and beyond. It seeks to offer insights and guidance for facilitating inclusive education through EdTech in Jordan. To do this, it highlights key challenges and provides a selection of concrete, scalable solutions informed by regional experiences. This study aligns with the Global Disability Summit (GDS), which aims to accelerate inclusive development, strengthen international cooperation, and drive evidence-based policy innovation to ensure that no one is left behind in digital transformation.

1.1. The Promise of Educational Technologies in Inclusive Education

Education is a fundamental human right and EdTech offer a powerful means to ensure this right for learners with disabilities. The UN Convention on the Rights of Persons with Disabilities (UNCRPD) reinforces this human right by requiring that learners with disabilities have access to quality, inclusive, and free education alongside reasonable accommodation and support (Article 24). Additionally, it emphasizes the importance of accessibility, including access to EdTech for inclusion, to remove barriers in information, communication, and learning environments (Article 9c).

This human right provision establishes a **clear legal and ethical foundation for transforming education systems** to be inclusive and responsive to diverse needs.

EdTech can play a key role in supporting the inclusion of learners with disabilities. Screen readers for learners with visual impairments and live captions for learners who are deaf or hard of hearing can make content accessible and facilitate communication. Accessible learning management systems (LMS) and digital libraries also play a significant role. These platforms provide content through multiple means of representation, such as audio and visual formats. By offering information in different formats, they assist to overcome barriers related to inaccessible materials and communication challenges.
This enables substantial participation in education.

Globally, there is a **strong momentum for advancing disability inclusion and inclusive education**, understood here as ensuring that all learners, regardless of their abilities, have equal access to quality education. This is particularly evident following milestones such as the GDS, which recently reinforced international commitments including the sustainable development goal on education, with its ambitious vision for inclusive and equitable quality education and lifelong learning opportunities for all by 2030. While EdTech continuously faces general scepticism regarding their proven added value – often evolving faster than they can be evaluated – they have nevertheless showed significant potential to foster the inclusion of learners with disabilities in learning. They can bridge communication gaps and enhance engagement, independence, and learning outcomes for learners with disabilities (UNESCO, 2023a; WHO & UNICEF, 2022). However, only a fraction of those who could benefit from assistive technology currently have access, especially in LMICs, where only 5 – 15 % of learners can obtain necessary assistive technology (Lynch, Singal & Francis, 2022). This disparity is further exacerbated by a digital gender gap both in terms of access and digital literacy. Women with disabilities in LMICs experience the lowest rates of smartphone ownership, internet usage and consequently limited access to Technology (GSMA, 2020). In addition to limited access, there is a lack of digital literacy. Many technologies are not designed with gender in mind, often catering to male users and leaving the needs of women and girls unaddressed. As a result, women and girls are more likely to report difficulties in using digital technologies and EdTech – a challenge rooted in both harmful gender norms and persistent disparities in device ownership (UNICEF, 2022).

1.2. The Policy Landscape and Digital Transformation in Jordan

Jordan has made notable progress in establishing policy frameworks that support the use of EdTech for inclusive education. The Jordan government, mostly under the leadership of the MoE, in collaboration with the Jordanian Higher Council for the Rights of Persons with Disabilities (HCD), has developed key strategic documents such as Law on the Rights of Persons with Disabilities No. (20) (HCD, 2017), the **Ten-Year Strategy for Inclusive Education 2020 – 2030 (IES)**, complemented by concrete three-year action plans. The IES explicitly aims to utilize assistive technologies for classroom support and to provide reasonable accommodations in schools. Further underlining this commitment, the MoE published the **Jordan Declaration on Inclusion and Diversity in Education** (MoE, 2022), establishing a common definition of inclusion and a commitment to accessible learning environments. The recently **published National Framework for Inclusive Education** (MoE, HCD & UNESCO, 2025) highlights the need for „Realizing the Potential of Digital (and Non-Digital) Technologies“ as a core component of an inclusive education system. These policy developments underscore the growing recognition and consensus among Jordanian education stakeholders on the transformative role and relevance of EdTech for inclusion. This was demonstrated by the **MoE‘s commitment at the GDS to ensure „equitable access to education for children and youth with disabilities through digital transformation“ by 2028** (GDS Commitment Portal, 2025). Notably, the **Education Technology (EdTech) Strategy** of the MoE was published as an annex to the Education Strategic Plan in 2021 and already highlighted key **obstacles** for successful implementation of past programs in Jordan. Among these are a **focus on hardware instead of teaching, curriculum and assessment; sustainability issues arising from one-off donations and underestimating the costs of maintaining and updating EdTech, as well as context mismatch of**

solutions and local challenges when applied solutions are based on theory and not on the actual school realities in Jordan (MoE, 2021). However, the EdTech committee that was planned to be established as part of implementing the EdTech Strategy of 2021 is not operational yet to the knowledge of the authors. In addition, there is a **Digitization Thematic Group** for partners in development cooperation who have on-going or planned technical cooperation with the MoE in the digitization thematic area, led by the Queen Rania Center for Education Technology. This thematic group is part of the Education Sector Assessment (completed) and the Education Sector Planning (ongoing).

1.3. The Implementation Challenges in Jordan

Jordan has **a robust national digital infrastructure**. 99 % of the country is covered by mobile broadband internet, over 80 % of the population have access to internet connection, either via mobile connections or partly via public services such as libraries (Datareportal, 2025; GSMA, 2025). This is reflected in the general digital infrastructure of schools. Up to 97 % of all 4,081 schools under the MoE in Jordan have an internet connection (MoE, 2023). 75 % of schools have a computer lab and only 1.8 % have internet connectivity in the classrooms (MoE, 2023). Consequently, they lack functional spaces where learners and teachers can actively use widespread connectivity for learning and teaching. Even for most schools that have internet access and a computer lab, it appears to be a challenge to use it in regular classrooms since connectivity in the classrooms is extremely rare. In addition, digital gaps in terms of access translate into persistent digital literacy gaps.

There is strong evidence that, as in many other countries, **private schools are generally better equipped with digital infrastructure compared to public schools**. This trend is observed internationally. Private schools often have greater financial resources, enabling them to invest more in up-to-date software and hardware, and reliable internet access. For instance, in Jordan only 27 – 33 % of learners in public schools regularly use EdTech for learning, compared to 56–64 % in private schools, indicating a stark contrast in resource availability, from well-equipped to poorly maintained and outdated computer labs (Khalayleh, Ghawi & Al-Qawasmeh, 2020). Furthermore, another pattern known from other countries can be observed in Jordan, which is the **urban-rural divide in digital access**. Schools in underserved communities such as rural and refugee-hosting areas encounter significant barriers related to device availability and maintenance, unstable internet connectivity, limited digital literacy development of learners and staff training (Abdullah & Taddese, 2020; Abusneneh, 2024). Furthermore, high data costs relative to income remain a significant impediment (Compare Dial, 2025) but are even more pronounced in rural areas, which face socio-economic challenges. In addition, some families share a limited number of devices, which consequently means that access to digital devices is even lower in those areas (MoE, 2021).

Data on the effectiveness of Educational Technologies for inclusive education in Jordan is limited. Studies in LMICs often focus narrowly on testing software for accessibility and usability, with insufficient attention paid to pedagogical approaches or alignment with national curricula (Lynch, Singal & Francis, 2022). Available evidence suggests that EdTech utilization is unevenly distributed between private and public schools as well as between urban and rural areas (UNESCO, 2021). HCD reports that in special schools for learners with disabilities, available EdTech are sometimes not used due to challenges in terms of regulations of

these tools. Generally persistent obstacles hinder the effective widespread use of EdTech for inclusive education in Jordan. These include **limited financial resources for procuring EdTech for inclusion, a shortage of specialized personnel, negative societal attitudes toward disability, gaps in teacher training on inclusive pedagogies and EdTech use, and restricted access to technology in public schools** (Alananbeh & Asha, 2023). Furthermore, Jordan´s online LMS, EduWave, is not fully accessible for learners with disabilities and not compliant with WCAG 2.2 AA. The platform is not accessible with screen readers so that people with visual impairments can use it independently.

Learners with intellectual disabilities specifically face compounded barriers to their right to education with the majority remaining excluded from mainstream schools (MoE & HCD, 2020). These challenges call for tailored approaches that address their unique cognitive, communicative and behavioural needs (Chekaraou, Mouawad Jourdi & Matei, 2022). As a result, HCD has started producing easy-read material in partnership with specialised entities.

The MoE, together with international partners, has launched a limited number of pilot initiatives in the past to equip schools with EdTech for inclusion and build capacities to integrate their usage for inclusive teaching. For example, the **national blended learning programme "Learning Bridges" (2020 – 2022)** supported by UNICEF was launched in response to COVID-19 to ensure continuity of education for vulnerable learners, including those with disabilities. It included audio content and accessible materials to support inclusive learning (UNICEF, 2022).

Furthermore, World Bank and United States Agency for International Development projects, such as the **Education Reform Support Program**, have among other activities worked with the MoE to digitize the curriculum and establish digital libraries. As a result, the NCCD website hosts all curricula material online. QR-Codes are used in many schoolbooks to link to the material hosted on the NCCD website. However, the use of QR-Codes itself should be evaluated against accessibility criteria. Some of the material is also available in audio-format. However, the extent of the accessibility of this material is not known in detail but reported to be insufficient. During the COVID-19 pandemic, HCD provided its curriculum in sign language for deaf students and made these materials available both on their own webpage and on their YouTube channel.

This effort not only ensured continuity of education for a marginalized group during a global crisis but also demonstrated the feasibility and impact of EdTech for inclusion.

Overall, while preconditions are favourable and substantial policy commitments in inclusive education and EdTech exist, no widespread adoption of EdTech for inclusive education in Jordan could be observed. Specifically, for those with intellectual disabilities, there has been – to the knowledge of the authors – no program in Jordan, so far. Jordan's experiences reflect broader trends in the Arab countries, where inclusive education is increasingly recognized as a right but practical implementation, especially regarding EdTech for inclusion, remains a challenge (MoE & HCD, 2020).

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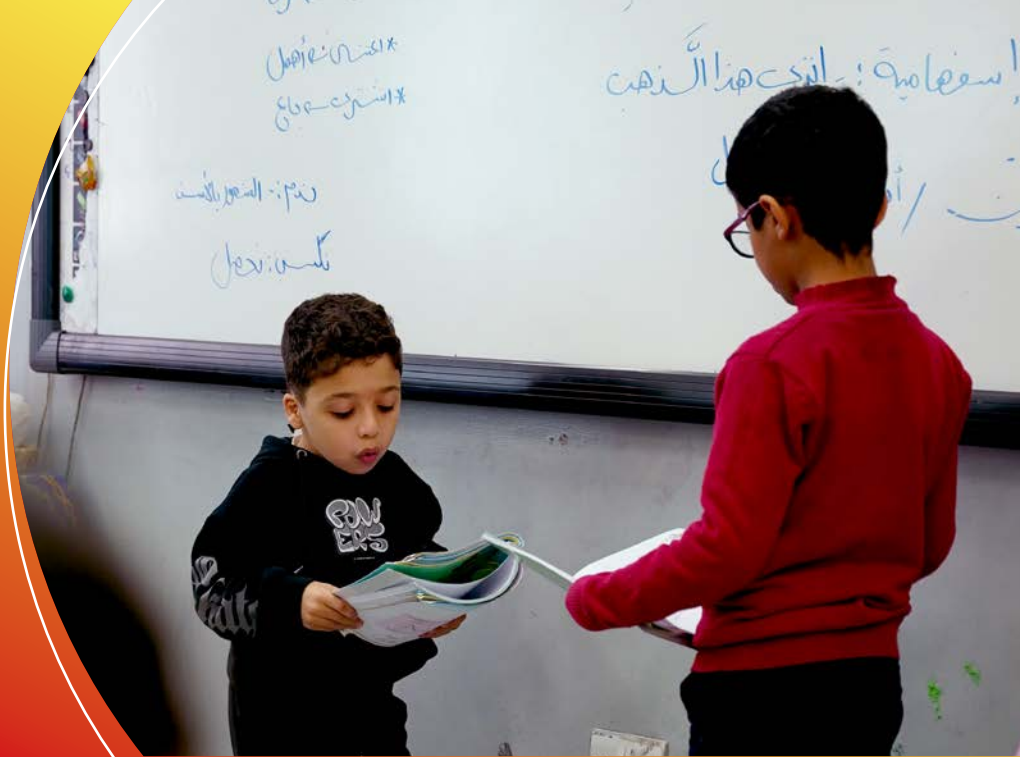

Methodological Approach

To gain a comprehensive understanding of the use of EdTech in inclusive education this chapter outlines the mixed methods approach of the study. The study combines an extensive literature review, key informant interviews (KII) and a survey of teachers and school staff to capture a broad range of perspectives and experiences related to the use of EdTech in inclusive education practices. The mixed methods approach was chosen to combine quantitative data from the field with qualitative insights from local and international experts. Combining quantitative and qualitative approaches allows to validate findings and offers deeper insights into the experiences of educational practitioners, complementing the breadth of the information provided through the quantitative survey with the depth of the qualitative interviews.

Between October and December 2024, four in-depth interviews were conducted with disability-inclusive education experts from MoE, HCD, Christoffel-Blindenmission and Academia based in Jordan, South Africa, and the United Arab Emirates (UAE). The Jordanian and South African experts were chosen based on their expertise both in Jordan and on the topic. An expert from the UAE was chosen to complement this with regional experiences on the topic. The participants included two women and two men, with two of them identifying as persons with disabilities. Interviews were held in English and Arabic.

An online survey in English was developed by the researchers, translated to Arabic and validated with local field staff of the GIZ PROMISE team to ensure cultural and linguistic appropriateness. The survey was designed to be concise – to encourage higher response rates – while retaining enough detail for meaningful insights. As part of the process, the questionnaire was translated back into English for analysis purposes, which may have introduced minor biases in translation and interpretation. Additionally, only descriptive analyses could be conducted, as the data did not lend itself to more complex multivariate approaches to establish causality.

There are about 4,081 public schools in Jordan (MoE, HCD & UNESCO, 2025). The questionnaire was distributed to staff from 60 public primary and secondary public schools across six field directorates

in Jordan that are part of the PROMISE project pilot school network including Marka (49 participants), Tafila (46 participants), Irbid (37 participants), Karak (36 participants), Ajloun (34 participants) and Aqaba (33 participants). These schools have been selected to be representative for the public school's landscape in Jordan, selection criteria for the schools were developed in cooperation with the MoE. A total of 235 school representatives responded, including teachers, support teachers, principals, and supervisors. Most respondents were female (77 %), reflecting the general gender distribution among teachers in Jordan. Respondents reported that their schools serve learners with a variety of disabilities, most commonly learning difficulties, intellectual disabilities, and speech difficulties.

All participants provided consent after being fully informed about the study's purpose and their rights. Confidentiality and anonymity were maintained throughout the research. Special attention was given to ensure accessibility and respect for participants with disabilities. The study adhered to ethical guidelines and institutional requirements.

The online survey method may have led to a selection bias, as participants needed internet access and digital skills to respond. Additionally, since respondents were school representatives and the questionnaire was provided by GIZ as a German implementing organization, their answers might have been influenced by social desirability, providing responses they thought were expected. These limitations should be considered when interpreting the results. Due to capacity restraints, only four expert interviews could be conducted, while more interviews would have added more depth and allowed for more triangulation of answers. Since the questionnaire had to be kept short to ensure a high response rate, the accessibility and inclusivity of teaching resources or the collaboration between educators could not be properly addressed.

3

Research Findings

This chapter highlights the research findings related to the current state of digital inclusion in Jordan, identifies existing barriers, and highlights opportunities for fostering a more inclusive learning environment through EdTech. Results of the survey and the KII support the findings from the literature review that the adoption of EdTech for inclusive education in Jordan is scarce. When asked about EdTech use for inclusion among school representatives in Jordan, responses were evenly split between those who use EdTech at least occasionally for inclusion and those who do not use it at all. EdTech for inclusion in schools were primarily used for enhancing communication (60 %) and improving accessibility (52 %). Other reported means included personalized learning (38 %), increasing independence (25 %), and supporting writing skills (20 %).

3.1. Challenges in Using Educational Technology for Learners with Disabilities

Using EdTech for the inclusion of learners with disabilities remains an urgent yet complex challenge related to its adoption, use and scalability, particularly in contexts like Jordan. Systemic barriers intersect with socio-economic disparities and infrastructural limitations. By addressing these challenges and leveraging EdTech for inclusion effectively, inclusive education can become a reality, ensuring that all learners, regardless of abilities, have equal opportunities to learn and succeed. According to the KII and survey respondents, several factors affect the integration of EdTech in schools for learners with disabilities.

Technical and Infrastructure Challenges

- **Limited internet access in classrooms, unreliable connectivity and outdated infrastructure** make it difficult to integrate EdTech for inclusion into learning environments. Although general internet access of schools is widespread in Jordan, internet is often not available for classroom use and connections are often unstable.

- **High data costs** are still a major problem in countries like Jordan where internet access is unaffordable for many learners. This financial constraint limits learners' ability to participate in digital education and access online resources, exacerbating existing educational inequalities. However, this zero data agreement is not in place anymore. During COVID-19, zero-data agreements for some public e-learning platforms were launched as an emergency response and provided resources and services such as remote online learning through video lessons. All existing functions of the public e-learning platforms (Darsak, Noorspace, JoLearn) will be integrated in EduWave platform, which will be the core e-learning and education management platform for Jordan. EduWave will be based on the Open Education Management Information System (Open EMIS). Open EMIS is an open-source, customizable Education Management Information System developed by United Nations Educational, Scientific and Cultural Organisation (UNESCO) and the Community Systems Foundation to support countries to efficiently collect, analyse, and manage education data in order to improve planning and decision-making.

- **High costs and limited availability of EdTech for inclusion** create significant long-term sustainability challenges. Survey results indicate that only 18 % of school representatives use EdTech to support learners with disabilities often or always, while the majority use it either sometimes (41 %) or never/rarely (40 %). Specific EdTech to support inclusion remain rare in many schools with devices like Braille keyboards being cost-intensive and thus adoption and upscaling remains slow. Even when available, specific EdTech to support inclusion are often underused due to ongoing maintenance efforts and expenses, insufficient follow-up training, lack of awareness in school settings and accessibility barriers in older school buildings. In addition, many EdTech are designed and developed in high-income countries and are not customized to the context of LMICs and the needs of their users and practitioners such as teachers, who require training, which is underlined by existing research in other contexts as well (ATscale & ILO, 2025).

- **Underutilization of mainstream devices** for educational purposes that integrate a wide range of accessibility features is still a major barrier for the use of EdTech for inclusion. The high smartphone availability in Jordan of more than 80 % underlines a chance for better digital inclusion in education. However, smartphones are banned in schools in Jordan, as in 40 % of countries worldwide, which limits the adoption of EdTech for inclusion in classrooms (UNESCO, 2025). Study results based on KII and survey responses indicate that interactive whiteboards and computers are often used only to play videos or for basic communication, rather than to leverage their built-in accessibility features to support inclusive learning.

- **Lack of inclusive procurement:** Schools frequently acquire general EdTech without considering accessibility criteria, lack of training of practitioners and are discouraged to buy small batches of EdTech. In addition, LMICs often have only few regional manufacturers of EdTech for inclusion as well as networks and suppliers.

Design and adaptation challenges

- **Lack of local adaption and contextualisation:** Popular open source and free screen readers such as Non-Visual Desktop Access (NVDA) support Arabic and so do several other smartphone applications and features supporting language accessibility. However, specific smartphone applications supporting inclusive learning do not always cater for Arabic, making them obsolete for the use in Jordan.

- **Social stigma:** Social systems often categorize assistive devices – such as wheelchairs – as eligible for support, while mainstream devices like smartphones may not be recognized, since they are used privately by the general population. However, global research suggests that mainstream devices (e.g., smartphones) can help reduce stigma for people with disabilities, precisely because these technologies are widely adopted by everyone, not just those with specific needs (UNESCO, 2020).

- **Inaccessibility of learning materials and content:** The creation and adaptation of accessible learning material and content is rarely prioritized. Persons with disabilities or organizations of persons with disabilities (OPD) are often excluded from the design processes of EdTech and learning materials, resulting in widespread accessibility gaps. The online learning platforms used during COVID-19 and the current EduWave platform as well as textbooks fail to incorporate universal accessibility principles, such as screen-reader compatibility, keyboard navigation, or adjustable font sizes, plain text, and sign language. Inaccessible learning materials can increase the risk of cognitive overload because they often introduce barriers that consume a learner's limited working memory resources. When content is hard to access – due to poor sound quality, confusing navigation, lack of captions, or cluttered presentation – learners must devote extra mental effort to simply understand or access the material, rather than focusing on the essential learning tasks. These findings resonate with global evidence. The lack of accessible textbooks can present a major barrier for learners with disabilities, indicating that less than 10 % of published materials are available in accessible formats like braille, audio, e-text, or large print (UNESCO, 2020). All curricula materials in Jordan are uploaded at the website of the NCCD by the MoE. However, the website itself is not accessible according to WCAG 2.2 AA as well as most of the learning materials. There is a gap between different forms of disabilities as well since many accessibility criteria in the WCAG 2.2 AA focus on accessibility for persons with visual impairments. This can lead to the fact, that learners with intellectual and learning disabilities, such as dyslexia, dyscalculia, ADHD or autism are left behind. In addition, some learners depend on accessible written content in Easy language. However, easy read versions of texts are often costly and time intensive since specialists are required for text creation, visual aids as well as professional software and image licensing. As a result, learners often do not possess access to learning materials and information, an essential prerequisite for independence. Furthermore, learners with disabilities are often underrepresented in learning materials. Representation in turn could support an inclusive and diverse school culture and a sense of belonging.

- **Lack of online safety and security concerns:** Often, EdTech collect sensitive learner data, which raises important issues around privacy and child protection. Yet, child protection measures are often inadequate due to insufficient training and awareness among teachers, administrators, and other stakeholders. This is amplified by a gender gap, which is underlined by global evidence. Harmful gender norms and systemic inequalities based on disability status intersect and amplify the risks faced by girls and women with disabilities. This makes girls with disabilities significantly more vulnerable to online gender-based violence than their peers without disabilities, as emerging evidence increasingly demonstrates (UN Women, 2025). Learners with intellectual disabilities are especially vulnerable to online risks such as cyberbullying, exploitation, and misinformation, as they may face additional challenges in understanding social cues and maintaining online safety. Tailored accommodations for learners with disabilities are missing to counter this risk.

Teacher-related challenges

- **Insufficient formal training:** A central challenge to digital inclusion for learners with disabilities in Jordan is the lack of accredited teacher trainings on usage of EdTech for inclusive education. While inclusive education pedagogy and teaching methods are increasingly integrated in accredited teacher trainings, the integration of EdTech for inclusion into these trainings remains limited. Research in Jordan shows that digital training for teachers is only effective when it combines both pre- and in-service components, as pre-service programs alone have negligible impact on EdTech use within the classroom (Khalayleh, Ghawi & Al-Qawasmeh, 2020). Notably, 36 % of surveyed school representatives reported never having received formal training in EdTech for inclusion, while only 27 % received such training often or very often. Most teachers rely on self-paced learning (66 % indicate to have engaged in self-paced learning sometimes to always) or peer learning (69 % reported doing so sometimes to always), which often leads to inconsistent skill development. This deficit in professional development and upskilling impedes teachers' ability to shift their attitudes towards inclusion and to leverage technology effectively. As a result, many teachers feel unprepared and insecure to select and implement appropriate EdTech for learners with disabilities, resulting in the underutilization of available EdTech for inclusion. A finding, which resonated with existing literature, both from the region and globally (Al-Zaboon, 2019; Al-Zaboon & AL-Dababneh, 2021; Lynch, Singal & Francis, 2022; Chekaraou, Mouawad Jourdi & Matei, 2022). Research by Fernández-Batanero et al. (2022) further underscores the need for targeted teacher training in EdTech for inclusion, noting that both the quantity and quality of training for teachers – whether for learners with disabilities or general classroom use – remain inadequate. Lastly, offering teacher trainings in an inclusive and accessible manner could also support the share of teachers with disabilities, which are essential for inclusive education (Singal & Godwin, 2025). As a result, teachers frequently depend on learners for technical issues. According to survey responses, 40% of teachers indicated that they sometimes receive support from learners, while an additional 30% receive assistance often, and 11% always receive support from learners.

- **Inaccessible teacher trainings:** One way of supporting inclusive education is by increasing the share of teachers with disabilities. However, the e-learning platform for teacher trainings teachers.gov.jo is not accessible according to WCAG 2.2 AA.

- **Insufficient usage of technology for learning:** Findings show that teachers prioritize administrative over pedagogical uses of technology due to a lack of pedagogical training. This is in line with evidence from Jordan indicating that 90 % of teachers use technologies for administrative purposes (Khalayleh, Ghawi & Al-Qawasmeh, 2020). A lack of awareness among teachers and users regarding the optimal application of these tools leads to underutilization and ineffective use, compounded by issues such as broken or poorly maintained devices.

- **Lack of time:** Given a shortage on teachers both globally and nationally (UNESCO & International Task Force on Teachers for Education, 2024), teachers face insufficient time and support to explore, implement, and maintain EdTech for inclusion, especially given packed schedules, short lessons structure and competing demands.

- **Lack of multipliers:** While trained teachers often transfer technology skills to their learners, they rarely see it as their responsibility to train other

teachers. This lack of multiplying limits the broader adoption and effective use of technology within and across schools. Survey respondents mentioned that the transfer of skills is better in special schools in Jordan, because they have a less packed schedule allowing for more time investment. Consequently, they tend to have better skill transfer and technology adoption.

- **Negative perceptions, ableism and resistance** surrounding the inclusion of learners with disabilities, both among teachers and learners without disabilities, as well as scepticism about the role of technology in education, persist.

Disability-related challenges

- **Undiagnosed (intellectual) disabilities:** A particular challenge regarding the inclusion of learners with intellectual disabilities is a lack of understanding about intellectual disabilities among parents, communities, and schools. Often, intellectual disabilities are less visible compared to visual and hearing impairments or physical disabilities and are less included in inclusive settings. The consequences are rarer initial diagnoses from health institutions. Also, in educational settings intellectual disabilities are less recognized and consequently, learners lack targeted support. As a result, learners with intellectual disabilities are more likely to experience discrimination, which can negatively affect their motivation to learn.

- **Competing needs:** A further challenge arises, when EdTech for inclusion are designed to accommodate a broad range of learners' needs, yet this versatility can sometimes result in reduced accessibility, particularly when the needs of different groups are conflicting. For instance, EdTech for inclusion that use photos or videos instead of illustrations can be beneficial for some deaf learners and learners with intellectual disabilities. However, while some deaf learners rely heavily on reading lip movements, some learners with intellectual disabilities can have difficulties with generalizations (for example when it comes to highly abstract mouth movements). Learners with intellectual disabilities generally experience lower levels of digital inclusion compared to those with sensory impairments who are more likely to own and use digital devices such as smartphones. While most survey respondents (70 %) report that learners with intellectual disabilities receive some support, this support is inconsistent and not always available. 23 % of participants noted that no support was provided at all, despite surveyed schools reporting to cater to these needs.

- **Cognitive overload and uncertainties in digital environments:** Challenges for learners with intellectual disabilities can include anxiety and uncertainty when encountering new digital interfaces or unexpected pop-ups, as well as difficulties with password management and navigating complex, overwhelming online environments. This can lead to overstimulation. Further challenges include a lack of clear instructions, an overabundance of interactive elements that can create cognitive overload, fast-moving animations or auto-playing media, and forms with multiple steps or time limits.

- **Social isolation:** Often, there is also the risk and fear of isolation when using technology, especially for some learners with Down syndrome, but also other learners with disabilities. While EdTech can support inclusive learning, children with Down syndrome can benefit more when they are around other children, as social interaction helps them develop communication, social, and emotional skills (Kreuder-Schock et al., 2024). Being part of a group encourages imitation, cooperation, and

motivation, which are essential for their learning and overall development. Therefore, while technology can be a valuable supplement, it should not replace opportunities for real-life social engagement and inclusive group activities.

- **Complex role of gatekeepers:** Often some learners with disabilities rely on caregivers and family members to share devices – an issue that is further exacerbated in low-income households, where purchasing additional devices may be unaffordable. Often, learners with disabilities receive insufficient support for using EdTech independently, particularly when they only have access to shared devices in the school context. Caregivers and support staff may unintentionally restrict independent internet use and access to digital services for learners with disabilities, further limiting the benefits of technology.

Policy and Implementation Gaps

- **Disconnect between policy and practice:** Often, policies such as those in the Jordanian context are progressive in terms of disability inclusion. However, their implementation frequently lags behind. One contributing factor is the donor dependency of technology-based projects as well as reliance on volunteers for activities such as training, which is particularly evident in the disability sector. This reliance impedes the sustainable scaling of initiatives. Furthermore, stakeholders are typically trained to use accessible materials, but there is little capacity-building around the production of accessible content. As a result, there is an ongoing dependence on content that may not be locally relevant or available in local languages.

3.2. Conditions for the Use of Educational Technologies

Jordan demonstrates both, the opportunities and challenges, of advancing digital inclusion in education within LMICs. While progressive policies and innovative pilot projects have positioned Jordan as a potential regional leader, significant barriers remain – specifically in affordability, accessibility, availability, and acceptance of EdTech for inclusion. Addressing these challenges requires sustained investment, capacity development, and a shift toward more personalized, technology-supported educational practices. Evidence suggests that solutions developed through community co-design and cross-sector partnerships are the most sustainable, especially when aligned with Jordan's emerging digital and inclusion strategies. With continued innovation and collaboration, Jordan has strong potential to become a regional model for EdTech in inclusive education. By bridging the mentioned gaps, Jordan – and similar contexts – can advance towards equitable digital inclusion, ensuring technology serves as a bridge rather than a barrier.

"While technology has clear benefits, scaling EdTech solutions requires significant investment in infrastructure, training, and policy alignment." (KII)

To realize the potential of EdTech for inclusive education, it is key to implement context- and resource-sensitively as well as linking implementation properly to adequate pedagogical approaches and teacher trainings (Global Education Evidence Advisory Panel, 2023). But first, EdTech must be designed inclusively, making it accessible to as many learners as possible. Inclusive design is fundamentally human-centred and aligns with the disability movement's guiding principle "Nothing about us, without us". It is essential to prioritize accessibility and

inclusion from the earliest stages of technology design and development to ensure that all learners can benefit equally. This approach actively involves persons with disabilities from the earliest stages – planning, testing, and implementation – ensuring that EdTech are genuinely applicable and beneficial for their needs, while also aiming to reach the widest possible user base. Consulting with persons with disabilities provides invaluable insight into their lived experiences, helps identify their needs and preferences for EdTech for inclusion, and highlights the specific digital challenges they face.

A key strategy is to work with parents since they are the experts on the needs of their children and ensure better integration into the learners' environment. In this regard, crisis-response mobile learning initiatives demonstrated that hybrid learning models could increase parental engagement by 55 % when combined with caregiver training (Navas-Bonilla et al., 2025). Additionally, empowering families and community members with the knowledge to maintain and repair devices – for example through low-threshold resources like accessible YouTube tutorials – can help keep EdTech accessible and functional for everyone.

A central dilemma in digital inclusion is the balance between cost-effective shared device models and the need for personal access to technology to foster independence and inclusion. Many educational institutions opt for shared devices – such as collaborative workstations in classrooms – rather than providing each learner with their own device. This strategy is more affordable and can promote teamwork and social learning. However, it also means that learners may lack continuous access to EdTech for inclusion outside of school hours, which can limit their ability to develop and maintain independence. If learners cannot take devices home or use them in their daily life, they may lose crucial skills and support after leaving school. To address these challenges, collaboration between schools, families, and the wider community is essential. Ensuring that students can use EdTech for inclusion at home and in their communities supports sustainable inclusion and helps build lasting skills.

"While technology holds immense potential to revolutionise inclusive education, its implementation must be thoughtful, resource-sensitive, and context-specific." (KII)

EdTech must be integrated within a child-centred pedagogical approach from an early age, which recognizes and accommodates the diverse and sometimes conflicting needs of learners with disabilities. This approach should be personalized, emphasizing positive, low-threshold methods that particularly support socio-emotional learning and language development. Interactive formats, such as technology camps, can help familiarize learners with EdTech for inclusion. Additionally, peer-to-peer learning should be encouraged, as learners – being digital natives – often train and support each other more effectively.

EdTech need to be **designed in line with accessibility standards** (e.g., WCAG 2.2 AA). A user-friendly digital environment is learner-centred to support diverse learning pathways and prioritizes accessibility through a **clear and simple layout**, with intuitive menus and displays, as well as well-structured headings and subheadings for each section. The **logical order of content** ensures that the user flow is coherent and easy to follow. Text is presented in easy-to-read language, using a readable font that can be resized for individual needs. The **interface is flexible**, supporting a variety of screen sizes and display orientations such as portrait and landscape. **High colour contrast** makes content distinguishable and visible under different lighting conditions. **Multiple alternative formats** such as text, audio, and video are available, for instance, images include descriptions, videos come

with subtitles or transcripts, and buttons, links, and headings are descriptive. **User customization**, allows users to magnify text, adjust contrast, change colours or backgrounds, and use either keyboard or touch-screen input. Finally, **compatibility with in-built mobile accessibility features**, including screen readers, ensures that all users can access content effectively. Additionally, EdTech need to be localized to meet specific cultural and linguistic needs, are **open source** to encourage adaptability and community-driven improvements. Finally, EdTech need to be interoperable, allowing seamless integration with a variety of educational tools and devices.

Particularly in low-resource settings like Jordan, the benefits of the **Marrakesh Treaty** were emphasized by KII. This international agreement is specifically designed to create exceptions in copyright laws, thereby improving access to books and other published works for persons with print disabilities. Jordan has ratified this treaty in 2018, and HCD and the National Library are working on the implementation at the national level. HCD is also a member of the World Intellectual Property Organization, that is committed to ensure the accessibility of its website and services to all users, in accordance with UNCRPD Article 9. Building on the Marrakesh Treaty, initiatives such as UNICEF's Accessible Digital Textbooks for All addresses the persistent gap in accessible educational materials. UNICEF has provided over 100 accessible digital textbooks to learners with disabilities in selected countries, making important progress. However, this still represents only a small fraction of the overall need, highlighting the ongoing necessity for expanded efforts to ensure inclusive access to learning resources worldwide (UNICEF, 2023).

Teachers play a central role in advancing digital inclusion – both through their own diversity (including the representation of teachers with and without disabilities) and through the quality and accessibility of their professional training. Increasing the inclusion of teachers with disabilities in training programs can raise awareness of available accessibility features and ensure that professional development is truly inclusive. A practical step toward this goal is to ensure that online teacher training platforms – such as Teachers.gov.jo – are fully accessible and comply with the latest international standards, such as WCAG 2.2 at AA level. In addition, all Teachers need to be trained on digital skills and how to integrate digital components with an adequate pedagogy. Blended learning is ideal for this because it combines flexible online learning with in-person sessions, allowing teachers to practice and reflect on digital methods in a supportive and accessible environment. This approach enhances engagement, supports different learning styles, and helps teachers apply what they learn directly in their classrooms for a lasting impact. Low-tech teacher trainings for both general and specific EdTech for inclusion that are scalable, cost-efficient, inclusive and socially accepted can be a promising approach for large-scale interventions and have been proven successful in several contexts (UNESCO, 2023b). The Future Teacher Kit (FTK) is a teacher training solution that leverages widely available low-tech tools, such as mobile phones and messaging platforms, to equip large numbers of teachers with 21st-century skills on the go. It also provides them with access to a collaborative community of practice (GIZ, 2025). It was developed and implemented in collaboration with UNESCO as well as co-designed with over 1500 teachers in Jamaica. Fostering peer learning and mentorship among teachers and learners is essential to multiply the impact of training. The role of learners without disabilities must be emphasized as well. Engaging learners with and without disabilities as active participants in this process is especially valuable: their involvement not only helps to bridge social divides and forge authentic friendships but also enriches the learning experience for all learners by

promoting mutual understanding, collaboration, and shared growth. In addition, providing teachers with time slot to enhance their skill set is crucial, especially considering that special schools with lighter schedules tend to have better technology adoption. One important aspect for teacher training is the use of appropriate pedagogy and didactics (such as UDL and Differentiated Instruction (DI)) that need to be personalized to accommodate learners' differing and sometimes conflicting needs. A competency-based assessment framework can be a useful tool to evaluate teachers' ability to produce accessible content and transfer skills to learners.

3.3. Mapping of Educational Technologies

The accompanying stigma of EdTech for inclusion that are only used by learners with disabilities can be reduced by using mainstream devices such as smartphones and interactive whiteboards highlighting their universal benefits for learning, communication, and collaboration.

"Some of the mainstream technology solutions that was initially developed for people with disabilities such as speech-to-text, live translation, and augmented communication now benefit mainstream applications. This leads their features to become transformative." (KII)

Integrated smartphone tools or applications such as text-to-speech, speech-to-text, and gamified learning applications can improve literacy, numeracy, and communication skills. When it comes to smartphones, institutional reluctance remains, partly due to concerns about the private use and policy restrictions (e.g., smartphone bans in schools in many countries). However, 50 % of survey respondents used smartphones to support learners with disabilities. Clear and inclusive policies that allow smartphone use for educational purposes while setting boundaries for private use in the school context could help to foster acceptability and minimize distractions. This could come along with a designated tech-free zone or time slots for focused learning, while allowing technology use in other contexts to support inclusion and accessibility. Additionally, smartphones can help address the common issue of dedicated assistive technologies being frequently broken or difficult to repair due to a lack of technical support and financial resources. By using widely available technology like smartphones, learners benefit from easier access to updates, repairs, and technical assistance, ensuring more consistent and reliable support for their needs both in and outside of school.

"Smartphones, in particular, can provide a cost-effective way to enhance inclusion for learners with disabilities. They offer a versatile platform for assistive apps and tools, making them accessible and familiar to many users." (KII)

Laptops and desktop computers can offer similar capabilities to smartphones, although their distribution rate remains significantly lower than those of smartphones and is heavily skewed towards urban households.

Televisions and radios can also play a role in digital inclusion, particularly given the high rate of out-of-school learners with disabilities. However, their functionalities (one-way use), lack of accessibility and limited distribution, especially for televisions compared to smartphones, limit their role for inclusive education.

Interactive whiteboards are available in several schools in Jordan, widely accepted by school leaders and were used by 25 % of survey respondents. Their potential for inclusion could be realized through capacity development for teachers and other school staff on how to best use them. They can play a crucial role in creating a more inclusive, engaging and accessible classroom environment by offering a range of accessibility features and inclusive learning opportunities. Their ability to integrate multimedia content, such as audio, video, and interactive simulations, supports diverse learning styles and helps to engage learners with various needs. Teachers can use customizable settings – like screen magnification, subtitles, high-contrast displays, and text-to-speech functions – to accommodate visual impairments or learning disabilities, while touch or voice input options allow learners with physical challenges to participate actively. Additionally, interactive whiteboards encourage collaboration and group work, providing all learners, including those with physical and communication disabilities, with opportunities to contribute and learn alongside their peers. However, the effective accommodation of diverse disabilities in the classroom is limited when an interactive whiteboard is not connected to personalized devices accessible to individual students.

Screen readers and magnifiers empower learners with visual impairments by providing independent access to information, while digital sign language dictionaries support learners with hearing impairments in understanding and communicating content. For learners with intellectual disabilities, easy-to-read digital curricula with audio-visual features are particularly beneficial, as they help to make learning materials more comprehensible and engaging. According to survey respondents and KII, learners with intellectual disabilities are often distracted in the classroom. Tools such as noise-cancelling headphones can help reduce distracting background noises, supporting learners with sensory sensitivities and helping them avoid overstimulation (Kulawiak, 2021).

Few respondents mentioned high-tech solutions such as virtual or augmented reality since it offers a safe space for practicing everyday situations and social interactions for learners with intellectual disabilities. However, many contexts lack the necessary resources to utilize this option.

3.3.1. Overview of Usage of Educational Technologies for Learners with Disabilities

The table below highlights key use cases categorized by the type of disabilities.

	Access to education tools and teaching materials	Access to written and oral materials	Communication with teachers and students	Written and oral expression
Visual impairment	Interactive screen / projector, standard projector, computer, touchscreen tablet, braille display, Braille touchscreen tablet, smartphone, magnification software, screen reader, Digital Accessible Information System (DAISY) reader and audiobooks in DAISY format, adaptive learning platforms, easy-to-read language	Braille transcription software, screen magnifier/ large screens, optical character recognition reading machine, handheld scanner, wayfinding applications, audio alert systems, braille display, Braille touchscreen tablet, audiobooks, text-to-speech software / screen readers, FM devices, adaptive learning platforms, easy-to-read language	Computer, touchscreen tablet, Braille touchscreen tablet, smartphone, Braille notepad, Speech-generating devices, social media and communication platforms, FM devices, real-time transcription services, AI-powered calendars, reminders, and organizational tools, easy-to-read language	Conventional keyboard, magnification software, screen reader, real-time transcription services
Hearing impairment	FM devices, Radio transmitters/receivers, speakers / loudspeakers, smartphone, sound amplifier, assisting listening systems, visual alert systems, speech-to-text software, adaptive learning platforms, easy-to-read language	Speakers/loudspeakers, automated captioning for videos and lectures, closed captioning, headsets, assistive listening systems, adaptive learning platforms, easy-to-read language	Radio transmitters / receivers, sound amplifier, sign language learning material, AI-based sign language translation, social media and communication platforms, AI-powered calendars, reminders, and organizational tools, easy-to-read language	(real-time) speech-to-text software

	Access to education tools and teaching materials	Access to written and oral materials	Communication with teachers and students	Written and oral expression
Intellectual and learning disabilities	Computer, touchscreen tablet, smartphone, assistive learning platforms, virtual classrooms, educational apps, games, memory aids, task and time management software, adaptive learning platforms, assistive systems and decision aids, adaptive learning platforms, easy-to-read language	Speech-to-text, text-to-speech, screen magnifiers, easy-to-read AI solutions, screen reader, dyslexic fonts, wayfinding apps, real-time transcription services, assistive systems and decision aids, adaptive learning platforms, easy-to-read language	Augmentative and alternative communication devices, social media and communication platforms, video conferencing tools, virtual and augmented reality, assistive systems and decision aids, AI-powered calendars, reminders, and organizational tools, easy-to-read language	Speech-to-text, text-to-speech, symbol-based communication apps

Table 1: Information and communication technologies supporting access to education, by type of impairment and challenge (adapted from UNESCO, 2023a). This table was adapted for better accessibility for screen readers.

3.3.2. Use of Artificial Intelligence

The integration of **artificial intelligence (AI)** in education is a powerful enabler of inclusion, by automating key processes, personalizing learning experiences, and significantly enhancing accessibility for all learners. AI can play a crucial role in promoting the inclusion of learners with disabilities in Jordan and beyond, particularly as AI tools and products become increasingly prevalent in schools and learning environments worldwide.

AI supports learners with disabilities by overcoming barriers in their daily life and education. Examples of AI-driven solutions include:

- **Adaptive learning platforms** that automatically adjust to each learner's level and pace, providing personalized feedback and supporting diverse learning needs.

- **AI systems that translate complex texts into easy-to-read language**, making information more accessible. For example, the EasyReadTogether.ai initiative, which is a cooperation between GIZ and UNICEF, uses AI to make information more accessible for learners with intellectual disabilities, including multilingual support such as Swahili. By creating and combining natural language processing AI with multilanguage capabilities and AI image generation, their model converts text

content into an Easy Read format. The visual elements, tailored to support learners with diverse cognitive abilities, are envisioned to be generated by a child-friendly AI imagne generator and seamlessly integrated with the Easy Read texts.

- **AI-powered speech-to-text conversion technologies** have demonstrated a significant improvement in literacy outcomes in pilot programs in Jordan.
- **Real-time transcription services** to access written text.
- **Assistive systems and decision aids** that help learners with intellectual or cognitive disabilities to make daily decisions, organize tasks, break down complex tasks, and plan routines through apps offering reminders and step-by-step guidance.
- **AI-powered calendars, reminders, and organizational tools** that support independent living and participation, enabling greater autonomy for individuals with disabilities.
- **3D printing applications** enable the production of tactile learning materials at 30 % lower cost compared to imported alternatives (Chekaraou, Mouawad Jourdi & Matei, 2022).

However, challenges remain. There is a risk of widening educational gaps due to biased or incomplete data because of ongoing ableism that can be reinforced by digital technologies in general, insufficient data protection, and a lack of understanding of the complex needs of learners with disabilities. Addressing these issues requires embedding accessibility considerations into AI development and implementation from the outset. Collaboration between teachers, developers, and people with disabilities is essential to ensure that AI solutions are truly inclusive and meet existing needs.

4

Recommendations for Different Stakeholders

While EdTech offer significant potential for inclusive education, it is crucial to recognize that EdTech are a tool for inclusion – not a solution in itself. Without proper incorporation, EdTech are insufficient to address the complex challenges in inclusive education. Instead, successful implementation requires a holistic approach to incorporate tech- and non-tech measures, while genuine inclusion must be prioritized at all levels to effectively support learners with disabilities. Lessons learned from Jordan's policy reforms, pilot projects, and research can inform regional and even global efforts to scale up the use of EdTech for inclusive education.

4.1. Policy Makers

Policy Framework and Collaboration

- **Policy frameworks:** Building on the considerable achievements in including EdTech within Jordan's education policies and regulations the 2021 EdTech Strategy should be updated and explicitly include all learners with disabilities and the role of EdTech to support them. A complementing detailed **action plan** with clear accountability and regular monitoring could contribute towards bridging the gap between policy and practice. This could include encouraging the adoption of low-cost, mainstream devices like smartphones, which can serve a variety of disability needs rather than relying on single-purpose applications.
- **Policy enforcement** by actively implementing and constantly reviewing policies that promote digital inclusion.
- **Interministerial collaboration:** Foster stronger collaboration among ministries of education, finance, infrastructure, digitalization, health, and social affairs and other relevant institutions, such as HCD, in the Jordanian context to ensure holistic support for inclusive education. This need was also highlighted in the 2021 EdTech Strategy.

- **Multi-stakeholder consultations on policy level:** Partner closely with technology companies, telecom providers, and actors in development cooperation to co-develop affordable, context-appropriate digital strategies and solutions.

- **Collaboration with private sector:** Partner with telecommunication firms to implement low/zero-rating agreements on educational apps, ensuring that educational content is accessible without data costs for learners with and without disabilities. Examples from other countries such as South Africa's zero-data agreements or during the Covid-19 pandemic on educational platforms can be a promising example to reduce costs. New agreements should be negotiated for platforms and websites such as EduWave and NCCD website to eliminate data cost barriers for learners and teachers.

- **Clear responsibilities:** Identify clear roles and responsibilities to drive national efforts on EdTech for inclusion.

- **Data protection and safeguarding measures:** Implement robust data protection laws and safeguarding measures for learners with disabilities, particularly in the context of AI legislation. Resist pressure to water down tech regulations and instead incorporate a fundamental human rights perspective.

Infrastructure and resource investment

- **Digital infrastructure:** Equip schools with reliable internet in the classrooms and sufficient devices as minimum standards.

- **Context sensitive solutions:** Promote offline-capable and open-source EdTech for inclusion that support the Arabic language and local contexts.

- **Access to public e-learning:** Zero-rated data agreements for key e-learning platforms, such as EduWave and the NCCD website, were implemented during COVID-19 but are no longer active. New agreements should be negotiated to eliminate data cost barriers for learners and teachers.

- **National procurement list for EdTech:** Prioritize the development a national procurement list for EdTech for inclusion, drawing on international best practices like South Africa's approach for assistive technology procurement in education or from ATscale & ILO (2025) to guide schools in acquiring appropriate, affordable, and sustainable assistive technologies. The procurement list should be regularly updated and adapted to reflect data protection, technological advances and local market conditions, ensuring cost-effectiveness, transparency and relevance.

- **Scalable solutions:** Prioritize the maintenance of a few well-equipped devices per school over equipping every learner individually, ensuring sustainability and ease of management.

- **Existing technology:** Pilot the use of existing interactive whiteboards to support inclusive teaching and learning and scale up, if successful. Existing pilots on FM device usage could be evaluated and potentially scaled up, too.

- **Maintenance of devices and software:** Fixing broken devices and software errors as well as updating the operating system has been insufficient in numerous digital projects both of donors and governments around the world in various sectors. To ensure sustainability, it is key to establish a comprehensive maintenance system including a budget and timeline with clear responsibilities. Involving learners as peer technicians or "Tech champions" and establishing school-based maintenance teams as well as providing low-threshold training could increase ownership and responsibility as well as digital literacy and capacity.

- **Sustainable funding:** Secure long-term funding for digital infrastructure, maintenance, and teacher support to guarantee ongoing access and use. Establish inclusive financing mechanisms, such as dedicated budgets for accessibility including grants, tax relief and subsidies, in line with the Amman-Berlin Declaration. Short-time solutions could include micro-credits and subsidized internet access. In addition, the MoE should also allocate sufficient budget for this aspect in their annual budget plan to ensure sustainability.

Consultation and design

- **Multi-directional knowledge sharing with OPD:** Invest in the capacities of OPD and involve them as key stakeholders in all processes.
- **Co-Design with persons with disabilities:** Involve persons with disabilities and OPD in the design, testing and implementation of digital strategies, reflecting the principle "Nothing about us, without us." Consider the diverse needs of persons with disabilities. This will ensure that policies are grounded in real needs and promote ownership. Aligning this with broader national inclusion frameworks will enhance coherence and impact.
- **Diversity of disability:** Ensure that the diversity of disability in consultation and implementation is considered.
- **Involvement of community stakeholders:** Involve learners, teachers, parents, and administrators in design and implementation to secure their buy-in and address concerns regarding privacy, equity, and responsible technology use.
- **Parental and community involvement:** Develop digital literacy programs for parents and caregivers and involve them in the education process for better support and acceptance.
- **Ethical AI:** Ensure ethical, open-source AI-solutions that are available long-term and open source.
- **Continuous monitoring:** Ensure monitoring and adjustments to prevent biases and discrimination.

Teacher training and support

- **Embedded EdTech for inclusion training:** Integrate EdTech for inclusion training into both accredited pre- and in-service teacher trainings that incorporate a child-centred pedagogy.
- **Accessible teacher trainings:** Teacher training platforms such as Teachers.gov.jo as well as learning content and delivery should be accessible to teachers with disabilities to promote inclusion within the teaching workforce.
- **Hands-on professional development:** Provide ongoing, practical training for teachers, including case studies of successful inclusive teaching methods and community of practice to support peer learning and encourage cooperation.
- **Low-tech teacher training:** Make use of low-tech teacher training formats that tap into the potential of scaled low-tech such as mobile phones and messenger systems. Foster peer learning and mentorship among teachers and learners.
- **Local expertise:** Invest in enhancing local expertise in procurement, training, maintenance and support its availability at the school level.

Awareness and advocacy

- **Importance of inclusive education:** Increase awareness of inclusive education as a human right as well as an economic imperative and investment for the future, in line with the UNCRPD. Make sure that learners are aware of the potential of EdTech for inclusion.
- **Combatting stereotypes:** Use OPD to challenge stereotypes and promote positive perceptions of technology use among learners with disabilities.

Educational resources

- **Localized solutions:** Support the creation of accessible, locally relevant, community-driven and interactive educational materials and libraries (e.g. talking books, audio-navigable textbooks) and platforms that are offline-capable.
- **Accessibility of content:** All educational content on the NCCD website and should be made fully accessible according to WCAG 2.2 AA and UDL principles. Mandate accessibility in procurement for new learning material.
- **Accessible LMS:** Make existing platforms like EduWave accessible and invest in maintenance and teacher support.
- **Accessibility standards for publishers:** Require publishers and software developers to adopt accessibility standards like WCAG 2.2 AA. Align with the current efforts from the Royal Academy for Inclusive Education that develops standards in this regard.
- **Open source:** Encourage adaptability and community-driven improvements. Solutions need to be open source and designed for seamless interoperability, enabling integration with a variety of educational tools, devices and platforms including both existing hardware, assistive technologies and emerging AI-powered solutions

4.2. Implementing Agencies

- **Donor coordination:** Strengthen coordination among governments, donors, OPD, civil society organisations and development partners to avoid fragmented efforts and to shift from small-scale pilot projects toward scalable, systemic reforms that can be applied in all schools.
- **Capacity building and localization:** Invest in building the capacity of local organizations and agencies to design, implement, maintain, and adapt EdTech for inclusion.
- **Evidence-based decision-making:** Base all interventions on robust evidence, supported by research partnerships and the systematic collection of disability-disaggregated data. Monitor and evaluate existing tools and formats (such as the EasyRead-Together.ai initiative or the FTK) to scale up existing formats.
- **Collaboration with the private sector** is essential to develop affordable and context-appropriate solutions.
- **Leveraging multilateral funds:** Utilize multilateral funding mechanisms such as the Global Partnership for Education and Education Cannot Wait to expand outreach and enhance the effectiveness of inclusive education initiatives.

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