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HOW DIGITAL TECHNOLOGY IS INCREASING ACCESSIBILITY FOR DEAF LANGUAGE LEARNERS IN TWO USAID- SUPPORTED SCHOOLS IN JORDAN

CASE STUDY PAPER

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ACRONYMS AND ABBREVIATIONS

Al Amal Aqaba	Al Amal Secondary Mixed Inclusive School for Sign Language in Aqaba
Al Amal Zarqa	Al Amal Secondary Mixed School for Sign Language in Zarqa
ESP	Education Strategic Plan 2018–2022 for Jordan
GOJ	Government of Jordan
HCD	Higher Council for the Rights of Persons with Disabilities
MOE	Ministry of Education in Jordan
MPWH	Ministry of Public Works and Housing in Jordan
SKEP	Schools for a Knowledge Economy Project
SRT	The School Resources Team

I. INTRODUCTION

I.1 BACKGROUND

This is a case study of two schools in Jordan that integrate information and communication technology (ICT) equipment into the teaching curriculum for learners with disabilities. It assesses the impact that approach has for students, families, and communities.

The estimated percentage of persons with disabilities in Jordan is 11.2 percent of the total population. In Jordan, disabilities covered in this statistic are not exhaustive but include vision (6 percent), physical (4.8 percent), and hearing disabilities (3.1 percent). Of the total persons with these disabilities, only 1.6 percent receive public education, according to the Ministry of Education (MOE), which states that for the 2020–2021 academic year, 2,046 schools, including 11 schools focused on deaf language learners and one focused on learners with vision disabilities, are open. Combined, the total number of learners with disabilities receiving education services increases to 2 percent.¹ There are several challenges within Jordan's educational system that influence its ability to adequately respond to the needs of learners with disabilities, and as a result, too few of them have access to quality education.

Jordan's [Education Strategic Plan 2018–2022](#) (ESP) includes six priority domains: 1) Early Childhood Education and Development, 2) Access and Equity, 3) System Strengthening, 4) Quality, 5) Human Resources, and 6) Vocational Education. Inclusive education and special education are identified under the Access and Equity Domain, with specific objectives that include developing the capabilities of the MOE, increasing the number of specialized technical staff to diagnose disabilities, enhancing awareness of the needs of learners with disabilities, expanding access to inclusive education, and promoting development and the investment of gifted learners' abilities and skills. The ESP is consistent with the international [Education 2030 Framework for Action](#) (2015) and is advancing Jordan's progress toward achieving [Sustainable Development Goal 4](#).

ICT for education is identified under the ESP's fourth domain, Quality, as an essential tool to further education. It outlines approaches to ICT and education integration, such as increasing computer equipment in schools, increasing the number of schools connected to the internet, training teachers on the use of ICT equipment, and developing ICT infrastructure and maintenance plans. However, there are challenges that impact the implementation and utilization of ICT within the education system. Some of those challenges include weak technological infrastructure and a lack of maintenance. According to the ESP, 21 percent of schools do not have internet access, while 79 percent have slow internet. Other barriers include out-of-date technology and insufficient capacity building on the use of ICT for principals and teachers.

As outlined in the ESP, the MOE collaborates with the Higher Council for the Rights of Persons with Disabilities (HCD) to promote inclusive education and rehabilitate schools to accommodate the needs of learners with disabilities. On January 15, 2020, the MOE and HCD launched a [10-Year Strategy for Inclusive Education \(2020–2030\)](#) that aims to increase the number of school-aged children with

¹ Government of Jordan Ministry of Education. [Education Strategic Plan 2018–2022](#).

disabilities enrolled in mainstream schools to 10 percent, while continuing to provide inclusive education.

In alignment with Jordan’s Country Development Cooperation Strategy (2020–2025), and to increase access to services and rights for persons with disabilities and improve learning outcomes for school-aged children, USAID collaborates with the MOE and the Ministry of Public Works & Housing to build schools that provide safe and inclusive learning environments. In 2014, USAID and its partners launched the Schools for a Knowledge Economy Project (SKEP) to build and furnish 25 new schools throughout Jordan, increasing access to inclusive, environmentally friendly, and student-centered learning environments. Partners designed and built the 25 schools to be accessible for learners with physical disabilities and special needs. For example, the schools have footpaths, staircases (ramps), and sanitary facilities with doors for privacy.

Of the 25 schools, two of them accommodate deaf language learners: The Al Amal Secondary Mixed School for Sign Language in Zarqa (Al Amal Zarqa) and the Al Amal Secondary Mixed Inclusive School for Sign Language in Aqaba (Al Amal Aqaba). Both schools serve kindergarten to grade 12 learners and are fully equipped with ICT equipment, including laptops, smart projectors, smart boards, computer labs, science labs with digital equipment—for example, electronic microscopes—and an audiometric booth for assessing a person’s hearing ability. In Aqaba, the school staff, learners without disabilities, deaf language learners, parents, and the local community use the equipment to maximize learning outcomes.

I.2 PROBLEM STATEMENT

There are several challenges impacting the education system’s ability to adequately respond to the needs of learners with disabilities. These include negative stereotypes and attitudes toward persons with disabilities, limited financial resources dedicated to inclusive education, a lack of accessible school infrastructure, a shortage of specialized cadres to work with learners with disabilities, and a shortage of expertise in adapting curricula and teaching strategies for learners with disabilities. There is also insufficient availability and knowledge of accessible and assistive technology. As a result of these environmental, educational, and behavioral barriers, only 2 percent of learners with disabilities are receiving education services in Jordan.²

Considering these challenges, the MOE and HCD implemented a plan to promote the needs of learners with disabilities by working with the HCD to use media, text SMS, publications, etc., to renovate two schools in each field directorate per year. Then they will use the renovated schools as tools to disseminate information about inclusive education like specialized teacher training, parental awareness programs, and the creation of specialized support units. Additionally, the MOE will implement inclusive education measures that build awareness and identify and respond to various educational needs of learners with disabilities. The MOE will achieve this by developing curricula and teaching strategies that align with inclusive education requirements and strengthen professional capabilities of cadres to better respond to the needs of learners with disabilities.³

² Government of Jordan Ministry of Education. [Education Strategic Plan 2018–2022](#).

³ See [Article 3 of Jordan’s Law No. 20 of 2017 on the Rights of Persons with Disabilities](#).

I.3 STUDY PURPOSE

This case study examines how Al Amal Zarqa and Al Amal Aqaba schools integrate ICT equipment into teaching deaf language learners. The research questions listed below assessed whether the schools' new ICT equipment improve education outcomes among learners with hearing disabilities.

I.4 RESEARCH QUESTIONS

1. Are we equipping the schools with the technology necessary to help deaf learners gain equitable access to education through Jordanian Sign Language?
 - a. What is the number of deaf learners vs. learners without disabilities?
 - b. What types of disabilities do learners at the schools have and what corresponding assistive technology is needed?
 - c. What types of majority technologies, accessible technologies, and assistive technologies⁴ exist? Is there WiFi accessibility? What challenges exist?
2. To what extent are teachers trained on using ICT in classrooms?
 - a. Are teachers trained to use ICT equipment?
 - b. Do teachers know who to contact when they face a technical problem?
3. What ICT equipment is available and how is it utilized?
 - a. How are deaf learners taught to use the technology?
 - b. How are the learning outcomes and access to education tracked and measured? Are the outcomes traced back to the specific accessible and/or assistive technology or to the USAID-funded school as a whole?
 - c. Is there a system in place that trains parents and caregivers to use technology in assisting deaf children? Do they have similar ICT equipment necessary for supporting a child's education at home?

I.5 LIMITATIONS

There are limitations associated with this case study. They include the limited amount of time available for conducting research and limited available resources. Expanding on this research would require further investigation into the selection of appropriate ICT equipment, the financial resources required, and the financial resources contributed by the Government of Jordan (GOJ).

⁴ Page 5, [Using Information Communications Technologies to Implement Universal Design for Learning Paper](#).

Furthermore, there is no data that connects ICT for deaf language learners directly with better learning outcomes or access to education in these two schools. This is another opportunity to explore further.

2. SCENARIO

2.1 BACKGROUND AND CONTEXT

Over the past 20 years, Jordan's population doubled in size, to approximately 11 million people, with nearly 1.6 million students in public schools. The public education system in Jordan is significantly strained due to immigration, inadequate infrastructure, a growing population, and an influx of refugees from regional crises. Those strains create significant challenges: Overcrowded classrooms, double-shifted and rented schools, strained resources, worn infrastructure, and a lack of recreational facilities. Those pressures and demands are now compounded by impacts of the COVID-19 pandemic.

USAID has been active in Jordan's education sector since 2003 and bases its education assistance on the GOJ's priorities, outlined in the Education Reform for Knowledge Economy (ERfKE) initiative, which is in its second phase. USAID supports the MOE's efforts under ERfKE II by improving and expanding access to early childhood and secondary education.

In August 2006, and in response to the MOE's request, USAID launched the Jordan School Construction and Rehabilitation Project (JSP). Its primary objective was to reduce overcrowding in public schools, replacing rented and double-shifted schools, and providing a safe and more suitable school environment. The project was completed in 2015.

In 2014, JSP moved into phase two (JSP II) and three activities launched, including SKEP. Under SKEP, 12 out of 25 planned schools have been built. The remaining 13 schools are underway and scheduled to be completed by mid-2023. In total, these 25 schools will provide more than 21,744 students with access to classrooms and fully equipped science, computer, and vocational labs. In addition to advancing more efficient use of energy and water, the schools are designed in a cluster model—a “school within a school”—that provides a structured way for school administrators to monitor and evaluate the impact of educational activities. Outside of school hours, community members have access to the schools' multipurpose and meeting rooms, computer labs, and recreational spaces, making the school the center of the community and increasing the value of education.

2.2 INTERVENTION

Al Amal Zarqa and Al Amal Aqaba schools were built in response to a request from the GOJ and the local communities to replace two rented buildings in Rseifeh and Aqaba governorates that were previously used to educate deaf learners. Both buildings were in a very poor condition, with deteriorating infrastructure and no reasonable accommodation for deaf learners.

During the design phase of these schools, stakeholders who had strong backgrounds and expertise in the needs of persons with disabilities attended workshops. These stakeholders included principals and teachers from other schools for learners with disabilities, representatives from the HCD, and representatives from the Inclusive Education Division at MOE. This step was crucial to building inclusive schools that truly meet the needs of learners with hearing, vision, and physical disabilities.

Al Amal Zarqa and Al Amal Aqaba were built, equipped, and furnished as inclusive schools. However, by the time Al Amal Zarqa opened in September 2019, the MOE was unable to accommodate the requirements of a fully inclusive school. For example, there was a lack of specialized staff who could work with children in inclusive schools, which prompted the MOE to devote Al Amal Zarqa solely to the needs of deaf learners. Al Amal Zarqa currently serves 168 deaf students and has 54 teachers.

When the construction of Al Amal Aqaba completed in September 2021, the MOE was expanding access to inclusive education by applying the related objectives of the ESP. As a result, Al Amal Aqaba receives learners without disabilities *and* deaf learners. Four classrooms, each with the capacity of 36 learners, were allocated for learners without disabilities and the remaining 12 classrooms have a total capacity of eight deaf learners each. All learners can mingle in the playground and resource areas with teacher supervision. Although the thought of allowing learners without disabilities to play and spend time with deaf classmates was not initially accepted by the local community, now all learners get along well, and deaf students feel included and are excited to attend school every day. Al Amal Aqaba currently serves 96 learners without disabilities and 42 deaf learners, and has 29 teachers, of which 25 are dedicated to the needs of deaf learners.

Both schools were equipped with different types of ICT equipment, including smart boards, smart projectors, PCs, printers, photocopiers, laptops, an audiometric booth, an audiometer, and a tympanometer. Technology equipment used by teachers and students (e.g., smart boards, smart projectors, PCs, and laptops) are accessible and have functions and features that increase access to learning and effective delivery of basic learning skills. Some of the functions and features include video creation apps, sound detectors, notifications, and on-screen alerts, turning off all sound, adjusting sound for balance of headphones, and visual on-screen alerts. Having easy access to this equipment reduced the need for traveling to the Ministry of Health to obtain an audiogram that assessed students' hearing level, a time-consuming task because of the high demand.

Deaf learners study the same curriculum used for learners without disabilities, and although the curriculum is not amended, it is adapted to meet the needs of deaf language learners. Every teacher adapts the curriculum to the learners as they see fit. Currently, this contextualization of curriculum is not unified and is instead an individual effort, but teachers may discuss curriculum adaptation techniques as part of a knowledge exchange. For example, if teachers find the curriculum difficult for deaf learners, perhaps because it is lacking in pictures, they might cut the curriculum short and focus on certain subjects and exercises that deaf learners can understand. In addition, certain arrangements are made in the Tawjihi exam for deaf learners per MOE requirements. These arrangements include having a Jordanian Sign Language (JSL) interpreter available at the exam and giving deaf learners extra time to complete it. Deaf learners are also excluded from certain subjects like composition writing in the Arabic language, as well as Tajweed and the recitation of the Quran in the Islamic religion.

Despite JSL being the main form of communication between all learners in both schools, there is no formal JSL curriculum or classes at the schools. However, teachers expect students, especially those with residual hearing and hearing aids to lip read, as well. Learners who are deaf interact with one another using JSL, while learners with residual hearing and hearing aids have varying levels of ability in lip reading and speaking. Learners without disabilities use JSL to communicate with the deaf learners and learn JSL through training courses arranged by the school or informally from their classmates. Deaf learners also learn JSL from other members of the deaf community in Jordan and elsewhere through communication applications, such as Messenger, Google Duo, EMO, and WhatsApp.

Teachers use the total communication method,⁵ which includes use of JSL and speaking in Arabic at the same time, to educate students who are deaf and hard of hearing, in addition to using body language and facial expressions. Whiteboards and computers support visual learning, as teachers use the tools to draw and show images that help deaf learners associate information with pictures and/or shapes.

Currently, the MOE is conducting training courses for all teachers on educating learners with hearing, vision, and physical disabilities. Each teacher must attend 30 hours of training and then pass exams at the end of each course with a score of 75 percent or above. Pre- and post-assessments measure trainers' capacity to communicate the information to all participating teachers in the MOE trainings. These new training courses are yet to be given to the teachers of Al Amal Zarqa School and Al Amal Aqaba Schools. It should be noted that until the 10-year strategy launched, there were no formal opportunities for teachers to learn JSL or training on how to teach deaf learners, but school principals typically organized monthly training sessions for teachers with external trainers.

2.3 OVERVIEW AND IMPACT—INCLUSIVE SCHOOLS UNDER SKEP

Al Amal Zarqa and Al Amal Aqaba have a significant impact on deaf learners, their parents, and the local community. These schools improved learners' attendance, participation, and completion rates, as well as their learning outcomes. The majority of the deaf language learners now fall between 70 and 80 percent, with a few distinguished learners above this grade and few learners below. Learning outcomes are measured through three exams, per MOE regulations, which include an initial exam that measures and diagnoses learners' levels and capabilities. The formative exams are conducted during the teaching process (i.e., the school year) and their results give an indicator on whether the plan in place is sufficient or needs adaptation or improvement. Finally, the national exams are conducted by the MOE, as well as the international exams, such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS).

Since Al Amal Zarqa opened in 2019, the graduation rate for learners is 100 percent. Also, nine deaf learners have passed the Tawjihi exam⁶ since the school started operating and are continuing their higher education at the Hashemite University in Jordan. This is a distinctive academic achievement. Before the ICT equipment was integrated into Al Amal Zarqa, only one student on average passed the exam each year.

Per the 10-year strategy, there are external and internal pillars in place that guide the path for increasing access to education for learners with disabilities. The external pillar includes transportation of learners between the school and home. The internal pillar involves the learning environment, and includes accessibility of school infrastructure and educational facilities, the Frequency Modulation (FM) system, availability of JSL teachers and interpreters, health facilities, computers, and more. The pillars are not fully implemented, but implementation is underway.

⁵ Total communication is an outdated approach in the space of deaf education and evidence overwhelmingly shows that it's ineffective for most deaf students. The current evidence-based approach is called "bilingual deaf education."

⁶ The Tawjihi exam is the General Secondary Education Certificate Examination in [Jordan](#). It is the last stage of school education (as defined by Wikipedia).

When measuring learners' access to education, the MOE assesses access to education through the Quality of Education and Accountability Unit, the educational supervisors, and schools' inspection tours, which are conducted by the MOE and directorates. During the inspection tours, the inspectors meet deaf language learners and receive and respond to different questions and concerns from learners, teachers, principals, and schools. Learning outcomes and access to education are tracked and measured in relation to the general school environment, and not in relation to the provided ICT equipment.

The available resources and capabilities in both schools are prominent and highly appreciated by the citizens of both governorates. Previously, parents saw the school as a place where deaf children could go to spend time away from home without any real benefit, and teachers struggled to communicate with deaf learners and convince them to open books or to write. The ICT equipment installed in both schools played an important role in facilitating the teaching and learning processes. A team hired by USAID—the “school start-up team”—consisting of a lead education advisor and three education advisors deployed to each school. The team prepared the school staff and ensured the schools were optimally utilized, that effective school governance policies were in place, and that staff, students, parents, and the community felt a sense of ownership in the schools.

Technology is an integral part of the teaching and learning process. It helps enrich the learning process and increase the effectiveness of participation and the cooperation between the society, the schools, the parents, and the learners. A development plan was written and applied in both schools to integrate technology into classrooms so that it has ample influence on the learning outcomes of deaf learners.

Things like smart boards, movable data shows, and computer labs help develop deaf language learners' mental, social, linguistic, sensory, and kinetic skills. These tools also help build the learners' characters, expand their minds, and improve their literacy skills. With these technologies, deaf learners can apply what they see in the curriculum, express themselves better and have more confidence and independence. They can teach themselves and appreciate their own work, and can observe, notice details, work in teams, renew their creativity, and stimulate their imagination.

Technology facilitates the teaching process, with teachers now communicating information easily and quickly to students, and can utilize the deaf language learners' higher mental abilities. Microsoft Teams and Zoom applications introduced them to a virtual community, in which they use JSL and International Sign⁷ to connect with deaf persons in other countries like Dubai, the United States, and the Gulf. Deaf language learners no longer feel isolated, and teachers can reach out to other teachers to participate in regional conferences to exchange their knowledge and experiences, allowing them to develop skills and capabilities, making them available to the schools and the public education system in Jordan.

⁷ International Sign (IS) is a [pidgin sign language, or a grammatically simplified means of communication that develops between two or more groups that do not have a language in common; typically, its vocabulary and grammar are limited and often drawn from several languages](#). IS is used in a variety of different contexts, particularly at international meetings, such as the [World Federation of the Deaf](#) (WFD) congress, and events like the [Deaflympics](#) and informally when traveling and socializing.

2.3.1 SUCCESS STORIES

WHEN TECHNOLOGY CHANGES BEHAVIOR: SUCCESS STORY FROM AL AMAL AQABA

Moataz Aless, a deaf learner, was known to be violent with his classmates in the old, rented building before Al Amal Aqaba SKEP school was built. The educational counselor at the school reached out to his family several times to resolve the problem, but was unsuccessful and his violence persisted.

When the administrative staff, teachers, and learners moved to the new USAID-built Al Amal Aqaba, Moataz's teacher, Ms. Nihad Al Jaraisheh, noticed he was fluent in JSL. In coordination with the educational advisor, Ms. Nihad invited Moataz to participate in the "Take My Hand" Initiative⁸ for World Children's Day. Through this activity, Ms. Nihad and the educational advisor utilized the available ICT resources to create a video, which they presented to all learners and parents and published on social media platforms. When Moataz saw himself in the video, he was impressed and proud that all his schoolmates wanted to see it.

Since that day, Moataz has less aggression and feels valued among his teachers and schoolmates. He also started requesting to participate in other similar activities, which encourages other deaf learners to participate in these activities. Moataz's change of behavior was also noted in his household, making his family happy with the results and appreciative of the school and its ICT resources. The use of ICT improved Moataz's ability to communicate effectively within academic and social settings, due to easier access to, and use of, JSL.

Exhibit 1: Moataz, a deaf language learner at Al Amal Aqaba



PHOTO | MR. TAREQ AL ZEN, SCHOOL START-UP ACTIVITY COACH

Exhibit 2: Moataz's schoolmates watching the video Moataz made on World Children's Day



PHOTO | MR. TAREQ AL ZEN, SCHOOL START-UP ACTIVITY COACH

⁸ The Take My Hand initiative was launched by Al Amal Aqaba School and aims to educate deaf learners about their societal rights in health and education.

SERVING THE LOCAL COMMUNITY: SUCCESS STORY OF AL AMAL ZARQA'S AUDIOMETRIC BOOTH

Sarah Al-Shami holds a Bachelor's degree from Jordan University of Science and Technology. She is also a certified audio technician with the Ministry of Health and works as a hearing and speech specialist at Al Amal Zarqa, where she performs audiograms to assess how well someone hears sounds. The audiometric booth also contributes to teaching methodologies because it offers a quiet space to administer hearing tests with ease and record students' hearing levels. Teachers of the deaf and hard of hearing can use students' audiograms to plan their educational programming.

“Previously I could not provide my services to students, parents, and the local community, but now I can do so with the new school and its isolated audiometric booth equipped with the latest equipment to perform hearing tests. This is the first school in the Hashemite Kingdom of Jordan to have this technology.”

Exhibit 3: Sara Al-Shami, a hearing and speech specialist, using the equipment in the audiometric booth to do a hearing test.



PHOTOS | MR. ESSAM AL-NUSAIRAT, SCHOOL START-UP ACTIVITY COACH

3. METHODOLOGY AND FINDINGS

3.1 METHOD OF DATA COLLECTION

This case study is prepared based on data, evidence, and information solicited from the SKEP Contracting Officer's Representative (COR), school start-up teams, representative groups of teachers and principals from Al Amal Zarqa and Al Amal Aqaba, and MOE staff from the Disability Division. In total, 21 stakeholders were interviewed during six interviews. Researchers developed a separate set of questions for each interview. The interviews were conducted as follows:

1. Dr. Issam Omar, SKEP COR, conducted on December 30, 2021
2. Ibrahim Mahfouz, School Start-up Team Leader, conducted on December 30, 2021

3. Three coaches in the school start-up team, and the teachers and principals from Al Amal Zarq and Al Amal Aqaba, conducted on January 6, 2022
4. Six teachers and the principal of Al Amal Zarqa, conducted on April 4, 2022
5. Six teachers and the principal of Al Amal Zarqa, conducted on April 14, 2022
6. Director of Programs for Students with Disabilities and the Head of the Disability Division at MOE, conducted on April 27, 2022

See Appendix B for the lists of questions asked during the six interviews.

3.2 FINDINGS

3.2.1 HOW THE TECHNOLOGY WAS UTILIZED

Teachers utilize hardware and software to explain the curriculum and deliver the information to the learners. Each school is connected to the Internet via a local provider (Umniah) and the computers and laptops connect to wireless networks, allowing teachers to use online resources in class.

APPLYING WHAT THEY SEE AND FACILITATING THE TEACHING AND LEARNING PROCESS

a. Use of Different Programs for Learning

Learners use the different technologies to apply what they see in the curriculum, reach conclusions, and understand theories. They also engage in experiments in the science labs and watch the experiments on smart projectors. Teachers use online programs to help learners with applying the curriculum. For example, teachers use the Crocodile Program—a hypothetical lab—to conduct science experiments and build learners’ interest in science.

Other programs assist with the teaching process in different subjects, including:

- AlKira’a Al’Arabiyeh AlSaleemah, a learning application that teaches the Arabic language by learning phonics, alphabets, colors, numbers, words, and phrases;
- Rihlet AlKalimat helps users learn the concept of connecting letters to form simple words;
- Ta’alom Al Imla’a teaches its users how to spell in Arabic;
- [Geogebra](#) is an interactive geometry, algebra, statistics, and calculus application intended for learning and teaching mathematics and science from primary school to university level; and
- [Scratch](#), a high-level, block-based visual programming language website is targeted primarily to children 8 to 16 years of age. Users on the site, called Scratchers, can create projects on the website using a block-like interface.

Nihad Al Jaraisheh, a learning difficulties teacher at Al Amal Aqaba says:

“Because of the available technology, I have additional resources to explain a lesson to deaf learners. This was not possible in the old building, where technology was not available. Programs

such as Geogebra and Microsoft Excel are tools that are providing the deaf students with a more dynamic and visual interaction in the teaching of geometry and math.”

b. Use of Smart Boards in Kindergartens (KGs)

In Kindergarten, the smart projector and smart board play a crucial role in helping deaf language learners interactively learn and understand the different letters of the alphabet. Learners can see the letter and where it is placed, whether it is at the beginning, the middle, or the end of the word. Learners use the smart board to draw the letter assigned to them by the teacher or a letter they choose. This process has an immense impact on how much knowledge the learner gains. This learning process lets learners memorize how a letter looks, how to properly pronounce the letter, and how to use JSL to convey the letter.

c. Use of Computer Labs

In addition to sign language as the main modality form of instruction, teachers use computer classes to complement and add to the deaf learners' experience. Computer labs give the learners the chance to use computer applications like Microsoft Flash and Paint. The teacher's computer connects to the learners' computers, creating one network that increases the interaction between the learners and the teacher and optimizes the communication process. Depending on the grade level, learners use the computer for different purposes, e.g., creating videos and coding with various programming languages, such as C++ and HTML.

d. Use of Digital Games

Teachers also use digital games that rely on stereoscopic movements like car racing, drawing faces, or coloring letters, and allow learners to play with entertainment programs as they identify what inspires them. Additionally, teachers use games that help deaf language learners learn JSL more quickly and easily.

e. Use of Available ICT Equipment to Create an Encyclopedia in Al Amal Zarqa

Teachers also work on creating an encyclopedia for scientific terms using JSL through the Ramz program, from which they source signs from experts like Mr. Naji Zakarneh and Mr. Sameer Samrain from Al Jazeera Channel (Qatar), international interpreters, and regional and national teachers. They also established simple knowledge societies in different subject areas, such as child education, mathematics, and science, while using the available smart boards.

f. Use of Laptops

In many classes, laptops give learners the opportunity to make videos of deaf language learners and show how they are progressing in their school year, what they are learning, and how they are building their self-esteem. When the parents watch these videos, they are intrigued, become proud of their children, and become more committed to the schools.

g. Distance Learning During the COVID-19 Pandemic

Finally, during the COVID-19 pandemic lockdowns, teachers could stay in touch with their learners. For example, the science teachers encouraged learners to rely on themselves and self-learn, and learners

conducted experiments at home if simple resources were available. They communicated to their teachers what they learned and understood.

3.2.2 TRAINING OF TEACHERS, DEAF LANGUAGE LEARNERS, AND PARENTS ON ICT EQUIPMENT

The school start-up team, in coordination with the suppliers of the ICT equipment, trains School Resources Teams (SRTs) to use the ICT equipment. The school start-up team also ensures information is transferred to all school cadres, so the SRT employs technology during computer classes and shows the flexibility of moving the equipment around facilities. This process is coordinated with the computer lab supervisor to receive the equipment and activate it. The responsibility of preserving the schools' ICT equipment is a collective responsibility and does not only rely on the SRTs. Everyone, including the school administration, teachers, students, and parents, shares this responsibility.

In addition to the teacher technology training, teachers exchange their expertise and knowledge across the Arab region and worldwide using Microsoft Teams and Zoom. They connect with other schools that serve learners without disabilities and deaf language learners, and they engage in conversations and discussions with other teachers, building upon their experience and knowledge. They also use WhatsApp to create groups from different governorates across Jordan to share information.

Learners receive training on how to use the ICT equipment in various ways, including in computer classes, science labs, and the resources area, where teachers use modern teaching techniques like role playing, simulation, and the Little Teacher initiative, in which teachers and students switch roles and give students the chance to use the smart boards and other available supportive learning resources. In some cases, the learners themselves train a new teacher on how to use the equipment and JSL.

Learners also learn about ICT from the computer and science clubs. They attend computer classes twice a week and write programming code. Moreover, sometimes learners can be more knowledgeable of technology than their teachers, and they possess good digital literacy skills. In addition to teachers and learners, parents have the opportunity to learn about these technologies through the schools. For example, one of the initiatives at the schools is training a parent and their child on pronunciation, their earpieces, and how to increase their child's productivity.

In many cases, parents do not have formal opportunities to learn sign language or how to cope with having deaf children. Additionally, some parents may keep their deaf children home until they are nine years old, when they eventually send their deaf children to school. Under the SKEP program, the school start-up teams have successfully started working with Al Amal Zarqa and Al Amal Aqaba schools and other schools to spread awareness throughout the local community and instill better understanding of the educational needs of deaf children. As a result, more parents are sending their children to school at a younger age.

Both schools have had several initiatives to support the students' and families' needs. In Al Amal Zarqa for example, there is the "Mom please learn my language and teach me" initiative for parents who do not know sign language. Through this initiative they learn how to communicate with their deaf children. In addition, the schools resort to the parent-teacher meetings to teach them the developmental traits for deaf children between the ages of two and eight, to receive feedback from parents, and to provide training and guidance to parents. Parents also attend sign language courses arranged by the schools.

The school start-up team engages parents through the Parents Engagement Team, which utilizes coaches to train parents and the local community. ICT equipment training can be part of the training, although it is not mandatory and depends on the school and its needs. In case the lab instructor is not at school on one of the days, a parent can assist. However, this idea is applicable only if the computer lab instructor agrees to give the lab keys to a parent volunteer. This is not often the case, as there are liability and cost considerations to be made.

3.2.3 ICT EQUIPMENT PROVIDED, ITS MAINTENANCE AND RELIABILITY

Al Amal Zarqa and Al Amal Aqaba have desktop computers, smart boards, smart projectors, laptops, movable data shows, and fixed data shows (see Exhibit 4). Each school has an audiometric booth, an audiometer, and a tympanometer.

Exhibit 4: Quantities of ICT equipment in the schools and their distributions

SCHOOL	ITEM	QUANTITY	LOCATION(S) USED
Al Amal Zarqa	Desktop computer	68	Principal's office, deputy's office, secretary's office, two teachers' rooms, two computer labs, the library, chemistry & biology lab, physics & geology lab, art & music lab, vocational lab, speech & hearing room, learning difficulties room, KG rooms, educational counselor room, physical education room, school radio room, meeting room, activities, and sports hall, one classroom
	Interactive whiteboards (smart boards)	7	KG rooms, KG activities hall
	Smart projectors	7	Chemistry & biology lab, physics & geology lab, art & music lab, vocational lab, activities and sports hall, grades 5 and 11 classrooms
	Laptops	8	Laptops are used in all school facilities and as needed, such as classrooms, laboratories, resource areas, etc., and they are maintained in the computer lab.
	Movable data shows	2	Laptops are used in all school facilities and as needed, such as classrooms, laboratories, resource areas, etc., and they are maintained in the computer lab.
	Fixed data shows	1	Multi-purpose hall and it is used for the school and the local community activities
Al Amal Aqaba	Desktop computer	58	Principal's office, deputy's office, secretary's office, teachers' rooms, school custodian room, two computer labs, chemistry & biology lab, physics & geology lab, art & music lab, vocational lab, speech & hearing room, learning difficulties room, KG rooms, educational counselor room
	Interactive whiteboards (smart boards)	4	KG rooms, KG activities hall
	Smart projectors	7	Chemistry & biology lab, physics & geology lab, art & music lab, learning difficulties room, activities & sports hall, the library
	Laptops	3	Laptops are used in all school facilities and as needed, such as classrooms, laboratories, resource areas, etc., and they are maintained in the computer lab.

SCHOOL	ITEM	QUANTITY	LOCATION(S) USED
	Movable data shows	2	Laptops are used in all school facilities and as needed, such as classrooms, laboratories, resource areas, etc., and they are maintained in the computer lab.
	Fixed data shows	1	Multi-purpose hall and it is used for the school and the local community activities

All ICT technologies including computers, laptops, and mobile phones connect to a server that distributes Internet services using WiFi to the different learning areas, including classrooms, the science lab, resources areas, the art lab, the library, and the computer lab. Unfortunately, the Internet service provided is very slow and can be very challenging for the educational process. However, teachers overcome this challenge by resorting to the cellular data on their personal mobile phones if classes are interrupted by slow Internet connection.

To maintain the ICT equipment, the SRTs must follow certain procedures that ensure the sustainability and longevity of the equipment. The SRTs are responsible for the following:

1. **Predictive Procedures:** ICT equipment is examined regularly to determine potential technical issues.
2. **Protective Procedures:** These proactive procedures minimize the likelihood of potential problems that can occur due to lack of maintenance.
3. **Repair:** These actions repair the equipment after it malfunctions.
4. **Replacement:** Replacing or changing the ICT equipment if it is broken or old.

If repair or maintenance for the ICT equipment is required, the teacher in charge reaches out to the SRT, which gets in touch with the science lab and computer lab supervisors to support and fix the equipment. If they cannot solve the problem, the principal reaches out to the supplier, as all equipment at the schools is under factory warranty. The supplier fixes the malfunctioning equipment or replaces it, if necessary. Additionally, if the supplier accepts a device for repair, the school is not affected, as there is enough ICT equipment at the schools until the supplier returns the repaired device.

4. MOVING FORWARD

Since Al Amal Zarqa and Al Amal Aqaba started operating in 2019 and 2021, respectively, they have had a positive impact on the local community, per the feedback received from the administrative staff, the teachers, learners, and the local community. Through these schools, deaf language learners can receive education at a public school and become productive members of society who contribute to Jordan’s economic development.

The ICT equipment in both schools is sufficient in meeting the needs of the deaf language learners. When teachers were asked about additional ICT equipment to support the learning experience of deaf language learners, their requests were minimal, and they were satisfied with the technology already available in the schools. They suggested the availability of tablets, which learners can use when playing Kahoot, “a game-based learning platform”, used as educational technology in schools and other educational institutions. Teachers also suggested having frequency modulation systems that are “wireless assistive hearing devices that enhance the use of hearing aids, cochlear implants and also assist people

who are hard of hearing but do not wear hearing aids, in particular over distance and in noisy environments.”⁹

Through these schools, the deaf language learners in Zarqa and Aqaba can access, attend, participate, and succeed in a local mainstream school. As Ms. Nuha AlRab'i from Al Amal Aqaba said:

“I have been teaching deaf language learners for 17 years in Al Amal School, and I wish that what I am seeing now in Al Amal Aqaba is generalized and applied to all schools in Jordan. I am seeing impressive things for learners, in terms of how a learner’s skills and knowledge are developed from all directions and all mental, psychological, physical, and kinetic sides.”

Additionally, learners and teachers mentioned that the old, rented building for Al Amal Aqaba was challenging. Ms. Raeda Ajjawi from Al Amal Aqab said:

“In the old building, we used to suffer a lot, there was no space or place to train, and there were no capabilities.”

USAID is now designing 30 new inclusive schools across Jordan. They will be built in collaboration with the MOE and according to certain criteria. USAID’s contribution to the number of inclusive schools in Jordan aligns with the 10-year strategy for inclusive education plan by the HCD and the ESP 2018–2022 in Jordan.

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⁹ See FM systems definition from [Hearinglink.org](https://hearinglink.org).

ANNEXES

ANNEX A: DATA ABOUT AL AMAL ZARQA AND AL AMAL AQABA

I. AL AMAL ZARQA

GENDER	# OF TEACHERS	TOTAL # OF LEARNERS WITH DISABILITIES
Male	0	86
Female	54	82
Total	54	168

TYPES OF DISABILITIES

HEARING	MOBILITY	COGNITIVE	VISION
86	0	0	0
82	0	0	0
168	0	0	0

2. AL AMAL AQABA

GENDER	# OF TEACHERS	TOTAL # OF LEARNERS	TOTAL # OF DEAF LANGUAGE LEARNERS	TOTAL # OF LEARNERS WITHOUT DISABILITIES	TOTAL # OF LEARNERS WITH DISABILITIES
Male	0	71	23	48	23
Female	29	67	19	48	19
Total	29	138	42	96	42

TYPES OF DISABILITIES

HEARING	MOBILITY	COGNITIVE	VISION
23	0	0	0
18	0	1	0
41	0	1	0

ANNEX B: INTERVIEW QUESTIONS

I. Interview questions for SKEP COR

- How did the idea of Al Amal inclusive schools come up in the design of SKEP? Provide background.
- What discussions have you had about ICT in general, ICT for students with disabilities, and digital literacy skills when designing Al Amal Schools and now for ISP?
- Are there lessons learned from these two schools that made the design of ISP different in terms of accessible and assistive technology?
- Does use of ICT link directly to the learning outcomes of learners (if possible, showing separate results for both students with disabilities and students without disabilities)?
- How do the overall literacy skills of students link to their ability to use ICT?
- Do we have pre- and post-intervention data that shows impact?

2. Interview questions for School Start-Up team leader

- What is the total number of schools that serve learners with disabilities in Jordan?
- What is the total number of children at each school, disaggregated by children with and without disabilities?
- What is the total number of teachers? Of those, how many teachers work directly with children with disabilities?
- What are the roles of teachers who work directly with children with disabilities? Give a brief description of each role.
- What are the types of disabilities in the schools (i.e., physical, vision, deaf and hard of hearing, and cognitive and learning)? What technology is available for each disability?
- What ICT is provided?
- How do you rate WiFi accessibility at the school? As per my knowledge, does the Ministry of Education provide this? Does the school face any challenges in this area? How do the principal and school staff deal with such problems?
- Do all teachers receive training on how to use accessible technology? Who does the training?
- If the tool will be used in more than one place, how portable is it?
- How reliable is the tool?
- Who teaches the learners (and parents) to use the technology? What technical support is available? Do teachers know who to contact when they are facing a technical problem? I know that the coaches with the school start-up have trained the teachers on this matter. Can you give me more details about this? What are the challenges they are facing?
- Who is responsible for maintaining, repairing, or replacing broken devices?
- How are learners taught to use the technology?

3. Interview questions for School Start-Up team coaches, and Al Amal Zarqa and Al Amal Aqaba teachers and principals

- What is the feedback from the school staff (principal, administrators, teachers), the learners, and their parents about the technology at the school? How does it match the educational needs of the deaf language learners, in addition to learners without disabilities in Al Amal School in Aqaba? And what are the challenges you face with the technology?
- How do you evaluate the role of accessible and assistive technology in improving the learning outcomes of learners with disabilities? Have you seen substantial improvements, compared to before the technology was provided? Please describe.
- What other technology (accessible and/or assistive) do you think the deaf language learners would benefit from and how can this improve his/her learning process?
- How is ICT integrated in your classroom and teaching? Does it help you structure learning in a new way and/or help you develop socially active classrooms and encourage cooperative interaction and collaborative learning and group work? What kind of technology tools and digital content do you use in your classroom?
- Regarding the training you received on utilizing the technologies and maximizing their benefit, how do you evaluate this training? Was it challenging? If so, how? Are there any skills you need training for? How do you transfer this knowledge about technology to the learners?
- Finally, would you like to share a story of a student from your school whose learning outcomes improved substantially? The case study will be published online.

4. Interview questions for Al Amal Zarqa and Al Amal Aqaba teachers and principals

- Do you use the same curriculum for students without disabilities or a curriculum written especially for deaf students?
 - a. If it is the same, what do you do differently to explain this to the deaf students?
 - b. If it is different, can you give us details on how they are different?
- What are the languages of instruction used to educate students who are deaf and hard of hearing?
 - a. If the respondent does not mention the use of a sign language, probe with this question: How is Jordanian Sign Language used in the education of students who are deaf and hard of hearing?
- Can you tell us about how deaf students interact with one another? How do they communicate?
- What formal and informal opportunities do deaf students have to learn Jordanian Sign Language?
- How are access to education and learning outcomes for deaf students tracked and measured over time?
- Did you see changes in students' learning outcomes after introducing ICT?
 - a. Probing question if respondent does not share any specific improvements linking tech to language and literacy skills: What changes have you seen in deaf students' language and literacy skills after the introduction of education technology?
- What sort of training do teachers of the deaf receive? Is there a degree or certificate that teachers of the deaf must earn? How does the MOE assess training of teachers of the deaf?
- In computer labs, how does the teacher communicate with the deaf students other than showing things step-by-step in real time on the computer? Any use of Jordanian Sign Language? (Guide for the Question: In the computer labs, the teacher's computer relates to the learners' computers)

creating one network. This increases the interaction between the learners and the teacher, thus optimizing the communication process. Deaf students can see on their screen what the teacher is doing step-by-step.)

- What opportunities exist for parents and communities of deaf students attending your school to learn Jordanian Sign Language? Do parents learn about how schools are using bilingual teaching methodologies, e.g., using it to teach core subject material?
- Which education technology/ies do you use to connect deaf students in virtual communities locally and internationally?
- Question for Al Amal Al Zarqa Specifically: Regarding the creation of an encyclopedia in Al Amal Zarqa, where are the signs sourced from? (Audience: Dr. Wafa' Al Zaben, School Principal; Ms. Ruqaya Miqdadi, Teacher at Al Amal Zarqa)
- Question for Al Amal Al Aqaba Specifically: During our last meeting in January, you mentioned that “Because of the available technology, I can resort to the higher mental abilities of the deaf language learner to explain a lesson. This was not possible in the old building, where technology was not available, as employing higher mental abilities in teaching without the help of technology is known to overwork deaf language learners and requires much more effort from them in comparison to learners without disabilities.” The question now is: Why is it more effort for learners who are deaf to understand the information compared to other learners without disabilities? We have seen cases of low resource contexts without ICT equipment, yet deaf students can still understand the information the teacher is relaying. We would like to understand what you are or are not doing that would otherwise help students understand better? (Ask Question to: Mrs. Nihad Al Jaraisheh, Learning Difficulties Teacher Al Amal Aqaba)

5. Interview questions for MOE

- How is the education of deaf students constructed within the Ministry of Education? What is their pedagogical approach to teaching deaf students? Do they espouse a bilingual approach, e.g., using sign language as a first language to teach secondary languages (Arabic, English, etc.)?
- How is access to education and learning outcomes tracked and measured over time?
- What sort of training do teachers of the deaf receive? Is there a degree or certificate that teachers of the deaf must earn? How does the MOE assess training of teachers of the deaf?