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Inclusive Education during the Coronavirus Outbreak Accessible Resources for Online Learning During School Closures

Mada's Glossary
The First Arabic Glossary Specialized in Assistive Technology and Digital Access

Education in the 4th Industrial Revolution

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Mada's Glossary – The First Arabic Glossary Specialized in Assistive Technology and Digital Access

Anirban Lahiri
Mada Center

As part of its commitment to creating Arabic language resources for the purpose of raising awareness about the potential of Assistive Technology (AT) and e-Accessibility to empower People with Disabilities, the Mada Center has developed a first of its kind resource in Qatar and the Region: an online glossary of key accessibility, AT, and disability-related terms in both Arabic and English.

The Mada Glossary is developed within the framework of the Mada Innovation Program, which aims to enhance digital access in the Arabic language and encourage innovators to provide more technological solutions for persons with disabilities. Furthermore, Mada's Glossary provides a thorough explanation of the main terms related to the field of inclusive ICT access in both Arabic and English. It is a specialized terminology reference related to ICT accessibility and assistive technology (AT).

The main objective of developing the glossary is to promote innovation in the Arabic language in various fields of technology. The glossary provides a list of terms in Arabic and English to help stakeholders, experts, innovators, parents, users, teachers, students, therapists, and related institutions understand key terms related to ICT, digital accessibility, and Assistive Technology (AT) in order to achieve the centre's vision to improve ICT accessibility. Subsequently, effectively unleashing the potential of all persons with disabilities and the elderly through capacity-building and supporting the development of accessible digital platforms in Qatar and the world. The glossary includes technical terms that could be used in developing scientific papers and general articles by authors to produce scientific and academic resource content in Arabic among other languages.

Due to the infancy of Arabic digital resources related to ICT and digital access for persons with disabilities, Mada sought to launch a specialized glossary to improve the knowledge and quality resources of assistive technology solutions in the Arabic language. This will help establish a more well-versed society in line with the Fourth Industrial Revolution, artificial intelligence, and all that is new in the field of innovation. Furthermore, this resource will help raise awareness related to inclusive digital accessibility and highlight the role of Mada as a key contributor towards capacity building in the field of Digital Accessibility and AT in Qatar and the region. The Mada Glossary was reviewed in cooperation with the Translation and Interpretation Institute (TII) at Hamad Bin Khalifa University (HBKU) within the framework of activating the cooperation agreement between Mada and HBKU signed during QITCOM 2019.

Mada's Glossary consists of 354 terms, each of which provides a concise definition of matters related to persons with disabilities, accessibility, and technology. Mada

seeks to expand this project to its next stages by adding more terms available in various languages. The resource is now available online, free of charge, through Mada's web presence, providing a much-needed resource for People with Disabilities, caregivers, therapists, technologists, policymakers and academics interested in the field.

Making Social Media Accessible for All
Facebook

Oumer Seid
Mada Center

Through a series of articles, Nafath will focus on the accessibility features put in place by prominent social media platforms. According to a 2019 study by Oxford University and the Global Change Data Lab, social media platforms are used by one-in-three people in the world, and more than two-thirds of all internet users. Access to them is a fundamental right, that once fulfilled, will ensure the inclusion of a large portion of the world's population, empowering them to create and share content in a manner that is barrier-free.

For the first part of this series, Mada will focus on the accessibility features of Facebook.

Facebook
Launched in 2004, Facebook has dominated the social media realm for the last 15 years. The multidimensional space claims to have a staggering 2.3 billion active users as of December 2018. For many around the world, Facebook is the Internet. Facebook, which can be accessed through the Internet from multiple devices and platforms, including laptops, tablets and smartphones, allows users to create their profile, revealing a variety of information about themselves. Once set up, users can share text, in multiple languages, along with photos and videos with their pre-approved contact or friends list. Additionally, users can make use of a wide range of apps, including games, or they can join common interest groups, and even post and apply for work, or buy and sell products and services.

Key functionality of the platform is notifications, which alerts users on activity by their friends, pages they are members of or apps that they use. As such, every time a user logs in, they can see what kind of activity took place since they last logged on. This includes how many likes or reactions a post has received, prompting the user to respond, hence the social aspect of the technology.

With a platform that is so multi-functional as Facebook, it is imperative to ensure that despite its complexity, it remains accessible to People with Disabilities, particularly those that use Assistive Technologies, such as screen readers, refreshable Braille displays or switches to access the platform. This has not gone unnoticed by the California based Facebook team, which has embedded a series of accessibility features into the platform. Here is an overview of them. A central component of Facebook's accessibility efforts is the accessibility help centre which features a wealth of information for users with disabilities that want to learn more about what features are available to them.

Navigation Assistant

Navigation assistant is a tool for people who rely on screen readers or keyboard shortcuts to get around Facebook. For all screen reader users, the navigation assistant is always the first element on the page, even when it can't be seen visually. The assistance can also be launched from any part of Facebook, and users can move the focus from the browser toolbar to the webpage using the Tab key.

Keyboard Shortcuts

One of the main features of any accessible website is giving a user the ability to navigate a website entirely through the keyboard. For both people with physical or visual disabilities, using a mouse might not be possible. Instead, users must be able to access all features of the website with a keyboard alone.
Facebook has recognized this and embedded several keyboard shortcuts onto its platform. Here are some of these shortcuts – J and K – Scroll between News Feed stories; Enter – See more of the selected story; P – Post a new status; L – Like or unlike the selected story; C – Comment on the selected story; S – Share the selected story; O – Open an attachment from the selected story; / – Search; and Q – Search chat contacts.

Screen Reader Compatibility

Being built according to global e-accessibility standards such as W3C-WAI WCAG 2.1 means that Facebook is compatible with most major screen readers. For Mac OS and iOS users, the platform can be accessed through the built-in Voiceover feature. Similarly, Android users can access the Facebook app using TalkBack. For Windows desktop users, Facebook recommends Job Access With Speech (JAWS) and NonVisual Desktop Access (NVDA) as compatible screen readers. Additionally, Facebook also has a robust troubleshooting team that can be reached through different social media with regards to any concerns surrounding screen reader usage.

Voice Recognition

Facebook can also be controlled through mainstream voice recognition tools such as Dragon Naturally Speaking. In addition to being able to navigate the platform, users can also post comments or content through voice control.

Closed Captions and Media

To ensure that people with hearing disabilities can enjoy video content in an equitable fashion, Facebook has provided users with a robust set of tools that enable them to add closed captioning to their content.

Text Size and Contrast

One of the most important features of any accessible digital platform is the presentation of text and colour in a manner that is legible, and in accordance with international standards for size and contrast respectively. Ideally, the platform would enable users to customize font and colour settings to better suit their visual needs. This is usually a feature that is built into the settings of an operating system or a browser. For its part, Facebook provides users with information on how to make such changes.

Automatic Alt-Text (AAT)

In addition to featuring a slew of mainstream accessibility features, Facebook's accessibility ambitions are also very forward-looking. In 2016, for example, it launched something called automatic alt-text (AAT) for people using screen readers to identify what's displayed. AAT uses object recognition technology to generate descriptions of photos on Facebook. So if a user posts an image of a pizza, Facebook will correlate the image posted to its library of images and tell the user that the image may contain an image of food or a pizza (see below).

The same type of feature has been extended to pictures of people, where Facebook leverages face recognition technology to label the faces of people featured in images, thereby allowing people with visual disabilities the ability to ascertain who is featured in an image.

Moving forward, Google, Microsoft and Adobe have teamed up with Facebook to launch a program that brings together students, teachers and industry partners to explore accessibility. This will include research on how to support people with dyslexia who might have apprehension around posting content and developing an alt-text tool for a video that would describe content for people with visual disabilities. It is without a doubt that a platform with the reach of Facebook, that any accessibility gains made on the platform will have an impact on the way people interact with digital content wherever and however they may be logging in.

Inclusive Education during the Corona Virus Outbreak – Accessible Resources for Online Learning During School Closures

Mada Center

Coronavirus disease 2019 abbreviated as COVID-19 where 'CO' stands for 'Corona', 'VI' for 'Virus' and 'D' for Disease was officially announced by the World Health Organization (WHO) as a pandemic in March 2020. This is a new disease that causes respiratory illness in humans and could possibly lead to death to the elderly, people with pre-existing chronic conditions and lowered immune systems. This is a highly contagious virus that can spread rapidly across communities, nations, and borders affecting the population on a worldwide scale. As this is a newly detected virus, its vaccines and antiviral treatments are still under development. According to WHO guidelines, the most effective strategy to counter the impact of the virus is to avoid touching eyes, nose & mouth, practice respiratory hygiene, maintain social distancing, and implement community quarantine in highly affected areas. This will help prevent the increase of new contagions and allows time for the virus to subside from spreading further, and no longer be a pandemic or epidemic threat to humans.

In a matter of weeks, COVID-19 has drastically impacted various aspects of life as never experienced before. Major daily life aspects like attending work and education are severely hampered due to the precautionary measures adopted worldwide. The education sector has had to adapt swiftly to the situation of students being unable to physically attend schools and classes regularly. Most countries adopted ICT based Distance Learning approaches to deliver coursework and continue regular classroom activities. This approach ensures the continuity of education regardless of the student's location and abilities. Numerous distance learning platforms are designed to be inclusive for students with disabilities allowing them to be ideal solutions to deliver classroom activities. Some examples of accessible online learning platforms are:

Microsoft Inclusive Classroom: Microsoft offers various features integrated into its suite of Office applications. These features allow students to gain skills like:

Improved Reading: Integrated features like text highlighting, breaking of words into syllables, reading text aloud, and provision of visual references reduce visual crowding and enable learners of all ages and abilities to have enhanced reading skills.

Strengthened Writing: Features like Dictation and Read Aloud, allow students to hear their writing read aloud providing them essential feedback to edit their work and clearly communicate their ideas to others.

Optimized Classroom Time: Learning tools allow the creation of personalized learning content resulting in improved student engagement and optimized classroom time.

Immersive Reader: This app enables students with learning disability such as Dyslexia using text decoding solutions and help build confidence for emerging readers through features like Line Focus and Picture Dictionary.

Google Classroom: Google Classroom is a free service offered to schools, non-profits, and individuals with a personal Google account. The service is designed to virtually connect teachers and students with the capability of organizing and sharing content with each other. The system allows simplifying the creation, distribution and grading assignments digitally. The Google Classroom utilizes a combination of its existing solutions like Google Drive, Google Docs, Sheets, and Slides to facilitate collaborative learning activities. Teachers can also monitor the progress for each student, and after being graded, and return submitted assignments along with comments.

Some key educational features supported by Google Classroom are:

Assignments: Assignments can be stored and graded on Google's suite of productivity applications that allow collaboration between the teacher and the student or student to student. Files are hosted on the student's Drive and then submitted for grading. Teachers may choose a file that can then be treated as a template so that every student can edit their own copy and then turn back in for a grade instead of allowing all students to view, and collaboratively work on the same document.
Grading: Teachers have the option to monitor the progress of each student on the assignment where they can make comments and edit. Turned in assignments can be graded by the teacher and returned with comments to allow the student to revise the assignment and turn back in. Once graded, assignments can only be edited by the teacher unless the teacher turns the assignment back in.

Communication: Announcements can be posted by teachers to the class stream which can be commented on by students allowing for two-way communication between the teacher and students.
Archive Course: Google Classroom allows instructors to archive courses at the end of a term or year. When a course is archived, it is removed from the homepage and placed in the Archived Classes area to help teachers keep their current classes organized. When a course is archived, teachers and students can view it, but won't be able to make any changes to it until it is restored.
Mobile Applications: Google Classroom mobile apps are available for iOS and Android devices. The apps let users take photos and attach them to their assignments, share files from other apps, and support offline access.

Blackboard: Blackboard Learn is a virtual learning environment and learning management system developed by Blackboard Inc. It may be installed on local servers or hosted by Blackboard ASP Solutions. Its main purposes are to add online

elements to courses traditionally delivered face-to-face and to develop completely online courses with few or no face-to-face meetings.

Some student-teacher collaborative elements supported by Blackboard are as follows:

Announcements: Professors and teachers may post announcements for students to read. These can be found under the announcement tab or can be made to pop-up when a student accesses Blackboard.

Chat: This function allows those students who are online to chat in real-time with other students in their class section.

Discussions: This feature allows students and professors to create a discussion thread and reply to ones already created.

Course content: This feature allows teachers to post articles, assignments, videos etc.

Learning modules: This feature is often used for strictly online classes. It allows professors to post different lessons for students to access.

Assessments: Allows teachers to post quizzes and exams and allows students to access them via the internet

Grade Book: Teachers and professors may post grades on Blackboard for students to view.

Media Library: Videos and other course-related multimedia content may be integrated into the coursework through this feature.

In recognition of the challenges faced by the education sectors worldwide due to the COVID-19 pandemic, United Nations Educational, Scientific and Cultural Organization (UNESCO) has published a list of distance learning solutions that can be implemented in the event of school closures. This list can be accessed at https://en.unesco.org./themes/education-emergencies/coronavirus-school-closures/solutions.

These alternative approaches to deliver education have prompted new examples of educational innovation. Although it is too early to judge how reactions to COVID-19 will affect education systems around the world, there are signs suggesting that it could have a lasting impact on the trajectory of learning innovation and digitization because this is the first time in history when online education is being delivered on such grand scale. This is also an ideal demonstration of how the same technologies

can be equally effective for students with disabilities and their non-disabled classmates in pursuing quality and inclusive education. Despite all its benefits, it must be recognized that certain elements like face-to-face interaction and hands-on collaborative coursework facilitated in a traditional classroom setting cannot be replaced by distance learning approaches. The increased internet connectivity among populations worldwide coupled with the Information and Communications Technology (ICT) advancements is helping us to counter the devastating effects of social isolation caused by COVID-19. However, solutions like distance learning and work from home need to be implemented strategically to be adopted in a sustainable manner to be effective in the long term.

In the Arab region, the Arab League Educational, Cultural and Scientific Organization ALECSO launched an online platform (http://alecso.org/elearning/) grouping an important number of Educational resources as an initiative to support educational institutions in 22 Arabic countries and by raising awareness of the importance to have an Open Educational Resource OER.

Mada continuously promotes digital inclusion and works to build a technology-based community that meets the needs of persons with People with Functional Limitation (PFL) i.e. Person with Disabilities (PWD) and the elderly in Qatar. Mada is committed to ensuring an inclusive educational environment for students with disabilities by publishing and facilitating the use of international educational best practices. This is complimented by promoting cutting-edge assistive technologies, digital accessibility, and other related innovations that make the educational environment accessible.

See Sound for Hearing Impaired

Mada Center

Deafness is ultimately an invisible disability – you can't see it in the way that you can see someone who has lost an arm or a leg, making it what some call the "most normal" disability possible. Yet that doesn't make life any easier for those affected. Assistive devices for deaf people are doing more than just enhancing their hearing. 'Smart' hearing systems are now allowing people to stream their music, run their homes and monitor their health. Homebuilders are now constructing houses that are completely smart from the ground up. Likewise, there are devices, accessories, and gadgets readily available to make homes smart enough to be hearing assistive.

The sounds of routine household noises are something many of us take for granted. There are some of the sounds like a fire alarm, baby crying or a microwave in the kitchen that a lot of people depend on to take the next action, attend to chores, or just to be safe. Having said that, many of these sounds are not accessible to deaf people. There isn't an easy way for a deaf person to respond to sounds in a day to day setting, especially in a life-threatening situation.

To make daily sounds accessible to deaf people, a device that notifies hearing-impaired users of household sounds like fire alarms or children crying by sending notifications to their smartphone. This is a vital necessity to the deaf community for a couple of reasons. First, there is a phenomenon which many take-ups for granted called situational awareness. Often many tragedies occur due to lack of situational awareness in hearing-impaired community. The system will be taught how to identify specific sounds by analyzing millions of samples available

When a sound occurs, the technology will be able to capture it and first illuminates, and then its machine learning model predicts what it is with a certain confidence level. The user is immediately notified on their phone about the sound. The always-listening system will have a library of unique household sounds, and its machine learning model will be trained using more than 2 million samples from YouTube for accuracy. The solution will also be customized so the user gets notifications for sounds that they consider more important. The mobile application uses artificial intelligence to identify the variety of sounds. The hardware listens for things like a crying baby, security alarms and even glass breaks. As soon as it recognizes a sound, it sends a visual notification to a user's phone.

Such a solution is already available in the market under the name of WAVIO system solutions.
The main features of see sound by Wavio includes:
• Predicts a set of 75 unique household sounds based on a database of over 2 million sound clips.
• Listens for both common household and life-threatening sounds that could indicate an emergency.
• Ability to customize notifications based on what sounds are important to you.

• Seamlessly connects with other assistive devices that may already be in the home.
• See Sound alerts users that a sound has occurred via their smart devices.

How Wavio works:
• Wavio works on its own as an app or in union with a smart home device called See Sound.
• When a sound occurs inside or close to a household, the nearest See Sound registers the increase in volume and lights up.
• See Sound then interprets the sound it hears and makes a prediction.
• It then visually alerts the user that the sound has occurred on their smart devices via Wi-Fi.

Creating Art Using EyeGaze

Mada Center

Art is the creation or implementation of human creative ability and creativity, usually in a visual form, such as painting or sculpture, creating works that are mainly admired for their beauty or emotional power. It can be a challenging task for people who can not create pieces of art with their hands or legs. Assistive Technology can provide a solution, art can be produced with your eyes by using EyeGaze technology.

A number of eye-tracking systems have been specifically designed to assist people with severe motor impairments. Systems include Quick Glance (eyetechds.com), VisionKey (eyecan.ca), and the LC Technologies Eyegaze Communication System (eyegaze.com). These systems offer computer control via eye-typing. Hundreds of people use these systems to communicate and function in life. The Eyegaze Communication System offers perhaps the most functionality, with software for uttering phrases via a speech synthesizer, making telephone calls, controlling lights and appliances, and turning pages in electronic books. Overall, few software applications have been specifically designed to be controlled with eye movements.

An EyeGaze technology device follows your eyes with amazing accuracy to see where you are looking on the screen. You can then select the item you are looking at my dwelling (staring at the screen for a length of time), blinking or clicking with a switch.

Many software programs allow people with severe mobility impairments to create art only with their eyes and to benefit from the same artistic and social activity tools as non-disabled people.

EyeGaze system works by continuously sending and receiving input from infra-red lights and cameras. The device captures the light reflections and converts the movement of the eyes to the mouse cursor. A one-time calibration will require just seconds to complete and ready to go.

Sarah Ezekiel is a physically disabled artist. Sarah uses her eyes as opposed to many who use their hands or feet to create art. Sara began to use eye gaze technology to help her continue to do all the stuff she had ever enjoyed doing before diagnosing her with motor neuron disease. She wasn’t expecting an entirely new skill!

In 2012, Sarah used a graphics application program to create art using her EyeGaze system. From the UK Royal Art Schools to the Katara Art Center in Qatar with the help of Mada Center, she has displayed her art everywhere.

Megan Fry is another talented person who is a U.S. artist with a physical disability. She uses her eye movements to create various art. In her art, she demonstrates a wide range of emotions. Since she was 8 years old, she has been utilizing drawing

software independently. To perform the tasks, she uses an EyeGaze technology device. Using EyeGaze technology, she can drag and render shapes and colours to build her beautiful art. With such tools as Eye Trackers and some software, art became a possible area to dive into and unleash the creativity in any person despite their abilities.

Education in the 4th Industrial Revolution

Mohamed Koutheair Khribi
Mada Center

Today, the world lives on the impact of the Fourth Industrial Revolution (4IR), as its manifestations accelerated and its effects increased in various areas of human activity, and it became one of the most disruptive forces altering our societies economically, culturally and politically. The Fourth Industrial Revolution refers to how new technologies are merging with the physical, digital, and biological worlds, affecting all disciplines, economies, industries, as well as challenging ideas related even to the concept of humanity. This enabled the use, integration and adaptation of emerging technologies such as Artificial Intelligence (AI), Robotics, Virtual Reality (VR), Blockchain, the Internet of Things (IoT), etc., to achieve digital transformation in various fields, especially in the field of education.

In light of the rapidly increasing development in the uses of the Fourth Industrial Revolution's technologies, several new trends and innovations related to the educational field have emerged, which contributed a lot to the promotion of smart, open and inclusive learning, coping with global education priorities and principles, especially the fourth goal of the SDGs 2030 related to "ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all". Among the most important capabilities inherent in the Fourth Industrial Revolution's technologies and their uses, driving transformation in the field of education, we mention in particular, Artificial Intelligence, Virtual Reality and Augmented Reality, Cloud Computing Technology, the Internet of Things, Robotics, Mobile Technologies, Open Educational Resources OER and MOOCs, Social Networks, Big Data, Learning Analytics, Coding, Ethics and privacy protection, etc.

From this standpoint, it is becoming obvious that the jobs that will be created in the near future and beyond will be completely different from what's available today, which requires preparing a workforce empowered with the technologies of the Fourth Industrial Revolution and able to exploit them optimally. Therefore, students, today need to be enabled, in a bid to acquire and also to comprehend how benefiting from the latest technologies and innovations and generating subsequently new knowledge. Accordingly, students require advanced skills to succeed in the globalized, knowledge-based changing world of today (in particular 21st century skills encompassing, among others, use of ICT for learning, creativity, knowledge construction, real-world problem-solving and innovation, etc.). This is what made the education, aligned with the emerging 4IR, termed as the fourth generation of education, or abbreviated "Education 4.0". One of the most important technological developments that underlie Education 4.0 is the use of technology innovations such as Artificial Intelligence, Machine Learning, Learning Analytics, and Open and Ubiquitous learning, in order to provide flexible and personalized learning experiences for all students, according to their needs, interests, characteristics,

levels, and understanding, which makes the learning process more adaptive, effective, engaged, flexible, thoughtful and accessible.

Artificial Intelligence for instance offers a wide range of techniques to support education, many tools and solutions are used to enhance teaching and learning practices, taking advantage of the tremendous computer capabilities and the availability of big data. Today, we find many examples of AI tools available and used in education such as machine translation tools for educational content, AI-based tutoring for students commendation Systems, etc. In this regard, the report of the United Nations Educational, Scientific and Cultural Organization – UNESCO, on artificial intelligence, which was issued as a summary of seminars and expert meetings organized, on the sidelines of the Mobile Learning Week conference (MLW 2019), under the theme of Artificial Intelligence (AI) for Sustainable Development, discusses the potential opportunities and challenges of AI and how to harness it to accelerate the achievement of Sustainable Development Goal (SDG) 4. In the same vein, the Educause's Horizon Report (2019 Higher Education Edition) explores key emerging technology trends supporting learning and teaching, and highlights the AI considerable potential to drive changes in the education sector.

Additionally, the fourth generation of education is characterized by the ease and continuing access to learning, anytime and anywhere, so that everday learning can be made either inside or outside educational institutions, whenever and wherever the learner wants, supported by mobile technologies (BYOT Bring Your Own Technology & BYOD Bring Your Own Device), this is what made the ubiquity aspect of learning (Ubiquitous Learning). Equally important, the emergence of the open education movement contributed largely to the sharing of knowledge and increasing access to quality and inclusive education for all, especially through OER Open Educational Resources available through specialized repositories and platforms. Open educational resources are "learning, teaching and research materials in any format and medium that reside in the public domain or are under the copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others". Indeed, OER's transformative potential, coupled with the expansion of 4IR technology innovations, represents a strategic opportunity to foster access to inclusive education and to promote pedagogical innovation and knowledge creation and sharing. Furthermore, the movement of open education and open educational resources along with the growing demand for lifelong learning have paved the way for the emergence of a new learning trend called MOOCs Massive Open Online Courses. Two key distinctive dimensions characterizing those courses can be drawn obviously from the term MOOC itself: "Massiveness" and "Openness". Indeed, by providing MOOCs, it is intended to offer open learning for free to a wide range of online learners through the Internet. This type of education has spread all over the world and it has become more desirable by all age groups, according to their different backgrounds and educational goals. On that premise, MOOCs can provide tremendous opportunities to enhance formal and informal learning as well as lifelong learning, at no or low cost, which will inevitably contribute to increasing access to education for all.

In light of the rapidly developing 4IR technology innovations and related transformation and trends in learning and teaching, it became necessary to provide teachers with the skills required to keep pace with technological developments, make good use of them and employ them in their teaching practices. This would support the achievement of quality and inclusive education and enhance access to the knowledge economy. With this in mind, the importance of training teachers about the use of information and communication technology in education was emphasized during the World Education Forum in Incheon 2015. Moreover, the 2015 Qingdao Declaration[1] stressed the importance of developing teachers' professional skills in order to integrate information and communication technologies in their practices effectively. In this regard, UNESCO has created an international framework of reference that defines the necessary competencies required to teach effectively with ICT, which is known as the UNESCO ICT Competency Framework for Teachers (ICT CFT). The third edition of the Competency Framework took into account the 2030 Agenda for Sustainable Development, considering the inclusive principles of non-discrimination, open and information accessibility and gender equality in the delivery of education supported by technology. Furthermore, the latest edition addresses the impacts of 4IR technologies and their uses in education, such as AI, Mobile Technologies, IoT, OER, etc. in order to promote building inclusive knowledge societies.

In this context, Mada Center, in cooperation and partnership with the Qatari Ministry of Education and Higher Education, provides assistance through the program of "Preparing the Creative Teacher". The program is a diversified, comprehensive and integrated training program, using the latest technological tools and systems, for the benefit of teachers in order to enable them to use the latest available technologies and to use and employ them according to the best methods, strategies and contexts in the inclusive classroom.

Written by: Dr Mohamed Koutheair Khribi
Dr Mohamed Koutheair Khribi is ICT specialist in education. He has over 20 years' experience in the Technology Enhanced Learning field. Dr. Khribi served as programme specialist in educational technology at the ALECSO ICT department (The Arab League Educational, Cultural and Scientific Organization). He'd been leading several projects at large scale in Arab countries, related mainly to the ICT in education field, namely, Smart Learning, OER, MOOCs, ICT-CFT, Mobile Applications and Cloud Computing. Dr. Khribi participated in the establishment of the Virtual University of Tunis in 2002 where he served as head of the ICT department. He also headed the Online Education Department at the University of Kairouan in Tunisia. Dr. Khribi is a Fulbright Alumnus, He attended the Knowledge Discovery and Web Mining Lab at the University of Louisville in the USA as a Fulbright visiting scholar. Currently, Dr. Khribi is associate professor and researcher at the University of Tunis in Tunisia. He is member of L@tice laboratory at the University of Tunis, and IEEE member. His research interests include Technology Enhanced Learning; Educational Recommender Systems; Open Educational Resources; Artificial Intelligence, Learning Analytics; Machine Learning, Mobile and Ubiquitous Learning. He has authored several well-cited e-learning related publications in scientific books, journals, and conferences.

How to Make Gaming Accessible for Console and PC?

Mada Center

The ability to participate in playing games can serve as an engaging and motivating factor in one's social life and leading to an improved quality of living. In recent years, games have played a significant role in representing improved access to recreation, cultural life, and entertainment. All these elements are essential for maintaining a balanced quality of life. Access to gaming has been recognized as a vital contributor towards playing an important role in the lives of PWDs. Additionally, gaming is no longer constraint to being a sole source of entertainment anymore as gaming is now widely used for educational, employment, and healthcare exercises. The United Nations Convention on the Rights of People with Disabilities (UNCRPD) recognizes the necessity of supporting equal access to ICT and gaming for PWDs.

Accessibility considerations during designing games is a necessity and must not be perceived as an optional feature. Nowadays, gaming is more than a passive activity and represents a platform of collaboration and active participation making it a shared experience. The advent of the internet has paved the way for concepts like multiplayer gaming which reinforces the intrinsic social values. Inaccessibility in gaming deprives individuals with disabilities of their ability to contribute towards the wider society by barring them from participating in this form of social activity. Inclusive design of mainstream games is a significant step for the gaming industry to recognize the importance of accessible gaming. The eventual goal for the gaming industry must be to develop all games with accessibility considerations from the very beginning of the conceptual cycle. The availability of playing games on digital platforms like the PC and gaming consoles has revolutionized the gaming industry over the past two decades. Integration of accessibility features within games designed for these platforms can significantly improve the gaming experience for a considerable number of PWDs. Following are the accessibility features that would make the gaming experience accessible for consoles and PC:

Console Accessibility

Mobility

— Remappable keys
— No button mashing
— Camera/joystick sensitivity
— No precision needed
— No mandatory quick-time events
— Timing of movement/button pressing not important
— Difficulty levels
— Game Assists

Visual

— No key elements of the game are identified by red and green

— Colorblind options are present
— Game presented in high contrast
— Subtitles are easy to read
— Subtitles are letterboxed
— Game menus are easy to see/read/use

Hearing
— Subtitles are present
— Ambient noise is included
— Identifies speaker
— All audio cues are accompanied by visual cues
— Game can be successfully completed and hearing presents no disadvantage

PC Accessibility

Mobility
— Remappable keys
— Camera/mouse sensitivity
— On-screen keyboard functions properly
— No button mashing
— No precision needed
— Can play with only the mouse
— Can play with only the keyboard
— Can move User Interface elements
— No mandatory quick-time events
— Timing of movement/button pressing not important
— Difficulty levels
— Game Assists

Visual
— No key elements of the game are identified by red and green
— Colorblind options are present or not needed
— Font colour can be changed
— Font size/type can be changed
— Game presented in high contrast
— Subtitles are easy to read
— Subtitles are letterboxed
— Game menus are easy to see/read/use

Hearing
— Subtitles are present
— Ambient noise is included
— Identifies speaker
— All audio cues are accompanied by visual cues
— Game can be successfully completed without sound

Using EMG technology to improve accessibility

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Assistive technologies and Accessibility have been the focus of considerable research efforts as they improve the living comfort of many disabled persons. These efforts concern mainly the Human Activity Assistive Technology that represents the interaction between people with disability PWDs and their activities. Nowadays, diverse input/output technologies have been developed to ensure an easy and comfortable way for PWDs to interact with machines. One of the most recent technologies is the capture the electric activity generated by muscles movement. In fact, when moving a part of our body or a group of muscles an electrical activity is generated. The measurement of this activity, which is detected by electrodes fixed on the nearest skin surface to the activated muscles group, is named Electromyography EMG. Since its discovery in the 1980s, EMG have been used mainly for clinical purpose such as neuromuscular diagnosis and rehabilitation and for controlling mechanical prosthesis.

The NeuroNode system is one of the products developed thanks to the research results in this field. It is a wireless device that can be connected to any computer, mobile phone or tablet. NeuroNode is useful to write text, send messages or emails, generate speech and more. As an input device, it is an ideal solution for children and adults with physical limitations. The user has to attach the device to his skin above a group of muscle. Then NeuroNode reads the EMG signal generated by the activation or the minimally activation of muscles and execute a task to control the connected device. The NeuroNode is compatible with most speech generative devices. Consequently, it allows communicating only using the EMG signals.

Emego is also a new device, which is based on the electromyographic signals to control electronic devices. It is activated by a very small electrical signal generated by a small muscle activity. Emego is designed to be used by persons with severe physical disability in order to control diverse electronic devices like computers, tablets, wheelchairs, etc. It aims to give them more independence in their daily live. The device is simple to set up thanks to its ability to attach the sensor to diverse body and face muscles. By a simple activation of the muscle, a small electromyographic signal is generated and captured by the attached sensor. The detected signal is converted immediately to a switching signal connected, through a wireless connection, to an existing assistive technology equipment. The sensor is a small device designed to be discreet. Consequently, it is connected wirelessly to a small station that is connected to the augmented and alternative communication AAC equipment through a standard jack connector.

Many researchers are now working on EMG signals analysis. They aim to extract more information from captured signals rather than the binary information used by the existing devices. The goal is to create more comfortable and easy-to-use devices

by giving the user more than two choices at each time. The purpose of their works is to process the captured signal using IA based algorithms to classify the muscles activities and the execute a specific task or to control AAC equipment. According to many researchers the results are very accurate. In fact, the accuracy of that systems exceeds 96% for five gestures classification.

Music and Assistive Technology

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Music can serve as a powerful, comforting and motivating medium to empower and improve the well-being of Persons with Disabilities (PWD). The process of playing music can encourage behaviours like cooperation and turn-taking as completion of a musical piece can often involve teamwork with others where each person plays a beat or musical instrument to achieve the final musical arrangement.

Music can provide people with developmental and learning disabilities with opportunities to interact and cooperate with those who do not experience these forms of disabilities. Playing music in a group has the ability to give PWDs involved a sense of equal empowerment by offering a platform for equivalent participation in achieving the outcome. Through music, people can have diverse opportunities to express and experience various emotions. The desire to participate in music, as well as to produce musical pieces, may become mediums to control emotional outbursts especially for those with behavioural and cognitive challenges.

For about a decade, the Assistive Technology (AT) industry has been developing various innovative solutions to empower PWDs to play music. Such solutions often involve various combinations of sensors and input methods (e.g. body movement, switches, etc.) to allow individuals with a varying range of movements and cognitive skills to compose music effectively. These AT solutions enable the PWDs to experience the creation of music in their own unique ways. Some examples of such AT are:

• Soundbeam is a touch-free device which uses sensor technology (ultrasonic beams) and adapted switches to translate body movement into music and sound. it gives children and adults the opportunity, regardless of the impairments of their range of dexterity.
• Magic Flute is an electronic wind instrument that enables people to play music with small movements of the head. The flute is rotated up and down to change pitch and the strength of the breath controls the volume. The Magic Flute enables individuals to play music without the need for any kind of limb movements.
• Skoog is a tactile cube that has a dome switch on each of its sides (except for its base). The device connects with tablets or computers using Bluetooth allowing the user to play customized music by pressing the dome switches individually or in combination.
• Novation LauchpadX is a 64-pad Music Instrument Digital Interface (MIDI) grid controller for Ableton Live. It can launch, play and perform selected sounds and build tracks using the large, super-sensitive RGB pads, dynamic note and scale modes, and mixer controls.
• E-Scape music software has been specifically designed to be used by the widest range of people with disabilities to create or perform music. PWD users can compose unaided, as the system is operated via a series of pop-up menus to guide

them through operations and choices. Menus are controllable using a variety of methods, e.g. one or more switches, mouse, keyboard, eye-gaze, or MIDI controllers or sensors.

Music is a powerful tool to help develop effective educational and social skills. Access to creating and listening to music may effect changes in skill areas that are important for people with a variety of forms of disabilities such as learning disabilities, intellectual disabilities, cerebral palsy, autism and many others. Participation in music for PWD gives them a sense of control which make them feel empowered and motivated to share experiences while accomplishing their goals. Music is also an effective way to stimulate and focus a person's attention and might be particularly significant for some people who may not respond to other types of stimuli. Musical activities can also often improve interaction and communication skills as it facilitates to be an integral part of a wider group (e.g. musical band, etc.). Other notable benefits of music are its effect towards helping to maintain one's attention, and lower anxiety levels by engaging their cognitive focus. Furthermore, music can be an impactful medium to provide an avenue of nonverbal communication for people with learning and communication disabilities. Successful participation with music for many PWDs can lead to a positive effect on self-esteem and thus an improved quality of life.