Learn, live, work and play: Mobile assistive technologies supporting users with learning disabilities (LD)

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Abstract

Introduction: Mobile technologies are not new to healthcare; many physicians and nurses and students in healthcare utilise smart mobile devices and tablets to assist them in their daily hospital duties, and for offering guidance to and communicating with their patients. Mobile technologies have become an extension of our thoughts in our everyday lives, wellbeing and activities. With the dawn of the 21st century, cloud-based applications and information and communication technology (ICT) devices have made the accessibility and integration of assistive technologies (ATs) on mobile applications considerably easier, for instance, speech and text recognition applications, read aloud applications, social networking, messaging, reminders, calendars, note taking applications and keeping contacts can nowadays support students with learning disabilities (LDs). It can also be applied to other disabilities. Health libraries − more than others – need to be sensitive to the needs of users including students with disabilities.
Objectives: The purpose of this paper is to highlight the pivotal role that health librarians can play in providing appropriate guidance and information regarding mobile AT services to healthcare students with LDs.
Method: The paper will follow a pragmatic analysis approach based on literature associated with ATs and LDs applicable to healthcare student communities to propose practical guidelines for selecting and using such technologies.
Discussion: The discussion would also apply to other users. The paper will elucidate on four issues, also known as the SETT framework (i.e. students, environment, tasks and tools (mobile)) suggested by Zabala[14], for health libraries to reflect on when recommending the most suitable collection of mobile AT applications and services for students with LDs Learning disabilities will be defined and types noted. Examples of applying the technology will be organised into various categories (speech, writing, reasoning, and reading).
Conclusion: Such a categorisation can enable health librarians to suggest enhanced opportunities of access to learning prospects, communication methods, and completing academic, work and everyday life tasks to healthcare students with LDs. Thus supporting better independence, awareness and quality of life.

Keywords: assistive technologies; information and communication technology; healthcare; learning disabilities; smart mobile technology

Introduction

Over the past couple of years, smart mobile devices, including tablets, have entirely transformed the means in which we interact with mass media − as our daily activities and doings can now be accomplished on our mobile devices or, to be more exact, with mobile applications (also referred to as apps).[1] According to Statista[2], which is one of the leading statistics companies on the internet, as

of July 2015 more than 1.6 million mobile applications were available in the Google Play Store, more than a 100 billion apps available in the Apple App Store, and more than 340 000 apps available on the Windows Phone Store. Overall, a total of 92.88 billion free mobile apps were downloaded in 2015.[2] Against the preceding statistics, one can note that mobile technologies are becoming an integrated part of our daily lives, as well as part of our wellbeing.

'No matter where in the world you live, whether you are talking about patients, consumers, or healthcare providers, mobile is revolutionizing the future of healthcare'.[3] Furthermore, Duffey and Erbs [3] reveal that one of the most significant components within mobile health is applications. More specifically, mobile health, also noted as mHealth, which is the utilisation of mobile technologies to deliver healthcare, can be divided into two main categorises of applications, namely: wellness and medical. Hence, various opportunities to improve health, especially for individuals with learning disabilities (LD), can be accomplished through the utilisation of assistive technology (AT) services on mobile devices. It is very important to note that although students with LDs may share some common attributes, there are several different types of LDs which may affect a student's ability to write, read, interpret nonverbal cues, and use and understand visual and auditory information.[4]

Mates[5] mentions that most disabled students consider tertiary education as just a fantasy due to a lack of funds to procure ATs and generate the required adjustments, however, on the other hand some barriers branch from 'insufficient knowledge about disabilities and what disabled individuals can accomplish if given the opportunity'.[5] With the dawn of the 21st century cloud-based applications and mobile devices made the accessibility and integration of ATs into mobile application much easier.[1] Jones and Hinesmon-Matthews[6] note that AT services can be include 'any services that directly assist an individual with a disability in the selection, acquisition, or use of an AT device'.

For that reason, this paper will focus on the role of health libraries in assisting their healthcare students with LDs by means of providing appropriate guidance and information regarding mobile AT applications and services. The paper covers the clarification of concepts, value of mobile ATs for students with LDs, components to consider by health librarians when assessing mobile ATs, and examples of mobile ATs for LDs organised into various categories, and a conclusion.

Purpose of paper

The purpose of this paper is to highlight the essential role that health librarians can play in providing appropriate guidance and information regarding mobile AT applications to healthcare students with LDs.

Questions to be answered:

- What value does the utilisation of mobile ATs have to offer for students with LDs?
- What role can health librarians play in providing appropriate guidance and information regarding mobile AT applications?
- What components should be taken into account by health librarians when assessing mobile AT applications?
- What mobile AT applications are available to healthcare students with LDs?

Concept clarification

Assistive technologies

Tripathi and Shukla[7] define ATs as 'a rubric term that refers to assistive, adaptive rehabilitative devices, products, or equipment for helping people with disabilities'. In addition to the previous definition, Hurst and Tobias[8] explain that AT has been outlined to generally take account of any devices, equipment or products that are developed commercially, improved or personalized to achieve something that was not otherwise conceivable, and as a result, AT covers a comprehensive array of tools from simple low-tech devices (e.g. handrails and grips) to high-tech devices (e.g. robots and power wheelchairs).

Learning disability

The Learning Disabilities Association (LDA) of America[9] define a LD as 'a neurological condition that interferes with an individual's ability to store, process, or produce information', which 'can affect one's ability to read, write, speak, spell, compute math, reason and also affect an individual's attention, memory, coordination, social skills and emotional maturity'.

Mobile technology

Mobile technology denotes to devices that are both portable and offer instant access to information[10], thus including technologies such as: 'iPods, MP3 player, Personal Digital Assistants, USB Drive, E-Book Reader, Smart Phone, Ultra-Mobile PC and Laptop / Tablet PC'.[11]

Overview of the value of mobile assistive technologies for students with learning disabilities

Bomhold[12] highlights that libraries, in this case health libraries, should reconsider what mobile services they provide and why they provide it, as well as, how they can provide innovative mobile services to accommodate the impaired abilities of their patrons. According to Pramis[13], there are billions connected individuals worldwide that are skilled to innovate, communicate and learn anywhere, anytime, which gave rise to the fact that the number of mobile devices worldwide are larger than the total population in the world. Students with LDs can benefit from the integration of mobile technology as it can empower, engage and assist them with their daily tasks that their struggle. Subsequently, health libraries should provide information regarding the most beneficiary mobile AT applications to their student community with LDs, as mobile ATs can add the following value:[1]

- Mobile AT applications are available and accessible 24/7 − due to mostly being cloud-based.
- Mobile AT applications can be customised and personalised according to a student's needs.
- AT devices are often instinctual and are designed for exact tasks and needs such as JAWS, which is specifically designed as a screen reader.
- Mobile AT applications can be inexpensive depending on the type of ATs, for example, low-tech devices (e.g. handrails and grips) are more affordable than high-tech devices (e.g. robots and power wheelchairs). Therefore, the role of academic libraries should be to provide a list of free or inexpensive mobile AT applications to their student community with LDs.
- Mobile AT applications can assist users in being more efficient (i.e. time management), independent and increase quality of life.

Against the preceding benefits of mobile AT applications, there is however also shortcomings noted in regards to the LD community such as mobile AT applications cannot compensate for unsuccessful teaching practices or inadequate resources, mobile AT applications are not a silver bullet that can make the students' LD go away, and mobile AT applications cannot spontaneously encourage positive attitudes and behaviour toward education.

Components to consider by health librarians when selecting and assessing the most suitable mobile assistive technology applications

'The best way for a person to make use of assistive technology is to immerse them in it. Mobile assistive technology allows users to do this naturally'.[1] Zabala[14] explains that students with LDs may require additional assistance and a diverse range of technological support. In addition to ATs' benefits and shortcomings, health librarians will have to take into account various components of the educational environment when accessing, selecting and presenting the most suitable collection of mobile AT applications for students.

Subsequently, Zabala[14] has identified four significant components, referred to as the SETT framework, to support health librarians when assessing the suitability of mobile AT applications. Exceeding everything, the health librarian must primarily start by developing a mutual understanding of the students, their habitual environments, the tasks required from them, and the tools (i.e. mobile AT applications) necessary to achieve educational success. For this reason, the SETT Framework will provide a golden opportunity for health librarians to make informed and reasonable decisions regarding the selection of mobile AT applications, namely:

(1) Student component: Guiding questions to assist health librarians to identify their current abilities, their special needs, and support required, namely: what the current abilities of the students are; what are their special needs?; what support are needed?; what expectations they have?; and what preferences and interests does the students have?
(2) Environment component: Guiding questions to assist health librarians to identify the current space, their special needs, and support required, namely: what kind of activities are performed in the environment?; how will the environment have to be modified to suit the needs of the students?; and what special materials, equipment and technologies will be required?.
(3) Task component: Guiding questions to assist health librarians to identify their current activities, their special needs, and resource and services support required, namely: what kind of task are required from the students?; what support, resources and skills will be required by students to successfully complete a task?; and will tasks be complete individually or collectively?
(4) Tools (mobile applications) component: Guiding questions to assist health librarians to identify their current mobile AT needs, their cognitive abilities, and support required, namely: what range of mobile AT applications are available for the students?; are the mobile AT applications considered for their features and needs rather than their brand names?; what is the cognitive load required by the student to use these mobile AT applications?; and what training will be required for the students and support staff?.

Using the SETT Framework, health librarians can identify an inclusive range of mobile AT applications and services for their students with LDs according to the guiding questions.

Various examples of mobile assistive technology apps

The following examples of mobile AT applications (refer to Table 1) are categorised into four main categories (i.e. reading, speech, writing and reasoning assistance apps) and are available from the Google Play Store.

Table 1: Examples of mobile AT applications for students with LDs

Category of mobile AT apps	Examples and their benefits
Reading assistance apps	• IDEAL Group Reader: Digital talking book player that aids students in reading audiobooks, websites, make notes and transform reader files to match the users' needs. • AIReader: Is a read-aloud book app that support Text-To-Speech (TTS), various book formats, configuring of display styles, search function, support external dictionaries, correct hyphenation for 20 languages, and quotes, bookmarks and text labelling. • The KNFB Reader: Is a read-aloud book app that converts printed text into high quality speech that can read mail, receipts, class handouts, memos and many other documents, import, OCR, and read image-based pdf and jpg files, automatic text detection to enable hands-free operation, and can translation multiple languages.
Speech assistance apps	• DEAL Talking Tags: Is a talking label maker/reader app, which is designed to support and accommodate the access needs of individuals who are blind through audible guidance in the form of talking tags. • Talk - Text to Voice: Is a speech app that converts text to voice through talking what you type. Is multilingual and can read web pages, news and books. • Touch Voice +: Is an advanced medical speaking app which allows speech impaired persons to communicate through providing over 4,100+ English speaking words and phrases with 37 common dialog categories, as well as, 80 basic picture image speaking ability, wide-ranging of living needs, and pain levels and emoticons for defining feelings.
Writing assistance apps	• ListNote Speech-to-Text Notes: Is an easy-to-use speech to text app which provides students with hands-free speech recognition, full screen and popup screen text editors. • Voice Writer: Is an easy-to-use speech to text app which can send converted text via WhatsApp, Facebook, email, and any other services, thus reducing typing time and physical work. • Writer: Is a writing app that delivers a distraction free and clean writing atmosphere without all the trouble of a word processor.
Reasoning assistance apps	• Evernote: Supports note-taking, capturing, organising and alert creation. • Google Keep: Is a productivity app that quickly capture thoughts and get a reminder later at the right place or time. Speak a voice memo or add notes, lists and photos on the go and have it automatically transcribed, organised or added as a reminder. • SimpleMind: Is a mind mapping app that turns students' android phone or tablet into a brainstorming, idea collection and thought structuring device.

Conclusion

In conclusion, whether healthcare and educational specialists utilise a diverse set of terms to refer to LDs (i.e. learning problems, learning difficulties, learning disorders and learning differences) - one thing is certain that mobile AT applications should be viewed from a holistic perspective (i.e. SETT Framework) to focus on students' overall strengths, abilities and needs, rather than their weaknesses. As a result, the healthcare and mobile AT applications sectors play a significant role in driving the integration, design and personalisation of mobile AT applications to improve the quality of life, wellbeing and independence of individuals with LDs.

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