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Communication Technology for Users with Specific Learning Disabilities

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Abstract

In this paper we focus on the potential benefits of the use of Information and Communication Technology (ICT) to facilitate and promote learning for students with specific learning disabilities. This work reports the most representative studies about the inclusion of ICT applications for the target users and aims to derive practical guidelines on this aspect by exploring the experience of Arabic readers with and without dyslexia when using online text which is based on a user study with a group of 32 users (12 users with dyslexia). The data collected analyses spelling errors faced by Arabic learners. The comparison between the experience of learners with and without dyslexia has yielded insights into the need to consider features of the Arabic language that account for the unique needs of users with specific learning disabilities.

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1. Introduction

Recently, there has been an increase in the use of Information and Communication Technologies (ICT) in the field of education. A significant amount of research^{1,2,3} has proven that ICT use plays an important role in supporting students especially those with specific learning disabilities. Dyslexia is one of the most common learning disability that affects the educational development of a student. It is a neurologically based learning disability characterized by difficulties in reading and writing activities. According to⁴, dyslexia is a specific

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disorder that involves a severe impairment in reading ability, which affects and disrupts a person's language development and functioning.

However, ICT use may have positive effects on learners with learning difficulties. Affirmed to² ICT can facilitate access to students by increasing their motivation, fostering self-competition, enhancing their confidence and self-esteem. Regarded to⁵ students with dyslexia typically have a low self-esteem, and low expectations of their academic opportunities. It is possible to see that ICT is a key tool in the support of dyslexic students. It may facilitate learning and reduce the difficulties recognizing or confusing between words and meaning. ICT use has probably strong positives effects on learning it tends to increase student's confidence, motivation and self-esteem. Particularly designed applications can stimulate student's interest and overcome their learning difficulties. As claimed by⁶ the use of ICT has a valuable role in providing opportunities for the target users to participate more fully in education. It tends to improve and develop interactive experiences that can motivate the users.

Hence, dyslexia may manifest itself differently for speakers of different languages and most of the research on developmental dyslexia comes from English-speaking countries. Therefore, dyslexia in English is different from dyslexia in Arabic. As stated by⁷ the manifestations of dyslexia differs across different languages, and it is not language independent. However, Arabic is the largest member of the Semitic language family. It is written in an alphabetic system consisting of 28 letters to represents 34 phonemes, 25 consonants and three vowels considered as a long vowels (a, i, u) (أ، و، ي). However, the short vowels are usually not represented in the orthography, except for beginning readers vowels are marked by vocalization diacritics. Additionally, in Arabic there are no upper or lower case variations. Arabic language involves the use of diacritics that appear on top or below letters to represent short vowels, gemination, case, and silence. Arabic is considered as a bi-directional language since the script is read and written from right to left, whilst numerals written from left to right. Thus, Arabic is considered as a transparent and non-transparent orthography language. According to⁸, Arabic is stressed differently from English, since stress in Arabic is a morphological feature that depends on the syllable structure of the Arabic words. Hence, Arabic readers need to gain morphological knowledge to be able to express the position of the required Arabic stress. Consequently, Arabic is a widely spoken language, it may have a considerable rate of dyslexic readers. Unfortunately, a review of the literature about Arabic reveals that few studies have been conducted to explore dyslexia in this language, and most of these studies focus on the difficulties and complexity of Arabic.

Although there exists a variety of research within the areas of dyslexia, ICT use and assistive technology there still seems to be a research gap. This study, thus took the initiative to explore the learning experiences of Arabic readers with and without dyslexia in a single study to derive practical guidelines for inclusive dyslexia-friendly virtual environment. Therefore, this paper presents the following two main contributions:

- The inclusion of dyslexics Arabic readers in Information and Communication Technologies use.
- A set of practical guidelines based on the analysis of dyslexics spelling errors.

The researches provide the following hypothesis statement (H1): Dyslexic students made significantly more spelling errors in reading Arabic online text compared to non-dyslexic students.

The rest of the paper is organized as follows. Section 2 presents the related work. Section3 addresses the methodology of research used. Section 4 discusses the findings of the previous section and introduces practical guidelines for Arabic dyslexic users. Section 5 discusses conclusion and future works.

2. Related work

Recently, various programs for tablets and smartphones have been available for supporting students with learning difficulties. There exists a variety of research within the areas of the inclusion of users with learning difficulties in ICT use. Among the studies there is a paper presented by², which introduced a mobile application called *Easylexia* for children with special learning needs, that provides a learning environment which fosters learning and helps children with their learning difficulties by improving some of their elementary skills, such as language and mathematical abilities. However, its effectiveness has not been demonstrated, thus at this stage this mobile application cannot be conclusive.

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