

Developing a New Framework for Evaluating Arabic Dyslexia Training Tools

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Abstract. Compared to numerous studies in dyslexia, there is still a paucity of research exploring dyslexia in Arabic and especially the issues that arise in deciding the success or failure of Arabic dyslexia training tools. The present research attempts to address this gap by developing an Arabic Framework for Dyslexia Training Tools (AFD TT) that can be utilized to support the design and guide the evaluation of such training tools. This paper demonstrates the development, confirmation and refinement of the AFD TT. Drawing upon established theories and prior research findings, the initial version of the proposed framework has been developed. Confirmation and refinement involving feedback from content experts were carried out on the components of the proposed framework.

Keywords: Dyslexia, Arabic, Framework, Training Tool.

1 Relevant Research Literature

Technology can help facilitate the lives of individuals with dyslexia. The range of available technological resources for identifying, training and supporting individuals with dyslexia is steadily growing. However, in order to address the difficulties experienced by this group and achieve the objectives of these resources, all these resources should be based on clear standards and appropriate guidelines developed especially for this population.

Al-Wabil et al. [1] reported the results of a workshop that was conducted to check some published principles supporting accessibility of electronic content for readers with dyslexia and discover issues linked to Arabic script and not mentioned in the reviewed principles. In another study by Al-Wabil et al. [2] a set of guidelines was presented for supporting designing and guiding the evaluation of educational games for children with dyslexia. They synthesized Nielsen's guidelines for evaluating user interfaces [3] and the interactive guidelines toolkit for evaluating software for individuals with disabilities [4] with their experience obtained from a list of development software projects, including educational games for Arabic children with dyslexia.

A notable system called MyLexics was developed by Abdullah et al. [5]. This system is a courseware to support children with dyslexia in learning to read and write in the Malay language. It utilizes multimedia elements to provide interactive and independent learning that can be applied at school or at home. Deibel [6] proposed a computer-based

accommodation project to address the diversity of needs, stigma risks and self-advocacy challenges that are faced by users with reading disabilities. Moreover, a useful study by Beacham [7] investigated how learners with dyslexia can improve their learning when it is based on computer materials. From this, a set of guidelines was created based on some attributes of learners with dyslexia to design "dyslexia friendly learning materials" [7, p.75]. A notable approach was proposed by Hazoury et al. [8] to teach Arabic decoding to students with dyslexia. They highlighted a set of instructional guidelines for teaching Arabic decoding for students with dyslexia resulting from their experience with different teaching techniques.

2 Development of the Arabic Framework for Dyslexia Training Tools

An extensive literature review in different fields helped in formulating significant theoretical findings in dyslexia. The findings from relevant studies were analyzed, synthesized and utilized in developing a set of ninety seven elements, taking into consideration features of the Arabic language and related cultural factors that account for the unique needs of Arabic individuals with dyslexia [9]. These elements are used as the theoretical foundation for the construction of the proposed AFDTT. The illustration of the ninety seven elements is provided at:

<http://eprints.soton.ac.uk/id/eprint/357183>

Sixteen new themes have been created to categorize the elements and to incorporate them within the framework. The themes have been allocated on the basis of having the same objectives for each group of elements and constitute the main components of the AFDTT. The established elements form the description for the components (themes) and could help achieve the objectives identified for each of them. Figure 1 shows the themes and how they were used to group the elements.

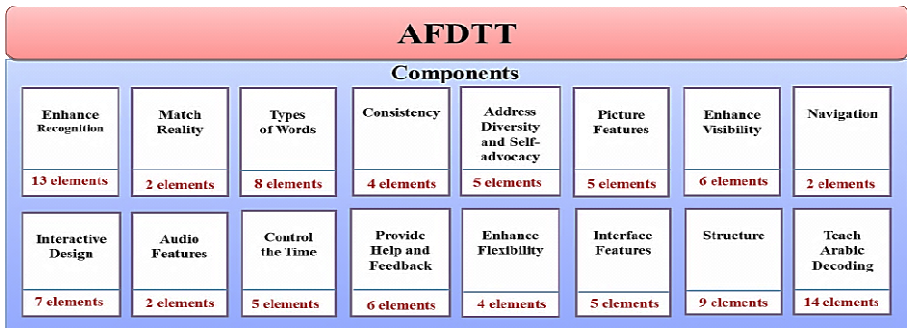


Fig. 1. The structure of the AFDTT

3 Confirmation and Refinement of the AFDTT

3.1 Methodology

Taking into consideration the objectives of this stage, it is clear that both quantitative and qualitative research methods are suitable options. This is because the developed AFDTT needs to be confirmed and refined and this can be done by conducting expert reviews with experts from different content domains and linking these interviews with a questionnaire. The questions were developed using the AFDTT as a guide and reference. They include ninety-seven closed ended questions that utilize a five-point Likert scale to measure the importance of each element in the AFDTT, and to serve as a quantitative research method. This can help to gain confirmation for the content of the AFDTT. In addition, some open ended questions were asked in the expert review, which can be used in a qualitative textual analysis. These open ended questions can help in gaining insight into the comprehensibility and clarification of the content of the AFDTT from expert experience and to find out the reasons behind their decisions regarding the importance of the elements. In addition, these types of questions can produce unanticipated responses which could help to discover new elements not covered by the set presented. The main phase of the survey involved nineteen experts who had completed the questionnaire and sixteen of those were interviewed with an average interview time from one to three hours for each interview. In order to analyze the resulting quantitative data, SPSS was used. QSR Nvivo was used to help in managing and analyzing the resulting qualitative data.

3.2 Results and Findings

The importance of all the elements in the proposed AFDTT, except three, was confirmed through the results and findings of this research including by the production of statistically significant results for all these elements. The findings also revealed a number of reasons for agreement with these elements. The results and the findings were consistent in considering three elements, from three different components; Interactive Design, Picture Features and Teach Arabic Decoding respectively, as unimportant. No statistically significant results were produced from these elements and neither did the findings identify any reason to keep them in the proposed AFDTT, so they were excluded. Further findings of this research provided significant reasons to exclude two other elements from the Teach Arabic Decoding component. Furthermore, thirty one elements in twelve components were improved, including two merging operations. Five new elements emerged from the findings and were incorporated into three different components. One element is added to the Picture Features component, related to avoiding segmentation in the picture. Two elements are constructed to support the Audio Features component, focusing on avoiding the merging of more than one sound at the same time and offering a control for the speed of the speech. Two elements are incorporated into the Provide Help and Feedback component, which support provision of balanced and encouraging feedback and avoiding negative feedback.

4 Conclusions and Future Work

The present research has attempted to address the gap in deciding what are the appropriate dyslexia training tools for Arabic speakers with dyslexia by developing an Arabic Framework for Dyslexia Training Tools (AFDTT). This paper reports of the development, confirmation and refinement of AFDTT. Following the analysis of the results and findings, from the ninety seven elements in the AFDTT, five were excluded, five new elements were added and two were merged with other elements. The final form of the AFDTT consists of sixteen components and ninety three elements. In the current stage, an instrument for applying the AFDTT was developed and an experiment for validating the developed instrument will be designed and conducted. The developed framework is expected to contribute to the development of Arabic teaching technology for individuals with dyslexia. It could be helpful in improving designers' knowledge of the needs of speakers with dyslexia. It could also be used to check the ability of the training tools to take into account the difficulties experienced by Arabic speakers with dyslexia which could prevent them from benefiting from these resources.

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