

Developing and Implementing a Web-Based educational platform for Children with Special Needs

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ABSTRACT

Web-Based educational platform is now broadly adopted. These platforms are a real opportunities for education of a better quality for a lot of people. Though, people with disabilities are still meeting many barriers to use these systems. In fact, the main barrier is that most accessible Web-Based educational platforms is not available to people with disabilities and doesn't consider their special needs. In this paper, we present an accessible web-based educational platform for children with special needs from the design step to the implementation. The motive for choosing this idea was the lack of comprehensive educational platforms for children in particular, which bring together children, parents and schools. The proposed platform will support the educational process in schools as the platform contains simplified explanations of what is taught in some school curricula such as numbers, letters and mathematical operations, and also forms a link between the child and his school where it contains worksheets and extracurricular activities that the teaching staff can benefit from. There is also a section for parents that include educational home games and simple books that enhance children's skills and train them on what has been learned. The proposed system was developed using the Unified Modeling Language (UML), ASP.NET, HTML and CSS.

Keywords : Children, Parents, Schools and Educational Platform.

I. INTRODUCTION

The rapid growth of communication and technologies of information have empowered education and offered a sophisticated environments for education especially the Web-Based educational platform. However, Web-Based educational platforms learning environments are still away from being reachable for children with special needs since they meet many obstacles to benefit from this learning method. Actually, the World Health Organization (WHO) reports that over one billion people around the world are having some kind of disability (some of them are the children with special needs) and facing a variety

of barriers, which include access to education, information, and a deficiency of job opportunities [1-3].

There is no commonly agreed definition for Special educational needs (SEN) in use across the world, but most definitions encompass a broad spectrum of conditions that include physical, mental, cognitive and educational impairments. For the purpose of this memo, we define children with SEN as children whose learning difficulties hinder their ability to benefit from the general education system without support or accommodation to their needs [3].

In this paper, we present our work toward developing an accessible web-based educational platform for children with special needs from the design step to the implementation. The motive for choosing this idea was the lack of comprehensive educational platforms for children in particular, which bring together children, parents and schools. The proposed platform will support the educational process in schools as the platform contains simplified explanations of what is taught in some school curricula such as numbers, letters and mathematical operations, and also forms a link between the child and his school where it contains worksheets and extracurricular activities that the teaching staff can benefit from. There is also a section for parents that include educational home games and simple books that enhance children's skills and train them on what has been learned.

II. RELATED WORKS

Kids.jo is an Arabic website that aims to teach and entertain children, the site has been divided into several sections, including general information in a simple and easy way for children to understand and another section for laughter and jokes. There is also a section that contains religious lessons and lessons in the English language, history, science, etc. The site also contains various games in addition to drawing and coloring tools. Moreover; the site also provides advice for parents on raising children and caring for their health [4]. Figure 1 shows the main interface for Kids.jo website.



Figure 1: The main interface for Kids.jo website [4].

3asafeer is an online digital library and platform, which aims to provide: "quality, cost-efficient, trackable resources for reading in Arabic for kids". The platform teaches the Arabic language in a unique way for children's creativity and also contains useful resources for teachers to help students succeed. It also contains activities for teachers to be able to teach a generation of distinguished readers and writers. There is a feature on the site, which is the possibility of children's opinions appearing in the read stories and the ability to see the number of readings of these stories. Figure 2 shows the main interface for the 3asafeer platform [5].



Figure 2: The main interface for the 3asafeer platform [5].

Nafham is a free online educational platform, which offers 5-15min video lessons to the students to cover the Ministry of Education curriculum, the videos are categorized by academic schedule, grade, subject, and term, the platform helps the students to get the lesson they want quickly. There are 3 sources for Videos: 1. Accurate and aggregate videos available online. 2. Crowd-Teach. 3. Created video content. Currently the platform has more many videos which cover the following countries, KSA, Egypt, Algeria. Figure 3 shows the main interface for the Nafham platform.



Figure 3: The main interface for the Nafham platform.

The technological revolution influenced everything [6-83], even the methods that aim to improve the community culture and knowledge by developing a platform for children with special educational needs within the community through a free electronic platform. Today, the use of Artificial Intelligence (AI) algorithms is expansive, particularly in providing solutions to challenging problems including patterns recognition and retrieval of information [53], image segmentation [7], analysis of medical images [29, 33, 84-86], prediction of river flow [38, 87, 88], Learning Management System [12], Healthcare Monitoring system [46, 57], as well as nurse rostering problem [89]. Accordingly, many researchers have used Artificial Intelligence as an effective tool for developing a platform for children with special educational needs [90-92].

III. METHODOLOGY

The aims of system analysis process is to study an existing system for designing an entirely new system. The aims of the system analysis are mainly:

- Understanding the system or the process clearly. This helps in designing new system.
- Helping to identify the the existing system problems; consequently this will assist to recognize the reasons of .inefficiency.

The Unified Modeling Language (UML) is a graphical notations that assist in describing and designing software systems, mainly the object-oriented style is used to construct software systems [93-97]. The UML was used to design the proposed system. The Context diagram and the Use-case diagram are addressed below.

• Use Case Diagram

The Use-Case Model represents requirements of the system. Use-case shows the communication between system, users and other stakeholders in order to reach the aim of the system. It illustrates the interaction between the external entities and the system [19, 67, 96, 98, 99]. The external entities which represent roles are the Actors. They could be human users, external hardware or other systems. The actors in this case are the Student, Admin, Teacher and Parents. Figure 4 shows the the proposed system’s use case diagram.

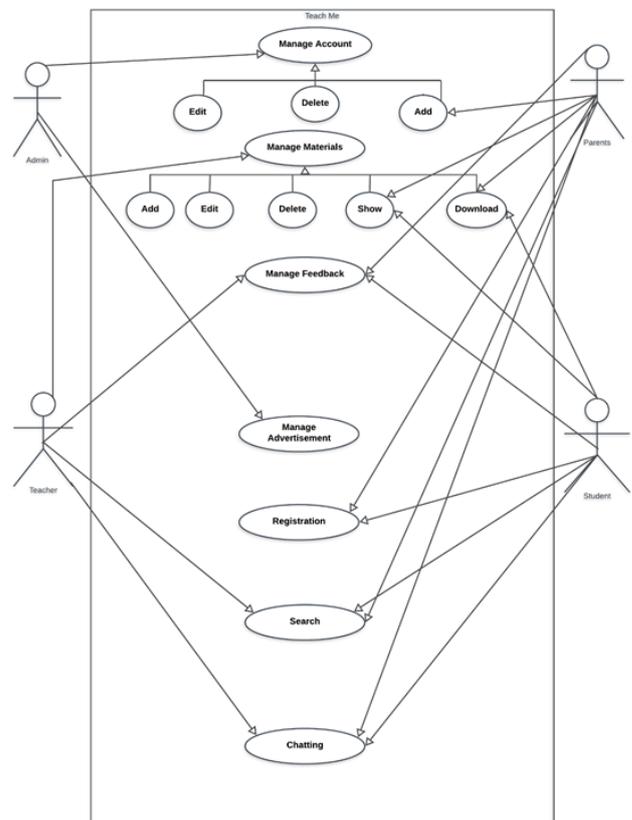


Figure 4: Use case diagram for the proposed system.

• **Context Diagram**

The Context Diagram depicts the system shows the relationship of the system with other external entities [68, 69, 73]. Another name for a Context Diagram is a Level-0 Data Flow Diagram or a Context-Level Data-Flow Diagram. Figure 5 shows the Context Diagram for the proposed system.

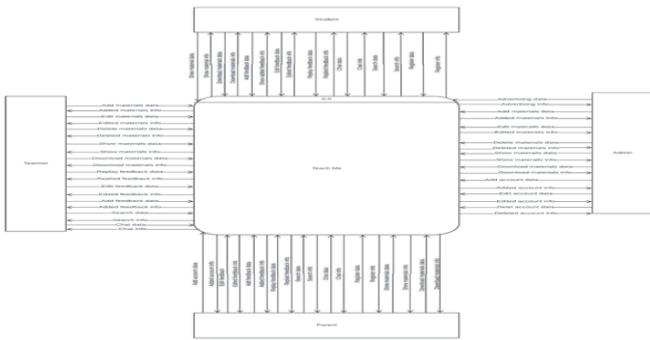


Figure 5: The Context Diagram for the proposed system.

• **Entity-Relationship (ER) Diagram**

An Entity Relationship Diagram (ERD) shows how entities (such as objects, people or concepts, etc.) are related to each other in a specific system [68, 69, 73]. Mostly, the ERD graphically displays patterns of business data. ERD may assist users to conceptualize abstract elements to understand and discuss the different concepts relationship. Figure 6 shows the ER diagram for the proposed system.

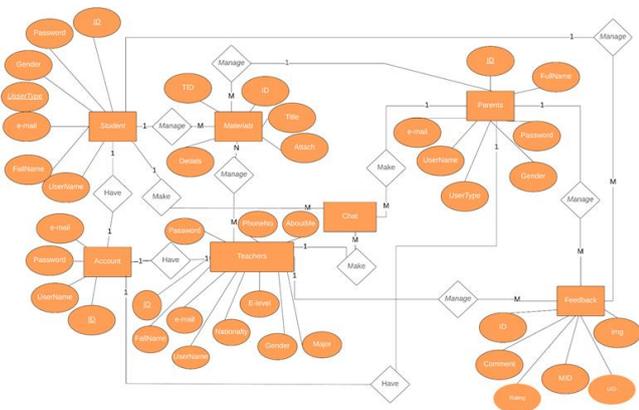


Figure 6: ER diagram for the proposed system

IV. INTERFACE DESIGN

ASP.NET, HTML and CSS. were used as programming language in this work. They were chosen to rely on the language features that makes them more appropriate for this system. In the proposed system, the user begins with the registering in the system; then, the user is offered a form for login and he has to fill the required information. If the filled information is found accurate by searching in the system’s database, the homepage of the system is displayed to the user and the user is allowed to use the proposed system. On the other hand, if it’s not correct, the system will redirect the user to the login page. The below figures are illustrations of designed and implemented interfaces.

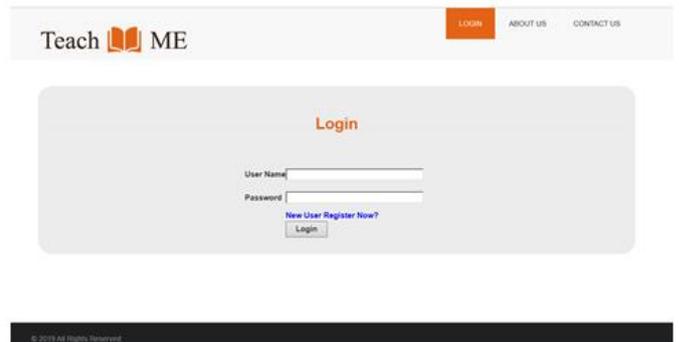


Figure 7: Login interface.

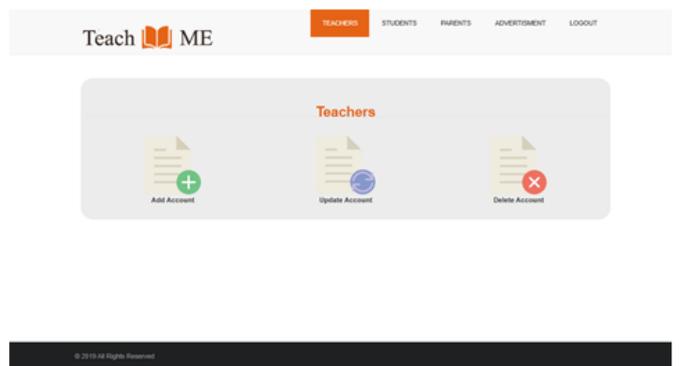


Figure 8: Teachers account interface.

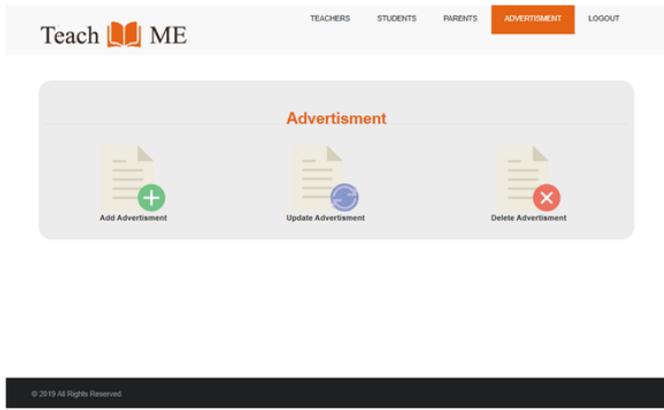


Figure 9: Advertisements interface.

V. DISCUSSION

This section highlights the proposed system usability. At this stage, system evaluation is employed while ensuring user satisfaction. The proposed system was executed on Internet Explorer and Mozilla Firefox using the localhost server. To evaluate the system, we invited 20 students from the College of Applied Studies and Community Service at Imam Abdulrahman Bin Faisal University (IAU) to use the prototype. They were first briefed on the usage of the prototype and the user interface. After that, the system was tested by the students and they answered the survey questionnaire which consists of 10 items designed to gauge the user satisfaction level. The proposed system usability was also determined. According to the 20 students' feedback, the result, as well as the level of usability of the system, are addressed in figure 10. As can be interpreted from the result, a high percentage of users agree that the system is useful, practical, and fulfills the primary objective of the project.

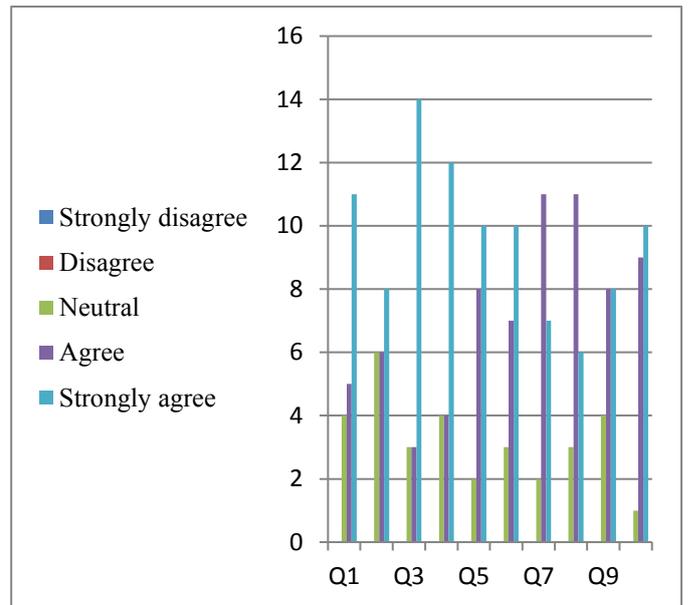


Figure 10: collected data results from the 20 students.

VI. CONCLUSION

In this paper, we presented our work toward developing an accessible web-based educational platform for children with special needs from the design step to the implementation. The proposed platform will support the educational process in schools as the platform contains simplified explanations of what is taught in some school curricula such as numbers, letters, and mathematical operations, and also forms a link between the child and his school where it contains worksheets and extracurricular activities that the teaching staff can benefit from. There is also a section for parents that include educational home games and simple books that enhance children's skills and train them on what has been learned. The proposed system was developed using the Unified Modeling Language (UML), ASP.NET, HTML, and CSS.

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