E-learning Platform Designed for Electronic Laboratories in The Engineering Departments at Iraqi Universities

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Abstract: The E-learning Platform helps the learners to learn experiments and theories anytime and from anywhere also includes educational material that expands the learners' knowledge. In this study, an E-learning platform for (analog, digital, power) electronic laboratories has been built depending on the ADDIE model to be used for the electronic laboratories in the University of Technology (UoT). The proposed platform contains many pages that include PDF, 3D simulation video lectures, and guidance videos for the suggested applications. The platform has been tested and evaluated by a group of teachers and students from the UoT and the results showed that the platform motives them toward their lessons and increase their understanding of the electronic experiments.

Keywords: E-learning Platform, ADDIE, LMS, Blended-Learning, 3D simulation.

I. INTRODUCTION

The E-learning Platform is a helpful and modernized pattern that enable the learners to reach an educational material from any place and at any time to extend their knowledge, it is used in many fields such as in companies and universities. [1]. It provides many learning resources to the learners such as E-books, video lectures, documents, as well as it enables the communications between instructors and other learners, via message, forums, chats, video-conference [2]. The E-learning has been used with traditional learning to enable the learner from obtaining the knowledge through the internet via watching a complete course presented online and also from the teacher inside the classroom, this method called blended-learning [3]. The learning management system (LMS) is a web-based learning tool that facilitates management and access to the learning contents anytime and from anywhere and it has an interface with the database that includes information about the courses, users, and content [4].

II. RELATED WORK

Some research on the subject of E-learning platforms are as follows:
• **O. Deperlioglu, U. Kose, R. Yildirim [2012]** designed and developed a web-based E-learning system for the course of Electrical Circuit Analysis. This system involves multiple lesson pages that contain texts and interactive simulations, also uses assessment tools and online communication for teachers and students. The achieved results showed that this system develops students' performances in the course of Electrical Circuit Analysis and gives an efficient way in engineering learning [5].
• **H. Khazaal, R. Abbas, B. Abdulridha [2014**] presented an E-learning system which can be used by an educational organization to manage the whole educational process in a highly reliable, flexible, and secure manner. The E-learning system consists of three layers which are (user's interface, middle, server) layers. The E-learning system was successfully tested on the Electrical Engineering Courses and proved efficiency for user and management [6].

• **Grigoris Tziallas, Athanasios Kontogeorgos [2016]** designed and implemented an E-learning platform which uses the information of the departmental database to automatically register the students in the courses, and the teachers as courses instructors. This platform enables the students to obtain information such as the passed course, the degrees of the past exams, also enables the teachers to obtain the statistical data about their students' achievement. This platform assessed successfully and used by the Institute of Lamia [7].

III. PROPOSED PLATFORM

The proposed platform is an E-learning platform for the electronic laboratories that contain pages which are classified into public and private pages, these pages have been built by depending on the instructional design model (ADDIE). The users of the proposed platform which are visitors, teachers, students, and admin have several responsibilities that is determined by the platform as illustrated below:

A. Visitor

The visitor has been given the responsibility that enables him to view and read the information about the content of the platform.

B. Teacher

The teacher has been given the responsibility that enables him to edit, upload or download the content on the platform such as PDF, videos, text, images, and links.

C. Student

The student has been given the responsibility that enables him to view, read and download the content of the platform such as PDF, videos, text, images, and links.

D. Admin

The admin is the user that is given the highest level of responsibility to enable him to manage the Platform and the Database.

  i. Managing the Platform (Accept Registration Request, Change platform design).
 ii. Managing the Database (Unblock the user, edit, delete, update the metadata).
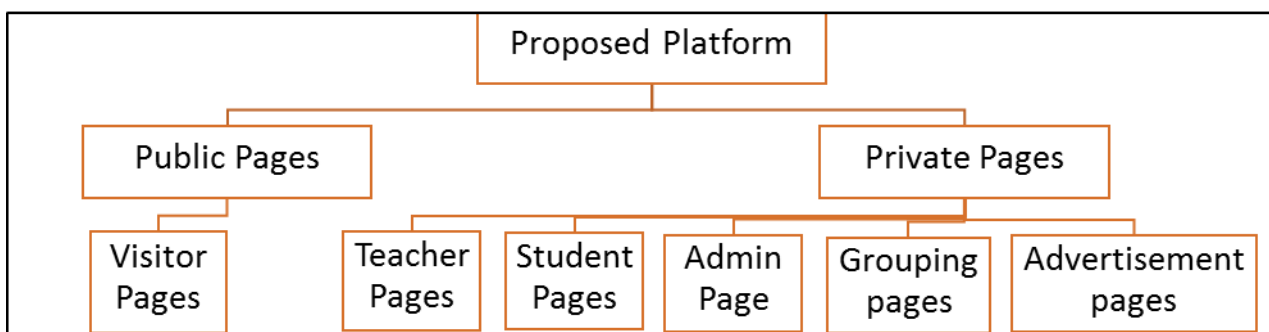

Fig 1: Proposed Platform

The five phases of ADDIE model will be explained in details as follows:

A. Analysis Phase

In this phase, interviews are made with the teaching staff to collect more information about their goals, for what they need the platform, the problems phasing the teaching process, the challenges that could the researcher phase when building this platform. Also the teaching materials are collected and arranged to be inserted in the proposed platform.

B. Design Phase

In this phase, the E-learning platform is being drawn by using two types of diagrams. The First diagram, is the Sitemap diagram which specify the structure of the platform and how the pages are connected to each other through hierarchical style. The fig (1), fig (2), fig (3) show the pages that the visitor, teacher, and student can reach respectively.
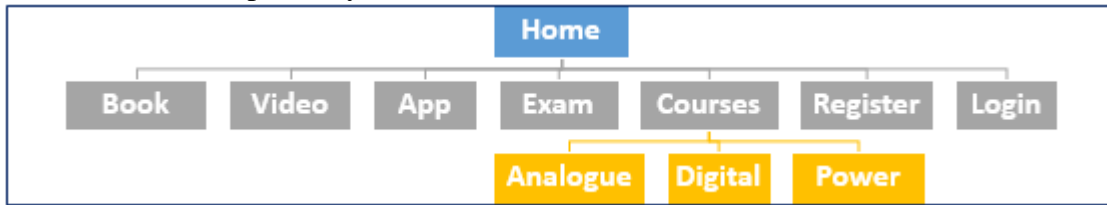
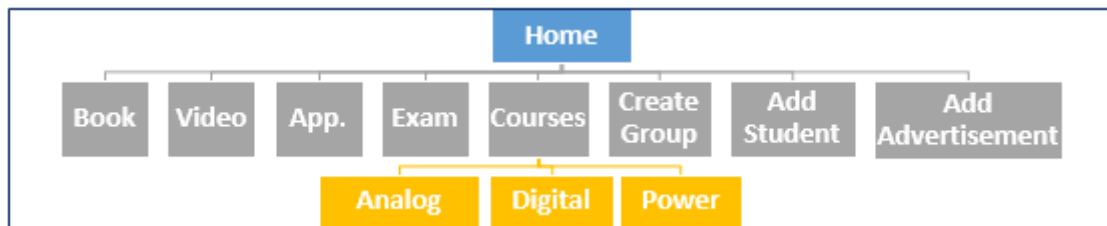Fig 2: Sitemap of the Platform for Visitor
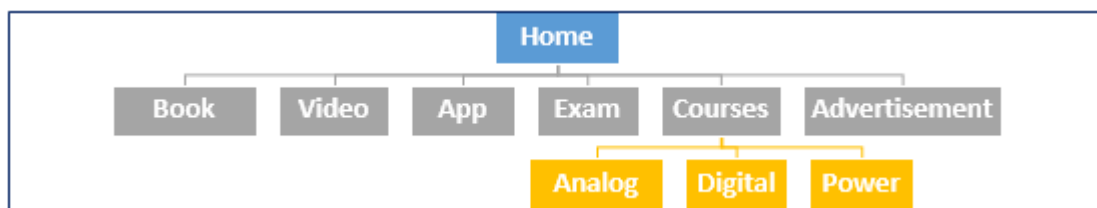
Fig 3: Sitemap of the Platform for Teachers

Fig 4: Sitemap of the Platform for Students

The Second diagram, is the Wireframe diagram which specify the style and appearance of the proposed platform, and how the contents are distributed on the platform. For example, the fig (5) displays a sample of the public pages which is the visitor's video page, it includes only the title of the videos presented in the platform.
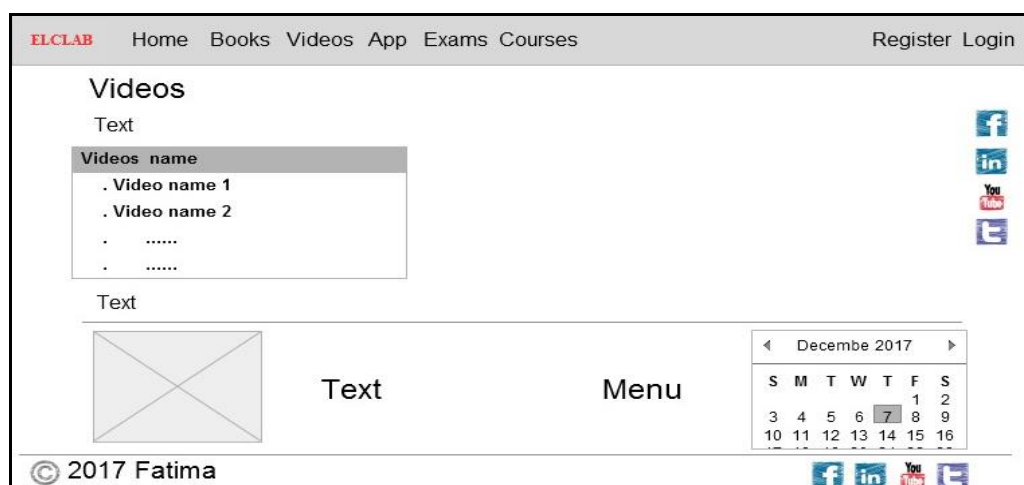
Fig (5): Wireframe Diagram for Visitor's Video Page

The fig (6) illustrated how the video page of the ***teacher's private pages*** will look like, where the teachers are allowed to perform (edit, delete, upload, download) tasks.
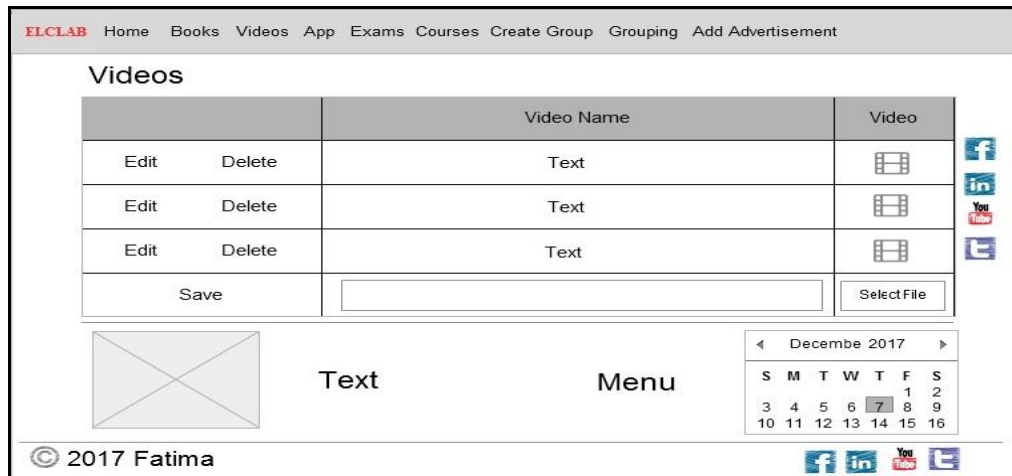

Fig (6): Wireframe Diagram for Teacher's Video Page

The fig (7) displays the same video page but from student's private pages, the students are only allowed to perform the download task.
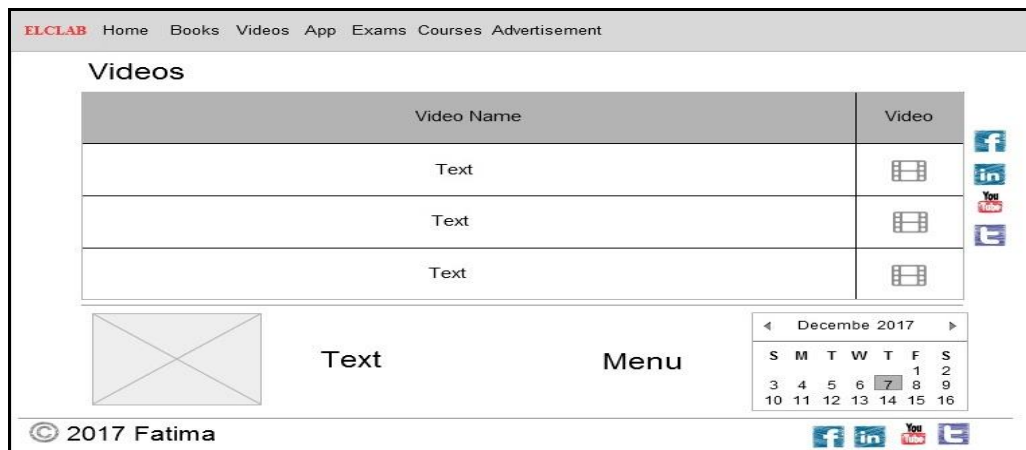

Fig (7): Wireframe Diagram for Student's Video Page

The fig (8) displays the ***grouping page*** which enable the teacher to create group and add students to that group.
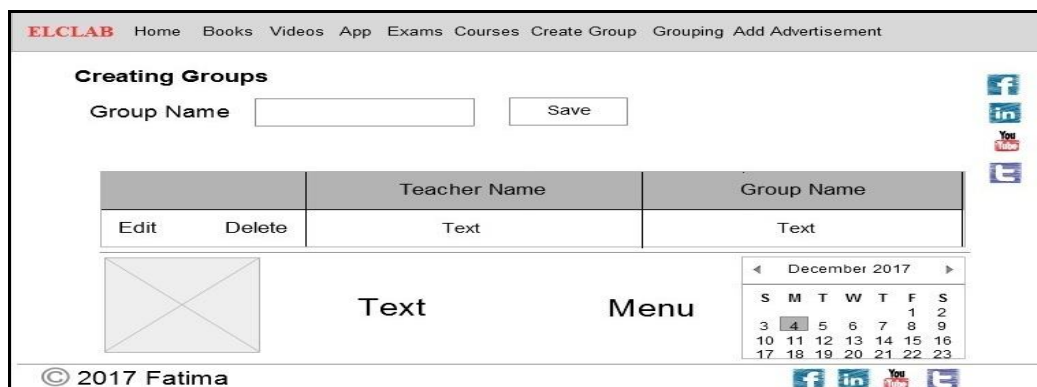

Fig (8): Wireframe Diagram for Teacher's Creating Group

The next two wireframe diagrams will illustrate the advertisement pages for both the teacher and student, the fig (9) displays what the teachers are able to perform in this page, and the fig (10) displays what the students can see on this page.
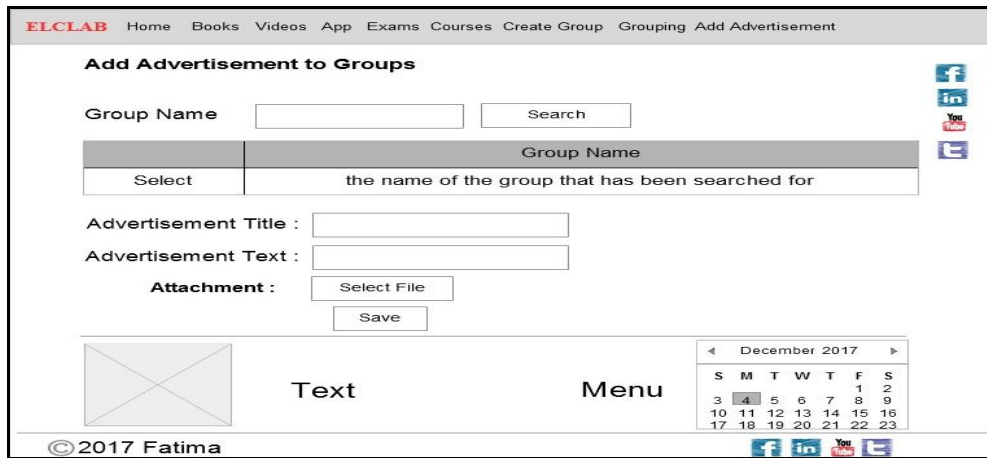

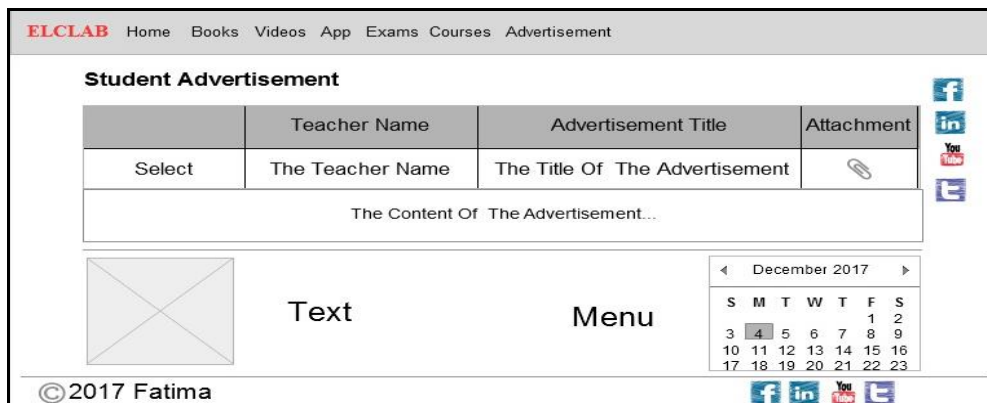Fig (9): Wireframe Diagram for Teacher's Advertisement Page

Fig (10): Wireframe Diagram for Student's Advertisement Page

C. Development Phase

In this phase, the platform will be changed from a layout to a real platform by using programming works. This phase includes two sections which are:

• Development Architecture: this section consists of Front-End and Back-End, the Front-End is the Client-Side and the Back-End is the Server-Side and Storage, as illustrated in fig (11).
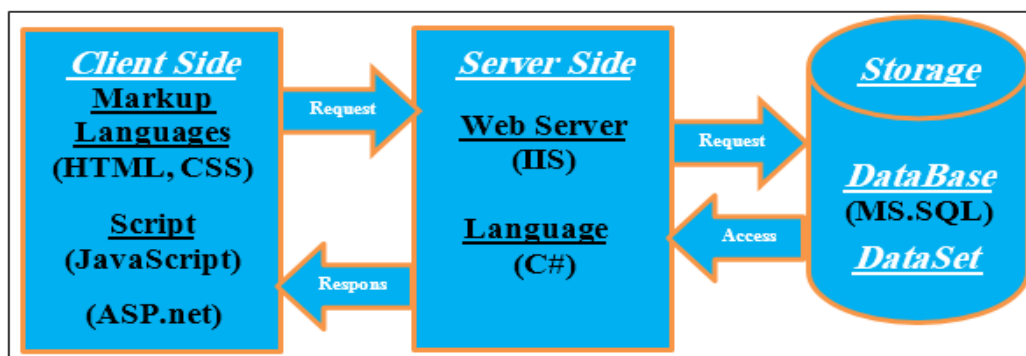

Fig 11: Development Architecture of the Proposed Platform

- The User Functionality: in this section flowcharts will be used to illustrate the sequence of tasks that the user (visitor, teacher, student) can perform.
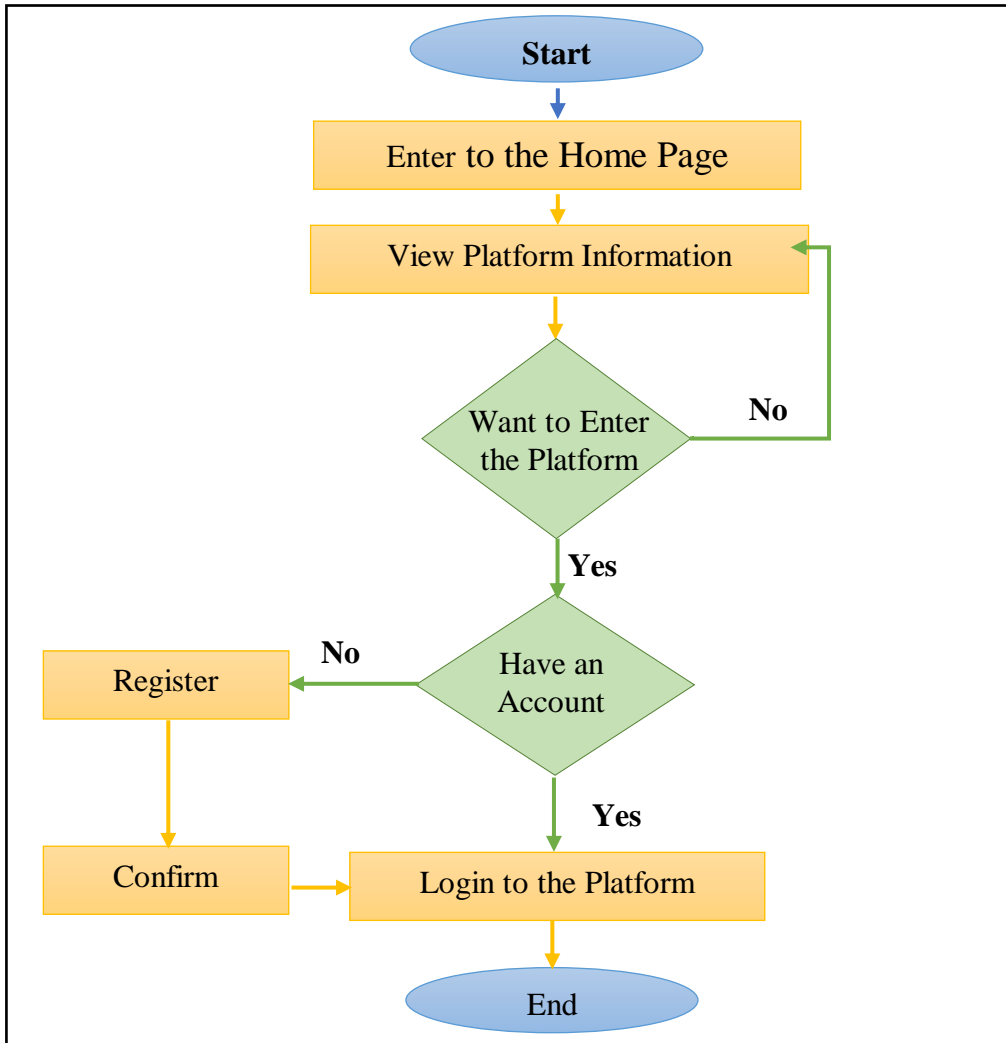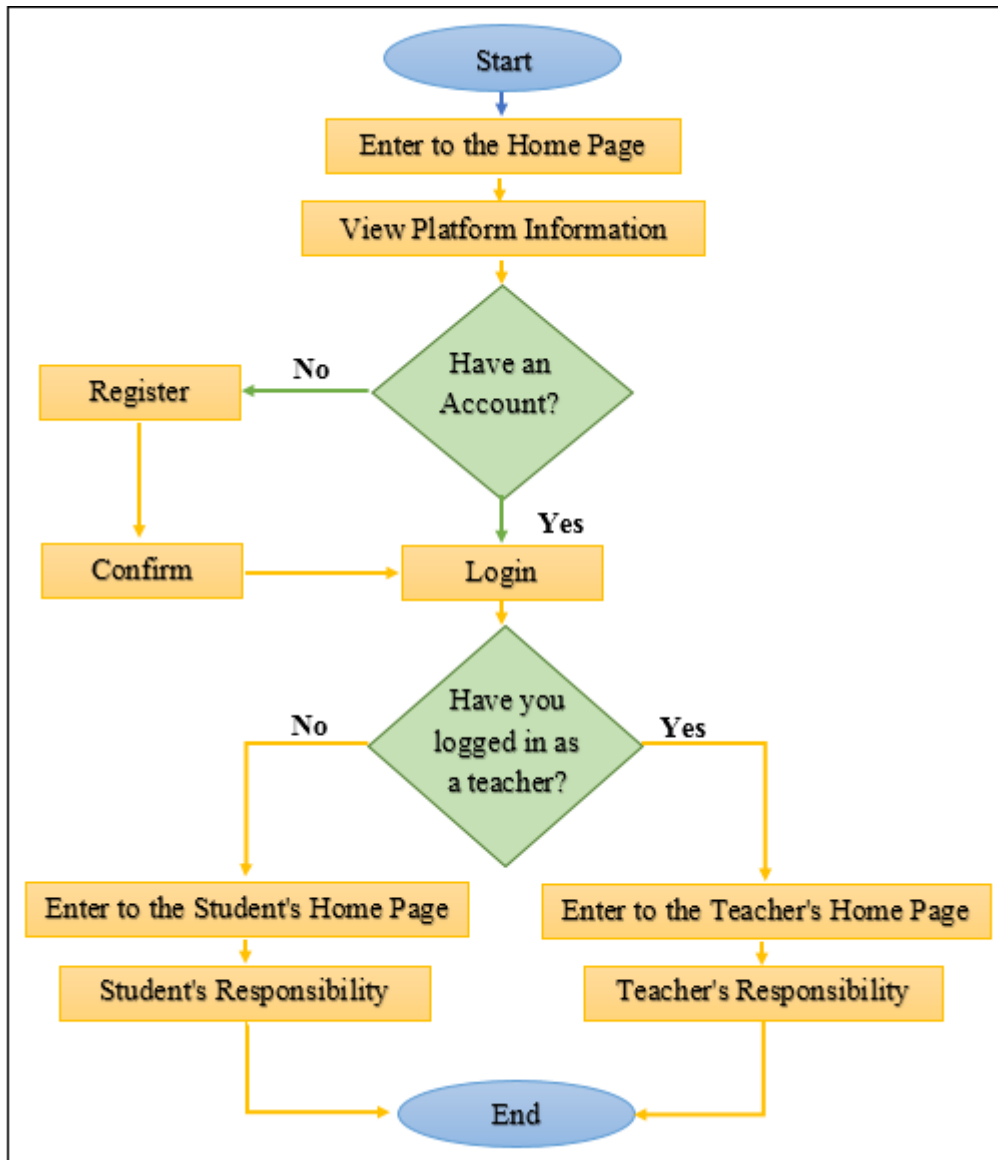
Fig 12: Visitor's Tasks Flowchart

Fig 13: Teacher's and Student's Tasks Flowchart

D. Implementation Phase

In this phase, the proposed platform files will be transferred from the Local Web Server (Microsoft's Internet Information Services (IIS)), into the Web Hosting Services (SmarterAsp.Net) that has been chosen depending on the following factors (Bandwidth, Compatibility, Reliability and Availability, Security). And also instruct both the teachers and students about how to use the platform.

E. Evaluation Phase

In this phase, two kinds of evaluation are done:

• Formative evaluation, where in which the evaluation is done during the phases, and between phases to improve all phases before the implementation.

• Summative evaluation, where in which the evaluation is done after the implementation phase to measure the entire platform. In this evaluation, the proposed E-learning platform has been presented to a group of teachers and students in of Electromechanical, Electrical, Control and System engineering departments to evaluate the effectiveness of the platform.

IV. CONCLUSION

• The proposed platform can be used as a blended-learning environment for the electronics laboratory.

• The proposed platform increases the learners' attention and their motivation towards their lessons and encourage the teamwork.

• The proposed platform supports the development of E-Learning platform in Iraq by presenting a flexible design of the platform and the opportunities for communication between teachers and students, and providing different learning materials that the students can access at any time and from anywhere.

• The proposed platform supports the lifelong learning by providing a free course, articles, and quizzes for students

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