DEVELOPING USER INTERFACE FOR AN E-LEARNING PLATFORM

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Abstract

This paper is focused on developing web application to the electronic learning for the university and college students that makes their courses accessible for more people and take advantage of the versatility of e-learning. It is developed user interface of the web platform for providing e-learning and distance learning. The impact of e-learning that made on Traditional Education system so far and the distant future of e-learning are briefly discussed as well.

Key words: e-learning, user interface, web platform.

1. Introduction

E-learning is learning utilizing electronic technologies to access educational curriculum outside of a traditional classroom. In most cases, it refers to a course, program or degree delivered completely on-line.

E-learning solutions exist for both computers and Internet. It only takes a good e-learning tool for education to be facilitated from virtually anywhere. Technology has advanced so much that the geographical gap is bridged with the use of tools that make you feel as if you are inside the classroom.

E-learning offers the ability to share material in all kinds of formats such as videos, slideshows, word documents and PDF. Conducting webinars (live on-line classes) and communicating with professors via chat and message forums are also options available to users.

Overall, traditional learning is expensive, takes a long time and the results can vary. E-learning can offer an alternative that is much faster, cheaper and potentially better.

1.1. Types of e-learning

There are a number of types of e-learning that depend on the amount of physical interaction. Entirely on-line e-learning occurs without any face-to face interaction. Course work and materials are distributed electronically through email, websites, on-line forums and/or CD or DVD-ROMs. Combined learning uses a combination of Internet-directed instruction, as well as face-to-face interaction. Most traditional colleges and universities use combined learning as students learn in physical classrooms, with instruction augmented by on-line lessons. For those learning for personal accomplishment, e-learning can also use a combination of e-learning types, as they can be entirely self-directed, or they can use the assistance of an expert in their selected field.

There are several types of e-learning that should be mentioned here which are Active learning, Distance learning, Micro learning, On-line learning, Blended learning and Rapid e-learning. They differ from each other with their methodologies and approaches.

Active learning - refers to a broad range of teaching strategies which engage students as active participants in their learning during class time with their instructor. Typically, these strategies involve some amount of students working together during class, but may also involve individual work and/or reflection. These teaching approaches range from short, simple activities like journal writing, problem solving and paired discussions, to longer, involved activities or pedagogical frameworks like case studies, role plays, and structured team-based learning.

Blended Learning - is a kind of virtual learning which combines the traditional learning of face-to-face instructions of the teacher with on-line instructions of a remote teacher through a video conferencing tool like Microsoft Lync or ezTalks Cloud Meeting etc. So, in this type of learning instructions come from two sources. For one the students have to follow a fixed learning schedule by attending the classes at an educational institution, and for the second option they can schedule their timetable to get instructions from the remote

teacher through a virtual conferencing platform.

Online Learning - the main element is to get learning experience by using an Internet connection. The students have to use certain techniques to get this learning experience. In other words, on-line learning can be described as the combination of blended learning and e-Learning as it generally uses on-line tools like ezTalks Cloud Meeting etc. for learning the course.

Micro learning - deals with relatively small learning units and short-term learning activities. The term is used in e-learning and related fields in the sense of learning processes in mediated environments. Micro learning is a holistic approach for skill based learning and education which deals with relatively small learning units. It involves short-term-focused strategies especially designed for skill based understanding/learning/education. Micro learning refers to micro-perspectives of learning, education, training and skill development.

Rapid e-learning - can describe the amount of time spent on developing courses, or how quickly courses can be completed. In the past, it wasn't uncommon for authors to spend several months designing and developing e-learning content. Rapid e-learning reduces that amount of time to just weeks, or even days. For those interacting with course content, rapid e-learning makes it easier for learners to absorb information quickly and move on to the next segment.

Distance learning - is a formalized teaching and learning system specifically designed to be carried out remotely by using electronic communication. Because distance learning is less expensive to support and is not constrained by geographic considerations, it offers opportunities in situations where traditional education has difficulty operating. Students with scheduling or distance problems can benefit, as can employees, because distance education can be more flexible in terms of time and can be delivered virtually anywhere.

1.2. Learning management systems

A learning management system (LMS) is a software application or Web-based technology used to plan, implement, and assess a specific learning process. Typically, a learning management system provides an instructor with a way to create and deliver content, monitor student participation, and assess student performance. A learning management system may also provide students with the ability to use interactive features such as threaded discussions, video conferencing,

and discussion forums. Below we consider the top learning management systems benefits.

1.Organizes e-learning content in one location.

Instead of having an e-learning content spread out over different hard drives and devices, we can store all of our e-learning materials in one location. This reduces the risk of losing important data and makes it easier to create an e-learning course. Every member of the e-learning team can also access the information if we're using a cloud-based Learning Management System, thanks to the fact that it's all stored on the remote server. This makes Learning Management Systems a natural fit for on-line collaboration.

2. Provides unlimited access to eLearning materials.

Once we upload our eLearning course materials onto the LMS and publish them, our audience has unlimited access to the information they need. Even those who are on the go can login to the eLearning platform via their smartphones and tablets, so that they don't have to wait until their next on-line training session to develop skills and perfect work-related tasks. This is one of the main reasons why a LMS is essential for global audiences in different time zones.

3. Easily tracks learner progress and performance.

The best Learning Management System gives us the ability to keep track of learner progress and ensure that they are meeting their performance milestones. For instance, if an on-line learner is not able to successfully complete an eLearning scenario, we can offer them supplemental resources to improve their performance or learning behaviors. Most Learning Management Systems feature reporting and analytics tools that also allow us to pinpoint areas of our e-Learning course that may be lacking, as well as where it excels.

4. Reduces Learning and Development costs.

A Learning Management System gives us the power to completely do away with instructor travel costs, on-line training site rentals, and printed eLearning materials. Our on-line learners can carry out all of their training on-line, which means that we can save a sizable sum on our Learning and Development budget. For example, we won't have to worry about printing out 500 manuals and booking a hotel room for our instructor, because all the information our on-line learners require is right in the LMS.

5. Reduces Learning and Development time.

A Learning Management System can even reduce on-line training times, thanks to the fact that it gives on-line learners only the information they need in a direct and organized manner. Instead of having to sit through a lengthy half-hour

on-line training course, on-line learners can simply click on the on-line modules they need and absorb the knowledge in a fraction of the time. They can also assess their understanding by taking on-line tests or quizzes, participate in interactive scenarios and simulations, and watch eLearning videos that highlight complex processes or tasks.

6. Keeps organizations up-to-date with compliance regulations.

If our organization must stay up-to-date with current compliance regulations, then a Learning Management System can be an invaluable tool. Compliance laws chance on a regular basis and updating a traditional course to reflect these changes can be a time-consuming chore. However, using a corporate Learning Management System allows us to add new compliance standards to our on-line training course within a matter of minutes. As such, our corporate learners can always be aware of the latest compliance rules that they need to be aware of, so that our organization can avoid costly penalties. In addition, we have the power to ensure that every employee is on the same page when it comes to expectations and company policies, which boosts customer satisfaction and decreases employee turnover rates.

7. Quickly and conveniently expands eLearning courses.

If we want to add additional online modules to our eLearning course in order to update information based on new trends or scientific evidence, we can simply login to the Learning Management System and make the necessary modifications without redoing our entire eLearning course. All of the content is in one location, which allows us to change only the master eLearning course and then deploy it to all of our online learners. This is in stark contrast to a traditional course, where we would have to send every member of our audience an updated manual or updated handouts.

8. Integrates social learning experiences.

A Learning Management System makes it easy to integrate social learning into our eLearning strategy. Since the LMS is already on-line, we can include links to Facebook and Twitter pages, LinkedIn groups, and on-line forums that may be beneficial for our learners. We can also market our e-learning course on social media sites to attract new learners, as well as create eLearning exercises that center on peer collaboration.

## 2. Software Development for e-learning systems

There are many advantages of Learning Management Systems. They can automatically perform many tasks that

we used to do ourselves in a traditional way of education.

2.1. Development of User Interface of a centralized e-learning platform for Universities and Colleges

When developing any e-learning platform The User Interface is one of the most essential parts of the project. Everything stems from knowing our users, including understanding their goals, skills, preferences, and tendencies. Once we know about our user, first thing we should make sure to consider is keeping the interface simple.

The best interfaces are almost invisible to the user. They avoid unnecessary elements and are clear in the language they use on labels and in messaging. In our project we also tried to make our e-learning platform's User Interface as simple and understandable as possible. We considered only essential elements on every page. As an example we can take the home page:
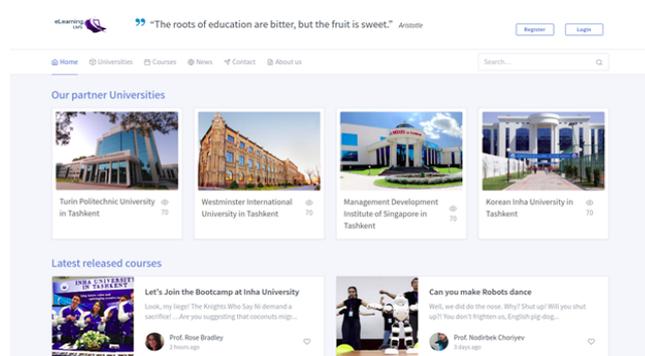
From the screenshot of the page, we can see that it only contains the main elements of our platform which are the navigation panel to the necessary pages of the web application, register and login buttons, list of partner Universities and the latest released courses from professors of registered Universities. And the page header also contains the Web site's brand image and a quote about education from famous scientist. They also help our users to easily understand the web platform's purpose.

Because, as shown above our brand image contains the name of the application which is « eLearning LMS» and the illustration of book shaped laptop. Book means knowledge, laptop means digital technology. They together give one the idea that this platform combined the Digital World with an Education. When talked about navigation panel, one can see that it includes 'Home', 'Universities', 'Courses', 'News', 'Contact' and 'About Us' pages. These pages contains almost all the information that our users may require from our e-learning platform. In order to be distinguished easily

we gave a different color and accordant borders to different blocks' of the page.

When developing an application developers should simultaneously take into account the simplicity and clearness of the application together with the clearness and understandability of the code of that application. For the reason that after writing thousands of lines of code it is really, hard to follow and understand the code if it is not well structured. For that reason,we also tried to make our code clean and clear as we could. Here we can see the structure of the code of our platform's Home page:

From the picture, it can be seen that the page is divided into different blocks and elements with the help of class names. For example 'header' class which contains the login buttons and navigation panel, 'container' class that includes the main contents of the web page. They also divided into smaller parts with another blocks with different but related class names.

Along with making our User Interface simple and understandable, we make the UI better by following some other useful strategies that we learned during our investigation. Creating consistency and using common UI elements improved the User Experience a lot. By using common elements in UI, users feel more comfortable and are able to get things done more quickly. Common elements are Input Controls (check-boxes, list boxes, buttons, text fields etc.), Navigational Components (search field, breadcrumb, pagination, icons etc.), Information Components (notifications, progress bars, message boxes, tool tips, modal window) and Containers (accordion).

Usage of those elements we can see from the courses page below:

There we used buttons to filter among courses, icons and different font sized HTML elements in order to increase scanability, legibility and readability. Careful placement of items can help draw attention to the most important pieces of information and can aid scanning and readability.

By strategically using color and texture to our advantage, we can direct attention toward or redirect attention away from items. We used different sizes and colors to texts, and different styles to active or hovered elements. For example in the courses page 'Courses' is styled differently from other navigation elements. Always informing users about their location in application, actions, changes in state, or errors is very useful.

The use of various UI elements to communicate status and, if necessary, next steps can reduce frustration for our users. There are times when multiple elements might be appropriate for displaying content. When this happens, it is important to consider the trade-offs. For instance, sometimes elements that can help save us space put more of a burden on the user mentally by forcing them to guess what is within the drop-down or what the element might be. Therefore, we should always hold the balance.

In the bottom part of this courses page we used pagination to direct the user to next list of courses and in the meanwhile to have some space for the 'Featured Courses' part. These courses are featured because of their popularity among users and instructor professors' reputations as well. Hence, we emphasized these courses by making their appearance different with corresponding images and bigger size on the web page.

2.2. Utilized software and technologies for development of UI

Development process of a Web Application or Web Platform is mainly divided into two parts: Front End and Back End.

Front End Web Development is the practice of converting data to graphical interface for user to view and interact with data through digital interaction using HTML, CSS and Java-script.

Back End Web Development includes developing Server Side of the project and the Database that is accessed by users indirectly through external application rather than by application programming stored within the database itself or by low level manipulation of the data (e.g. through SQL commands).

There are plenty of software and technologies for both Front end and Back end Web development nowadays. It is up to our purpose and our project what technologies we use. When talked about developing User Interface it is mainly included in Front End Development.

Despite the fact that there are hundreds of technologies in Front end world most of them are built on some cornerstone technologies like HTML, CSS, and Java Script in order to improve and speed up the development process. In our e-learning platform's User Interface development process we used many Front end technologies:

HTML (Hypertext Markup Language) –is a major markup language used to display Web pages on the Internet. In other words, Web pages are composed of HTML, which is used to display text, images or other resources through a Web browser. All HTML is plain text, meaning it is not compiled and may be read by humans. The file extension for an HTML file is .html or .htm.

HTML was never designed for the Web that exists today, as it is just a markup language with severe limitations, in terms of control and design. Numerous technologies have been used to work around this issue – the most significant being Cascading Style Sheet which is by short CSS.

HTML is for Structural layer of the application and CSS is for Presentation layer. Cascading Style Sheets are used to format the layout of Web pages. They can be used to define text styles, table sizes, and other aspects of Web pages that previously could only be defined in a page's HTML.

When we add another essential technology, which is Java-Script to our project we can get more interactivity and control on our platform. Java Script is a programming language commonly used in Web development. It was originally developed by Netscape as a means to add dynamic and interactive elements to websites. While Java-Script is influenced by Java, the syntax is more similar to C and is based on ECMAScript, a scripting language developed by Sun Microsystems.

Java-script is a client-side scripting language, which means the source code is processed by the client's web browser rather than on the web server. This means Java-Script functions can run after a web-page has loaded without communicating with the server. For example, a Java Script function may check a web form before it is submitted to make sure all the required fields have been filled out. The Java Script code can produce an error message before any information is actually transmitted to the server.

Next technology we used for our Front end development is Bootstrap. Bootstrap is the web's most popular framework for designing responsive web applications. It gives front end developers the ability to quickly build fluid web pages with a set of common HTML and CSS components. Its easy to use because it doesn't require learning a different language just a set of naming conventions applied to HTML class names.

Bootstrap's most basic component is the Grid. The bootstrap Grid is used to define the width that each html component takes up on the page. The Grid divides the screen into 12 equal columns. Content elements can occupy at the least one column and at most 12. The style of our web page will determine the sizes that each content element will take up.

Our page's components has changed when we make the page smaller in size. This is called adaptivity and responsiveness. For example, our Navigation bars elements now contains each one row. However, if we make the screen bigger they automatically fits in one line. That is really useful property of Bootstrap.

For easily structure and control our project's User Interface we used Atom IDE (Integrated Development Environment) as well. Atom is an open source software to maintain and control our projects in one IDE. Atom-IDE is a set of optional packages to bring IDE-like functionality to Atom and improve language integrations.

2.3. User Interface structure for the application

UI Design principles:

• To build the principles, we have to understand deeply about our user and mission of our product. We should do a research of who is the user, their nature, habits, and then narrow down their main problems that the product solves. These research will be the backbone for any further decision on design principle or language whatever the change in content

• This task cannot be done in silo. We need a team con-

tains anyone who deeply has wisdom of the company and users like CEO, CMO, founders even developers. Because developers understand the ecosystem of the product (main product, side plug-in, third-party-developed-products,…) so designer will have a better vision of what he/she going to build.

• UI design principles have a deep connection with product design principles. Or they can be one.

• We do not need to finish this step to start building Design language. We can set a few principles and move on. Those principles can be iterated.

According to the principles above our we learned about users of our e-learning platform and divided them into four categories. They are : Universities, Teachers, Students, and Guests.

Users in different categories have different permissions in the platform. Users in University category have control on their Teachers and Students. According to our Application's structure only Universities can add their Teachers and Students to the platform. While our platform is a centralized e-learning application for Universities and Colleges, giving the control over Teachers and Students to Universities is help to protect data in server and also decreases privacy risks.

At the same time the Users in Teachers category have corresponding permissions on platform. They can add Courses, Events, and Students to their Courses. In the Project we mostly emphasized the users Profile, in order to increase User Experience on our Web Site. As a sample we can consider Teacher's profile page. In the profile page we tried to demonstrate only necessary elements to our user.

On the Teacher's profile page there are default navigation bar, instead of register and login buttons we have logged in users picture, name and category, in the Main Content part of the page Contains information about the user. There are three buttons to add Course, Test, and Event in the 'My Profile' block. And in the right side we have 'My Courses' block with the list of all courses that the Teacher added.

As we come to the courses part, in the profile of teacher Courses are described with different statuses and colors along with the completion percentage of the course added by Teacher. When there is any notification that is related to the user he/she will get it immediately.

The Students and Guests categories have limited access respectively. Students can see all the courses added by their University's Teachers and also Partner Universities' Teachers. In the meanwhile Courses have their statuses, if the Course status is private Guests to the platform cannot see them but if the Course status is public Guests can see Them even if they are not registered or logged in to the Web Site yet. Elements of every page will render corresponding to the User that is entering to it. For example, if the user is guest and he is entering to Courses page he will see only the list of Courses with 'Public' status. Conditionally rendering the pages is very useful strategy in Application Structure.

4. Conclusion. Expected results on implementation of the application and future improvements of the project.

Today's learners want relevant, mobile, self-paced, and personalized content. This need is fulfilled with the online mode of learning; here, students can learn at their own comfort and requirement.

By implementing our Centralized eLearning Platform with shared data among Universities and Colleges we are expecting several results.

This method of distance learning is best suited for most of Students. E learning platform will led to remarkable changes in how the content is accessed, consumed, discussed, and shared. Online courses can be taken up by students who work simultaneously and housewives too, at the time that suits them. Depending on their availability and comfort, many people choose to learn at weekends or evenings.

With the help of our online learning platform students can access the content an unlimited number of times. This is especially required at the time of revision when preparing for an exam. In traditional form of learning, if one cannot attend the lecture, then he has to prepare for that topic on his own; in eLearning, we can attend the lectures whenever you want with ease.

We are also expecting Reduced Costs. ELearning is cost effective as compared to traditional forms of learning. The reason for this price reduction is because learning through this mode happens quickly and easily. A lot of training time is reduced with respect to trainers, travel, course materials, and accommodation.

As our first aim is to increase the Effectiveness in Education, we hope that this project yields to good results as expected.

For future development of this Web Site, developing a mobile version of the web application and adding live Video Courses to the platform are planned. In addition, implementing this project to other fields like employee training for Companies is also planned.

References

1. https://cei.umn.edu/active-learning

2.https://www.eztalks.com/elearning/difference-be-tween-elearning-and-online-learning.html

3. https://searchmicroservices.techtarget.com/definition/us-er-interface-UI

4.https://www.usability.gov/what-and-why/user-inter-face-design.html

5. https://elearningindustry.com/9-benefits-of-elearning-for-students

6. https://www.talentlms.com/elearning/what-is-elearning

7.https://medium.com/@duncandevs/responsive-web-de-sign-with-bootstrap-70147ecd9d98.