Study on the
Design of E-Learning Content

By

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Abstract

An e-learning platform is a collection of interactive contents, tools and services that provide information, resources, and tools to educators, learners, and other participants in the educational process. E-learning requires more self-control, motivation, and independence from the learner than traditional classroom learning. With the advent of e-learning, people are no longer limited to their local area. This eliminates the requirement for working 9 to 5 or keeping to a strict routine. We learn about several content categories in this article. E-learning content is created for the learners and the instractators. As a result, learners can benefit in a variety of ways, including the ability to readily locate course materials, attend quizzes, and submit them without difficulty. In addition, learners will also benefit from this approach because it will save them significant time. Examine how instractator operate, how instractator assist learners, and how instractator affect education. By using e-learning materials, teaching and learning standards can be raised. Change to meet the needs or styles of the learners. Improve how well things work. Make it easier for students to use and more flexible with time to get them involved in the learning process

Keywords : Interactive contents, Instractator, Learner, Resources, Tools

Acknowledgements

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Chapter 1

Introduction

Learning gives you "intellectual growth that leads to formal procedures, abstract thinking, and scientific reasoning." [1] E-learning platforms provide instructors, students, and other educational participants with interactive content, tools, and services. E-learning requires greater self-regulation, intrinsic motivation, and independence than classroom education. It eliminates the need for a 9-to-5 schedule and can improve teaching and learning standards. Remote learners who lack access to a campus physically must receive their education. E-learning has recently emerged as a possible replacement for conventional classroom instruction, assisting society in realizing the goal of lifelong and on-demand learning [2]. E-learning content is made with the learner and teacher in mind. As a result, learners can be benefited in several ways, like learners can find their course materials, easily attend quizzes and submit them without any hassles. Further, instructors will be benefited also by saving their valuable time using this system. After uploading the content of a particular course including videos, quizzes, they do not have to check that again. Aims to provide a configurable infrastructure that integrates learning material, tools, and services into a single solution to create and deliver training or educational content quickly, effectively, and economically [3]. The use of e-learning contents has several advantages. One benefit is that it can be used anywhere and at any time. This means that learners can go at their own pace, and facilitators can more easily and objectively track each learner's basic progress. e-Learning content also uses many different types of media, such as text, audio, video, and animation. Facilitators can also improve the course material by linking students to more online resources. E-learning content has another benefit in that it lets students form learning communities using Web-based tools like discussion boards and instant messaging. This lets them work together and help each other get better at school. Last but not least, e-learning makes it possible to take a learner-centered approach that takes into account the many different ways people learn. This means that students can use their favorite ways to learn and understand course materials or information [4]. Due to these widely agreed-upon benefits, many universities have started to offer online courses through e-learning platforms to their students in the past few years. [5]. Some of the e-learning contents are Lecture Video, Blog, Quiz, Smart Notebook, Powerpoint etc. A video lesson

or lecture is a presentation of information that needs to be learned about a subject. It could be a video of a teacher talking to the camera, pictures and text about the topic, or a mix of these things. Blogs have been increasingly used in higher education to facilitate student learning. Learners without advanced coding abilities can post, edit, and publish articles. Blogs can help undergraduate and graduate students teach and learn, according to research. As an example, a quiz can have a minimum 10 question multiple choice, fill in the blank, yes or false, and short answer test. Providing immediate feedback boosts motivation and interest, and quizzes are an efficient method. Smart boards and notebooks may help tech education. Touching the Smart Board with a finger or an interactive pen is possible. Smart Notebook's zooming, hide screen, and shade screen functions make highlighting or hiding content easy. Using smart technologies can "enhance learning" by increasing student "interest". Instructors often use PowerPoint Slide for rapid content preparation and delivery, but e-learning materials should be optimized for the web to ensure content delivery. When presenting face-to-face lecture notes online, instructors can incorporate animations, simulations, graphics, audio, and video. E-learning is a growing platform in higher education that is used by many people. To use e-Learning well, you need to know how to manage it and find resources. Imagine without having a road-map to guide you from start to finish. That's like diving into e-Learning without a strategy since learners would become lost in the content. There are now thousands of online courses available. Students can interact with instructional digital video thanks to its interactivity. This could improve student engagement and, in turn, the efficiency of learning. A major 'media attribute' of interactive video is random access to video content [6]. We have been able to incorporate a wide variety of educational resources into effective and coherent learning pathways thanks to the Internet and related technology. Our system has defined multiple learning object types, each with differing technologies and approaches.

1.1   Project Overview

We built up a project which is about studying the design of e-learning contents. It's basically focused on the learning contents, like how swiftly learners and instructors can use these contents in effective ways. Some of the reasons why learners may have trouble are to help working learners make up for the time they missed during regular lectures, help regular learners make up for lectures they missed because they were sick or chose not to go, help learners who have trouble understanding the lecturer's spoken language, and give learners a way to review important sections and check their notes. And also learners want to know them with a better version of themselves by participating in a quick assessment, so that they can know their progress in a faster way. Our project will be helpful for both instructors and learners.

1.2   Motivation

We offer a system that benefits both learners and instructors. In this system, the emphasis was placed primarily on the learning-specific content. As a result of the time that may be wasted and the content that they are unable to locate when searching across multiple sites. As a result, our approach combats these issues, reduces them for learners, saves them a substantial amount of time, and enables them to obtain all of the essential knowledge at once, enhancing their advantage. Consequently, it will increase their interest in our system.

1.3   Purpose of this document

This document is necessary for spreading knowledge about the concepts of e-learning contents. The purpose of this document is to describe the contents, so that the system user can understand those and gain knowledge effectively.

1.4   Scope of this document

We will implement a unique and optimized system-based platform for learners to get various types of e-learning contents for their own criteria.

- Create a platform that will give learners full support to find their expected contents.

- Ensure that our system's content is always available to users.

- Provide information, guidance, and resources.

- Keep the system simple so that anybody would be able to use it easily.

1.5   Methodology

We're making a web-based application to try to solve this problem. Here's a rundown of the whole process:

- Complex engineering criteria checking.

- Planning(GANTT Chart).

- Survey

- Review

  - Literature review.

  - Similar types of application review.

- Analysis

  - Benchmark analysis.

  - Requirements analysis.

  - Gap analysis.

  - Budget analysis.

- Feature Finalization.

- Prototype(Designing UI/UX).

- Implementation(Development).
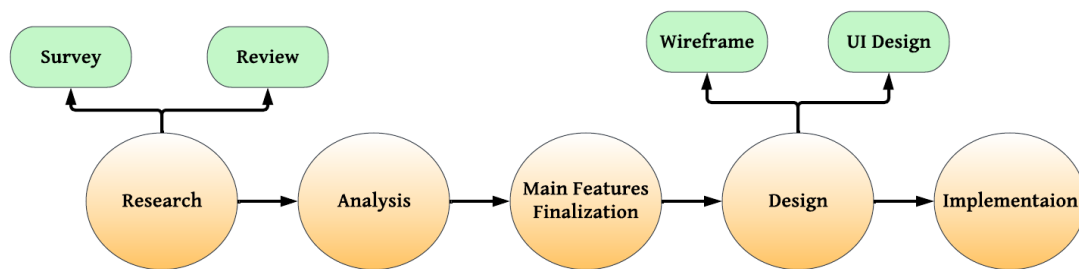
- Testing system usability and bugs.

Figure 1.1: Methodology

1.6   Project Outcome

The following will be the result of our project:

- Quick assessment of a student

- An optimized and user friendly system-based e-learning content will be developed.

- Teachers will provide course related content like videos, quizzes etc.

1.7   Organization of the Report

Our report is divided into five chapters for better understanding:

Chapter 1: In this chapter we have discussed our project's overall introduction following project overview, motivation, purpose of this document, scope of this document, Methodology, Project Outcomes.

Chapter 2: Our project's background was covered in this chapter. A literature review [2.2], a similar application evaluation [2.2.1], certain results that are reported in section [2.2.2] and a survey questionnaire and user review in section [2.3] were discovered. As a last step in section [2.4], we conducted a gap analysis comparing our project to other related projects.

Chapter 3: This chapter is about the design of our project, and it begins with a need analysis in section [3.1], followed by two further subsections for functional and non-functional needs [3.1.1], [3.1.2] and a use case diagram [3.2.1]. The whole UI design is presented in section [3.3] and the project plan explained in section [3.4]. We concluded the chapter with a summary in section [3.5].

Chapter 4: Section [4.1] of this chapter discusses the many standards that will be maintained during implementation, followed by subsections on software standards [4.1.1], coding standards in section [4.1.2], Ui/Ux standards[4.1.3], Ethics standard [4.1.4]. Design constraint was done in [4.2] and cost analysis was done in[4.3]. Finally, in [4.4], complex engineering problems, which has two sub-sections, "complex engineering problem solving" [4.4.1] where we did the mapping with complex problem solving and engineering activities [4.4.2].

Chapter 5: Our report comes to a close in section [5.1] of this chapter. Then, describe the restriction on the project that we will encounter when we reach our limit [5.2]. Final thoughts on next projects may be found in section [5.3].

Chapter 2

Background

Our background research will be covered in this part. We'll start by looking at comparable apps and summarizing their strengths and weaknesses. In the next section, we'll discuss related works and summaries of them.

2.1 Preliminaries

HTML5: HTML is short for "hypertext markup language." In order to construct the structure of a website, we utilize HTML. The HTML has been updated to its 5th and most recent version, known as HTML5. In this edition, a large number of tags were included that the site designer may make use of to make their job easier [7].

CSS3: The use of Cascading Style Sheets (CSS) makes it possible to create visually ap-pealing web pages. Cascading Style Sheets (CSS) are a powerful tool for customizing the look and feel of a website. Cascading Style Sheet (CSS3) is the newest and most user-friendly version of the technology [8].

BOOTSTRAP5: Using Bootstrap, we can easily build standard web components like forms, buttons, dropdowns, and modal windows. We mostly utilize BOOTSTRAP to create a flexible and adaptable layout with little effort.. As of this writing, this framework has been updated to BOOTSTRAP 5.0 [9].

REACT: The React library is a declarative, powerful, and flexible tool that can be used to make user interfaces with JavaScript. It does this by putting together "components," which are individual and relatively short chunks of code [10].

2.2   Literature Review

In this section, we summarize the review of the existing literature in terms of relevant applications and publications. As part of our research, we collected relevant papers and publications. A comparative application study was also undertaken to compare current projects.

2.2.1   Similar Applications

In this section, we will demonstrate a few apps that, like ours, serve a similar function. We have come to the conclusion that it would be beneficial to establish a benchmark that takes into account different types of use, primary characteristics, interface, geographic location, etc. Now that that's out of the way, let's have a look at what they have to offer and how they seem.

1.   10minuteschool.com: 10 Minute School is one of the most successful and widely used online educational systems in our country. We thought that one of the best things about **video lectures** was that they could help working-learners make up for the time they missed during regular lectures. And help regular students by letting them make up classes they missed because they were sick or chose not to go. And also help students who have trouble understanding the lecturer's speech. This isn't much worse than the level of interaction you can get in a crowded classroom. Instead of giving a frontal lecture on Java Collections, we decided to make it a requirement that students watch a video of the lecture from a previous version of the course before coming to class. So, the whole time in class can be used for free conversation.

2.   Coursera.com: Online learning platform Coursera is a famous one in the World. In this platform **Quiz** is one of the most important content for Self-tests and this is one method for judging and getting instant feedback to improve themselves and learn about how successful their goal is according to plan. In this study, we set out to discover how online quizzes' possibility for continual, self-monitoring practice impacts student progress.

3.   Shikho.com: For learners, this website provides **Blogs** which are important for beginners. Blogs are being used more and more in higher education to help students learn. They make it possible for people who don't know much about programming to make their own online space by posting, editing, and publishing articles. Research has shown that both undergraduate and graduate students can use blogs to teach and learn in useful ways. Through reflection-based learning processes, blogs can help adult learners have good learning experiences.

4. Udemy.com: Hand Note plays an important role to note up important topics from quick discussion. In this site they especially focused on the content **hand notes** which plays important roles for learning. Instructors deliver learners notes on various chapters. It helps learners to get proper knowledge on a specific topic. Learners can share his hand notes with other learners and study in a group. According to a survey, group study helps more than studying alone.

5. Khanacademy.org: To build up good communication between learners and instructor, **Message** content plays a vital role. A learner may text an instructor if he has a question on any particular topic or he needs more details. One can also text his other learners to clarify his problem. One can share ideas with others by texting

6. Autismnavigator.com: They provide both a sign-up and a login option. They are not accessible through social media platforms. The user interface and experience are both welcoming to the user. The website offers some free video links that may be used as tutorials. They provide a list of courses, and you may also search for classes by category. Courses cannot be accessed without a paid membership, since they are not offered for free. In addition to that, they have a presence on social media. They do not provide any live messaging options or capabilities. Users are able to get in touch with them since their contact information is displayed on the website.

Benchmark Analysis :

Features	Coursera	Udacity	Udemy	Shikho	BiddaBari	10minuteschool	Khan Academy	Unacademy	Byzu's	Edx	Dino
Search	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Yes —
Books	Y	N	Y	Y	Y	Y	Y	N	N	N	No —
Student's Profile	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Yes —
Quiz	Y	N	Y	Y	Y	Y	N	N	N	Y	Yes —
Hand note	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Yes —
Notification	N	N	Y	Y	Y	N	Y	Y	Y	Y	No —
Assignments	N	N	Y	N	N	N	N	Y	Y	Y	No —
Blog	N	N	Y	Y	Y	Y	Y	N	N	Y	Yes —
Grades	Y	Y	Y	N	N	N	N	Y	Y	N	Yes —
Completed	N	Y	N	Y	Y	Y	Y	N	N	Y	No —
Animated lesson	Y	N	N	Y	Y	N	Y	Y	N	Y	Yes —
Calender	Y	Y	Y	N	Y	Y	N	N	Y	N	No —
Workspace	N	Y	N	Y	Y	N	N	Y	Y	N	No —
Instructor's Profile	Y	Y	N	Y	Y	N	N	Y	Y	Y	Yes —
Practice Problem	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Yes —
Question bank	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	No —
Video	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Yes —

Table 2.2.1: Benchmark Analysis

2.2.2 Related Research:

We'll now go through a summary of some of the research we've done in order to learn more about our topic.

- **Online learning in higher education: exploring advantages and disadvantages for engagement [11]**
  Students who took more online classes were more likely to use quantitative reasoning, but they were less likely to work together and talk to their teachers. Students who had more online classes also said they were less exposed to good teaching methods and had less quality interactions with their teachers. Some kinds of engagement might do better in an online setting, while others might be put off by it. When making content for online courses, institutions should think about these results.

- **Online Learning and Emergency Remote Teaching: Opportunities and Challenges in Emergency Situations [12]**
  The goal of the study is to look at what the COVID-19 emergency taught us about the pros and cons of emergency remote teaching. There are some challenges and suggestions for how to deal with them, which should be and sometimes have been done. The results show that there are some problems with technology, education, and society. The main problems are that Internet connections aren't always reliable and that many students don't see the point.

- **E-Learning content design and learner adaptation for adaptive e-learning environment: a survey [13]**
  Learning content design and learner adaptation for adaptive e-learning environments: a survey This paper gives a survey of how learning content is designed and the

different levels of adaptation that can be used to meet the needs of learners in an e-learning environment. Learners usually have different learning styles, cognitive traits, learning goals, and learning progress over time. This affects the performance of each learner, even though they all take the same bundle of courses. In this paper, we talk in depth about the different levels of adaptation, the design of learning objects and the process for designing learning content, the parameters of the learner context, and the models and parts of online learning.

- **Teaching Aspects of E-Learning [14]**
  E-Teaching is a new form of pedagogy for learning in the 21st century. The roles of e-Teachers are to enhance learners' cognitive engagement and interaction. This is achieved by using the benefits of computer mediated communication - greater accessibility and adaptability. All stakeholders should make efforts to close transactional distance and increase verbal immediacy.

- **Enhancing e-Learning Content by Using Semantic Web Technologies [15]**
  We describe a new educational tool that relies on Semantic Web technologies to enhance lessons content. We conducted an experiment with 32 students whose results demonstrate better performance when exposed to our tool in comparison to a plain native tool. Consequently, this prototype opens new possibilities in lessons content enhancement.

- **The Changing Nature of E-Learning Content [16]**
  Bill Gates wrote a paper in 1996 called "Content is King." Back then, content was always the same, and the Internet was just starting to catch on. In 2011, 15 years later, the digital world is full of content, like user-generated content, content for mobile devices, and content that changes all the time, like social media, news sites, and online games. This chapter looks at what the first generation of E-learning content was like and what the next generation might be like.

- **Modeling e-learning content [17]**
  This paper talks about the different levels of information that should be taken into account in e-learning and gives conceptual models to help with the way e-learning content is shown. The e-learning content is better organized with this content, and the semantic relationships between information and conceptual units are used again. This paper fills a known need for information about e-learning content and shows a new way to model things.

- **A Model for E-Learning Content Design [18]**

  With the Internet changing and e-learning methods getting better, more and more attention is being paid to making e-content that meets the educational standards set by teachers. To make good electronic learning content that will appeal to everyone (especially tutors), it should be made in a way that is centered on learners, effective, easy to access, flexible, and "user friendly." To figure out how to deal with the main problem, we talked about some of the important things that affect different parts of the E learning environment. These factors can be put into four groups: Factors that have to do with management, technical factors, pedagogical factors, the user interface, and academic factors.

- **Best Practices in Syllabus Writing [19]**

  In general, for an online course, students should be able to rapidly scan the syllabus or overview of the course and get a sense of who is instructing the course and how the course was. Design of the syllabus is the first opportunity to make a positive impression on pupils. Students may become encouraged by policies and directions that are stated in an impersonal and harsh manner. The syllabus ought to include all of the data mentioned in the article.

- **Smartnotebook: a semi-automated approach to protein sequential NMR resonance assignments [20]**

  This study examines how smart gadgets like smart boards and notebooks might aid technology education. It provides a literature review of smart technology's appeal. The project will address NYS and ITEEA technical literacy standards. Touching the Smart Board with a finger or an interactive pen is possible. Screens can be recorded as videos or still images. Magic pen, zooming, hidden screen, and shade screen make highlighting or hiding content easy. Smart Notebook's zooming, hide screen, and shade screen functions make highlighting or hiding content easy. Smart technology is said to be "interactive". Smart technologies are said to "enhance learning" by increasing student "interest" through "active engagement". According to this theory, using intelligent technologies can "improve learning" by raising student "interest" through "active involvement". A common conclusion is that smart technologies encourage students to learn by getting them involved and involved. Extrinsic motivation can help explain why people are emotionally and actively involved in something.

- **The Importance of Books in Education: An Undeniable Source [21]**

  Books are an important part of education. They are the basis for everything else you learn. Without books, it would be hard for students to learn. They wouldn't know where to start and wouldn't be able to tell how they were doing. Also, books give you different points of view on a subject, which is important for critical thinking. People often say that books are the most important part of education. Teachers can

use them to teach their students about new topics, and students can use them to learn more about the world around them. Books can also be used to help people think more critically and creatively. Books are an important part of doing research. They give background information, introduce new ideas and theories, and talk about a topic from different points of view. You can use books to back up your own ideas or question those of others. Books are important for education because they give students the chance to learn about new and different topics, improve their critical thinking skills, and practice their writing skills. Books can also give students ideas and make them want to do better.
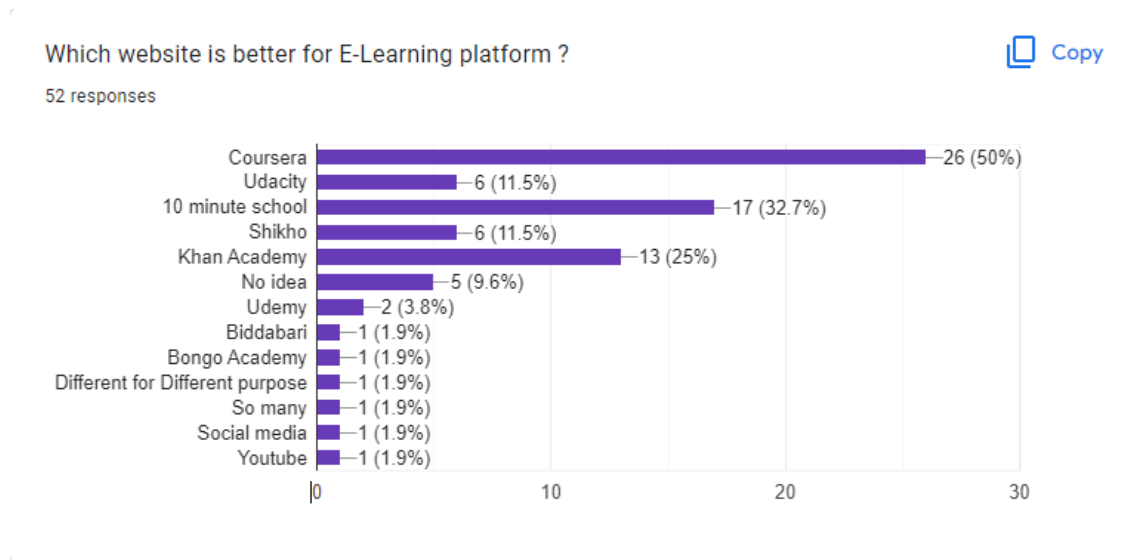
2.3   Survey
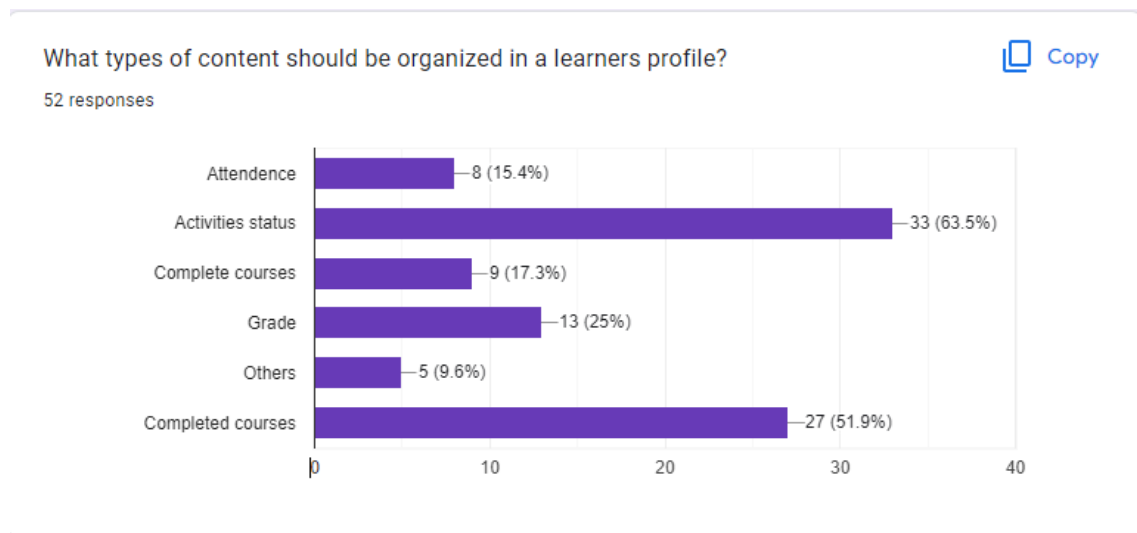
52 User's Responses

Figure 2.1: Popular Site

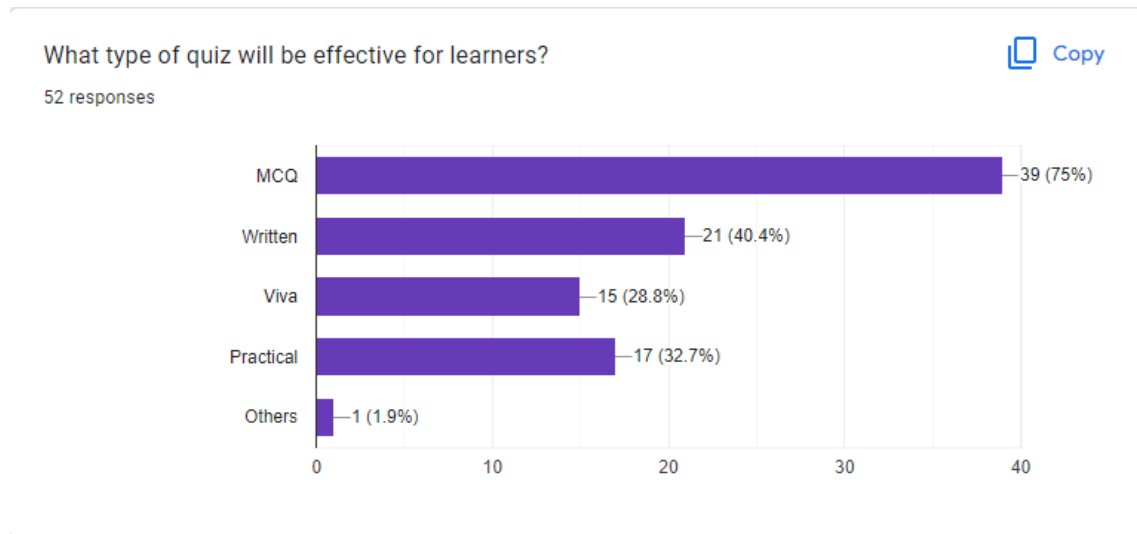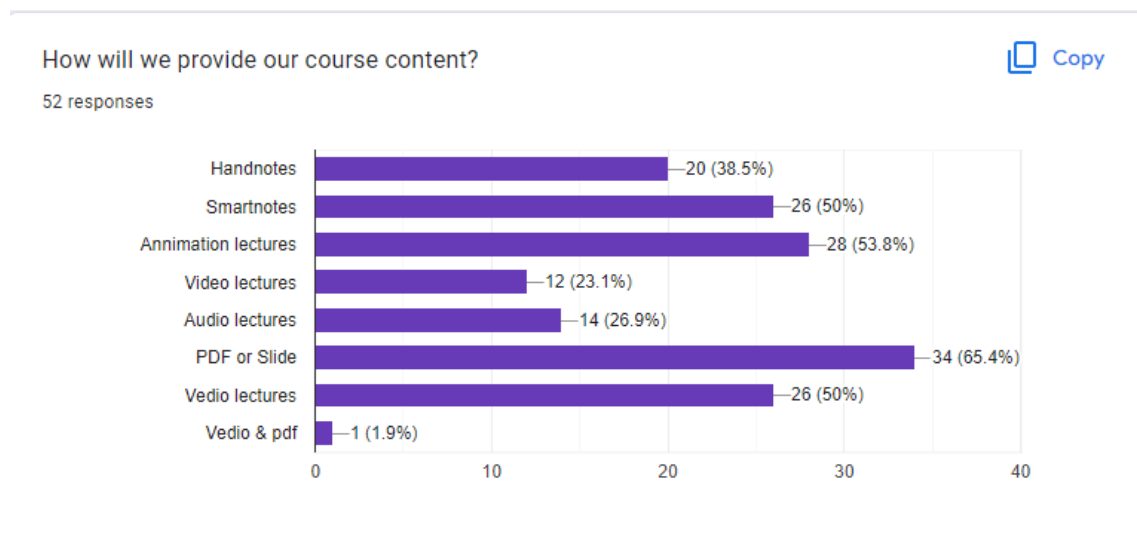Figure 2.2: Learners Profile

Figure 2.3: Quiz Type
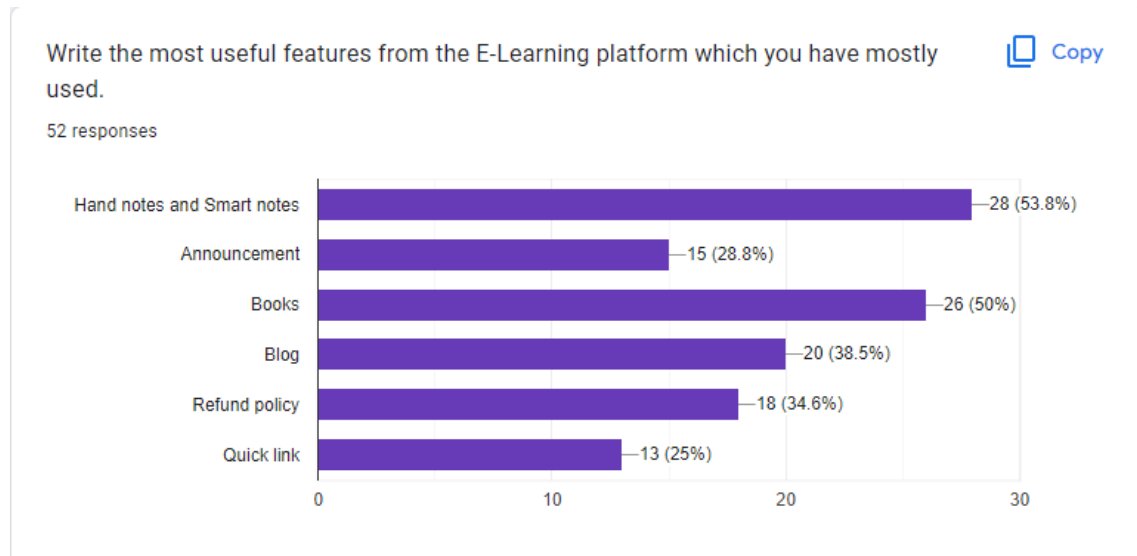

Figure 2.4: Popular Content

Figure 2.5: Most Usable Content

Figure 2.6: Certificate

2.4 Gap Analysis

Gap analysis compares the current state to the desired state or objective. It helps organizations improve their processes, goods, and services to meet their goals.

- **Books:** A book is a way to store information in the form of words or pictures, and it usually has many pages. In our system we try to provide the relevant books whereas many other systems don't focus on it.

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- **Messages:** Message is a great source of communication between the instructors and learners. Our system enhances this communication by providing the message system on which learners can message to others and discuss the important topics.

- **Blog:** Blogs are often interactive where readers, learners can learn many educational blogs. A few platforms offer this and we also include this section so that learners can read posts and can leave comments.

- **Learning Tools:** Learning Tools are a set of features that help all learners with reading, writing, math, and communication. They are available on a wide range of platforms. We utilized different tools such as tutorials, online free courses, syllabus which increases the potentiality of learners.

- **Hand Note:** We provide hand notes and smart notes for learners in our system. It's one of our system's greatest advantages because so many other systems lack similar features, but learners also greatly benefit from it because it enables them to quickly review the subject.

After the gap analysis it can be stated that our projects can identify the opportunities for improvement, and demonstrate the strength of the proposed system.

2.5 Summary

In this chapter, we've covered a number of comparable applications to our project. Subsequently, based on the conversation, we conducted a benchmark study. Then, we shared a summary of the research literature that we had reviewed to get further insight into our study. Then, we examined the gaps we saw when reading those papers and considering comparable applications.

Chapter 3

Project Design

3.1 Requirement Analysis

The process of finding out what users want from a new or changed project is called "requirement analysis." This section discusses our project's functional and non-functional needs.

3.1.1 Functional Requirements

In functional requirements are some specific services that the system should deliver, as well as how the system should react to extraordinary inputs and behave in exceptional situations, calculations, data processing. The system specifies the functionality that developers must include in the product to ensure that users can do their duties effortlessly.

1. The system must allow the learners to attend a quiz.
2. The learners are allowed to get access for the course.
3. The learners will be able to see their performance.
4. The affiliated institutions can develop, upload, update, and take down the courses.
5. Should be able to verify learners' availability to attend the quiz.
6. Data from the educational system should be able to be stored.
7. The system should allow learners to login to the system using their username and password.
8. System should allow them to see the time left during the exam.

3.1.2 Non-Functional Requirements

This document goes into detail about the non-functional qualities that software systems need to work better. Some examples are security, portability, reliability, reusability, application compatibility, data integrity, scalability capacity, etc.

1. Exams will be handled with the correct answer sheet which is provided by the teacher.

2. Has to take less time to operate and be efficient.

3. Have no security leaks.

4. Maintain the sequence of lectures and quiz.

3.2 Diagrams

3.2.1 Use Case Diagram

A use case diagram depicts how a user could interact with a piece of software or hardware. Use case diagrams, which are typically augmented by additional diagrams, represent the system's many use cases and types of users. Illustrations of use cases often include circles or ellipses. Our project's Use Case Diagram is depicted in picture 3.2.1.
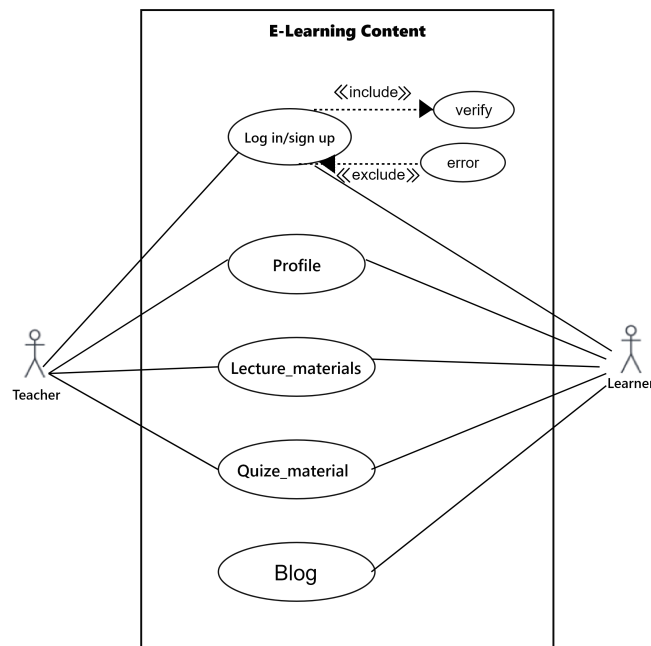

Figure 3.1: Use case diagram

3.2.2   Context Diagram

The entities in our context diagram are instructors and learners. The instructor will provide content which helps learners and also evaluate learners. The learners benefit from the content which is provided by the instructor and attend several quizzes.
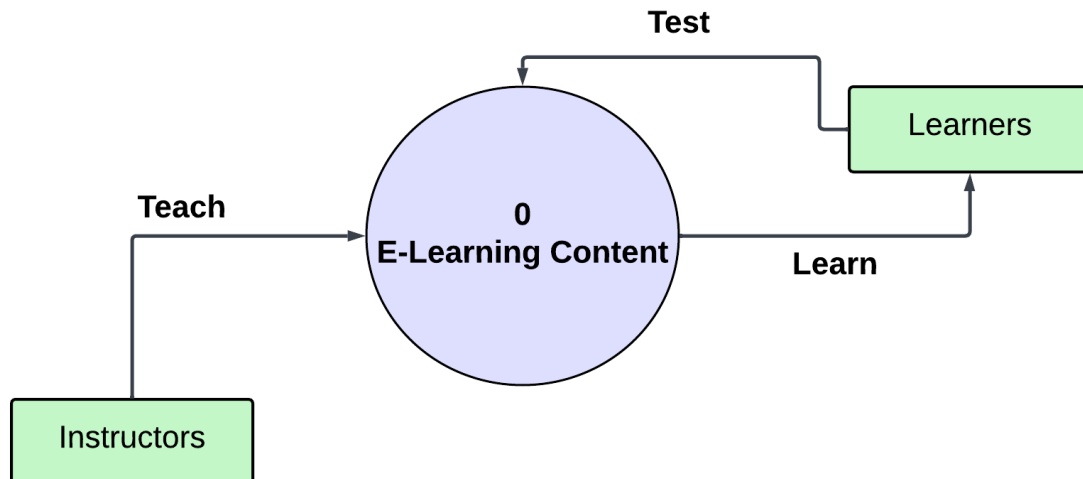

Figure 3.2: Context Diagram

3.2.3   Data Flow Diagram Level 1

The DFD level 1 entities in our project are Learner and Teacher. There are five processes in all, with two databases: User Data and Quiz Result Data. Quiz materials may manage the quiz marks and track corresponding student information from the quiz result database.
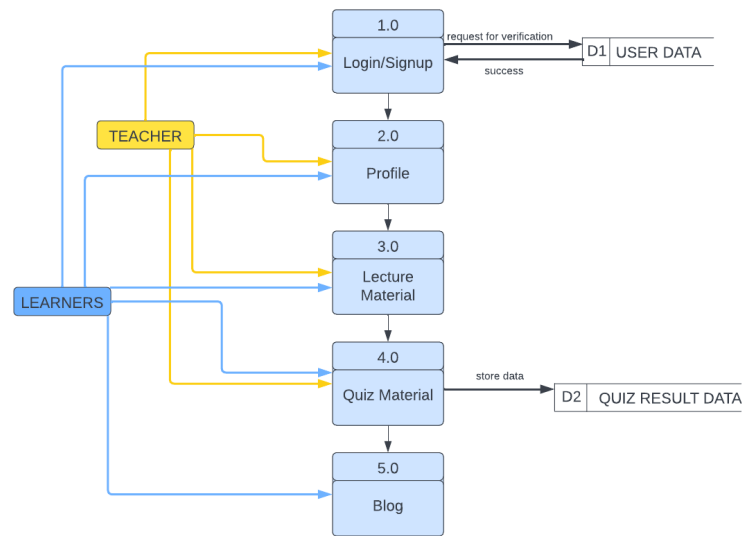
Figure 3.3: DFD Level 1

3.2.4 ER Diagram

An entity relationship diagram (ERD), which is also called an entity relationship model, is a picture that shows how people, things, places, ideas, and events in an information technology (IT) system are linked to each other. In our system there are 9 entities like message, book, quiz, learner, teacher, notes, course overview, blog and have corresponding attributes with entity relationship.
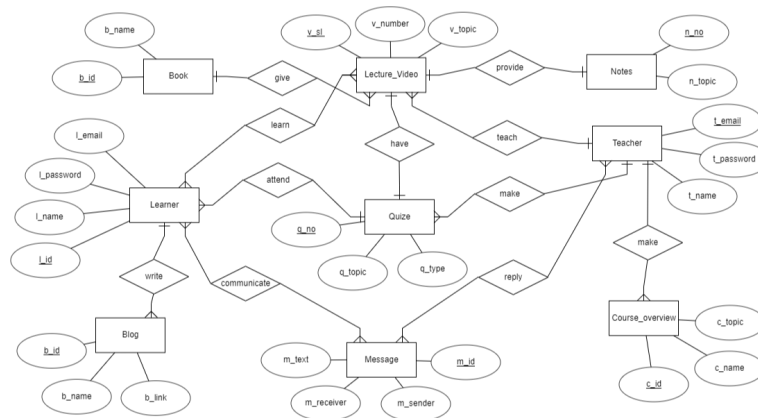

Figure 3.4: ER-Diagram

3.3   Design
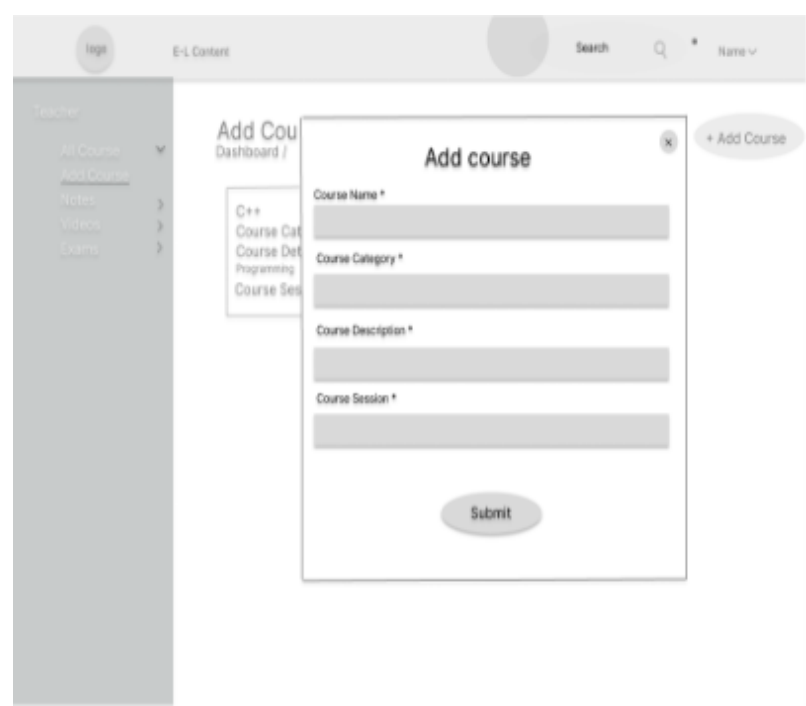
3.3.1   WareFrame
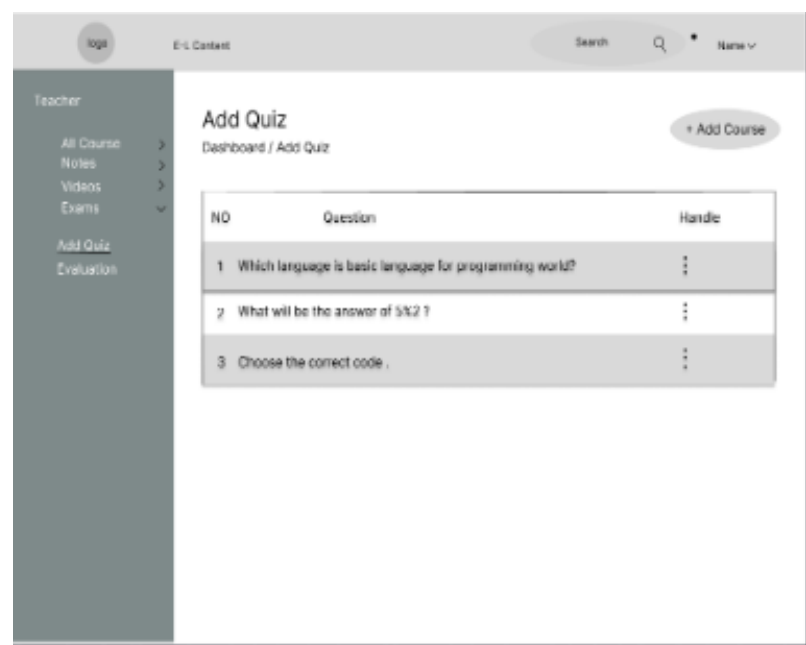

Figure 3.5: Adding Course
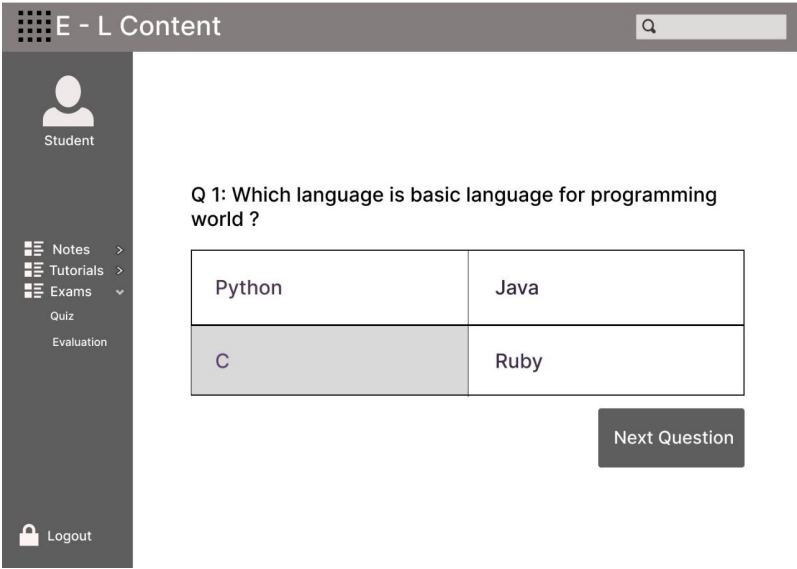

Figure 3.6: Quiz

Figure 3.7: Quiz attend

Figure 3.8: Quiz attend
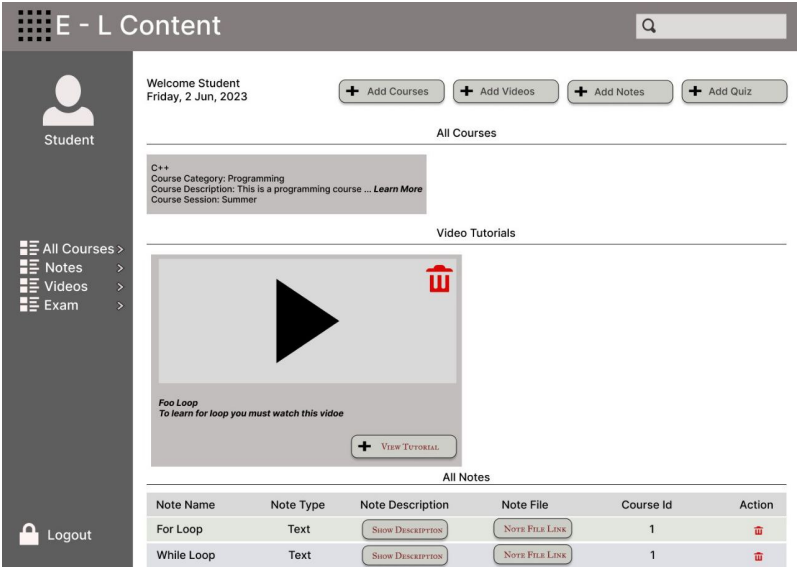
Figure 3.9: All Content

3.3.2   UI Design
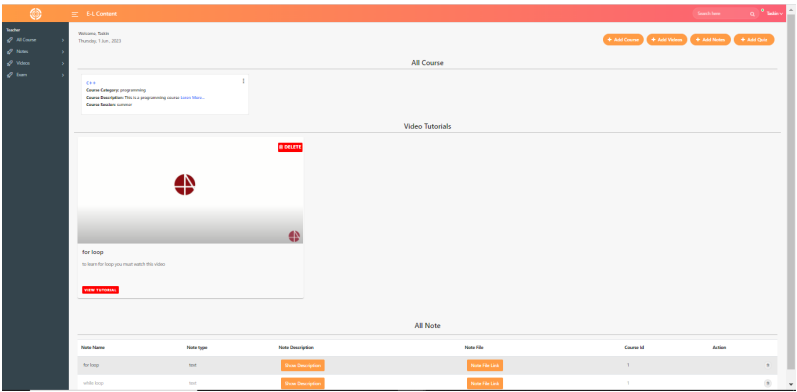
Figure 3.10: All Content
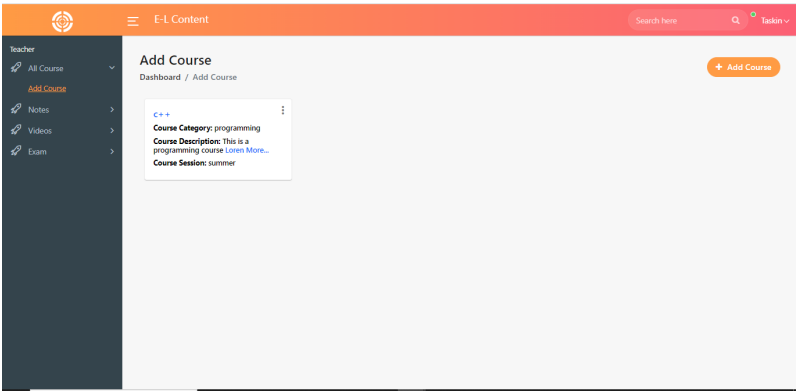
Figure 3.11: Course
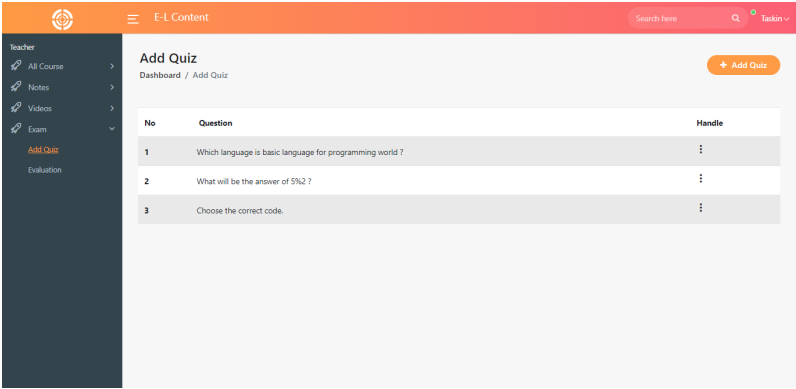
Figure 3.12: Questions
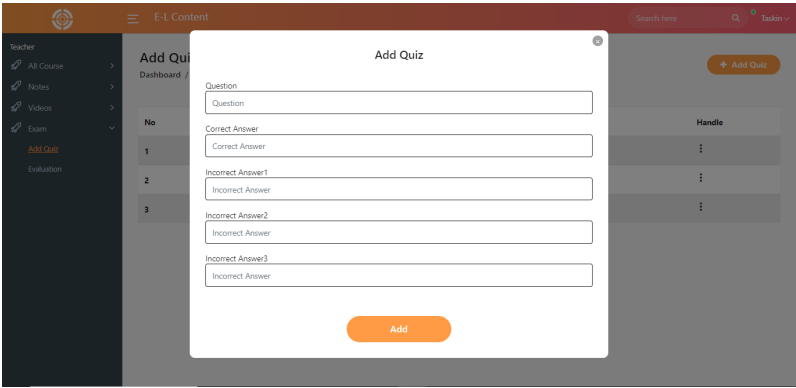
Figure 3.13: Add Question
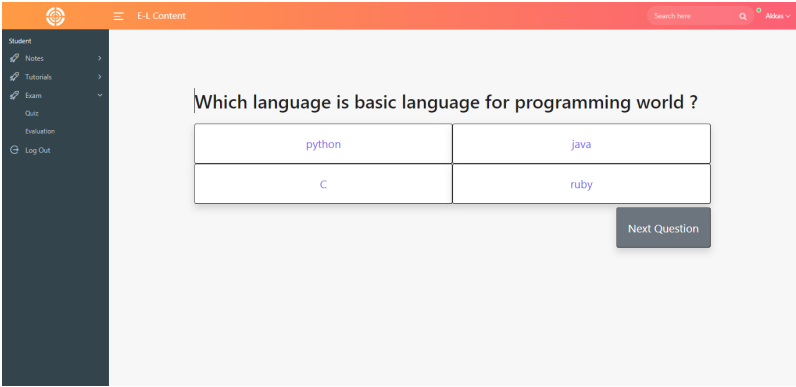
Figure 3.14: Attempt Quiz
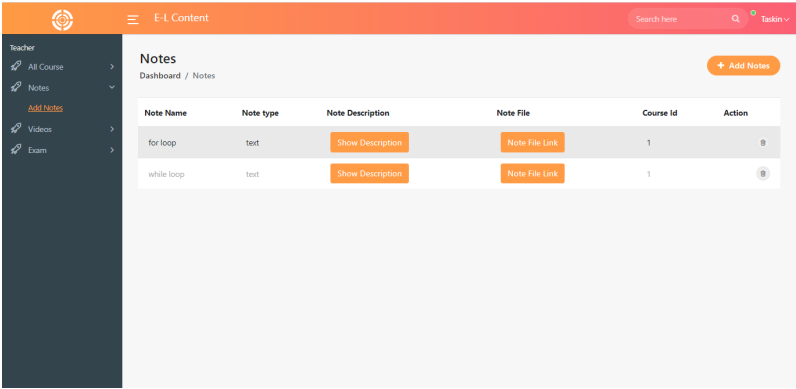
Figure 3.15: Note
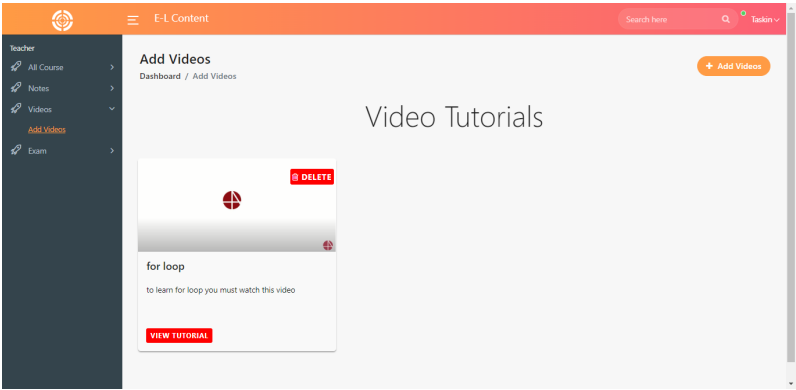
Figure 3.16: Videos

3.4   Project Plan

3.4.1   Gantt Chart
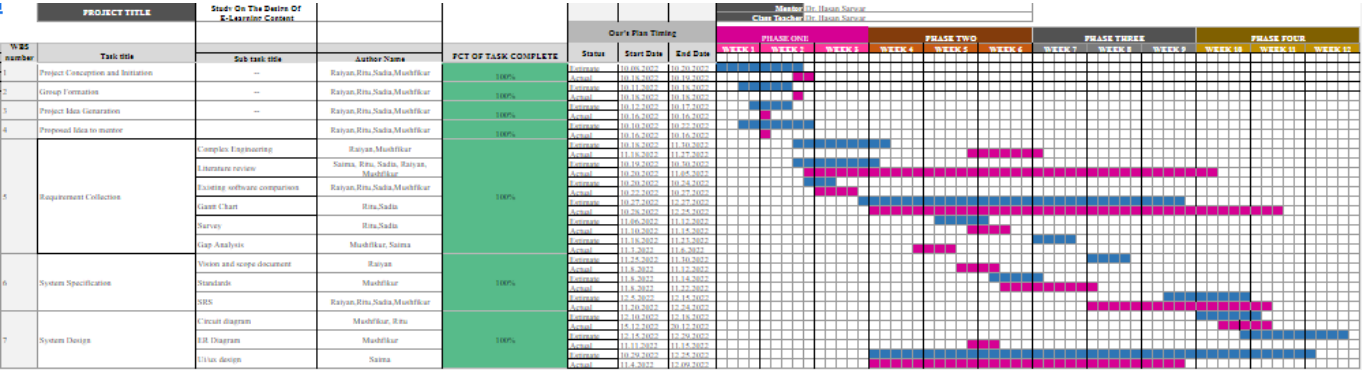
Figure 3.17: Gantt Chart FYDP - I

3.5   Task Allocation

Task Name	Author —
Use Case	Ritu—
DFD	Sadia, Mushfikur—
ERD	Ritu, Sadia—
Ui Design	Raiyan, Mushfikur—
Ganttchart	Ritu, Sadia, Mushfikur—

Table 3.5: Task Allocation

3.6   Summary

In this part we mentioned our important criteria here, covering functional and nonfunctional requirements, as well as required diagrams such as context and data flow. We've also created our sample UI design.

Chapter 4

Implementation and Results

4.1 Environment Setup

4.1.1 Coding Environment

Here, we are using Visual Studio code. Vs code is an open source software application. It can debug, highlight syntax,generate intelligent code, and embed Git.

4.1.2 Version Controlling Environment

In the following part, we will discuss our version control. For such a vast project, we require a platform for version control so that we can efficiently track group contributions and inspect for errors. Google Drive, Git and Github are chosen for version management.

Google Drive: Google Drive is a storage platform which stores any kind of file and shares with others.

GitHub: GitHub is an online repository hosting service and version control system for software development utilizing the git command. It is currently the most prevalent in both professional and non-professional settings.

4.2 Design Environment

Frontend: The front end of our project was developed with the help of vanilla javascript, React.js and Bootstrap.

Backend: Node.js was the main technology that we used for the back end of our project. In addition, we built our project using a node.js framework called express.

Database: MySQL Database is a client/server system that consists of a multithreaded SQL server that supports different back ends, several different client programs. We used

Sequelize to connect react js with mysql database.

4.3   Testing and Evaluation

The software development process must include testing. We also planned our project's testing processes. We'll employ three different testing methodologies.

1.   Unit Testing: Unit testing is a method for determining whether or not each individual function in Our project is running appropriately. In our website, we run unit tests for every particular content (Adding quiz, Adding note, Adding video, Removing video).

2.   Integration Testing: If a feature passes each unit test, it will be integrated with the other features of the project and its functionality as a whole will be evaluated. In our website, we run integration tests for every particular content(Adding course, Blog).

3. System Testing: After unit and integration testing, the entire system will be operational, and we will test it using the Black-Box software testing methodology. With this method, we will not intervene with the project's inner workings; instead, we will focus on our system's inputs and outputs to determine whether it is generating the desired results.

4.4 Results and Discussion

4.4.1 Results

The following features have been developed thoroughly by us.

1. Course Management: Instructors/Course providers have the ability to post, modify, and delete their courses.

2. Content: In our website, we create several major content such as videos, notes, and quizzes.
–**Video:** Learners can view those videos which are provided by the instructor. Instructors can add/delete/update videos.
–**Note:** Learners can view those notes which are provided by the instructor. Instructors can add/delete/update notes.
–**Quiz:** Learners can attend those quizzes which are provided by the instructor. Instructors can add/delete/update questions.

3. Blog: Learners can read the blog articles and learn about a variety of course-related topics.

4. Content Security: Our platform's video material is kept securely. Learner's cannot download them with a video downloader or capture their screen while the video is playing.

4.4.2 Discussion

We have had to deal with a small number of significant challenges. When making e-learning websites with video courses, the videos are usually connected in the You tube/drive links, where notes can be kept, while the credentials are kept in a separate database.
We did the same thing as well. So that they can be streamed quickly, the videos on our platform must be connected in the drive links. At first, we stored the content and credentials on the MySql server. We looked for and compared different hosting services until we found what we needed. However, the site does not have any broken pages and all pages are implemented.

Chapter 5

Standards and Design Constraints

5.1 Compliance with the Standards

In this chapter we will mention the standards that are related to our project. For each of the standards, we've discussed the alternatives with pros and cons.

5.1.1 Software Development Life Cycle Standard

The software development life cycle (SDLC) explains the different stages of software development. It's a framework, which defines tasks performed at each step in the software development process. In our System following (SDLC), will maintain software code of Ethics and Professional Practice in making the planning, Define Requirements, Design and Prototyping, Software development, Testing, Deployment, Operations and Maintenance. As a result SDLC will deliver high-quality software by creating it in a systematic manner.

5.1.2 Coding Standards

A coding standard makes sure that all of the codes that different engineers write look the same. It makes the code easier to read and maintain, and it also makes it simpler. In our project by maintaining the coding standards, we will use the Java Script with React framework to construct our system. Then we'll take forward the Java Script through positive collaboration and standards.

- **Documenting:** Well documentation is necessary.So The code should have proper comments so that it is easy to understand. Comments about the statements help make the code easier to understand.

- **White space:** Indentation must always be done with two spaces. Using consistent indentation and whitespace helps to make code more readable.

- **Naming:** When naming, lowercase camelCase must be used for all of the properties, functions, and methods. As a result, it'll reduce the amount of comments needed to explain the purpose of a particular function.

- **Comments:** In the event that anything in the code is unclear when you return to it six months from now, utilize the comments to clarify it.

- **Avoid using global variables:** Global variables are accessible from any scope, which can lead to unexpected behavior and difficult-to-debug errors. To avoid these issues, it is best practice to use local variables instead of global ones whenever possible.

- **Keep code DRY:** It means Don't Repeat Your code.When code is DRY, it's more concise and organized, making it easier for developers to understand the logic behind the code.

- **File Extensions:** According to the JavaScript coding standards and conventions, the HTML file ought to have a.html extension, the CSS file ought to have a.css extension, and the JavaScript file ought to have a.js extension. These are the required extensions for the files.

5.1.3 UI/UX Standards

UI/UX standards are design guidelines that help create a consistent user interface across different devices, platforms, and contexts.They help designers create an easily navigable experience for users. So, the UI of our system focuses on an extensive understanding of users, their needs, their values, their talents, and their constraints. The following are some of the most important standards we will adhere to:

- Visibility of system status.

- Match between system and the real world.

- User control and freedom.

- Consistency and standards.

- Error prevention.

- Recognition rather than recall.

- Flexibility and efficiency of use.

- Aesthetic and minimalist design.

5.1.4   Ethical Standards

Ethical standards are a set of principles. It is used to make engineering a beneficial respected profession and the efforts be used for good. As software engineers, we are required to abide by six principles in order to fulfill our responsibility to the users confidentiality and security. These principles are vital to us since they form the foundation of our organization.

- We'll always keep the user's interests first

- We'll disclose any software-related dangers so that our user never faces any danger which is harmful for them.

- We'll ensure adequate documentation, testing, debugging and review.

- We do not engage in any deceptive financial practices and maintain professional objectivity while handling related documents.

- We won't keep any information from my team, our stakeholders, our users, or the public community that could hurt them.

- We will not treat someone unfairly on the basis of any irrelevant preconceptions that they may have.

- Anybody who raises ethical concerns about our project will not be punished in any way.

- We shall not store any data in our system that might endanger our users.

5.2   Design Constraints

The boundaries that a project must work within are known as project constraints. To ensure that projects are completed successfully, we must incorporate the balance between these constraints. There are several constraints related to our projects are discussed below:

- **Economic Constraints:** There are several economic constraints that may affect the outcome of our projects. Budget available for developing e-learning content may be a significant constraint, as it may determine the types of resources that can be used in the projects. Cost of technology and delivery are also minimized in order to receive a potential return on investment for this project.

- **Ethical Constrains:** It is the most crucial constraints related to the system. We need to address with these constraints so that the vital information or data may not be leaked. In order to solve that we may utilized privacy, confidentiality and

security protocol. These protocols will secure and protect against data breaches and unauthorized access.

- **Social constraints:** There are several social constraints that may affect the design of e-learning content. The social and physical context environment in which learners will access the e-learning content, such as at home or in a classroom, may impact the design of the content. Also, the social norms and expectations of learners should be considered in designing the system.

- **Health Constraints:** During the developing of the project we also focus on the health concerns of the teachers and learners. To accommodate all these issues we planned to take adequate steps. Such as we will provide proper visualized diagram, scripts, simple navigation so that the vision, hearing and cognitive impairments do not harm.

- **Sustainability:** Sustainability is an important consideration in the design of e-learning content, as it involves finding ways to minimize the environmental impact of the content and ensure that it is effective and efficient over the long term. In our systems we introduce the flexible and adaptable strategies can be used and reused in different contexts, reducing the need to create new content and minimizing waste.

5.3   Cost Analysis

The following table 4.3 depicts our project's budget estimate.

Serial No	Criteria	Per/Month	Per/Year —
1	Article Analysis	-	1,500 —
2	Domain Registration (1 Time Fee)	-	3,000 —
3	Web Hosting (Dedicated Server)	7,000	84,000
4	Website Content (Logo Design) (1 Time Fee)	–	1,200
5	Website Content (Content Writing)	2,500	30,000
6	Ui/Ux design	–	1,20,000
7	Custom Development	–	2,20,000
8	Server Security(Cyber Threats - SiteLock)	3,950	47,400
9	Server Security(Backup Service CodeGuard)	3,900	46,800
10	Qualify Assurance	–	4,25,000
11	Maintenance Cost	–	2,20,000
12	SEO and Marketing	–	2,50,000
-	Total	-	1,428,900

Table 4.3: Cost Analysis

5.4   Complex Engineering Problem

5.4.1   Complex Problem Solving

This section contains a mapping of problem-solving categories. For each mapping, we've included justification subsections (Table 4.3).

P1 Depth of Knowledge Required	P2 Range of Conflicting Requirements	P3 Depth of Analysis Required	P4 Familiarity of Issues	P5 Extent of Applicable Codes	P6 Extent of Stakeholder Involvement And Needs	P7 Interdependence
✓	✓	X	✓	X	✓	✓

Table 4.4.1: Mapping with complex problem solving

P1(Depth of knowledge required)

In our project we cover Washington accord profile WK3, WK4, WK5, WK6 and WK8

- WK3 : Theory based all kinds of Formula, which necessary for engineering

- WK4 : Frameworks type all the things

- WK5 : Support design in a practice area for engineering

- WK6 : Support technical area for engineering

- WK8 : Research literature

P3(Range of Conflicting Requirements)

- Unwanted interruption during exam

- If any kind of action of one feature hampers another

P4(Familiarity of Issues))

- Cheating is unavoidable

- Plagiarism can be happened

- False evaluation

P6(Extent of Stake-holder Involvement And Needs)))

- Stakeholder: Dino, Developer Team, Instructors

- WK Needs: Learners

P7(Interdependence))))

- The features of our system have many sub-features. For instance, A feature named Classroom has Sub-features like Lecture, Note, Resource, Exam etc.

- WK One cannot watch the next lecture video unless attending an exam on the previous lecture.

5.4.2 Knowledge Profile

In this part of the report, we have presented a mapping along with the knowledge profile.

K1 Natural Sciences	K2 Mathematics	K3 Engineering Fundamentals	K4 Specialist Knowledge	K5 Engineering Design	K6 Engineering Practice	K7 Comprehension	K8 Research Literature
X	✓	✓	✓	✓	✓	X	✓

Table 4.4.2: Mapping with Knowledge profiles

Chapter 6

Conclusion

Content is one of the most important elements to a growing E-learning system. Design of the system to identify content is challenging. By defending those challenges we finalize some of the content as a top category. As a research of the content we can put "Lecture video" at the top. Because besides the written topic it will be better understandable to learn. World's top ranked University Princeton and MIT started collecting and making public numerous recordings and also supplying them for their learners. Which proved how important this content is and there should be no doubt. Another content quiz is always the top trending topic. It must be creative and employ reduced techniques which are successfully incorporated into the learning process. This dynamic development requires ongoing adaptation in education. Numerous scientific studies have shown that providing quick feedback may significantly boost motivation and interest levels, and quizzes are an effective technique for this. In this study, we set out to discover how online quizzes' possibility for continual, self-monitoring practice impacts student progress. And another type of quiz that is only for practical purposes that is held on site without any marking but it will show the answer is correct or not. It's also a great helper content to learn more efficiently. There is more other content like a book, course overview, note and blog. Here the course overview is a content where all the details of the course will be explained in detail. Design of the syllabus is the first opportunity to make a positive impression on pupils. learners may become encouraged by policies and directions that are stated in an impersonal and harsh manner. Note is most important for learners to achieve the easy and comfortable path. This note is one kind of a paper which is highlighting or written by hand of the instructor. One of the most significant sources of free information that is extremely beneficial and allows for unrestricted content exchange are blogs. They enable users to post, modify, and publish articles to build an online environment without having to know complex programming. Through reflection-based learning processes, blogs can support good learning experiences for adult learners. Research on minority learners' opinions on blogging for learning is scarce.

6.1   Summary

E-learning content is a system which will help to fully fill learners' needs. It can be used alone or in conjunction with other technologies to support the development of a more engaging and interactive teaching methodology.

6.2   Limitation

Problems will arise when performing any task. Along the way to finishing our project, we ran into numerous issues. We have highlighted a number of key issues from each of them. Certain specifics of the content are not included in any article. We need to spend more time on that content. It gets harder because some of them aren't free. In this case, we must locate a system that is designed for learners. Data collection has become more challenging because, in general, learners are not familiar with internet platforms at the time of the survey. Even though we've run across a lot of issues, we've always worked to find solutions.

6.3   Future Work

Additionally, there are certain future plans that will aid in the system's continued improvement. By incorporating materials like "Digital Note." The functionality of this note, which the teacher will offer, may be created with AI or Js, as will be detailed in more detail during implementation. The digital black-and-white video clip created by this content. For instance, a teacher might draw a portion of the board to help explain a concept. They will draw in this app during this process, and it will then change into a live, running picture element. so that it would be simpler to comprehend and will automatically create a good animation. Another content can be chosen "Audio content". It will function similarly to a handwritten letter. For example, imagine you occasionally need to communicate information but don't have enough time or for any other reason. In this case, sending a voice message is preferable to sending a notice or handwritten note because it is simpler to understand. Another important content may be "own file content" that will be used to store own documents for their personal use. None can see them and download them.

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