

## Educational Website (E-Learning)

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**Abstract-**Electronic learning, sometimes known as e-learning, is one of the most crucial parts of today's world. E-learning refers to any type of learning or teaching that is aided by technology. Whether or whether networked learning is used, knowledge and communication systems use specialized media to carry out academic processes. While advancements in terms of devices and curriculum continue, the term is likely to be used to refer both out-of-classroom and in-classroom educational experiences via technology. E-learning is the transfer of skills and knowledge using a computer and a network.

Web-based learning, computer-based learning, virtual education opportunities, and digital collaboration are all included in e-learning apps and processes. The Internet, intranet/extranet, audio or video cassette, satellite television, and CD-ROM are all used to provide content. It can be self-paced or instructor-led and incorporates text, image, animation, streaming video, and audio as well as other material.

Abbreviations like CBT (Computer-Based Training), IBT (Internet-Based Training) or WBT (Web-Based Training) are used as synonyms to e-learning. these days one will still realize these terms being used, together with variations of e-learning corresponding to e-learning, E-learning, and eLearning. The terms are going to be utilized throughout this text to point their validity beneath the broader nomenclature of E-learning.

Because of its flexibility, the demand for e-learning has been increasing day by day. E-learning systems are gaining attention among students and academics because they are location and time independent, which solves the flexibility problems in learning new things. Most e-learning systems are implemented on the Internet. The e-learning system needs to be standardized due to increasing demand to increase the quality of existing systems. Therefore, the purpose of this e-learning platform is to provide students with knowledge through this website. The required software is readily available and easy to use. This website will offer many courses and students can access these courses for their learning purposes. Courses are available for free and also paid depending on how the lecturer chooses to publish their course. Therefore, it will help students make better use of resources.

### I. INTRODUCTION

Nowadays e-learning is a mainly online-based learning process. This technique uses Internet technology to design, implement, manage, support and enhance learning, and can greatly improve learning performance. E-learning uses electronic technologies for the teaching and learning method. large number of e-learning definitions; however, all definitions describe the general use of electronic media in the context of the teaching and learning process. K.H.Fee defines e-learning as any learning that involves the use of the internet or intranet. The term e-learning encompasses many things, especially online learning, distributed learning, virtual learning, networked or web-based learning.

E-learning might be a widespread technology today and the actual conception of e-learning is explained in this section. Because the nature of learning differs from characteristics and activities that employ computers and the permitted network that connects those computers, e-learning is frequently defined. E-learning, according to a researcher, is a means of exercising and supplying data through online media, as well as exchanging knowledge with someone on the other side of the world over the Internet.

E-learning can be seen as a variant of self-collaborative learning and has close collaboration with the teacher and the student and can move with each other through websites and typical chat functions. There are various technical advances towards e-learning and it has taken many forms, and there are various service providers offering extremely integrated e-learning environment and key among them is Moodle.

Since the letter "e" in e-learning means "electronic", e-learning includes all academic activities managed by professionals, individuals, teams or organizations, online or offline, synchronous or asynchronous via computers, networked or stand-alone and alternatively electronically working devices. Although there are various disadvantages and advantages, we

should not always see e-learning as a form of communication. It would pose some challenges for the teachers to understand the students' perceptions or views about the courses where face-to-face communication does not take place. As the world becomes more and more connected every day, all kinds of services are going digital. And the teaching profession is no different. From old-school academics to the latest generation of knowledgeable people, everyone seems to be engaging with e-learning media.

Platforms like Udemy, Coursera, and Khan Academy have thrived in this market. With the right platform with elegant features, you can build an e-learning empire together and grow teachers and students. This is why we tend to build an e-learning empire and allow educators or teachers and students to grow with the right tools and also the right mindset.

## II. MATERIALS AND METHODS

E-learning is critical in the development of a digitally literate workforce as well as in addressing society's ongoing requirement for rapid lifetime learning. According to Kandies and Stern, web-based learning environments provide students with active, self-directed learning opportunities with upgraded learning materials (1999). As a third generation of e-learning, socialising, collaborating, project-based learning, social bookmarking, networking, and online simulations are being added.

## III. LEARNING

Technology, pedagogy, and persons all contribute to the effectiveness of e-learning. It is easier to teach and learn with technology-enhanced learning. The rethinking of the function of a teacher leads to changes in the meaning and content of learning. Full stack MERN was used to develop this e-learning platform.

MERN Stack is a Javascript stack that makes it easier and faster to deploy full-stack web applications. Mern stack is a popular stack technology for constructing a single-page application today. There are four technologies in the MERN Stack: MongoDB, Express, React, and Node.js. MERN makes the improvement process easier and more efficient. There are four successful technologies that provide builders with a cease-to-cess framework to work in and each of these technologies plays a crucial role in the development of net applications.

MERN, MongoDB, Express, React, Node, is the name given to the 4 pieces of the stack.

- MongoDB - It is a file primarily based totally open supply database.
- Express(.js) - It is an internet software framework that makes it less complicated to code an internet server in javascript.
- React(.js) - It is a javascript frontend library for constructing consumer interfaces.
- Node(.js) - It is used to permit javascript to run outdoor a browser in locations like an internet server.

How does the MERN stack work?

The MERN structure permits you to create a 3-tier structure (frontend, backend, database) completely the usage of JavaScript and JSON.

Middle-tier packages use Express and Node. There are servers to assist Express.js and Node.js. Express.js is a server-aspect net framework, and Node.js is an effective JavaScript server platform. Regardless of the JavaScript and JSON version you pick out, ME(RVA)N is the precise manner to paintings with those technologies.

Developers can pick out from quite a few libraries to be had in Node.js. Server-aspect rendering with a low barrier to access makes Next.js is a popular platform among developers.

We have divided our e-learning portal into three mainly stages or layers, which are:

First we have the Client Side, also known as the Front-End Side, working with the local server 3000. We used React.js in this case because it is a JavaScript front-end library and since we are using the JavaScript programming language. On a website, the part that the user directly interacts with is called the front end. The user interface consists of everything the user interacts with directly: text colors and styles, images, graphs and tables, buttons, colors, and navigation menus. HTML, CSS, and JavaScript are all languages used for Front End development. Developers implement everything seen on browser screens when websites, web applications, or mobile apps are opened, including structure, design, behaviour, and content.

Performance and responsiveness are two main goals of the Front End. There should be no abnormal behaviour on any part of the website regardless of screen size, which means that the developer must ensure that the website is responsive.

Languages used for front end development: The front end portion is developed using the languages below:

HyperText Markup Language is the abbreviation for HTML. Using markup, it is used for developing the front-end component of a web page. A web page is HTML with Hypertext and Markup. Links between web pages are defined by Hypertext. HTML markup language is used to define the structure of a web page's text documentation.

A CSS file, also known as Cascading Style Sheets, is a specially designed language intended to simplify the process of creating attractive web pages. It allows you to add styles to your page. In addition, CSS enables you to do this independently of the HTML that makes up each web page. There is a famous scripting language called JavaScript that is used to create magic on websites to make the user experience more interactive. Cool games and web-based software can be run on it to enhance the functionality of a website.

In addition to these languages, one can use many frameworks to develop front-end applications, for example, Flutter uses Dart, React uses JavaScript, Django uses Python, among others.

Frameworks and libraries for front end development:

The JavaScript library React plays a declarative, efficient, and flexible role in building user interfaces. In an application, ReactJS is responsible solely for the view layer, as it is a component-based library.

Server Side, which is also referred to as the Back-End side on the local machine 5000, is called the Middle Layer. Express.js and Node.js can be used for this. Real-time applications can be built with Express.js and JavaScript can be run using Node.js. Servers store data and arrange it, and they ensure that the website works properly on the client side, too. The restricted area is the part of the website that you can't see or interact with. It is the portions of the programme that are not directly associated with the users that are in direct contact with them. Through a front-end application, users can access the components and attributes established by backend designers. Without UIs or even scientific programming systems, you can write APIs, construct libraries, and work on system components in the backend.

Programming languages for the backend: The backend is written in Node.js, an open-source and cross-platform runtime environment that allows JavaScript code to be executed outside of a browser. NodeJS and its programming language are not comparable to frameworks. It appears that the majority of people believe it is a programming language or framework. We frequently utilise Node.js for back-end services in addition to constructing applications like APIs and Web Apps. PayPal, Uber, Netflix, Walmart, and other significant corporations use it in their manufacturing.

As a final layer, there is a database side, which also stores all the information collected. This is done with MongoDB. Information is stored in the form of documents (key value pairs). An open-source document-oriented database, MongoDB is the most popular NoSQL database available. 'NoSQL' is short for 'non-relational'. Essentially, MongoDB provides an entirely different mechanism for storing and retrieving data than is provided by relational databases. MongoDB stores data in a format called BSON (similar to JSON).

Material UI - This provides developers with material-based UI elements. They help cut back the time spent coming up with and developing applications. It's essentially a React framework.

@mui/styles: MUI is meant to supply a solid foundation for making dynamic user interfaces. For convenience, we offer the layout answer employed in MUI components as @mui/styles package.

@reduxjs/toolkit: this is often used for world state management.

Axios is a Promise-based hypertext transfer protocol shopper for Node. js and the browser. Sending asynchronous HTTP queries to REST APIs and performing CRUD tasks is straightforward using Axios.

Formik – is the world' most well-liked open source form library for React Associate in Nursing React Native.

Reactplayer is a React element that lets you watch videos from YouTube, Facebook, Twitch, SoundCloud, Streamable, Vimeo, Wistia, Mixcloud, DailyMotion, and Kaltura from a variety of URLs, including filepaths.

yup:Yup is a JavaScript schema generator that may be used to parse and support values. Create a schema, create a value that matches, validate the shape of an existing value, or do both.

For Backend we have used following modules:

NodeJs is a cross-platform JavaScript runtime environment based on the V8 JavaScript engine in Chrome. Node.js can run JavaScript code outside of a browser, making it perfect for building scalable network apps. Node.js is popular among developers since it can be used to build without the need for an HTML page and has its own module.

Express Js is a back-end web application framework that allows MERN stack developers to write applications more quickly by eliminating the requirement to write full web server code by hand in Node.js. Additionally, unlike a Node.js HTTP module, developers do not have to repeat the same code. Because Express facilitates fast development, comes with various functionalities as plugins, and has a minimalist structure, a MERN stack development business employs it to construct sophisticated web apps and APIs.

Mongo db is a cross-platform NoSQL document database that differs from relational databases in that it does not have a schema based on columns and tables. Remove the linings. MongoDB does not have a predefined schema and instead stores data as flexible documents that may be queried using a JSON-based query language. MongoDB is scalable and versatile as a result of this, especially because the content, size, and amount of fields in the documents can vary.

Mongoose is a mongodb framework. It is a MongoDB and Node.js Object Data Modeling (ODM) module. It handles data associations, does schema validation, and converts code objects into MongoDB representations.

bcryptjs: Using the bcrypt hashing function, we can create a password security platform that scales with computing power and always hashes each password with a salt.

CORS (cross-origin resource sharing) is a browser security feature that limits HTTP requests made by browser scripts. Allow requests to your API from a web application on a different domain by enabling CORS.

Body-parser is a body-parsing middleware for Node.js. It's in charge of processing request bodies in a middleware before you treat them.

JSON Web Token is an open standard for securely exchanging data between parties via a JSON object. JWT is a stateless authentication protocol for users and providers, which means that sessions are maintained on the client side rather than on the server.

Nodemailer: Nodemailer is a Node.js module that allows you to send emails from your server with ease.

passport: Passport is authentication middleware for Node.js.

passport-jwt:A Passport strategy for authenticating with a JSON Web Token. This module lets you authenticate endpoints using a JSON web token. It is intended to be used to secure RESTful endpoints without sessions

razorpay:Razorpay is a popular payment gateway in India used in e-commerce websites or any paid service. With few steps, you can start collecting money from your customers using this service.

Nodemon:nodemon is a command-line interface (CLI) programme created by @rem that covers your Node application, monitors the file system, and restarts the process automatically.

shortid: The NPM package'shortid' is used to generate short, non-sequential, url-friendly unique identifiers.

Starting with our website

We have three sections on the home page of our e-learning website: About, Login, and Contact. A section called InvisionLearnnovative provides login access for instructors, while a section called All Courses shows all courses created by all instructors.



Fig.1 Home Page of our E-learning Website Home Page:-

We created a Web Portal for this project. The user visits the Web Portal. First, the user must register with our web application. We have four sections on our e-learning website's home page: About, All courses, Login, and Contact Us. A user can see all the courses available on the page without logging in or creating an account by clicking on the all courses button. For enrolling, users must create an account. However, users can see the courses but not enroll. This is done through the signup page that is found on the login page. There is a separate login page for instructors and students. In order to create a student account, a user must click on the login button. Users who want to become instructors must click on the InvisionLearnovative button. Users can visit the contact us page by clicking on the contact us button in the center of the home page.

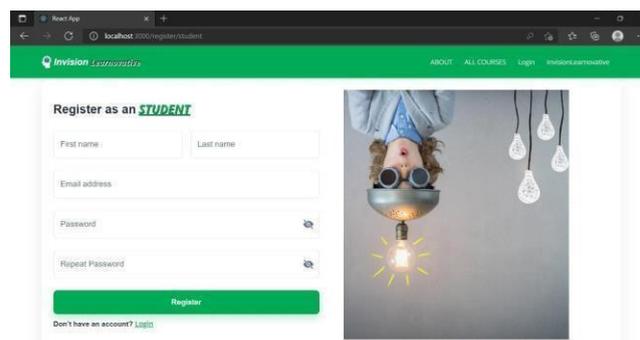


Fig.2 Registration page for student

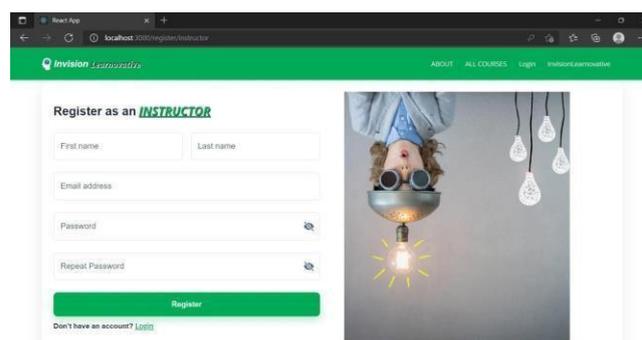


Fig.2 Registration page for Instructor

### Signup/Registration Page:-

This page requires the user to click either the login button or the InvisionLearnovative button. The user will then be directed to that page. The signup button can be found at the bottom of the login page. The user can create a student account by clicking on the signup button that appears on the student login page, and an instructor account can be created by clicking on the signup button that appears on the instructor login page. During this process, the user's data is sent or transferred to the backend using the fetch API. What is the fetch API? Application Programming Interface is what API

stands for. API is responsible for facilitating interaction between applications and users. Using a programming language, users can interact with applications. This is basically a bridge connecting the front-end and the back-end. First, we check if the email has already been entered into the database. There is a message stating that the email already exists if it is present. A validation of emails is also performed on the website. After a user enters his/her email address, a message will be sent from our InvisionLearnovative email address to activate his/her account. Using the wrong email id will prevent the user from registering for the website.

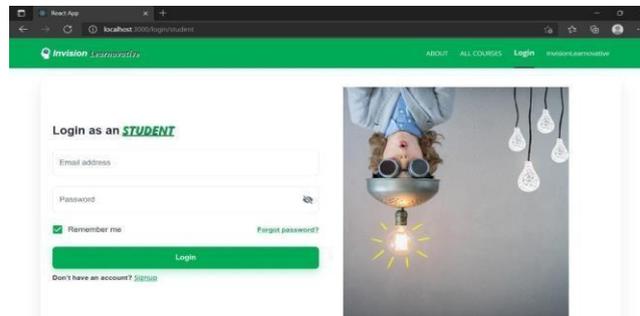


Fig 4. Login page for student Login Page:-

Once an account has been activated, the user can login to its respective account. The user who created a student account is only able to login to his/her student account and not as an instructor account, even if the user tries to login as the instructor account. Emails are checked in the database using APIs. The user can access the account if the email is already in the database by entering the password, but if the email is not present then the user is presented with a message indicating that no user has been found. In this case, the password is also checked against the password stored in the database, and if it matches, the user is logged in. For those who have forgotten their password, the forgot password button is available. Clicking on that button will direct the user to the forgotten password page. On that page, the user must provide their registered email address so that a password reset link can be sent to that address. By simply updating the new password with the old one, the user can reset his or her password, and then he or she can submit the new one by clicking on the submit button. The new password will then be added to the database. The user is then redirected to the login page. After the user login is done, all this data is rendered through all the pages using redux and context functionality which is provided by the react.js library (which manages the states of the data).

### STUDENT SECTION

When the user logs in as a student, he/she will be redirected to a page where he/she can interact with buttons such as my courses, all courses, and about. In addition, the user can see buttons such as logout and edit profile when clicking on the profile image. If a user wants to enroll in any course, they just need to visit the courses page. This can be done by clicking on the all courses button displayed on the home page. By clicking it, the user will be taken to a page where they can choose any course they wish to take. Users can choose between free and paid courses. In the case of a paid one, the user is redirected to the payment page where he or she can select the payment method and complete the process. Currently, the payment process is in development, but we can use it once we complete KYC and activate our Paypal account. PayPal is therefore required for payment integration. A user can review the course after enrolling in it and comment on it, and they can even access the course materials which the instructor has uploaded. In addition, the user can see what courses they have applied for by clicking on the button my courses.



#### Instructor Section:-

If the user logs in as an instructor, he/she will be redirected to a page where he/she can interact with buttons such as my courses, all courses, add courses, add lectures, and about. Instructors can see the courses created by other instructors but they cannot enroll in courses using this account, for that they need to create a student account. Courses can be added by instructors by clicking on the button add courses, and then they will be redirected to the course page. They can add a course with a thumbnail of their choice, a title, and even a short description of their course. Videos can be added in two ways. The instructor can either directly upload the video from their device or they can add the link to the video. Further lectures can be added by using the add lecture button on the home page for the same or another course. Using the add material option, they can upload lecture-related materials. Depending on their preferences, instructors may also charge for their courses.

#### IV. RESULT

As soon as a user visits our portal, he/she will decide if they would like to register as a student or instructor. If the user wants to register as a student, he/she has to click on the login button, and if the user wants to register as an instructor, he/she has to click the InvisionLearnoative button. All registration information is then stored in MongoDB, and the passwords are hashed for security reasons. Additionally, the instructor can generate courses and organize lectures or lessons, and add materials for specific courses. Additionally, the instructor can decide whether or not to charge for a particular course. Students will be able to enroll in these courses and see lectures and materials posted by the instructor. Instructors will also be rated by students. The contact us page will be available for both students and instructors so that users can contact us with any questions regarding the website or when having trouble accessing a particular course. As a result, the admin can view the query in MongoDB and respond to it.

#### V. CONCLUSION

In this Website, MERN stack has been used, which is the newest technology and it is also very efficient to use. This website will aid students by enabling them to access the courses available and also enables those who wish to teach.

#### ACKNOWLEDGMENT

In order to accomplish the goal of the paper, the authors would like to sincerely thank Assistant Professor Sandeep Mishra for his insightful suggestions as well as mentoring and guiding. Our heartfelt thanks go out to all faculty members of KJSIEIT who contributed directly or indirectly to this project.

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