

A
Mini-Project Report on

Virtual Classroom

Submitted in partial fulfillment of the requirements for
the degree of

BACHELOR OF ENGINEERING

IN

Computer Science & Engineering

Artificial Intelligence & Machine Learning

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CERTIFICATE

This is to certify that the project entitled “**Virtual ClassRoom**” is a bonafide work of Sahil Govardhane (22106097), Shreyas Joshi (22106006), Tejas Kalokhe (22106049), Sanket Kudale (22106059) submitted to the University of Mumbai in partial fulfillment of the requirement for the award of **Bachelor of Engineering in Computer Science & Engineering (Artificial Intelligence & Machine Learning)**.

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Project Report Approval

This Mini project report entitled “**VirTual ClassRoom**” by **Sahil Govardhane, Shreyas Joshi, Tejas Kalokhe and Sanket Kudale** is approved for the degree of *Bachelor of Engineering in Computer Science & Engineering, (AIML) 2022-23*.

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ABSTRACT

Virtual classrooms have emerged as a transformative paradigm in education, especially in response to the global challenges posed by the COVID-19 pandemic. This abstract explores the concept of virtual classrooms, which are digital environments that facilitate remote teaching and learning. Leveraging a variety of digital tools and platforms, virtual classrooms transcend geographical barriers, enabling educators to engage with students in a dynamic, interactive, and immersive manner. This paradigm shift in education fosters inclusivity, flexibility, and adaptability, offering students access to a diverse range of educational resources and experiences. This abstract delves into the key features, benefits, and challenges associated with virtual classrooms and highlights their pivotal role in shaping the future of education.

Keywords: Virtual classrooms, COVID-19 pandemic, Education

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CHAPTER 1

INTRODUCTION

INTRODUCTION

The rise of virtual classrooms has ignited a profound educational revolution, spurred on by the unprecedented challenges brought forth by the global COVID-19 pandemic. These innovative digital learning spaces have transcended the conventional confines of traditional brick-and-mortar classrooms, ushering in a new era where education is untethered from physical boundaries. Virtual classrooms harness the power of an extensive arsenal of digital tools and platforms, seamlessly bridging the geographical chasms that once separated educators and learners.

Within these dynamic virtual environments, the age-old notion of teachers merely imparting knowledge to passive learners has undergone a remarkable transformation. Instead, we witness the emergence of a highly interactive and collaborative educational experience. Students and educators, hailing from diverse corners of the globe, converge in these virtual classrooms, armed with an array of digital resources that enrich and diversify the learning process. This paradigm shift, while not without its fair share of challenges, holds the promise of inclusivity, adaptability, and flexibility that were hitherto unimaginable.

Intriguingly, the stage is now set for a comprehensive exploration of the myriad facets of virtual classrooms. This exploration will unveil the remarkable features that make them the cornerstone of a new educational era, shed light on the manifold benefits they offer to both educators and students, and confront the intricate challenges they present in the quest to reshape the future of education. As we embark on this journey into the expansive realm of virtual classrooms, we delve into a domain where knowledge knows no borders, and learning transcends the limitations of physical space and time.

Beyond the elimination of geographical constraints, virtual classrooms also facilitate personalized learning experiences. Instructors can tailor their teaching methodologies to cater to individual student needs, adjusting the pace and complexity of the material to ensure optimal comprehension and engagement. This adaptability is particularly valuable in today's diverse and multicultural educational landscape, where students possess varying levels of proficiency, learning styles, and preferences.

Moreover, virtual classrooms foster a globalized perspective. Students interact with peers from diverse backgrounds, exposing them to different cultures, viewpoints, and ideas. This intercultural exchange not only enriches their academic experience but also prepares them for an increasingly interconnected and multicultural world. It fosters tolerance, empathy, and a broader understanding of global issues, equipping students with essential skills for the 21st century.

However, it is essential to acknowledge that the transition to virtual classrooms is not without its complexities. Technical issues, such as connectivity problems or the digital divide, can hinder access to quality education for some students. Moreover, the absence of face-to-face interactions may lead to feelings of isolation and disengagement among learners, necessitating innovative solutions to maintain a sense of community and support.

In conclusion, virtual classrooms represent a pivotal evolution in the field of education, offering a plethora of benefits such as flexibility, inclusivity, and globalized perspectives. As we navigate this transformative landscape, it is crucial to address the associated challenges, ensuring that virtual classrooms can truly fulfill their potential as a cornerstone of modern education. In this ever-changing educational landscape, virtual classrooms stand as beacons of innovation and progress, propelling us into an era where knowledge is accessible to all, regardless of physical boundaries.

CHAPTER 2

LITERATURE SURVEY

LITERATURE SURVEY

2.1 HISTORY

The history of virtual classroom web apps is intertwined with the evolution of online education and e-learning technologies. It all began in the 1990s as the World Wide Web gained popularity. Educational institutions started experimenting with delivering course materials and content online. Early web-based learning management systems (LMS), such as WebCT and Blackboard, emerged during this period, offering basic tools for instructors to post course materials and engage with students.

As internet connectivity improved and web technologies evolved, virtual classroom tools began to gain traction in the 2000s. Elluminate, later known as Blackboard Collaborate, was one of the early platforms designed for synchronous online learning. It enabled real-time interaction between instructors and students, marking a significant step in the development of virtual classrooms.

The early 2010s saw the advent of Web 2.0 and the rise of Massive Open Online Courses (MOOCs) like Coursera and edX. These platforms incorporated video lectures and discussion forums, and they played a significant role in popularizing online education.

During the mid-2010s, specialized virtual classroom platforms like Zoom, Adobe Connect, and Microsoft Teams started offering more advanced features, including video conferencing, screen sharing, and chat. Learning management systems (LMS) such as Canvas and Moodle also integrated virtual classroom capabilities, making it easier for educational institutions to incorporate online learning into their programs.

However, the most significant turning point came in 2020 with the COVID-19 pandemic. Educational institutions worldwide rapidly adopted virtual classroom web apps as they shifted to online learning to ensure the continuity of education. Platforms like Zoom and Google Meet became household names as they provided solutions for remote learning and video conferencing.

As we move into the 2020s, virtual classroom web apps continue to evolve. There is a strong emphasis on user-friendly interfaces, accessibility, and integrations with other educational tools and resources. The demand for hybrid learning and the integration of virtual classrooms into a broader e-learning ecosystem is a key focus area, signaling that virtual classroom web apps will continue to play a significant role in the future of education.

2.2-LITERATURE REVIEW

1. **Development of E-learning: A Historical Review with Global Perspective** This paper has discussed the evolution of e-learning from the correspondence courses to the virtual learning platforms. Since the beginning, e-learning has introduced significant developments in the field of learning and teaching and is still developing while coping up challenges. The progress of e-learning showed that e-learning had matured since 1990s with the invention of computer and web technology. Today, it is considered as an integral and valuable aspect of education and its impact can be seen in almost all institutes. Workshops, trainings, seminars, and conferences are replaced by webinars to meet the demand for education.
2. **Face to face education to virtual classroom in the health sector during covid pandemic:** E- Learning is the only alternative to classroom learning at pandemic times. Though there are several advantages in online education; it possesses few disadvantages like technical issues, poor net connectivity, non-availability of gadgets, technological expertise and poor clinical skill training. So, by rectifying these problems e- learning would be best and convenient option for educating students during present and future pandemic crisis.
3. **A conceptual model using a digital virtual classroom learning environment:** significant and global support was found for the study's investigation and conceptual model into how a VCLE affects a Thai undergraduate student's creative thinking, critical thinking skills, and innovation from the STEAM education or 'STEAM-ification' process. Furthermore, although there are also extensive global studies on gamification, the success of gamification is dependent on a variety of factors, including technological (e.g., bit rates and streaming), site design, the method and use of game mechanics and game dynamics, and the emotional Education and Information Technologies (2022) 27:5689–5716 57091 3 aspects which contribute most to a highly pleasurable, hedonic experience. Finally, when undertaken correctly, innovation and motivation to learn are also outcomes from both VCLE and gamification implications. Students who study with the VCLE STEAM-ification format are more creative and creative innovation is higher than the students who study according to the normal teaching plan.
4. **Digital tools to enrich our virtual classroom for innovative teachers & students:** Technology is a friend of education for carrying out the case of education and there is no reason to fight this trend. Right on the contrary, by incorporating digital tools in the present classroom, we can become an effective educational leader who fosters innovation. The technologists of the present world cannot replace the teachers but can help them to play their roles in an effective and efficient way for preparing the future generation for the human cause. There are innumerable digital tools with educational importance but the present paper is a humble collection of different digital tools that can be used by teachers for teaching and by students to learn effectively. The world waits to see the more noble personalities for their research, Technology Learning in Contemporary World - Dr. R. Udhaya Mohan Babu 64innovation and other things to contribute more and more towards this cause of education.

CHAPTER 3

PROBLEM STATEMENT

PROBLEM STATEMENT

1. The Digital Divide

One of the foremost challenges in virtual classrooms is the digital divide. While technology has made online learning possible, not all students have equal access to the necessary devices and reliable internet connections. This digital inequity exacerbates educational disparities, hindering the educational progress of underserved communities and widening existing achievement gaps. Bridging the digital divide is a fundamental issue that must be resolved to ensure that all students have equal access to virtual classrooms.

2. Engagement and Interaction

Virtual classrooms often struggle to replicate the engagement and interaction levels found in traditional face-to-face settings. The absence of physical presence and non-verbal cues can lead to a sense of isolation among students. Educators must grapple with finding innovative ways to foster active participation, collaborative learning, and meaningful connections in the virtual space. Maintaining student engagement while harnessing the benefits of technology remains a critical challenge.

3. Pedagogical Adaptation

Educators must undergo a pedagogical shift when transitioning to virtual classrooms. Traditional teaching methods may not translate effectively into the digital realm. The challenge lies in redefining teaching strategies to accommodate the unique characteristics of virtual learning environments. Educators must become proficient in utilizing digital tools, designing interactive content, and fostering a sense of community to ensure effective learning experiences.

4. Mental Health and Well-being

The transition to virtual classrooms can take a toll on students' mental health and well-being. The isolation, screen time, and increased workload can contribute to stress and burnout. Institutions must prioritize mental health support services and create a supportive online learning environment that promotes holistic well-being.

CHAPTER-4

SOFTWARE SETUP

SOFTWARE SETUP

- **Integrated Development Environment (IDE):**

- Visual Studio Code (VS Code): VS Code is a versatile and popular code editor. It supports multiple programming languages and has a vast library of extensions for various development tasks.

- **Programming Languages:**

- HTML, CSS, JavaScript: These are fundamental for building web-based virtual classroom applications.

- Node.js: Node.js is often used for building real-time web applications and is a good choice for virtual classroom systems.

- **Version Control:**

- Git: Use Git for version control and collaborate with your development team. Platforms like GitHub,

- GitLab, or Bitbucket can host your repositories.

- **Backend Frameworks and Databases:**

- Node.js with Express, Boot: Choose a backend framework to build server-side components.

- MySQL Database: Use a relational database to store user data, courses, and other relevant information.

- **API Development:**

- Use your chosen backend language and framework to create RESTful or GraphQL APIs for communication between the frontend and backend.

- **Authentication and Authorization:**

- Passport.js: Implement secure user authentication and authorization to control access to virtual classroom features.

- **Database Management Tools:**

- MySQL: These tools help manage and interact with your databases.

- **Text and Video Editors:**

- Microsoft Word, Google Docs, and video editors (for creating instructional content).

- **Web Browsers for Testing:**

- Use different web browsers (Chrome, Firefox, Safari) for cross-browser testing of your virtual classroom web application.

CHAPTER-5

PROPOSED SYSTEM AND IMPLEMENTATION

BLOCK DIAGRAM OF PROPOSED SYSTEM

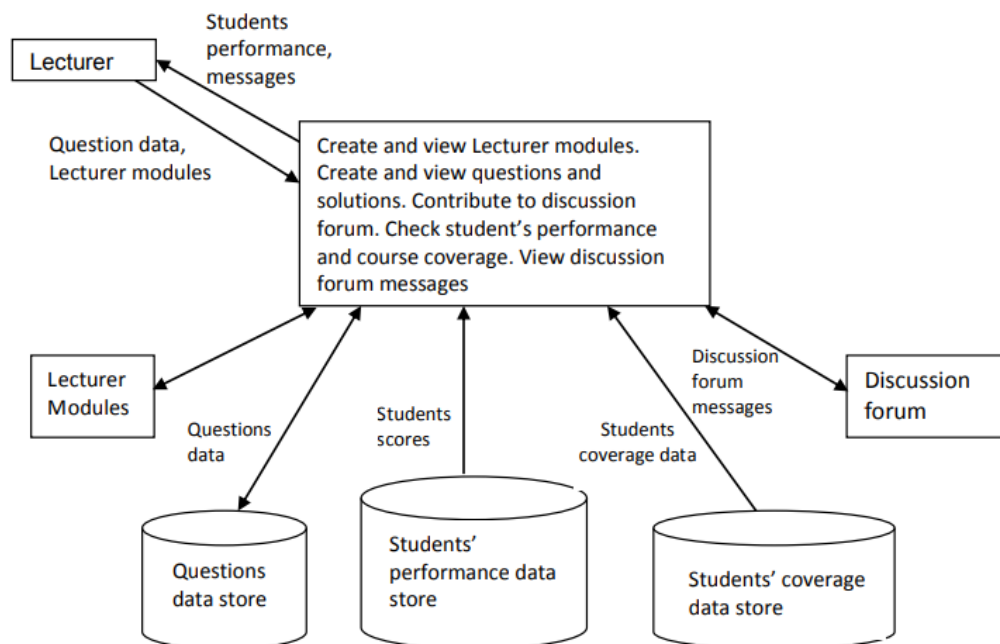


Figure 1: Data flow diagram showing the Lecturer user module.

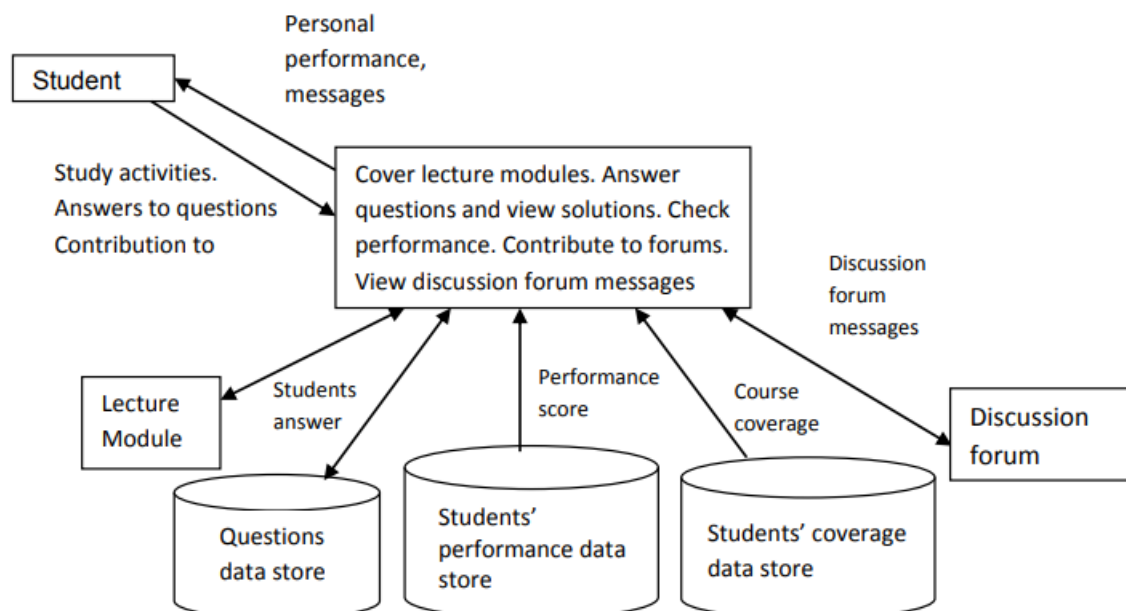


Figure 2: Data flow diagram showing the student user module.

Description of Block Diagram:

1. Database: This is where all the data is stored of students as well as teachers, details of the students, courses, attendance details, notes, pdf's and all, performance of the students, marks and score of the student, etc. are stored in the database.

2. Lecturer User Module:

- a. **Create and view lecture:** lecturer can create a new lecture for any new course and students can only see that lecture. Lecturer can share the notification of the new lecture to students. Creating a new lecture or adding a new course made easy for lecturer in the virtual classroom WebApp.
- b. **Create and view Questions and solutions:** Lecturer can create a test which is for students. In that a lecturer can create a questionnaire and also provide answer for students.
- c. **Contribute to discussion forum:** Lecturer can take part in discussion with students in the chat section of the virtual classroom WebApp where they can discuss the doubts and it will feel like doing interactions in real. It makes easy to solve the doubts by interacting. video and audio are also a medium made available for discussions while live lectures.
- d. **Check student performance and course coverage:** Lecturer can check the progress and performance of every student and also check the course completion details of students. Also, the Attendance and marks can be seen in the Virtual Classroom Webapp by the lecturer.

3. Students User Module:

- a. **Cover lecture modules:** Students can cover lecture modules created by lecturer. Student can also see the live lecture and do interaction through video and audio with Lecturer.
- b. **Answer questions and view solutions:** Students can attempt the tests given by the lecturer and can get graded by the lecturer. Also, if they want to see the solutions of the question, they can get the answers given by the lecturer in the Virtual Classroom WebApp.
- c. **Check Performance:** Students can check their marks of the test and also, they can check their attendance. All the personal progress and performance can be viewed by the students.
- d. **Contribute to discussion forum:** Students can discuss with the teacher about the doubts through chat section of the WebApp and also through audio and video.

Some Important Features available at User Interface:

- a. **Login/Sing-up:** This is to authenticate the user with a valid Username and Password. Both for Students and Lecturers.
- b. **Notifications:** Here the Student as well as Lecturer can see the notifications e.g., lecture starting notification for student or admit the student notification for lecturer.
- c. **All the courses provided by the lecturer:** All the Courses are visible at the User Interface for both student and lecturer.
- d. **To Do List:** here the student as well as lecturer can make their list for what task they have to do afterwards. This list help remembering things.
- e. **Timetable:** this section provides timetable to students. It can only be edited by lecturer and students can only view it.
- f. **Moodle Support and Achievements of APSIT:** Students can directly visit to the Moodle website through that button. And also, they can go to APSIT Diary to upload their achievements there.
- g. **Resources:** Here all the Notes and Pdfs are saved by the lecturer. From this section students can access the notes and can download the notes of the lectures provided by the lecturer.
- h. **Performance, Courses:** In the performance section students can get their progress and performance report such as their marks, attendance, grades, remarks, course completion details, etc. In course section students can see the extracurricular courses provided by the lecturer.

IMPLEMENTATION

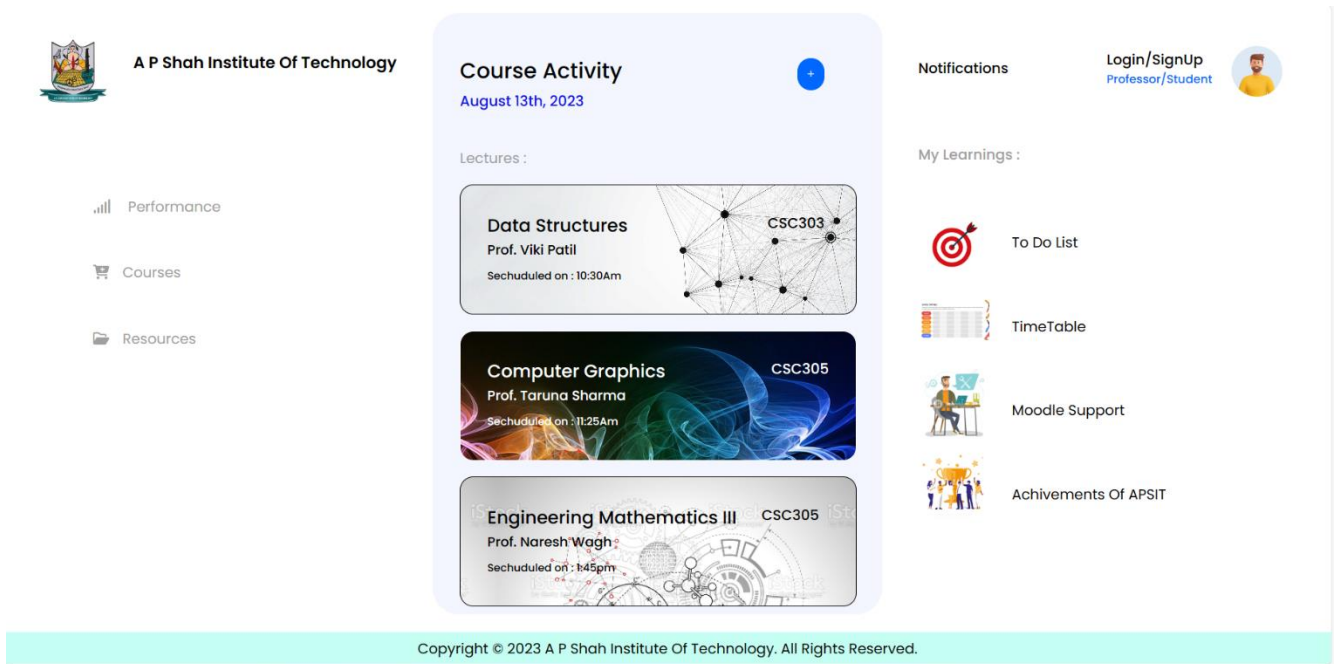


Fig 1. User Interface / Dashboard

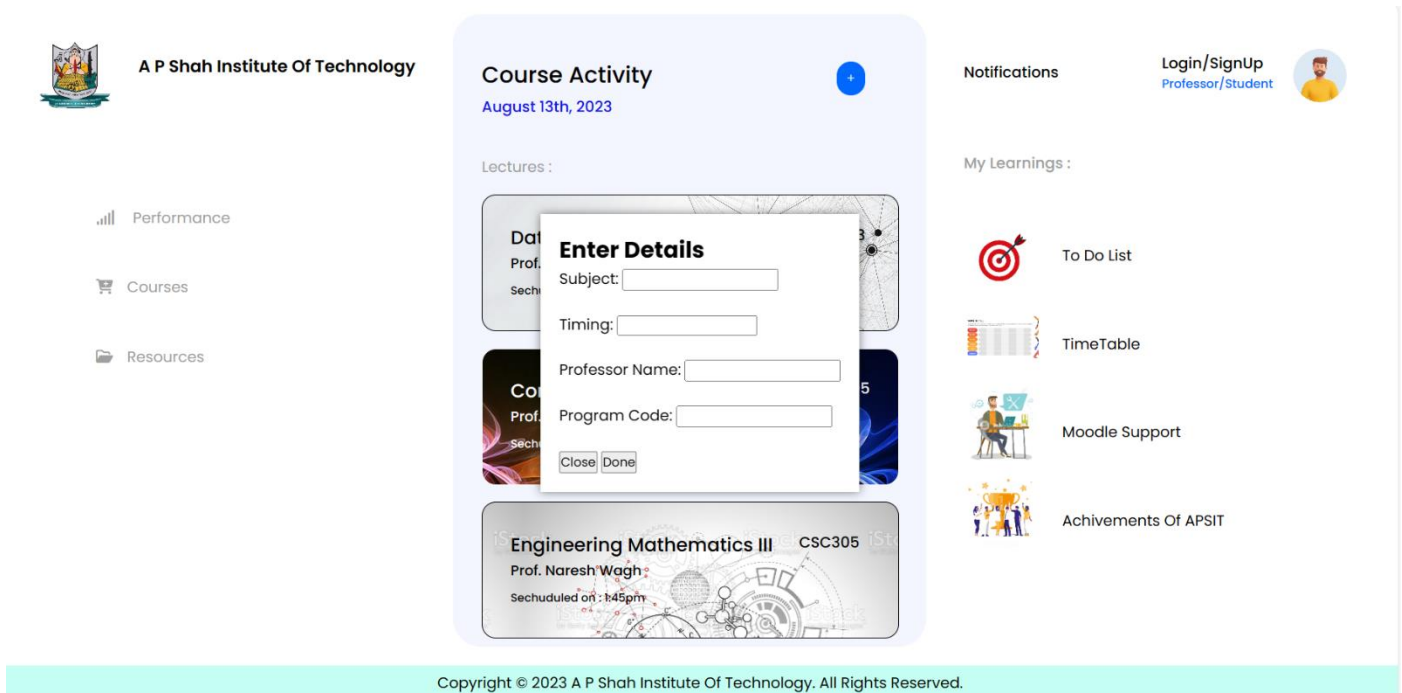


Fig 2. Adding new subject course

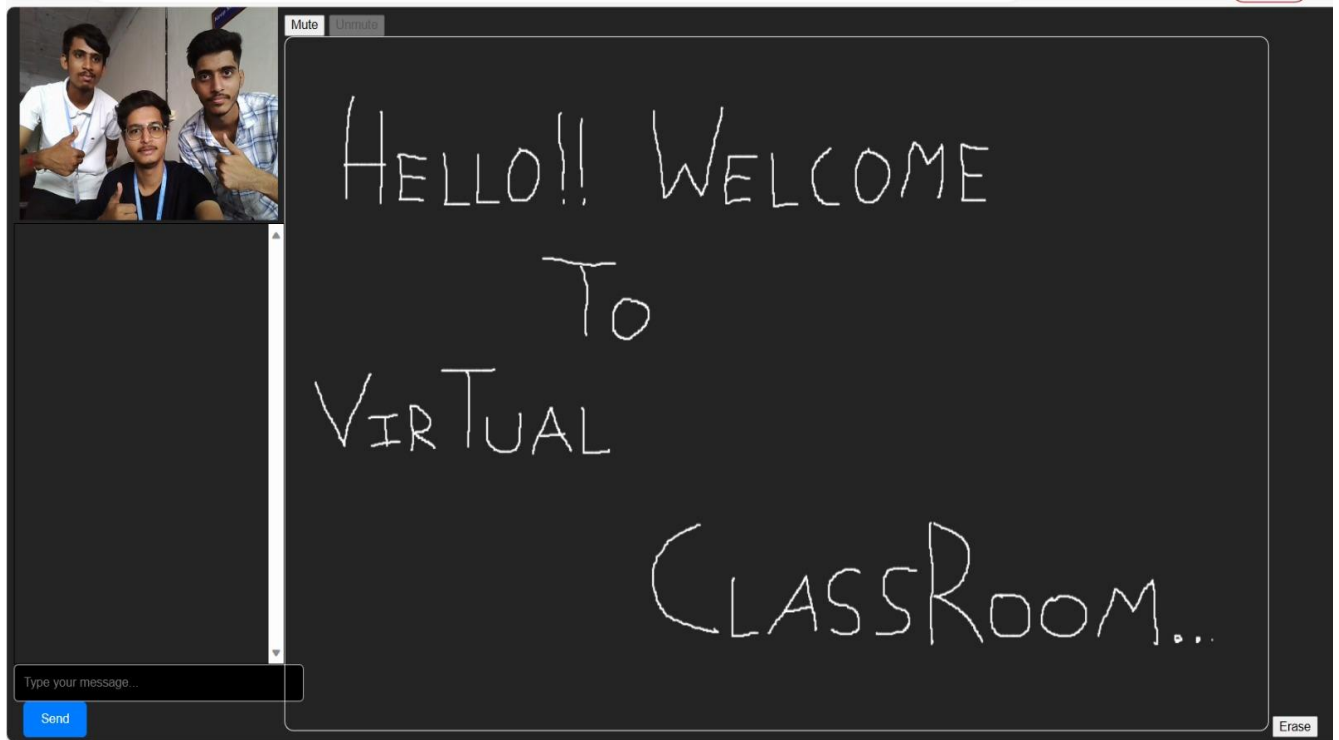


Fig 3. Classroom Interface in Live Lecture



Fig 4. PDF sharing Function

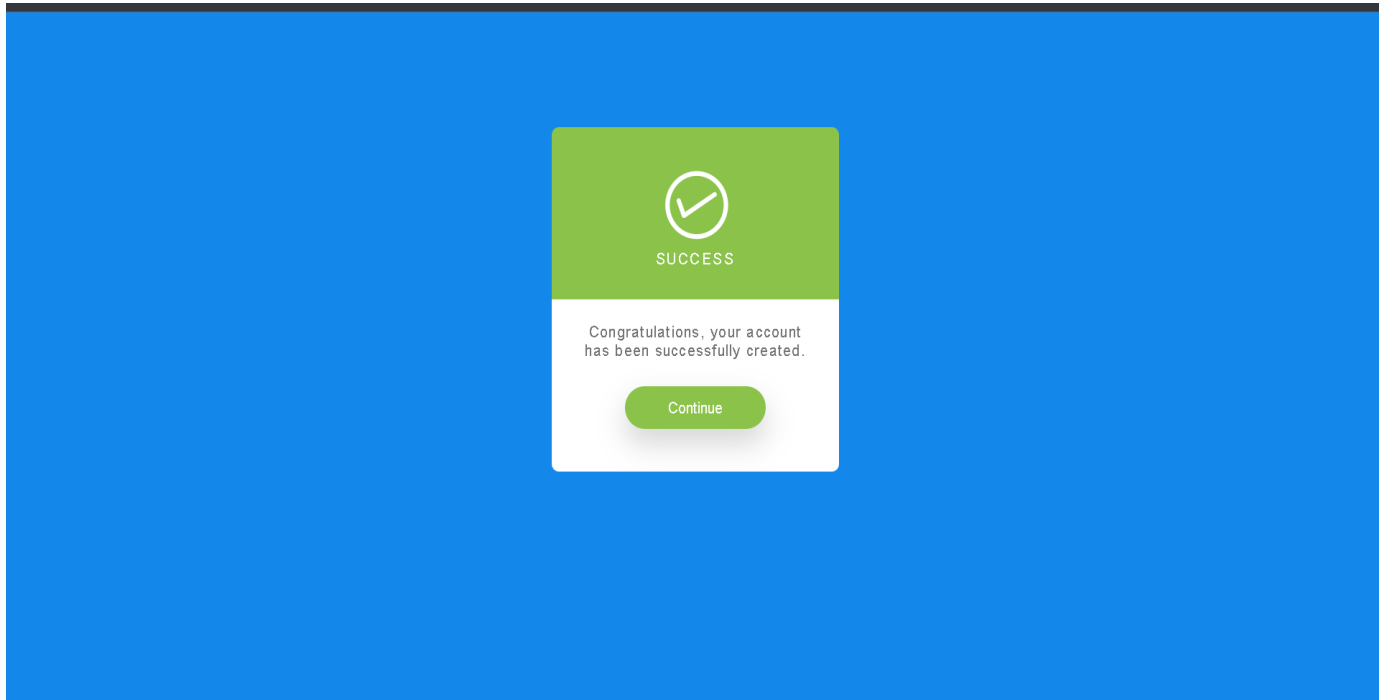


Fig 5. Account Creation Showing Account Created

Ongoing Courses/Internship

All courses/internship are completed till date

Completed Courses/Internships



Spoken Tutorial

IIT Spoken Tutorial Java Training

To download certificate [Click here](#)

End Date : 16th October 2023



Oracle Java Fundamentals

To download certificate [Click here](#)

End Date : 17th September 2023



AICTE Fotinet Network Security Associate Virtual Internship

To download certificate [Click here](#)

End Date : 23rd July 2023



AICTE Android Developer Internship

To download certificate [Click here](#)

Fig 6. Courses Section

```

login.ejs  JS Server1.js  register.ejs  register.css  JS database.js X
ServerSide > JS database.js > ...
1  const mysql = require('mysql2');
2
3  const db = mysql.createConnection({
4    host: 'localhost',
5    user: 'root',
6    password: 'root123',
7    database: 'classroom'
8  });
9
10 // Connect to the database
11 db.connect((err) => {
12   if (err) {
13     console.error('Database connection failed: ' + err.stack);
14     return;
15   }
16   console.log('Connected to the database');
17 });
18
19 module.exports = db;

```

Fig 7. Database Connection Code

Result Grid			Filter Rows:	Export:	Wrap Cell Content:
moodle_id	name	password			
123	sahil	abcd123			
22106049	Tejas Kalokhe	22106049@Apsit			
22106049	Tejas Kalokhe	22106049@Apsit			
8888888	etyee	rjgheruighe			
8888888	etyee	rjgheruighe			
22106049	Tejas Kalokhe	rgheigueg			
22106049	Tejas Kalokhe	rgheigueg			
22106097	SahilGovardhane	22106097@Apsit			
2210654	Rohidas Kalokhe	fgergeg			
22106044	HemlataKalokhe	fgiefef			
1231	efeerer	gergrev			
12313	sidhjain	dggeerger			
852586	sanketkudale	uydytygcc			
22106078	Priyal Jain	22106078@Apsit			
22106059	Omkar devkar	22106059@Apsit			

Fig 8. Database Table

. SEM 1

Unit Test 1 :

Subjects :

- Physics : 9/30
- Maths : 32/40
- Chemistry : 21/30
- Mechanics : 21/40
- Basics Of Electrical Engineering : 16/40

Unit Test 2 :

Subjects :

- Physics : 25/30
- Maths : 40/40
- Chemistry : 22/30
- Mechanics : 32/40
- Basics Of Electrical Engineering : 36/40

SEM 1

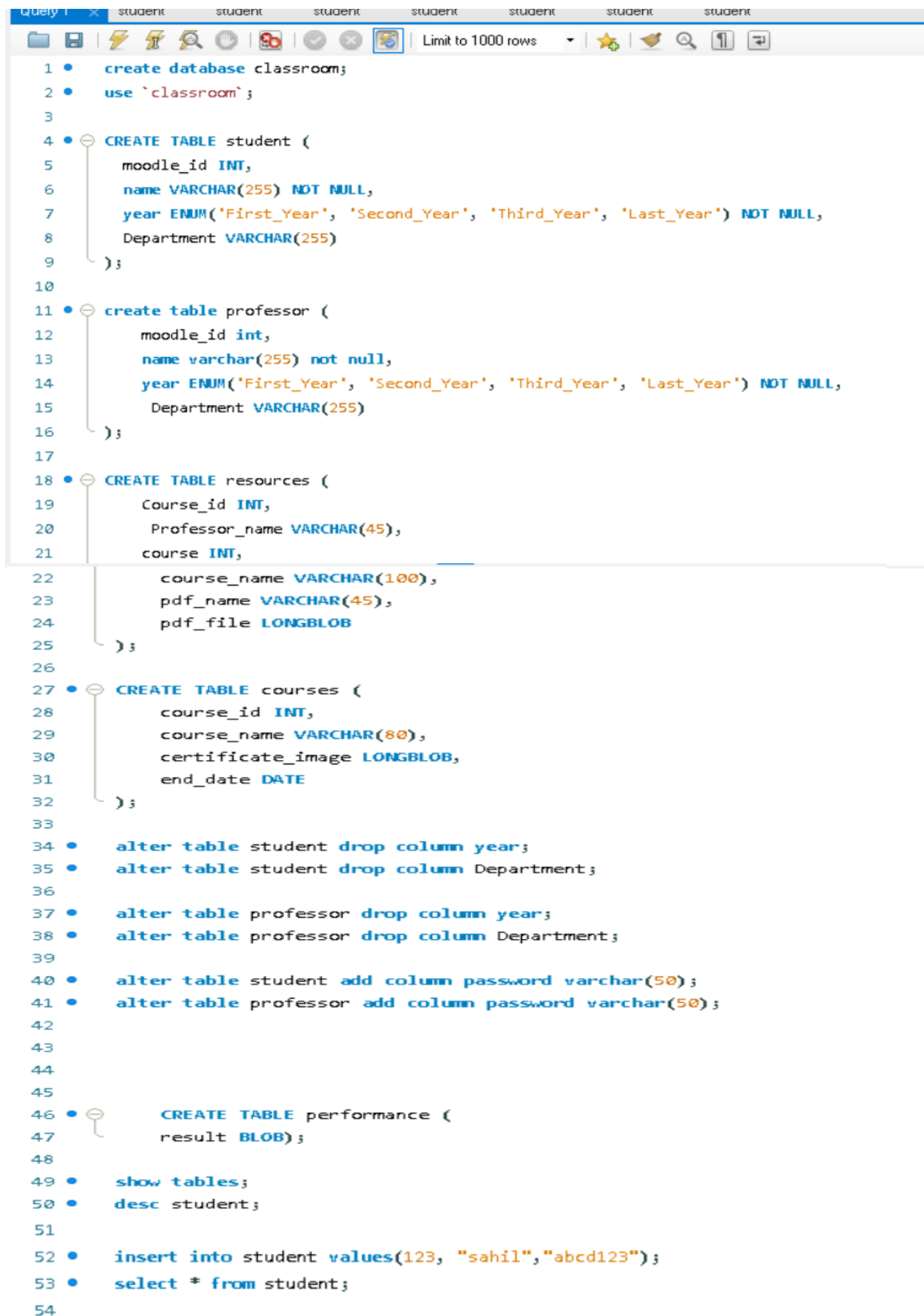
. SEM 2

Unit Test 1 :

Subjects :

- Physics : 23/30
- Maths : 36/40
- Chemistry : 23/30

Fig 9. Performance of Student



The screenshot displays the MySQL Workbench interface with a 'Query' window open. The window has a toolbar at the top with icons for file operations, execution, and navigation. Below the toolbar, the SQL editor contains a series of queries numbered 1 through 54. The queries are as follows:

```
1 • create database classroom;
2 • use `classroom`;
3
4 • CREATE TABLE student (
5     moodle_id INT,
6     name VARCHAR(255) NOT NULL,
7     year ENUM('First_Year', 'Second_Year', 'Third_Year', 'Last_Year') NOT NULL,
8     Department VARCHAR(255)
9 );
10
11 • create table professor (
12     moodle_id int,
13     name varchar(255) not null,
14     year ENUM('First_Year', 'Second_Year', 'Third_Year', 'Last_Year') NOT NULL,
15     Department VARCHAR(255)
16 );
17
18 • CREATE TABLE resources (
19     Course_id INT,
20     Professor_name VARCHAR(45),
21     course INT,
22     course_name VARCHAR(100),
23     pdf_name VARCHAR(45),
24     pdf_file LONGBLOB
25 );
26
27 • CREATE TABLE courses (
28     course_id INT,
29     course_name VARCHAR(80),
30     certificate_image LONGBLOB,
31     end_date DATE
32 );
33
34 • alter table student drop column year;
35 • alter table student drop column Department;
36
37 • alter table professor drop column year;
38 • alter table professor drop column Department;
39
40 • alter table student add column password varchar(50);
41 • alter table professor add column password varchar(50);
42
43
44
45
46 • CREATE TABLE performance (
47     result BLOB);
48
49 • show tables;
50 • desc student;
51
52 • insert into student values(123, "sahil", "abcd123");
53 • select * from student;
54
```

Fig 10. MySQL Workbench

```

login.ejs  JS Server1.js M X  register.ejs  register.css  JS database.js
ServerSide > JS Server1.js > ...
1  const db = require('./database');
2  const path = require('path');
3  const express = require('express');
4  const app = express();
5  const fs = require('fs');
6  const port = 3000;
7  const bodyParser = require('body-parser');
8  const { register } = require('module');
9
10
11 app.use(bodyParser.json());
12 app.use(bodyParser.urlencoded({ extended: true }));
13 app.use(express.static('Views'));
14 app.use(express.static('Views/css'));
15 app.use(express.static('Views/Img'));
16 app.set("view engine","ejs");
17
18
19 app.get("/", (req,res)=>{
20     res.render("Home");
21 })
22 app.get("/Home", (req,res)=>{
23     res.render("Home");
24 })
25
26
27 app.get("/MainClass", (req,res)=>{
28     res.render("MainClass");
29 })
30 app.get("/ToDoList", (req,res)=>{
31     res.render("ToDoList");
32 })
33 app.get("/login", (req,res)=>{
34     res.render("login");
35 })
36 app.get("/Courses", (req,res)=>{
37     res.render("Courses");
38 })
39 app.post('/login', (req, res) => {
40     var namee = req.body.name;
41     var idd = req.body.id;
42     var passwordd = req.body.password;
43     var sql = "INSERT INTO student(moodle_id,name,password) VALUES('" + idd + "','" + namee + "','" + passwordd + "')";
44     db.query(sql,function (err, result) {
45         res.render('register');
46     });
47 });
48
49 app.listen(port,()=>{
50     console.log(`listening on port ${port}`)
51 });
52

```

Fig 11. Server

```

D:\VirtualClassroom\NEWvr>nodemon ./ServerSide/Server1.js
[nodemon] 3.0.1
[nodemon] to restart at any time, enter `rs`
[nodemon] watching path(s): *.*
[nodemon] watching extensions: js,mjs,cjs,json
[nodemon] starting `node ./ServerSide/Server1.js`
listening on port 3000
Connected to the database

```

Fig 12. Starting Server

CHAPTER-6

CONCLUSION

CONCLUSION

Virtual classroom web apps empower individuals to embark on a journey of lifelong learning. By providing flexible, accessible, and engaging educational opportunities, these platforms ensure that learning doesn't stop after formal schooling, but continues throughout one's life. In a world where disruptions to traditional education can occur unexpectedly, virtual classroom web apps offer a resilient solution. We have successfully developed a web application that fulfils its intended purpose of hosting live lectures and facilitating the sharing of PDF documents. This achievement marks a significant milestone in your project's development. Our web app contributes to the enhancement of the learning experience by providing a platform for live lectures. This can be especially valuable for remote or online learning, allowing students and instructors to interact in real-time. The capability to share PDFs during lectures enhances collaboration and resource sharing among participants. This feature supports a dynamic and interactive learning environment. Depending on your project's architecture and infrastructure, it's important to consider how easily the system can scale to accommodate more users and larger file uploads. Scalability is crucial to meet increasing demand. The user interface should be intuitive and easy to navigate to encourage user adoption. Invest in user experience design to ensure that users find it pleasant to use the platform.

REFERENCES

RESEARCH PAPER

[1] “Development of E-learning: A Historical Review with Global Perspective Saira Niaz” by Shumaila Memon, Samina Khokhar (May 2021)

[2] “Face to face education to virtual classroom in the health sector during covid pandemic” by Monisha Mohan, Kalaiselvi Rajendiran, Veeraraghavan Gunasekaran, Ananda Vayaravel Cassinadan (2021)

[3] “A conceptual model using a digital virtual classroom learning environment” by Naphong Wannapiroon, Paitoon Pimdee (16 January 2022)

[4] “Digital tools to enrich our virtual classroom for innovative teachers & students” by Dr Bilal Ahmad Bhat (2020)