

Teaching-Learning Monitoring & Effectiveness Tracking System for SOET

Major Project Synopsis Report

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By

Ananya Joshi [2201010078]

Shanvi Mathuria [2201010081]

Under the supervision of

Dr. Amit Kumar Sah



Department of Computer Science and Engineering
School of Engineering and Technology
K.R Mangalam University, Gurugram- 122001, India
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Amit
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ABSTRACT

Our project aims to develop a Teaching-Learning Monitoring and Feedback System, which is currently in progress, to help universities and colleges systematically track teaching practices and student learning outcomes. We are designing the system to allow faculty to map syllabus coverage day by day, upload lecture notes, and log class details such as topics taught, teaching methods used, and student attendance. An Assessment & Outcome Tracker is also being worked on to link exam and assignment questions with Course Outcomes (COs) and Program Outcomes (POs), making it easier to evaluate actual student learning.

The implementation is being carried out using the MERN stack (MongoDB, Express.js, React.js, Node.js) along with Clerk authentication, Tailwind CSS, and Figma for user-friendly design. We are following a step-by-step methodology—starting with requirement gathering, then designing modules, integrating frontend with backend, and structuring the database to handle syllabus, attendance, and feedback data.

The platform will generate dashboards and reports that will not only support teachers in improving their teaching but also provide institutions with insights for better decision-making, ensuring continuous improvement and outcome-based education.

KEYWORDS: *Syllabus Mapping, Course Outcomes (CO), Program Outcomes (PO), Assessment & Outcome Tracker, Beyond-Classroom Learning, Faculty Reflection, Outcome-Based Education*

1. INTRODUCTION

In today's academic environment, universities face the challenge of systematically monitoring both teaching practices and student learning outcomes. Traditional approaches, such as manual record-keeping or exam-based evaluations, often lack the depth and consistency required to measure progress effectively. To overcome these limitations, our project focuses on developing a Teaching-Learning Monitoring and Feedback System that provides a structured way to capture and analyze academic activities.

The system is being designed to log syllabus coverage on a daily basis, record class details such as topics taught, teaching methods, and student attendance, and allow faculty to upload lecture notes and resources for each session. A central component of the system is the Assessment & Outcome Tracker, which connects assessment questions to defined Course Outcomes (COs) and Program Outcomes (POs), thereby making it possible to measure attainment levels and highlight gaps in teaching or learning.

Additionally, the platform will document beyond-classroom learning experiences such as MOOCs, workshops, hackathons, and internships, ensuring a holistic view of student engagement. Through dashboards and analytical reports, the system aims to provide faculty and institutions with actionable insights that support continuous improvement, strengthen outcome-based education, and promote higher academic quality.

2. MOTIVATION

In today's rapidly evolving educational landscape, universities face the challenge of ensuring both effective teaching and meaningful student learning. Traditional methods of monitoring teaching, such as attendance registers and periodic examinations, provide limited insight into the actual learning outcomes and engagement levels of students. There is a growing need for a systematic approach that can track classroom activities, syllabus coverage, student participation, and performance in a measurable and analyzable way.

Moreover, learning is no longer confined to classrooms. Students engage in online courses, workshops, hackathons, and internships that significantly contribute to their knowledge and skills. Capturing and integrating these beyond-classroom activities into a holistic view of student development is essential for modern education. Similarly, faculty require tools to reflect on their teaching practices, receive student feedback, and continuously improve their methods. The motivation behind this project is to create a comprehensive system that addresses these gaps. By combining syllabus mapping, daily tracking of lectures, attendance monitoring, assessment mapping to Course Outcomes (COs) and Program Outcomes (POs), and beyond-classroom activity logs, the system provides actionable insights. It empowers institutions to make data-driven decisions, promotes outcome-based education, and ensures continuous improvement in teaching and learning practices.

3. LITERATURE REVIEW

1. **Outcome-Based Education and CO/PO Mapping:** Outcome-Based Education (OBE) emphasizes the alignment of teaching methods, assessments, and course content with defined learning outcomes. Biggs & Tang (2011) highlighted that mapping Course Outcomes (COs) to Program Outcomes (POs) allows institutions to measure student attainment effectively and identify gaps in learning. While OBE frameworks are widely adopted, many traditional systems rely on manual tracking, limiting the accuracy and timeliness of insights.
2. **Syllabus Coverage and Class Monitoring:** Tracking daily syllabus coverage and student attendance is crucial for effective teaching. Singh et al. (2020) demonstrated that monitoring classroom sessions, including topics covered and student participation, improves engagement and helps teachers maintain teaching schedules. However, their system lacked integration with assessment tracking and feedback collection, reducing its effectiveness in holistic academic evaluation.
3. **Assessment and Performance Analytics:** Kumar & Singh (2022) proposed automated assessment mapping systems that link exam questions to COs and POs, allowing institutions to measure attainment levels and identify learning gaps. Their work highlighted the importance of combining assessment analytics with visual dashboards to support data-driven decision-making. Yet, many existing systems do not integrate beyond-classroom learning, such as MOOCs or workshops, limiting their comprehensiveness.
4. **Faculty Reflection and Student Feedback Systems:** Rao & Reddy (2021) emphasized the role of faculty self-reflection and student feedback in improving teaching quality. Systems that provide structured tools for teachers to record reflections and analyze student feedback enable continuous improvement and informed teaching strategies. Despite their usefulness, these systems often operate independently of class monitoring or syllabus tracking.
5. **Integration of Beyond-Classroom Learning:** Chen et al. (2020) studied the inclusion of extracurricular and online learning activities in academic analytics. Recording participation

in MOOCs, workshops, internships, and hackathons provides a more holistic understanding of student development. Integrating this data with in-class performance and CO/PO attainment creates a comprehensive monitoring system for higher education institutions.

Author / Year	Focus Area	Key Findings	Limitations
Biggs & Tang (2011)	Outcome-Based Education (OBE)	Highlighted the importance of mapping Course Outcomes (COs) to Program Outcomes (POs) to measure student attainment	Manual tracking limits real-time insights
Singh et al. (2020)	Syllabus Coverage & Class Monitoring	Tracking daily syllabus coverage and student attendance improves engagement and helps maintain teaching schedules	Lacked integration with assessment tracking and feedback
Kumar & Singh (2022)	Assessment & Performance Analytics	Automated linking of exam questions to COs and POs helps identify learning gaps and supports data-driven decisions	Did not include beyond-classroom learning
Rao & Reddy (2021)	Faculty Reflection & Student Feedback	Structured reflection tools and feedback analysis improve teaching quality and support continuous improvement	Often independent from class monitoring systems
Chen et al. (2020)	Beyond-Classroom Learning Analytics	Tracking participation in MOOCs, workshops, and internships provides a holistic view of student development	Limited integration with in-class performance
Patel & Desai (2021)	Academic Dashboards	Real-time dashboards visualize student performance, CO/PO attainment, and teaching progress	Did not include syllabus coverage and attendance tracking
Ahmed & Al-Harthy (2019)	Integrated Teaching-Learning Systems	Combining syllabus tracking, attendance, and assessments increases transparency in student progress	Focused mostly on classroom activities only

Table 1: Literature Review Table

4. GAP ANALYSIS

Even though some tools exist to monitor teaching and student performance, most are either too complex or focus only on a single aspect of academic monitoring. The main gaps in existing systems that this project addresses are:

1. **Partial Syllabus Tracking:** Many current systems do not track how much of the syllabus is covered on a daily basis or compare it with planned coverage, making it hard for faculty and students to know progress.
2. **No Daily Attendance Integration:** While attendance is tracked in some systems, it is often separate from syllabus and session tracking, preventing a clear picture of student participation.
3. **Manual Assessment-CO/PO Mapping:** Existing tools may include assessment tracking, but mapping assessments to Course Outcomes (COs) and Program Outcomes (POs) is often not included. In this project, CO/PO mapping will be done manually to keep the system simple and practical.
4. **No Beyond-Classroom Learning Records:** Activities like online courses, workshops, and internships are rarely included in student monitoring, even though they contribute to overall learning outcomes.
5. **Limited Teacher Reflection and Feedback:** Few systems provide a simple way for faculty to note reflections on each class or gather feedback from students in a structured way.

5. PROBLEM STATEMENT

Universities and colleges often face challenges in systematically monitoring teaching effectiveness and student learning outcomes. Traditional methods, such as manual attendance registers, periodic assessments, and informal feedback, fail to provide a complete, real-time, and structured view of classroom activities and student progress. Faculty struggle to track daily syllabus coverage, student participation, and the correlation between assessments and learning outcomes. Additionally, learning that occurs beyond the classroom—such as MOOCs, workshops, internships, and other activities—is rarely captured, leading to an incomplete understanding of student development. There is also limited provision for faculty reflections and structured feedback collection, which are essential for improving teaching quality.

This project addresses these gaps by developing a practical, easy-to-use system that allows faculty to track syllabus coverage, record daily attendance, manually map assessments to Course Outcomes (COs) and Program Outcomes (POs), log beyond-classroom learning activities, and capture faculty reflections and student feedback. The system aims to provide actionable insights to improve teaching effectiveness, monitor student progress, and support outcome-based education in a simple and feasible manner.

6. OBJECTIVES

This project aims to create a practical system that enables accurate tracking of teaching progress, student participation, and learning outcomes, supporting faculty and administrators in making informed decisions.

1. **Syllabus Tracking:** To systematically track the progress of syllabus coverage for each course, ensuring that faculty can compare daily teaching with the planned schedule, identify pending topics, and maintain consistency in course delivery.
2. **Attendance Monitoring:** To record student attendance for every class session, providing insights into participation patterns, identifying students who may need additional support, and ensuring accurate documentation of classroom engagement.
3. **Manual Assessment-CO/PO Mapping:** To link each assessment, such as quizzes, assignments, or exams, to specific Course Outcomes (COs) and Program Outcomes (POs). This enables faculty to evaluate whether learning objectives are being met and identify areas where students may need additional guidance.
4. **Beyond-Classroom Learning Logs:** To capture student participation in extracurricular and co-curricular learning activities, including online courses (MOOCs), workshops, seminars, hackathons, and internships. This provides a more holistic understanding of student learning and skill development beyond traditional classroom teaching.
5. **Student Feedback Collection:** To collect structured feedback from students on teaching methods, course content, and overall learning experience. This feedback helps faculty make informed adjustments to improve engagement and learning outcomes.

7. TOOLS/TECHNOLOGIES USED

Frontend Development:

- **React.js** : For building a responsive and user-friendly web interface for faculty, students, and administrators.
- **HTML, CSS, Tailwind CSS**: For structuring and styling web pages, ensuring a clean and modern design.
- **JavaScript**: For interactive functionalities like form validations, dynamic content updates, and dashboard interactivity.

Backend Development:

- **Node.js** : To handle server-side logic, API endpoints, and communication between frontend and database.
- **MongoDB**: For storing structured data such as syllabus details, attendance records, assessment information, feedback, and beyond-classroom activity logs.

Authentication and User Management:

- **Clerk** : For secure login and role-based access control for faculty, students, and administrators.

Data Visualization and Analytics:

- **Chart.js**: For creating interactive dashboards to display syllabus coverage, attendance, CO/PO attainment, and other performance metrics.

Design and Prototyping:

- **Figma**: For designing the system interface and creating mockups before development.

Deployment:

- **Vercel**: For deploying the web application online and making it accessible to users.

Other Tools:

- **Git / GitHub:** For version control and collaborative development.

Category	Tools / Technologies	Purpose / Use
Frontend Development	React.js	Build responsive and user-friendly web interface
	HTML, CSS, Tailwind CSS	Structure and style web pages
	JavaScript	Add interactive features and dynamic content
Backend Development	Node.js	Handle server-side logic and API endpoints
	MongoDB	Store structured data such as syllabus, attendance, assessments, and feedback
Authentication & User Management	Clerk	Secure login and role-based access control
Data Visualization & Analytics	Chart.js	Create interactive dashboards for syllabus coverage, attendance, and performance
Design & Prototyping	Figma	Design interfaces and create mockups
Deployment	Vercel	Deploy the web application online
Other Tools	Git / GitHub	Version control and collaborative development

Table 2: Tools and technology Used

8. METHODOLOGY

The development of the Teaching-Learning Monitoring and Feedback System follows a systematic approach, divided into multiple stages to ensure practicality, efficiency, and user-friendliness.

1. Requirement Analysis:

- Identify the key requirements from stakeholders, including faculty, students, and administrators.
- Understand the current challenges in tracking syllabus coverage, attendance, assessments, beyond-classroom activities, and feedback collection.
- Define the features and functionalities required to address these challenges in a simple, feasible manner.

2. System Design:

- Create detailed design specifications for the frontend, backend, and database structure.
- Develop mockups and UI prototypes using Figma to visualize the user interface for different user roles.
- Design a data model for storing syllabus details, daily attendance, assessment records, beyond-classroom activities, faculty reflections, and student feedback.

3. Development:

- Frontend: Build interactive web pages using React.js/Next.js, HTML, CSS, and Tailwind CSS to ensure responsive design.
- Backend: Implement server-side logic with Node.js and Express.js to handle API requests, data processing, and communication with the database.
- Database: Use MongoDB to store structured data securely and enable easy retrieval for analytics and reporting.
- Authentication: Implement secure login and role-based access using Clerk or Firebase Auth.

4. Integration of Features:

- Implement syllabus tracking by allowing faculty to mark topics covered each day and upload relevant notes or materials.
- Record student attendance alongside syllabus coverage to analyze participation.
- Provide manual CO/PO mapping for assessments to track learning attainment.
- Enable logging of beyond-classroom activities such as MOOCs, workshops, internships, and events.
- Include a module for faculty reflection and structured student feedback submission.

5. Dashboard and Analytics:

- Create interactive dashboards using Chart.js or Recharts to visualize attendance trends, syllabus completion, CO/PO attainment, and feedback statistics.
- Generate reports that provide actionable insights for faculty and administrators to improve teaching effectiveness and student learning outcomes.

6. Testing and Deployment:

- Test individual modules for functionality, usability, and data integrity.
- Perform system integration testing to ensure smooth interaction between frontend, backend, and database.
- Deploy the web application using Vercel, making it accessible for end-users.

7. User Training and Feedback:

- Provide basic guidance to faculty and students on how to use the system effectively.
- Gather initial feedback for improvements and refine features accordingly.

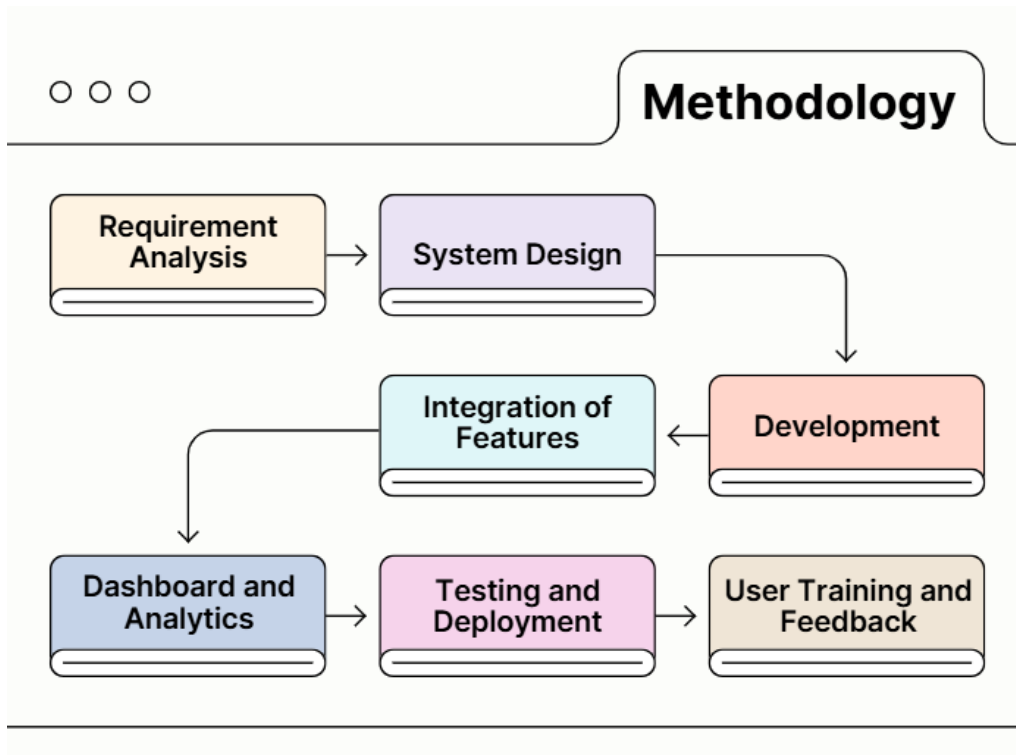


Figure 1: Methodology Flowchart

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