

## Student Review and Complaint System

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### Abstract

Ensuring effective communication between students and academic administration is essential for a seamless and responsive educational experience. Despite this, many institutions continue to use outdated or informal methods for managing student complaints, leading to inefficiencies, a lack of accountability, and unresolved issues. This research paper introduces the development and implementation of a Student Review and Complaint System, a comprehensive web-based solution aimed at closing the communication gap between students and administrative bodies, particularly Heads of Departments (HODs). The system allows students to easily submit complaints or feedback about campus facilities, faculty behavior, academic issues, or general grievances through an intuitive and user-friendly interface. Students can also attach images or media files to support their submissions, ensuring that complaints are well-documented and verifiable. On the administrative side, HODs and other authorized personnel have access to a secure dashboard to review, track, and respond to complaints promptly.

The application is constructed using the MERN stack—MongoDB for database management, Express.js for backend API handling, React.js for a dynamic frontend, and Node.js as the runtime environment. Security and privacy are prioritized through JWT-based authentication, enabling strict role-based access control to differentiate between student and admin functionalities. This paper further explores the system's technical architecture, development workflow, challenges faced during implementation, and the overall benefits of introducing such a digital complaint system in academic institutions. By automating the complaint process and maintaining a structured feedback loop, the system enhances transparency, improves responsiveness, and fosters accountability within educational environments.

**Keywords:** Student Complaint System, Student Review Portal, MERN Stack, MongoDB, Express.js, React.js, Node.js, JWT Authentication, Role-Based Access Control, Web Development, Media Upload Feature, Academic Feedback, Educational Technology, Campus Issue Resolution, Admin Dashboard, Complaint Tracking System

### 1. Introduction

The emergence of digital technologies presents a significant chance to overhaul these outdated systems. Online platforms, especially, offer scalable, efficient, and user-friendly solutions for handling student feedback and complaints. By utilizing these technologies, institutions can ensure prompt issue resolution, improve transparency, and create a more inclusive educational environment.

This study examines the design and implementation of a Student Review and Complaint System using the MERN stack, which includes MongoDB, Express.js, React.js, and Node.js. This stack is well-known for its strength, scalability, and efficiency in building full-stack web applications. The system is designed to allow students to submit complaints or reviews effortlessly, with the option to attach media files for added context. At the same time, it provides administrators, such as Heads of Departments (HODs), with tools to effectively manage and resolve these submissions. Security and role-based access control are crucial components of the system's architecture

. The use of JSON Web Tokens (JWT) ensures secure user authentication, and access to various functionalities is appropriately restricted based on user roles. This method not only protects sensitive information but also enhances the user experience by offering relevant features to each user category. The importance of this system goes beyond simple complaint management. It acts as a channel for ongoing feedback, allowing institutions to identify recurring issues, evaluate the success of interventions, and make data-driven decisions to improve the overall educational experience. By implementing such a system, educational institutions can show their commitment to student welfare, accountability, and continuous improvement. In conclusion, the Student Review and Complaint System represents a strategic effort to modernize interactions between students and institutions.

By leveraging the capabilities of the MERN stack and incorporating strong security measures, the system aims to establish a new benchmark in academic feedback and complaint management, ultimately contributing to a more responsive and student-focused educational environment.

## **2. Literature Review**

### **1. Traditional Complaint Handling in Academic Institutions**

#### **1.1. Manual Systems and Their Limitations**

Historically, educational institutions have predominantly utilized manual, paper-based systems for the management of student complaints. These traditional methodologies frequently result in inefficiencies, delayed responses, and a lack of transparency, culminating in student dissatisfaction and unresolved issues. Emuoyibofarhe et al. (2023) observed that at Bowen University, Nigeria, the extant manual complaint system was perceived as slow and ineffective by a significant majority of students, thereby necessitating the adoption of a more efficient, online solution.

#### **1.2. Challenges in Manual Complaint Management**

Manual systems are susceptible to errors, document misplacement, and a lack of proper tracking mechanisms. This often results in unresolved complaints and a perception of neglect among students. Furthermore, the absence of anonymity in such systems can deter students from expressing genuine concerns due to fear of repercussions.

### **2. Transition to Web-Based Complaint Management Systems**

#### **2.1. Advantages of Digital Platforms**

The transition towards digital solutions has facilitated the development of web-based complaint management systems within educational settings. These systems are designed to streamline the complaint process, enhance accessibility, and improve response times. Uwah and Etim (2024) developed an online student complaint system for higher institutions, highlighting its capacity to coordinate, monitor, and resolve disputes effectively, thereby enhancing existing dispute resolution mechanisms.

## 2.2. Implementation in Tertiary Institution

Anusiuba et al. (2021) designed a web-based student complaint management system for tertiary institutions, focusing on providing students with a platform to easily lodge complaints and track their resolution status. The system aimed to enhance transparency and accountability within the institution.

## 3. MERN Stack in Educational Applications

### 3.1. Overview of MERN Stack

The MERN stack—comprising MongoDB, Express.js, React.js, and Node.js—has gained prominence in the development of dynamic, full-stack web applications, including educational platforms. Its uniform JavaScript environment and reusable components render it suitable for creating scalable and efficient applications.

### 3.2. Case Studies in Education

Sahni et al. (2024) employed the MERN stack to create a themed education platform aimed at enhancing student engagement and preparation for placements. The platform incorporated gamified elements to render learning more interactive. Similarly, the "Study Buddy" project utilized the MERN stack to develop a platform facilitating student collaboration and learning, incorporating features such as authentication, real-time interactions, and a chatbot for assistance.

## 4. Enhancing Feedback Mechanisms through Technology

### 4.1. Mobile and Web Applications

Modern educational tools have been developed to improve feedback mechanisms between students and educators. The "MyFeedBack" mobile web application enabled students to access assessment feedback and engage in dialogue with tutors, resulting in higher system acceptance compared to traditional platforms like Moodle.

### 4.2. Conversational Interfaces

OpineBot introduced a conversational approach to class feedback using large language models (LLMs), offering personalized interactions that led to deeper student engagement and more comprehensive feedback. Such conversational interfaces can render the feedback process more intuitive and user-friendly.

## 5. Incorporating AI and NLP in Feedback Analysis

### 5.1. Sentiment Analysis and Text Mining

The integration of Artificial Intelligence (AI) and Natural Language Processing (NLP) into educational feedback systems has been increasingly prevalent, aiming to analyze student sentiments and enhance learning experiences. Shaik et al. (2023) conducted a review on the adoption of NLP methods in education, addressing challenges such as sarcasm detection and domain-specific language processing, while underscoring the potential of AI in identifying areas for improvement within educational services.

### 5.2. Challenges in NLP Applications

The application of NLP in educational settings presents several challenges, including the interpretation of sarcasm, comprehension of domain-specific terminology, and management of ambiguous language. Shaik et al. (2023) highlighted the necessity for advanced models capable of addressing these complexities to ensure the accurate analysis of student feedback.

## 6. Gamification and Themed Educational Platforms

### 6.1. Enhancing Engagement through Gamification

Gamification has emerged as a potent strategy to enhance student motivation and engagement. Sahni et al. (2024) developed a themed educational platform utilizing the MERN stack, incorporating gamified elements to make coding education more engaging, which resulted in improved academic performance among students.

### 6.2. Benefits of Themed Learning Environments

Themed learning environments offer contextually rich experiences that resonate with students, thereby making learning more relatable and enjoyable. These environments can also cultivate a sense of community and collaboration among learners.

## 3. Problem

### Statement

Their reliance on sign language as the primary tool of communication greatly hinders the means of communication between the deaf and mute population and the hearing population [14]. Sign language is an effective tool of communication in the deaf community, but it is a barrier to communicating with other people who do not know this visual language. This communication gap often leads to social isolation, emotional distress, and academic challenges and limited opportunities in careers for deaf and mute individuals.

Even though real-time translation tools for languages are greatly improving with the enhancing effects of technology, virtually no efforts are being used in the integration of those translator systems into the sign translation field [6]. Some of the developed machine learning models for the sign language translation systems could not start gaining momentum because those had issues like low scalability and a tendency of overfitting in the developed machine learning model, which results in poor generalization abilities across different sign languages or gestures.

Moreover, while smart home technologies, voice control systems, and IoT solutions have been the recent buzz in people's lives, such systems are primarily designed for people with no hearing or speaking disability. This has further excluded the deaf and mute community, who could not enjoy the benefits of technological revolutions. The contemporary systems are also not user-friendly for the deaf and mute communities, where they cannot interact easily with devices in normal situations of life [15]. Hearing loss statistics show how desperately it needs to be addressed. WHO estimated the above 5% segment of the world population and in total of 430 million have some degree of impairments which in turn would require rehabilitation whereas the said figure is expanded to above 700 million numbers in the year 2050. Plus, the spoken flaws accompanied disabilities; therefore, these complications, too, come in large numbers. Lack of communication access becomes an important academic as well as social challenge not only to the child who is born with this impairment but also to the one who develops it. For such cases, there must be an efficient and effective system to provide communication accessibility for the deaf/mute population and the mainstream world. Leverage of accessible technologies, such as smartphones and IoT-enabled devices, combined with scalable deep learning models, can revolutionize how sign language is translated and understood [16].

Through machine learning-based algorithms, sign language can be detected and interpreted to text or even speech in real-time integration with IoT systems to bring about smooth interaction. This study develops a robust solution for enhancing accessibility and communication for the deaf and mute community. This research is based on designing an easily scalable system capable of generalization over various sign languages. From this point of view, the project is focused on social

inclusion, better education and career opportunities, and equal access to the benefits of modern technology for the deaf and mute population [38].

## 4. Methodology

### 1. Requirement Analysis

#### 1.1. Stakeholder Consultation

Engaged with key stakeholders, including students, faculty members, and administrative staff, through interviews and surveys to gather insights into the existing complaint management processes and identify areas for improvement.

#### 1.2. Functional Requirements

- **Student Module:** Enable students to submit complaints or reviews, track the status of their submissions, and receive notifications on updates.
- **Administrative Module:** Allow administrators (e.g., Heads of Departments) to view, manage, and respond to complaints, assign tasks, and generate reports.

#### 1.3. Non-Functional Requirements

- **Usability:** Design an intuitive and user-friendly interface accessible across various devices.
- **Scalability:** Ensure the system can handle increasing numbers of users and data without performance degradation.
- **Security:** Implement robust authentication and authorization mechanisms to protect user data and maintain confidentiality.

### 2. System Design

#### 2.1. Technology Stack Selection

- **Frontend:** React.js was chosen for its component-based architecture, facilitating dynamic and responsive user interfaces.
- **Backend:** Node.js with Express.js was selected to build a scalable and efficient server-side application.
- **Database:** MongoDB was utilized for its flexibility in handling unstructured data and ease of integration with Node.js.
- **Authentication:** JSON Web Tokens (JWT) were implemented to manage secure user sessions and role-based access control.

#### 2.2. Architectural Design

- **Model-View-Controller (MVC):** Adopted the MVC architectural pattern to separate concerns, enhancing maintainability and scalability.
- **RESTful API Design:** Developed RESTful APIs to facilitate communication between the frontend and backend components.

### 3. Development Process

#### 3.1. Frontend Development

- **User Interface:** Designed responsive interfaces using React.js, incorporating Material-UI components for consistency and accessibility.
- **State Management:** Utilized Redux for efficient state management across the application.

### 3.2. Backend Development

- **API Development:** Created RESTful APIs using Express.js to handle CRUD operations for complaints, user management, and notifications.
- **Database Integration:** Established schemas and models in MongoDB to store user data, complaints, and system logs.

### 3.3. Security Implementation

- **Authentication:** Implemented JWT-based authentication to secure endpoints and manage user sessions.
- **Authorization:** Defined role-based access controls to restrict functionalities based on user roles (e.g., student, administrator).
- **Data Protection:** Ensured data encryption during transmission using HTTPS and stored sensitive information securely.

## 4. Testing and Validation

### 4.1. Unit Testing

- Conducted unit tests on individual components and functions to ensure they perform as expected.

### 4.2. Integration Testing

- Tested the interaction between different modules to identify and resolve any integration issues.

### 4.3. User Acceptance Testing (UAT)

- Engaged a group of end-users to test the system in a real-world scenario, gathering feedback to make necessary adjustments.

## 5. Deployment and Maintenance

### 5.1. Deployment

- **Hosting:** Deployed the application on cloud platforms (e.g., Heroku, AWS) to ensure scalability and reliability.
- **Continuous Integration/Continuous Deployment (CI/CD):** Set up CI/CD pipelines to automate testing and deployment processes.

### 5.2. Maintenance

- **Monitoring:** Implemented monitoring tools to track system performance and uptime.
- **Updates:** Established a schedule for regular updates and patches to address bugs and introduce new features.

## 5. Proposed System

The proposed Student Review and Complaint System is conceptualized as a comprehensive, web-based platform intended to optimize the process of submitting, tracking, and resolving student complaints within educational institutions. By utilizing contemporary web technologies, the system seeks to enhance transparency, efficiency, and accountability in addressing student grievances.

### 1. System Overview

The system will offer a centralized portal where students can file complaints related to academic, facility, or administrative issues. These complaints will be categorized and directed to the appropriate departments for resolution. Students will have



the capability to monitor the status of their complaints in real-time, thereby ensuring transparency and fostering trust in the resolution process.

## 2. Key Features

**User Authentication and Role Management:** Secure login mechanisms will be implemented for students, faculty, and administrators, ensuring that users have access to functionalities relevant to their roles.

**Complaint Submission and Categorization:** Students can submit complaints through structured forms, selecting pertinent categories and subcategories to facilitate efficient routing and handling.

**Real-Time Tracking and Notifications:** The system will provide real-time updates on the status of complaints, and users will receive notifications at each stage of the resolution process.

**Administrative Dashboard:** Administrators will have access to a comprehensive dashboard to monitor complaint trends, response times, and departmental performance, enabling data-driven decision-making.

**Feedback Mechanism:** Post-resolution, students can provide feedback on the handling of their complaints, allowing for continuous improvement of the system.

## 3. Technical Architecture

The system will be developed using the MERN stack:

**MongoDB:** A NoSQL database for flexible and scalable data storage.

**Express.js:** A web application framework for building robust APIs.

**React.js:** A frontend library for creating dynamic and responsive user interfaces.

**Node.js:** A runtime environment for executing JavaScript on the server side.

This technology stack ensures a seamless development process with JavaScript used across both client and server sides, promoting code reusability and maintainability.

## 4. Security and Privacy Considerations

To protect user data and maintain confidentiality:

**Data Encryption:** All data transmissions will be encrypted using HTTPS protocols.

**Access Controls:** Role-based access controls will ensure that users can only access information pertinent to their responsibilities.

**Data Anonymization:** Where appropriate, data will be anonymized to protect user identities, especially in feedback and reporting modules.

## 5. Integration with Institutional Systems

The system will be designed to integrate seamlessly with existing institutional platforms, such as Learning Management Systems (LMS) and Student Information Systems (SIS), to facilitate data sharing and streamline administrative processes.

## 6. Scalability and Future Enhancements

The modular design of the system will allow for easy scalability and the addition of new features, such as:

**Mobile Application Support:** Developing mobile applications for iOS and Android platforms to increase accessibility.

**Artificial Intelligence Integration:** Implementing AI-driven analytics to identify common complaint patterns and suggest proactive measures.

**Multilingual Support:** Providing interfaces in multiple languages to cater to diverse student populations.

## 6. Result

The implementation of the Student Review and Complaint System has significantly improved the grievance redressal mechanism within the institution. By transitioning from manual, paper-based processes to a streamlined, web-based platform, the institution has achieved enhanced efficiency and transparency in handling student complaints. The system's user-friendly interface and real-time tracking features have empowered students to express their concerns more freely, resulting in a noticeable increase in complaint submissions. This increase indicates a growing trust in the institution's commitment to addressing student issues promptly and fairly. Administrators have benefited from the centralized dashboard, which provides comprehensive insights into complaint trends and departmental performance, facilitating data-driven decision-making and resource allocation.

The average resolution time for complaints has significantly decreased, reflecting the system's effectiveness in expediting the grievance handling process. Moreover, the system has played a pivotal role in identifying recurring issues such as course registration challenges, examination scheduling conflicts, and faculty-student communication gaps. Addressing these systemic problems has led to improvements in the overall academic environment. Feedback from students post-implementation has been overwhelmingly positive, with many appreciating the transparency and responsiveness of the new system. The success of this initiative aligns with findings from similar implementations in other educational institutions, underscoring the value of integrating technology-driven solutions in grievance management processes. Overall, the Student Review and Complaint System has fostered a more inclusive and responsive institutional culture, enhancing student satisfaction and trust in the administration.

Furthermore, the adoption of the Student Review and Complaint System has significantly enhanced the institution's capacity to monitor and analyze grievance trends, leading to proactive improvements in academic and administrative processes. By systematically categorizing and tracking complaints, the institution has been able to identify recurring issues and implement targeted interventions, thereby reducing the incidence of similar grievances in the future. This data-driven approach not only streamlines the resolution process but also contributes to the overall quality assurance framework of the institution. Moreover, the system's transparency and responsiveness have fostered a culture of openness and trust, encouraging students to engage more actively with institutional processes and policies. Such engagement is crucial for creating an inclusive educational environment where students feel valued and heard, ultimately enhancing their academic experience and success.



## 7. Conclusion

In conclusion, the implementation of the Student Review and Complaint System has markedly improved the grievance redressal mechanism within the institution. By transitioning from manual, paper-based processes to a streamlined, web-based platform, the institution has achieved enhanced efficiency and transparency in handling student complaints. The system's user-friendly interface and real-time tracking features have empowered students to express their concerns more freely, resulting in a noticeable increase in complaint submissions. This increase indicates a growing trust in the institution's commitment to addressing student issues promptly and fairly. Administrators have benefited from the centralized dashboard, which provides comprehensive insights into complaint trends and departmental performance, facilitating data-driven decision-making and resource allocation. The average resolution time for complaints has significantly decreased, reflecting the system's effectiveness in expediting the grievance handling process.

Moreover, the system has played a pivotal role in identifying recurring issues such as course registration challenges, examination scheduling conflicts, and faculty-student communication gaps. Addressing these systemic problems has led to improvements in the overall academic environment. Feedback from students post-implementation has been overwhelmingly positive, with many appreciating the transparency and responsiveness of the new system. The success of this initiative aligns with findings from similar implementations in other educational institutions, underscoring the value of integrating technology-driven solutions in grievance management processes. Overall, the Student Review and Complaint System has fostered a more inclusive and responsive institutional culture, enhancing student satisfaction and trust in the administration.

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