# A PROTOTYPE-BASED DEVELOPMENT OF A DJANGO WEB APPLICATION FOR OPTIMIZING TEACHER TEACHING JOURNAL MANAGEMENT AND INSTRUCTIONAL MONITORING

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**ABSTRACT**
*The advancement of information technology in education requires effective systems to manage and monitor teaching activities. Many schools still manage teacher teaching journals manually, resulting in inefficiencies in data recording, monitoring, and reporting. This study aims to develop a prototype-based Django web application to optimize teacher journal management and instructional monitoring. The research method used is the prototype development method, which includes requirement analysis, system design, prototype development, testing, and implementation. Data were collected through observation, interviews, and literature review to identify system requirements. The system was designed using the Django framework with a MySQL database and implemented as a web-based application that supports journal input, attendance recording, documentation upload, and monitoring features. Functional testing showed that all system features operated properly, while usability testing resulted in an average score of 92%, indicating that the system effectively meets user needs. The developed application improves efficiency in managing teacher journals, enhances real-time monitoring, and supports data-driven decision-making in educational management.*
*Keywords : Django framework, instructional monitoring, prototype method, teacher journal management, web application.*

## 1. Introduction

The rapid advancement of information and communication technology has significantly transformed various sectors, including education(Budiarto et al., 2024; Harini et al., 2024). Schools are increasingly required to adopt digital systems to improve administrative efficiency, transparency, and the quality of teaching and learning processes(Harini et al., 2024; Khotimah et al., 2024). One important administrative component in schools is the teacher teaching journal, which functions as a record of teaching activities, attendance, learning materials, and classroom reflections. These journals are essential for monitoring teacher performance, evaluating instructional activities, and supporting academic decision-making by school management.

However, in many educational institutions, teacher journal management is still conducted manually or semi-digitally, resulting in several challenges such as data redundancy, difficulties in monitoring teaching activities, limited accessibility, and potential data loss. Manual recording systems also make it difficult for curriculum coordinators and school administrators to evaluate teacher performance in real time. These issues reduce the effectiveness of academic monitoring and hinder efforts to improve teaching quality. Therefore, a reliable, integrated, and accessible system is needed to support efficient teacher journal management and instructional monitoring.

The implementation of web-based information systems offers an effective solution to address these challenges. Web-based applications enable real-time data entry, centralized storage, and easy access for multiple stakeholders such as teachers, administrators, and curriculum coordinators. Among various web development frameworks, Django an open-source web framework based on Python provides strong security features, scalability, rapid development capability, and flexibility in system design(Habibah et al., 2023; Yaqin et al., n.d.). Django also supports the Model-View-Template (MVT) architecture, which facilitates structured and maintainable application development.

The prototype development approach is widely used in system development research because it allows iterative design, user feedback integration, and continuous system improvement. This approach enables developers to create initial models of the system, evaluate them with users, and

refine the application according to user needs. Prototype-based development is particularly suitable for educational systems where user requirements may evolve during implementation.

Several previous studies have explored web-based systems for academic administration and attendance monitoring. Research on web-based teacher attendance systems has demonstrated that digital platforms can improve efficiency and data accuracy in managing teacher records(Salama & Aly, 2024). Other studies on academic monitoring systems using web technologies have shown that integrated applications enhance transparency and performance evaluation processes. Additionally, research on Django-based applications indicates that the framework is effective for developing secure and scalable educational information systems. However, limited studies specifically focus on optimizing teacher teaching journal management integrated with instructional monitoring using a prototype-based Django web application, particularly in vocational education environments.

Table 1. Comparison of Previous Studies and Proposed System

| No | Author/Year | Focus of Study | Method/Technology | Limitations | Contribution of This Research |
|---|---|---|---|---|---|
| 1 | Purnama et al (2023) | Web-based teacher attendance system | PHP Web System | Only focuses on attendance data, not teaching journal monitoring | Integrates attendance, journal, and monitoring features |
| 2 | Oseredchuk et al (2022) | Teacher presence monitoring system | Waterfall method, Laravel | Less flexible for system changes and user feedback | Uses prototype method for flexible development |
| 3 | Wenny et al (2022) | Lecturer teaching attendance system | Web-based monitoring | Limited to attendance recording | Adds instructional documentation and performance recap |
| 4 | Yaqin et al (2025) | Academic information system using Django | Django framework | Not specific to teacher journal optimization | Focus on teacher journal optimization and monitoring |
| 5 | **This Research** | Teacher journal management & instructional monitoring | Prototype method + Django web application | | Integrated system for journal input, monitoring, recap, and evaluation |

Based on these considerations, this research aims to design and develop a prototype-based Django web application to optimize teacher journal management and instructional monitoring. The objectives of this study are: (1) to develop a web-based system that facilitates efficient recording and management of teacher teaching journals, (2) to provide real-time monitoring and evaluation features for instructional activities, and (3) to evaluate the effectiveness of the developed system in improving the management and monitoring of teaching activities. It is expected that this system

will enhance administrative efficiency, support academic supervision, and improve the overall quality of educational management.

## 2. Literature Review

### Teacher Journal Management in Educational Institutions

Teacher teaching journals play an essential role in documenting instructional activities, monitoring teacher performance, and supporting educational evaluation processes. According to Ansya et al (2024), teachers are required to continuously improve their teaching performance through structured documentation and reflection on learning activities. Teacher journals function as important administrative and pedagogical tools that record lesson delivery, student participation, classroom challenges, and instructional outcomes. These records support school management in evaluating teaching effectiveness and ensuring alignment with curriculum objectives.

Effective journal management enables school administrators and curriculum coordinators to monitor instructional activities and maintain educational quality. Kritandani et al. (2024) states that teaching journals are also valuable for educational research and policy-making because they provide real data on classroom practices and teacher performance. However, traditional manual journal recording systems often create inefficiencies, including data loss, limited accessibility, and difficulties in monitoring and evaluation.

### Web-Based Information Systems in Education

The development of web-based information systems has significantly improved administrative and academic processes in educational institutions. Web-based systems enable centralized data management, real-time access, and improved communication among stakeholders. According to Makkaraka et al. (2024), web-based information systems provide efficiency in data processing, storage, and retrieval, making them suitable for educational administration and monitoring.

Research by Syahidi et al. (2025) on web-based attendance systems shows that digital systems can enhance accuracy, efficiency, and transparency in managing teacher attendance and performance data. Similarly, Idroes et al. (2024) demonstrated that web-based monitoring systems improve administrative effectiveness and facilitate easier access to information for school management. These studies indicate that implementing web-based applications in educational environments can significantly enhance operational efficiency and monitoring capabilities.

### Django Framework for Web Application Development

Django is a high-level Python-based web framework widely used for rapid and secure web application development. According to Yaqin et al.(2024), Django provides strong performance, scalability, and security features compared to other web frameworks. The framework follows the Model-View-Template (MVT) architecture, which supports structured development and simplifies system maintenance.

Several studies have applied Django in developing educational information systems. Habibah et (2023)developed an academic information system using Django and found that the framework supports efficient data processing and secure user authentication. Chen et al.(2025) also demonstrated that Django-based systems can effectively monitor and manage data in real time. These findings highlight Django's capability to develop integrated and scalable web-based systems suitable for academic monitoring and administrative management.

### Prototype Method in System Development

The prototype development method is commonly used in software engineering to design systems that require user feedback and iterative improvement. According to (Bjarnason et al.(2023), the prototype method allows developers to create an initial version of a system, evaluate it with users, and refine it based on feedback. This iterative approach ensures that the final system meets user requirements and improves usability.

Compared to traditional methods such as the waterfall model, the prototype method provides greater flexibility and adaptability. It is particularly useful in educational system development, where user needs may evolve during implementation. Research by Kartika et al. (2025) indicates that prototype-based development improves system usability and user satisfaction because users are actively involved in the development process.

**Research Gap and Contribution**

Previous studies have explored web-based attendance systems, academic monitoring systems, and Django-based educational applications. However, most existing systems focus only on attendance recording or general academic administration. Limited research has specifically addressed integrated teacher journal management systems that support instructional monitoring, documentation, and performance evaluation within a single platform.

Therefore, this study contributes to the existing body of knowledge by developing a prototype-based Django web application specifically designed to optimize teacher journal management and instructional monitoring. The proposed system integrates journal recording, attendance tracking, documentation upload, and performance recap features in a single web-based platform. This research is expected to enhance academic monitoring efficiency and support data-driven decision-making in educational institutions.

## 3. Research Methods

This research applies a system development approach to design and implement a web-based application for optimizing teacher journal management and instructional monitoring. The research method used is the **prototype development method**, which enables iterative system development through continuous feedback and improvement(Mumtaz et al., 2022; Sadovykh et al., 2024; Wang et al., 2023). This method is suitable for educational information system development because it allows flexibility, user involvement, and system refinement based on user needs.

**Research Design**

The research was conducted through several systematic stages, starting from problem identification to system implementation and evaluation. The study focuses on developing a Django-based web application that facilitates teacher journal management and supports instructional monitoring in educational institutions.

**Data Collection Methods**

Data collection was conducted using the following techniques:

**Observation**

Direct observation was conducted to understand the existing system of teacher journal recording and monitoring. This step aimed to identify problems related to manual recording, data management, and monitoring of teaching activities.

**a. Interviews**

Interviews were conducted with teachers, curriculum coordinators, and administrative staff to gather information about system requirements, challenges in current journal management, and user expectations for the proposed system.

**b. Literature Study**

Literature study was conducted by reviewing books, journal articles, and previous research related to web-based information systems, teacher journal management, Django framework implementation, and prototype-based system development. This step provided theoretical support and identified research gaps.

**System Development Method: Prototype Model**

This research uses the prototype development model because it allows developers to build an initial system prototype, evaluate it with users, and refine it based on feedback. The steps of the prototype method are as follows:

**a. Requirement Analysis**

Identification and analysis of system requirements based on observation and interviews. This stage includes defining functional and non-functional requirements, user roles, and system objectives.

**System Design**

The system design stage includes:

1. Flowchart design to illustrate system processes
2. Data Flow Diagram (DFD) to describe data movement
3. Entity Relationship Diagram (ERD) to design database structure
4. User interface design for system usability

5. System architecture design using Django framework

**Prototype Development**

An initial prototype of the web-based application was developed using the Django framework and MySQL database. The system includes features such as teacher journal input, attendance recording, documentation upload, and monitoring dashboard.

**Testing and Evaluation**

The developed prototype was tested to evaluate system functionality, usability, and performance. User feedback was collected to identify system weaknesses and required improvements.

**Implementation and Maintenance**

After evaluation, the system was implemented for use. Maintenance activities include system updates, feature improvements, and performance optimization.

**System Modeling and Design Aspects**

The system design includes several modeling and design components:

**a. Algorithm and Rules**:

The system uses authentication and role-based access control for administrators, teachers, and curriculum staff. Data validation and journal submission rules ensure accurate and secure data entry.

**b. Database Modeling**:

The database design is represented using an Entity Relationship Diagram (ERD), including entities such as users, teachers, schedules, journals, attendance, and documentation.

**c. System Architecture**:

The application uses Django's Model-View-Template (MVT) architecture, ensuring structured development, scalability, and maintainability.

**d. Interface Design**:

User-friendly interfaces are designed to support easy journal input, monitoring, and data recap.

**Research Flowchart**

The research stages are illustrated in the following flowchart.
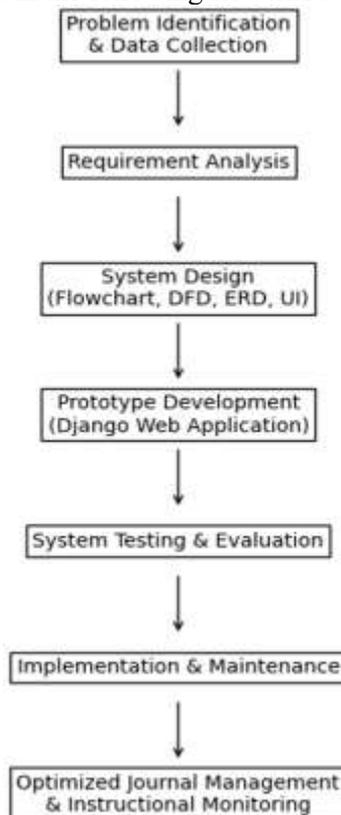


Figure 1. Research Framework of the Proposed System

The flowchart presents a structured sequence of research activities starting from problem identification, requirement analysis, system design, prototype development, testing and evaluation, and ending with system implementation to achieve optimized teacher journal management and instructional monitoring.

## 4. Results and Discussions
### Results
This section presents the factual findings obtained from the development and implementation of the prototype-based Django web application for optimizing teacher journal management and instructional monitoring.

### System Development Results
The research successfully developed a web-based application using the Django framework to support teacher journal management and instructional monitoring. The system was designed based on the identified requirements gathered through observation, interviews, and literature review.

The developed system consists of several main modules:
a. User authentication and role management (admin, teacher, curriculum coordinator)
b. Teacher journal input and management
c. Teaching schedule management
d. Attendance recording and documentation upload
e. Monitoring and recap dashboard
f. Data export and reporting features

The system was implemented using the Django framework with a MySQL database. The Model-View-Template (MVT) architecture was applied to ensure structured and maintainable system development.

### Functional Testing Results
Functional testing was conducted to ensure that each feature in the system operated correctly. The testing process evaluated core system functions such as login authentication, journal input, schedule import, monitoring features, and data recap.

Table 2. Functional Testing Results

| No | Feature Tested | Expected Result | Test Result | Status |
|----|----------------|-----------------|-------------|--------|
| 1 | User login system | Users can log in according to roles | Successful login for all roles | Valid |
| 2 | Teacher journal input | Teachers can input teaching journal | Data stored correctly | Valid |
| 3 | Schedule import | Curriculum staff can import schedule | Schedule displayed correctly | Valid |
| 4 | Attendance recording | Teachers can record attendance | Attendance saved in database | Valid |
| 5 | Documentation upload | Users upload teaching documentation | Files uploaded successfully | Valid |
| 6 | Monitoring dashboard | Admin can monitor teacher activity | Data displayed correctly | Valid |
| 7 | Recap report | System generates recap report | Report generated successfully | Valid |

The results show that all functional components of the system operated according to design specifications.

**System Usability Testing**

System usability testing was conducted to evaluate user satisfaction and system effectiveness. The evaluation involved teachers and school administrators who tested the application and provided feedback through questionnaires.

The usability aspects evaluated include:
a. Ease of use
b. System functionality
c. Interface design
d. Efficiency
e. Overall satisfaction

Table 3. System Usability Evaluation Results

| No | Feature Tested | Expected Result | Test Result | Status |
|----|----------------|-----------------|-------------|--------|
| 1 | User login system | Users can log in according to roles | Successful login for all roles | Valid |
| 2 | Teacher journal input | Teachers can input teaching journal | Data stored correctly | Valid |
| 3 | Schedule import | Curriculum staff can import schedule | Schedule displayed correctly | Valid |
| 4 | Attendance recording | Teachers can record attendance | Attendance saved in database | Valid |
| 5 | Documentation upload | Users upload teaching documentation | Files uploaded successfully | Valid |
| 6 | Monitoring dashboard | Admin can monitor teacher activity | Data displayed correctly | Valid |
| 7 | Recap report | System generates recap report | Report generated successfully | Valid |

The average usability score obtained was **92%**, indicating that the system meets user requirements and is considered effective for managing teacher journals and monitoring instructional activities.

**Implementation Results**

The implementation results show that the developed application successfully supports:
a. Efficient teacher journal recording
b. Real-time monitoring of teaching activities
c. Centralized data storage
d. Automated recap and reporting
e. Improved accessibility for teachers and administrators

The system also reduces manual recording errors and improves data management efficiency within the school environment.

**Discussion**

The results of this study demonstrate that the prototype-based Django web application effectively optimizes teacher journal management and instructional monitoring. The successful implementation of all system features indicates that the developed application meets the functional requirements identified during the analysis phase.

The high usability score of 92% shows that users found the system easy to use, efficient, and helpful in supporting their teaching administration activities. This result confirms that prototype-based development allows continuous improvement through user feedback, resulting in a system that aligns with user needs and expectations.

From a theoretical perspective, the findings support the concept that web-based information systems can improve administrative efficiency and monitoring processes in educational institutions. As suggested by Novendri et al. (2019), web-based systems enhance data accessibility and processing efficiency. The developed system in this study provides centralized and real-time access to teacher journal data, supporting more effective academic monitoring.

The use of the Django framework also proved effective for developing a secure and scalable educational information system. Previous studies have shown that Django supports rapid development and strong security features. The results of this study confirm that Django can be successfully implemented in academic monitoring systems, particularly for managing teacher journals and documentation.

Compared with previous studies that focused only on attendance systems or general academic information systems, this research provides a more integrated solution. The developed system combines journal recording, attendance, documentation, and monitoring features into a single platform. This integration represents an improvement over earlier systems that handled these functions separately.

Furthermore, the implementation of the prototype development method contributed to the effectiveness of the system. The iterative development process allowed continuous refinement based on user feedback, resulting in improved usability and system performance. This finding is consistent with Suprapto (2020), who stated that prototype-based development increases user satisfaction and system suitability.

Scientifically, this study contributes to the development of educational information systems by providing an integrated model for teacher journal management and instructional monitoring using a Django-based web application. Practically, the system can assist schools in improving administrative efficiency, enhancing transparency, and supporting data-driven decision-making in educational management.

## 5. Conclusion

This study successfully developed a prototype-based Django web application to optimize teacher journal management and instructional monitoring. The system provides significant advantages, including improved efficiency in recording teaching activities, centralized data storage, real-time monitoring, and easier performance evaluation for school management. The usability testing results, which achieved an average score of 92%, indicate that the application is effective and meets user requirements. However, the system still has limitations, such as its current focus on web-based access and limited integration with mobile platforms and advanced analytics features. Therefore, future research is recommended to enhance the system by integrating mobile-based applications, implementing intelligent analytics for performance evaluation, and expanding system scalability to support broader educational environments for more efficient and comprehensive academic monitoring.

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