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## Implementation of the Rapid Application Development (RAD) method for guidance and counseling: a case study at SMPN 3 Pakuhaji

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**Abstract**—This study presents the development and evaluation of a web-based Guidance and Counseling Information System at SMPN 3 Pakuhaji using the Rapid Application Development (RAD) method. Prior to system implementation, counseling services relied on manual documentation and face-to-face reporting, resulting in delayed case processing, limited monitoring, and inefficient data management. The RAD approach was applied through iterative prototyping cycles involving continuous feedback from counselors and teachers to ensure alignment with user requirements. The system was developed using PHP and MySQL, supported by UML modeling and database design. System evaluation was conducted using black-box testing to verify functional correctness and performance measurement to assess operational efficiency. The results indicate that counseling case processing time was reduced from approximately 2–3 working days to 3–5 hours, representing an efficiency improvement of about 85%. In addition, a user satisfaction survey involving 45 respondents yielded a 84.1% score, categorized as “Strongly Agree.” These findings demonstrate that the RAD-based system effectively improves the efficiency, accuracy, and accessibility of counseling services. The study confirms that iterative user-centered development not only accelerates system delivery but also enhances system usability and practical effectiveness in educational counseling environments.

**Keywords**—*guidance and counseling system; rapid application development; web-based application.*

### 1. Introduction

Guidance and counseling services have become increasingly crucial in junior high school environments to support students' learning, behavior, and mental health development (Akdemir, 2023; Zakaria et al., 2024). The complexity of academic expectations and social dynamics during adolescence requires comprehensive and responsive interventions from school counselors (Trice, 2025; Zyromski et al., 2021). However, the imbalance between the number of counselors and students creates serious limitations in providing optimal services, as one counselor may be responsible for hundreds of students, influencing the effectiveness of learning assistance and individual student development (Bariyyah et al., 2024). Consequently, counseling services must evolve into a more strategic and adaptive model.

Behavioral issues such as bullying and misconduct frequently emerge in school environments and pose a threat to students' psychological well-being. Bullying has been shown to significantly disrupt emotional stability and academic success, requiring schools to adopt preventive and treatment-oriented programs (Elvin et al., 2024). Effective counseling initiatives require collaboration among counselors, peers, and parents to build an inclusive and socially supportive school ecosystem (Zayani et al., 2025). Strengthening behavioral guidance ensures safer learning environments while fostering students' moral and emotional development.

In addition to behavioral challenges, students' mental health represents another major concern that affects their performance and socio-emotional functioning. Anxiety and

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depression among adolescents are increasingly reported and can hinder learning processes and overall well-being (Andhini et al., 2024). To reduce the stigma surrounding mental health, schools must provide psychoeducation and coping-skill programs that empower students to understand and manage their psychological state (Astutik & Dewi, 2022; Yunita, 2023). Cognitive-behavioral-based interventions, such as Cognitive Behavior Stress Management, have shown meaningful improvements in students' emotional regulation and resilience in academic environments (Zega et al., 2024).

Despite counseling's multidimensional role, the delivery of conventional counseling services has encountered barriers, most notably the reliance on manual administrative systems. Manual data recording is vulnerable to errors, loss of information, and inefficiencies that obstruct systematic case management (Bidayah et al., 2023; Yudiansah & Nasrulloh, 2024). Furthermore, limited monitoring capacity makes it difficult for counselors to consistently track behavioral progress and violations. The absence of digital reporting tools also restricts thorough evaluations and timely decision-making (Fitriani et al., 2022; Prihatiningsih et al., 2023; Rahmawati et al., 2023).

These challenges are evident at SMPN 3 Pakuhaji, where counseling services are still conducted face-to-face and depend on a single counselor to accommodate a large student population. While a disciplinary point system has been implemented, the lack of digital documentation and reporting limits communication between counselors, homeroom teachers, and parents. Students also express an increasing need for fast, accessible counseling; yet time constraints and staffing limitations impede prompt case handling.

The rapid development of educational technology offers significant opportunities to modernize guidance and counseling services. Digital platforms, including web-based and online counseling systems, have proven to improve accessibility, efficiency, and student engagement (Handika & Herdi, 2021; Khasanah et al., 2022; Muryono, 2022). Technology-enabled counseling fosters seamless communication, faster information processing, and easier administration (Ayub, 2024; Sudirman, 2020; Wibowo, 2021). To achieve digital transformation effectively, professional development and ethical mechanisms must be scaled alongside technological adoption (Elawati et al., 2025; Fitrihi et al., 2024; Prayoga et al., 2024).

To support this transformation, the development of counseling information systems requires a methodological approach that accelerates deployment while ensuring alignment with user needs. Rapid Application Development (RAD) enables fast and iterative system development through prototype cycles and continuous stakeholder involvement (Hardiyanto & Andarwati, 2024; Hayati & Chotijah, 2024). RAD also allows system refinements based on real-time feedback, minimizing development risks and increasing user satisfaction (Muthian & Amalia, 2023; Safitri & Atqiya, 2022). Therefore, the RAD method is highly relevant to the development of a web-based guidance and counseling system at SMPN 3 Pakuhaji to provide more effective, integrated, and responsive counseling services.

Unlike generic open-source school management systems that primarily focus on academic administration and attendance, the proposed system specifically addresses counseling workflows, including violation tracking, consultation documentation, sanction automation, and

Table 1. RAD user feedback loop

| Iteration   | User Feedback                       | System Improvement               |
|-------------|-------------------------------------|----------------------------------|
| Prototype 1 | Data entry too time-consuming       | Simplified input forms           |
| Prototype 1 | Difficulty tracking student history | Student behavior dashboard added |
| Prototype 2 | Need faster reporting               | Automated report generation      |

parental notification. This specialization allows deeper behavioral monitoring and individualized student development tracking, which are often absent in conventional school information systems.

2. Method

This study employed a qualitative and quantitative case study approach to design and implement a web-based guidance and counseling system at SMPN 3 Pakuhaji. The Rapid Application Development (RAD) methodology was used for its iterative, user-centered nature, enabling rapid prototyping and continuous feedback integration. The research began with system analysis through interviews and observations to identify existing challenges in the school's counseling services. Based on the findings, system requirements were formulated, and system modeling was conducted using Unified Modeling Language (UML) diagrams, including use case, activity, sequence, and class diagrams, as well as an Entity Relationship Diagram (ERD) for database design. The system was developed using PHP and MySQL, and interface design was emphasized to ensure user-friendliness for both students and counselors.

To evaluate the system's effectiveness, two testing methods were used: Black-Box Testing to verify functional correctness and a questionnaire survey to assess user satisfaction. The questionnaire was distributed to 45 respondents, consisting of students and staff who interacted with the system. The results showed an 84.1% satisfaction rate, indicating strong user approval. The combination of RAD methodology, user involvement, and systematic testing ensured the system aligned with user needs and operational requirements, ultimately enhancing the efficiency and accessibility of counseling services at the school.

The Rapid Application Development (RAD) method applied in this study follows an iterative cycle involving requirement planning, prototype development, user evaluation, and refinement. This process is illustrated in Fig. 1.

3. Results

3.1. RAD Iteration and User Feedback Loop

The RAD implementation in this study was conducted through two main prototyping cycles, as shown in Table 1. Prototype 1 focused on core functionalities including student violation input, consultation records, and basic reporting features. After user testing, feedback was collected from counselors and homeroom teachers through informal

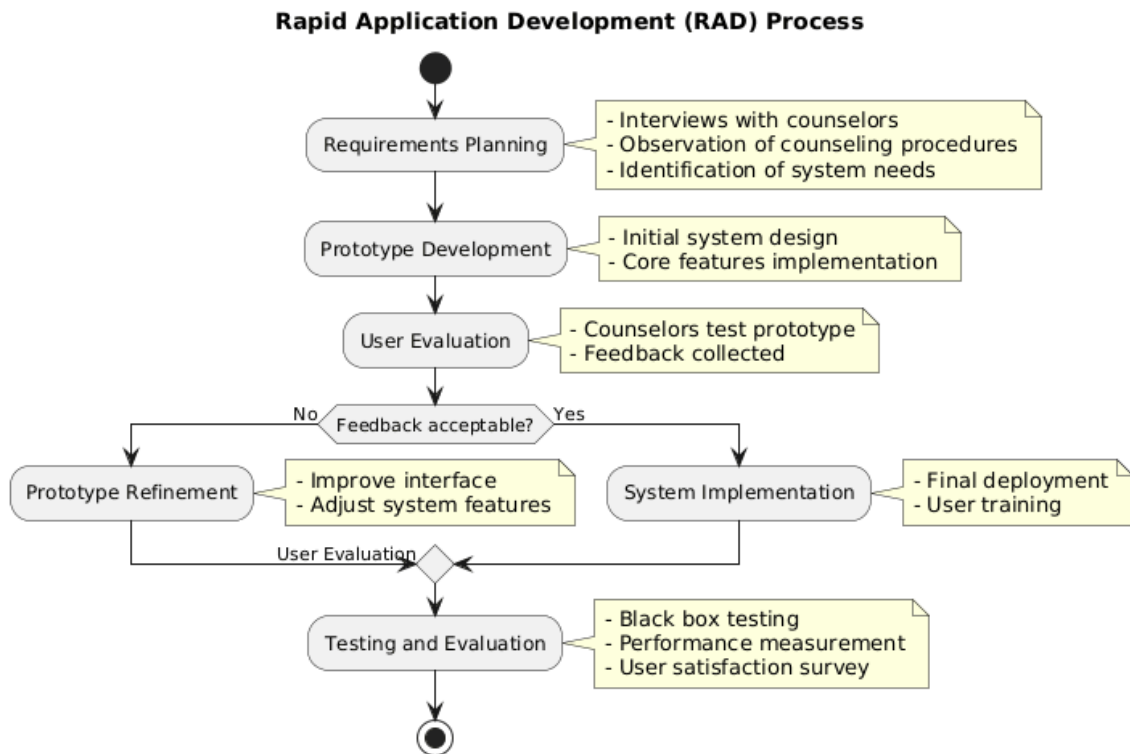


Fig. 1. Diagram Rapid Application Development (RAD)

interviews and direct observation.

Based on this feedback, Prototype 2 introduced improvements such as simplified data entry forms, automated sanction categorization, enhanced dashboard visualization, and faster report retrieval. This iterative refinement confirms that the system development followed the RAD principle of continuous user involvement rather than a linear Waterfall approach.

### 3.2. System Analysis

Based on data obtained from interviews and observations, the information was analyzed to formulate the system design required by SMPN 3 Pakuhaji. The existing guidance and counseling procedure at SMPN 3 Pakuhaji is described as follows and illustrated in Fig. 2:

1. Students at SMPN 3 Pakuhaji come to the guidance counselor's office or find the guidance counselor to meet with them.
2. Students report violations or seek consultation. The student then explains what happened and the problems they are experiencing.
3. Violation: The guidance counselor finds the student in question and imposes sanctions.
4. Consultation: The guidance counselor receives the consultation and provides input.
5. Students receive input.
6. The guidance counselor inputs the solution into the Guidance and Counseling form.

7. The type of violation is then recorded.
8. After listening to the student's problem, if the problem is relatively minor, the guidance counselor simply provides a solution. And if the violation is serious, a summons letter will be issued to the parents.
9. The student will accept the sanction.

#### 3.2.1. RAD Design Workshop

The next stage in the Rapid Application Development (RAD) method is design, which is divided into designing and building a system. To design a system using system modeling by involving users so that the design can be in accordance with the needs. The designed system modeling starts with the use of case diagrams, activity diagrams, sequence diagrams, and class diagrams. In addition, designing ERD, table structures, and user interfaces. Next, start building the system by creating a database and table structure based on the design results, then connecting the database to the source code using PHP. The design results at the design stage are adjusted to the input and output form maker. If there is still something that is not suitable, you can return to the system design section and Rebuild (looping) and so on until it meets the system specifications.

#### 3.2.2. ERD (Entity Relationship Diagram)

To ensure systematic data management and integrity within the guidance and counseling information system, a database design was developed using an Entity Relationship Diagram

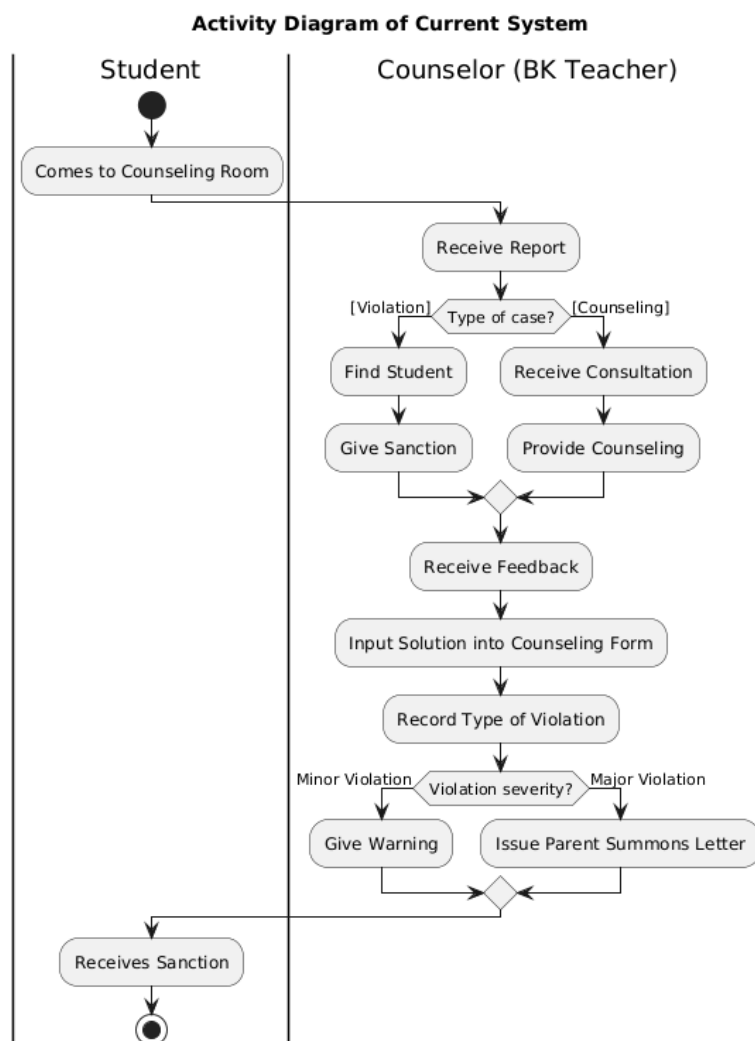


Fig. 2. Analysis of the running system

(ERD). This design stage is crucial to define data structures, entity relationships, and data flow required to support counseling activities such as student violation tracking, consultation records, sanctions, and reporting.

Fig. 3 presents the Entity Relationship Diagram (ERD) of the proposed guidance and counseling information system. The ERD illustrates the relationships among core entities, including students, violations, consultations, sanctions, and users. This design ensures data integrity and supports efficient tracking of student behavioral history.

### 3.2.3. Use Case Diagram

Functional system requirements were further modeled using a use case diagram to represent interactions between users and the system. This diagram was designed to clarify system functionality from the perspective of different user roles, including administrators, counselors, teachers, and students.

Fig. 4 illustrates the use case diagram of the proposed system, showing key functionalities such as login authentication, violation input, consultation management, report generation, and student data monitoring. The diagram demonstrates how each user role interacts with the system

based on their assigned access rights, ensuring secure, role-based system operation.

### 3.2.4. Sequence Diagram Login

To describe the system workflow and message exchanges between objects during specific processes, sequence diagrams were developed. These diagrams focus on illustrating the logical flow of system interactions, particularly during critical operations such as user authentication and data processing.

As presented in Fig. 5, the sequence diagram shows the interaction sequence between users, system interfaces, and the database during the login and data management process. This visualization helps ensure that system processes execute in the correct order and supports error handling and security validation.

### 3.2.5. Class Diagram

The system's structural design was modeled using a class diagram to represent its classes, attributes, methods, and relationships. This diagram serves as a blueprint for system development and object-oriented implementation.

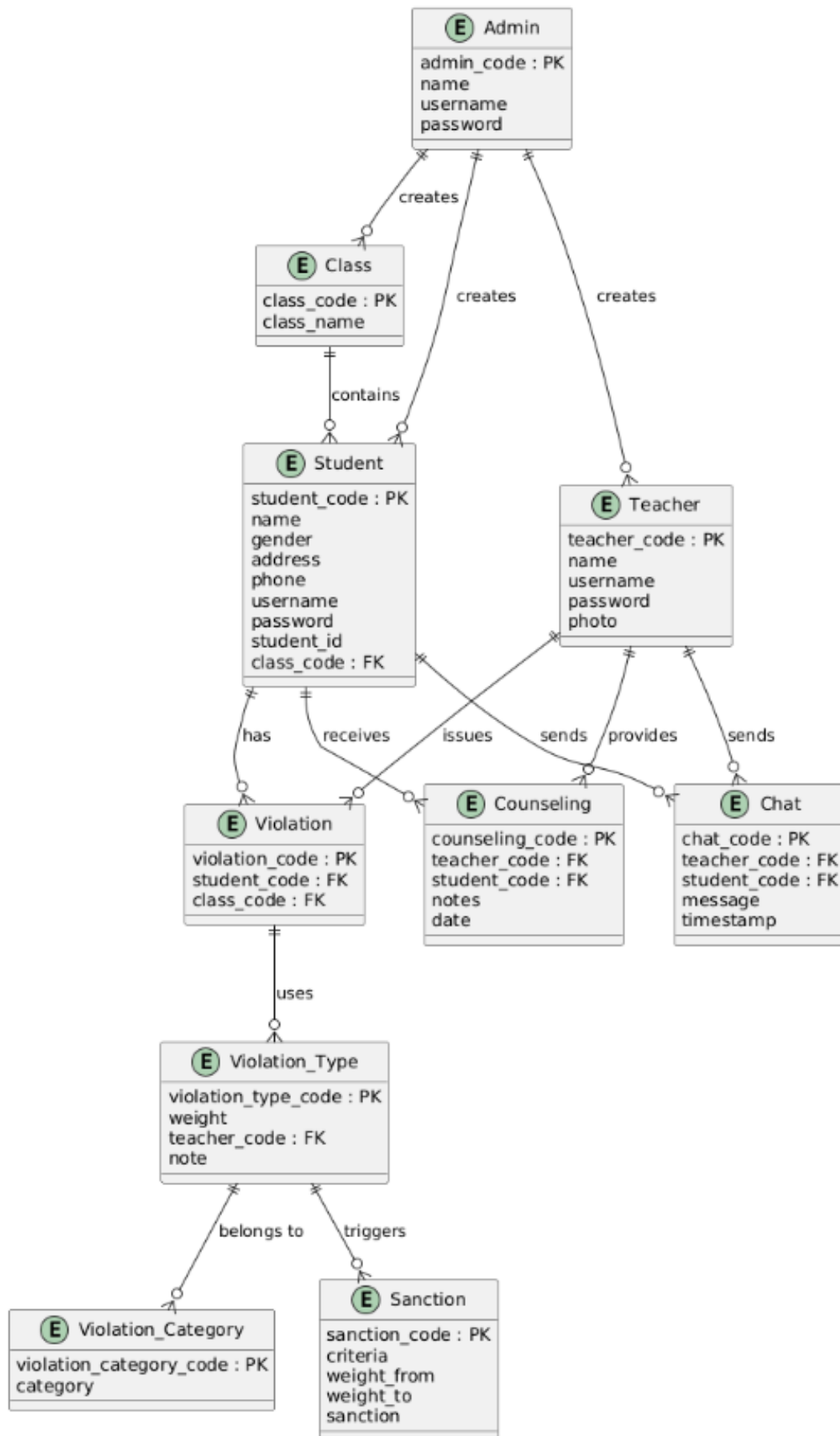
**ERD - Guidance & Counseling System (English Version)**

Fig. 3. Entity relationship diagram (ERD)

Fig. 6 depicts the class diagram of the guidance and counseling information system, illustrating how classes such as Student, Counselor, Violation, Consultation, and Report are interconnected. This design supports modular development and simplifies system maintenance and future enhancements.

### 3.2.6. System Implementation

Before system implementation, counseling case documentation and reporting required approximately 2–3 working days, as data were recorded manually and consolidated at the end of each week. After system implementation, the same process was completed within 3–5 hours, as all records were directly stored and accessed through the web-based system. This represents a time reduction of approximately 85%, demonstrating significant efficiency improvement.

To ensure a system is easy to use, a user-friendly interface is required. A simple interface allows users to quickly understand the steps required to use the system. On the login page (Fig. 7), there are two columns, each of which is used to enter a username and a password. If the data entered is correct, you will be taken to the main admin page. If the username and password are incorrect, the login will fail, and you will be asked to re-enter the correct username and password.

The implementation phase also focused on developing a user-friendly interface to ensure ease of use and accessibility for all system users. Interface design prioritized simplicity, clarity, and efficiency to support counseling activities without increasing user workload.

Figs. 8–10 show the main system interfaces, including the login page, the administrator dashboard, the student account management page, and the teacher dashboard. These interfaces enable users to efficiently access counseling information, monitor student behavior, and manage counseling records in real time.

### 3.2.7. System Testing

#### 3.2.7.1. Black Box Testing

To verify that the application operates error-free and meets the functional specifications defined in the requirements phase, Black Box Testing was conducted. This testing methodology focuses on the system's input-output behavior without examining its internal code structure. Various test cases were executed covering critical functionalities, including user authentication, data entry validation, and report generation. As summarized in Table 2, the testing process involved rigorous scenario-based input, such as entering invalid credentials or attempting to submit incomplete forms, to ensure the system handles exceptions gracefully and maintains data integrity under erroneous conditions.

#### 3.2.7.2. Questionnaire Testing

The quantitative data gathered from the 45 respondents (Table 3) was analyzed using a Likert scale summation method (Table 4). To determine the overall feasibility and user acceptance of the system, the raw scores from all questionnaire items were aggregated. The final validity index was calculated by comparing the total observed score against the maximum possible ideal score, using the following formulas.

Use Case Diagram - Guidance & Counseling System (Portrait)

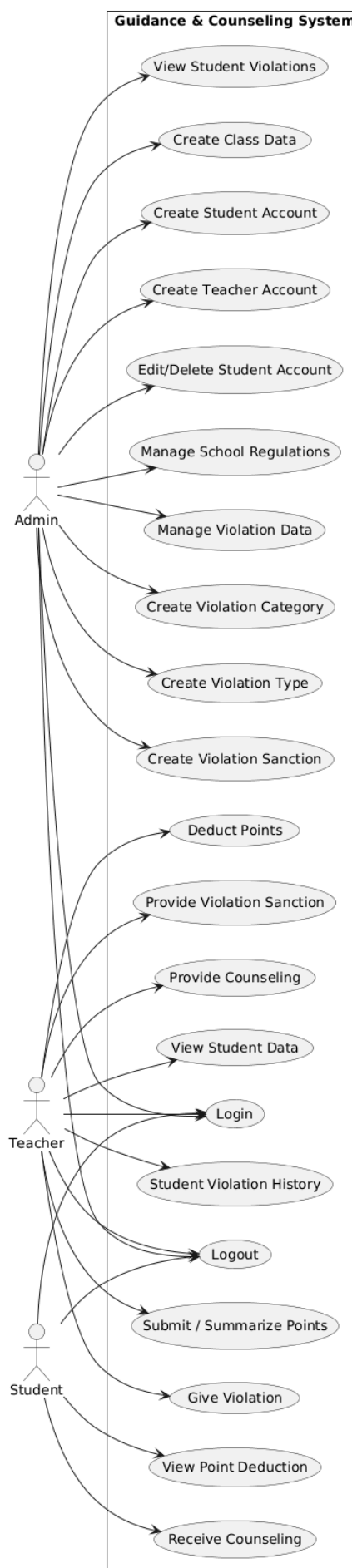


Fig. 4. Use case diagram

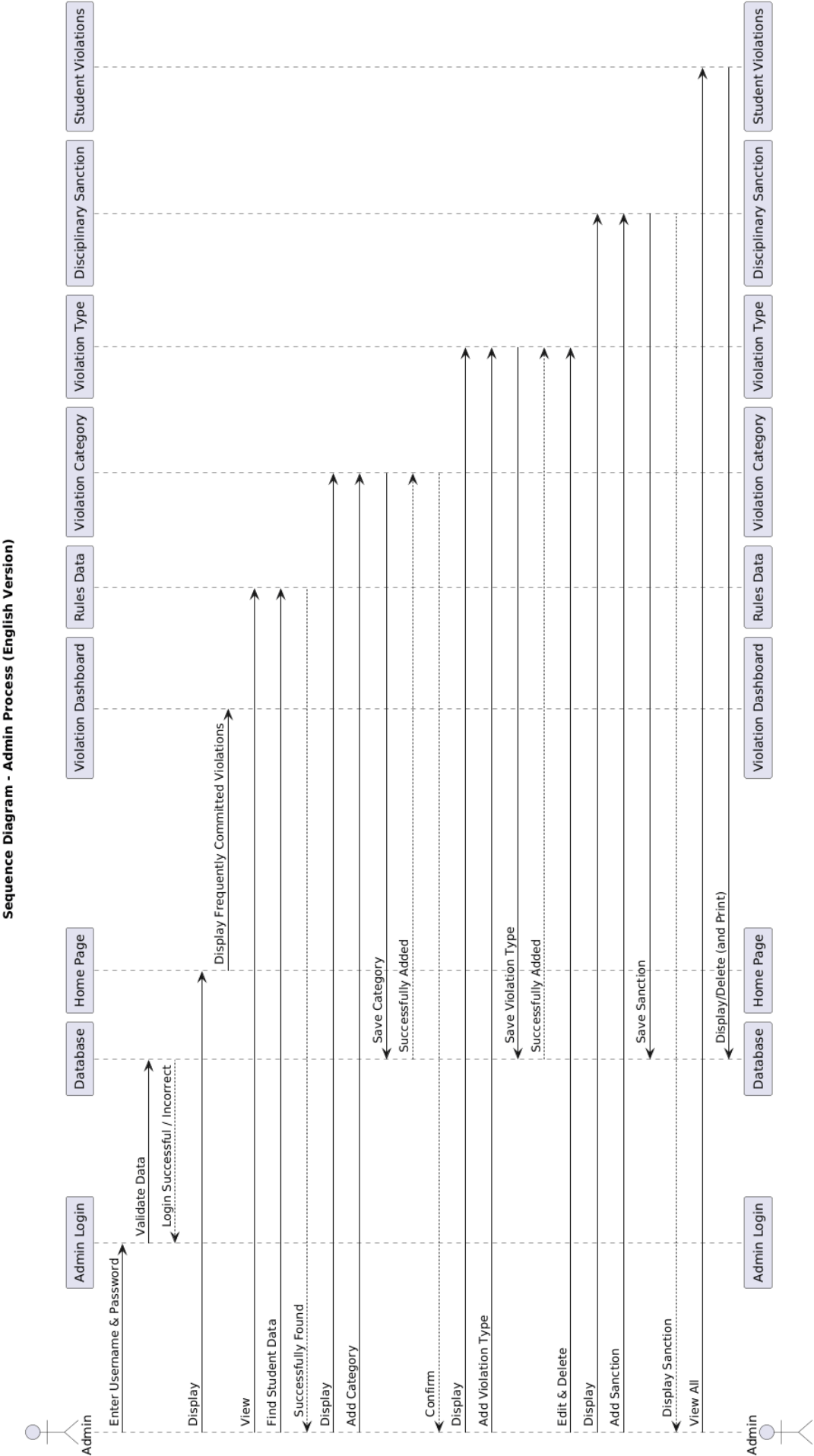


Fig. 5. Sequence diagram of admin data rules and regulations

Physical Data Model - Counseling &amp; Violation System (English Version)

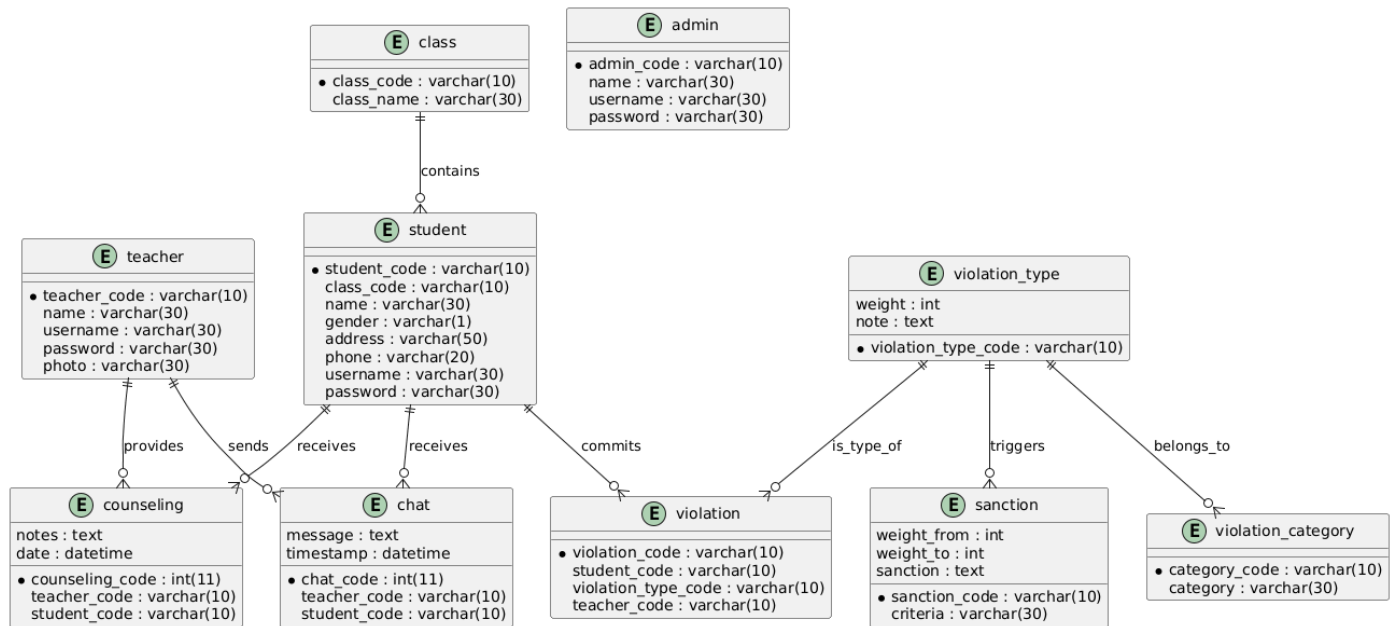


Fig. 6. Class diagram

Table 2. Black box login testing

| No | Identity                                             | Description                                                                        | Expected Result                                                                               | Result                                           | Conclusion                           |
|----|------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------|--------------------------------------|
| 1  | Username: admin<br>Password: admin<br>Login as admin | Enter username and password, then choose login as admin and press the login button | Dashboard page successfully displayed                                                         | Login successful as expected                     | (✓) Successful<br>( ) Not Successful |
| 2  | Username: admin<br>Password: admin<br>Login as admin | Admin enters username and password incorrectly, then presses the login button      | Displays page notification: "username or password is incorrect" and remains on the login page | Error message displayed and stayed at login page | (✓) Successful<br>( ) Not Successful |

$$Y = Q (5 \times R)$$

$$= 5 (5 \times 45)$$

$$= 1,125$$

(1)

$$y = Q (1 \times R)$$

$$= 5 (1 \times 45)$$

$$= 900$$

(2)

$$P = \frac{S}{Y} \times 100\%$$

$$= \frac{947}{1,125} \times 100\%$$

$$= 84.1\%$$

(3)

Where:

$Y$  = maximum ideal score  
 $y$  = minimum ideal score  
 $Q$  = number of questions  
 $R$  = number of respondents  
 $P$  = percentage validity  
 $S$  = total observed score.

Fig. 7. Login page

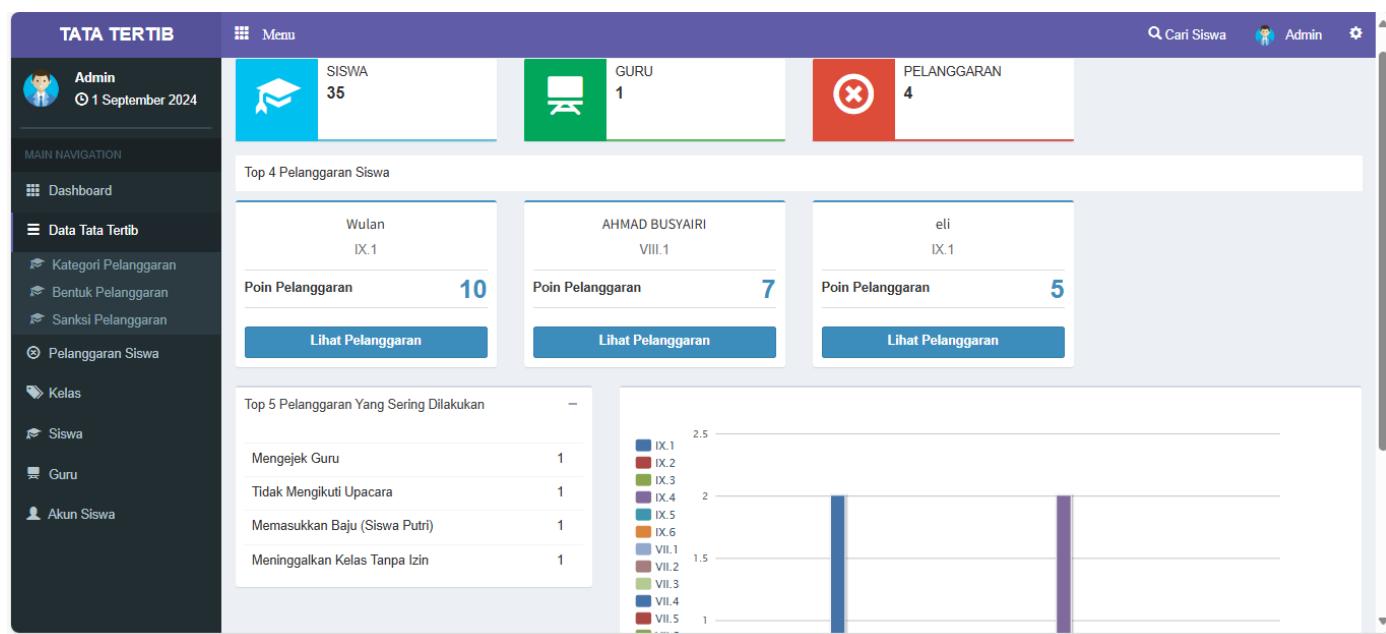


Fig. 8. Admin dashboard view

| TATA TERTIB             |                       |          |          |      |        |
|-------------------------|-----------------------|----------|----------|------|--------|
| Menu                    |                       |          |          |      |        |
| Cari Siswa Admin        |                       |          |          |      |        |
| Seluruh Akun Siswa      |                       |          |          |      |        |
| Show 10 entries Search: |                       |          |          |      |        |
| NO                      | SISWA                 | USERNAME | PASSWORD | OPSI |        |
| 1                       | AHMAD BUSYAIRI        | Ahmad    | 123      | Edit | Delete |
| 2                       | AHMAD RIDWAN ADILLAH  | Ridwan   | 123      | Edit | Delete |
| 3                       | AHMAD RIYAN           | Riyan    | 123      | Edit | Delete |
| 4                       | AJIS AZHARI           | Ajis     | 123      | Edit | Delete |
| 5                       | ALIYUDIN              | Udin     | 123      | Edit | Delete |
| 6                       | ANDINI                | Andini   | 123      | Edit | Delete |
| 7                       | BEDAH FATMAWATI       | BEDAH    | 123      | Edit | Delete |
| 8                       | DWI KARTIKA SALSABILA | Salsa    | 123      | Edit | Delete |
| 9                       | eli                   | eli      | 123      | Edit | Delete |
| 10                      | ISKAN THURTHUSI AMRUN | Iskan    | 123      | Edit | Delete |

Fig. 9. View of all student accounts

Based on this calculation, the system achieved a total score of 947 (Table 5), with a final validity score of 84.1%. According to the interpretation criteria established in the methodology, as show in Table 6, this score falls within the 'Strongly Agree' (or Very Good) interval. This metric confirms that the Guidance and Counseling Information System meets the operational requirements of SMPN 3 Pakuhaji and is accepted by the end-users as a significant improvement over the previous manual workflow.

#### 4. Discussion

The results of the study indicate that the implementation of a web-based guidance and counseling information system developed using the Rapid Application Development (RAD) method has successfully addressed procedural weaknesses in the conventional counseling process at SMPN 3 Pakuhaji. Prior to system implementation, service procedures relied heavily on manual data recording, direct reporting, and limited counselor

Table 3. Questionnaire data results

| No  | Name          | Questions | Total |
|-----|---------------|-----------|-------|
| 1   | Respondent 1  | 5         | 4     |
| 2   | Respondent 2  | 4         | 4     |
| 3   | Respondent 3  | 4         | 4     |
| 4   | Respondent 4  | 4         | 4     |
| 5   | Respondent 5  | 3         | 4     |
| 6   | Respondent 6  | 4         | 4     |
| 7   | Respondent 7  | 3         | 4     |
| 8   | Respondent 8  | 3         | 4     |
| 9   | Respondent 9  | 4         | 4     |
| 10  | Respondent 10 | 4         | 5     |
| 11  | Respondent 11 | 5         | 4     |
| 12  | Respondent 12 | 4         | 5     |
| 13  | Respondent 13 | 4         | 4     |
| 14  | Respondent 14 | 4         | 4     |
| 15  | Respondent 15 | 3         | 4     |
| 16  | Respondent 16 | 3         | 4     |
| 17  | Respondent 17 | 4         | 4     |
| 18  | Respondent 18 | 4         | 4     |
| 19  | Respondent 19 | 5         | 5     |
| 20  | Respondent 20 | 5         | 5     |
| 21  | Respondent 21 | 5         | 5     |
| 22  | Respondent 22 | 3         | 4     |
| 23  | Respondent 23 | 5         | 5     |
| 24  | Respondent 24 | 3         | 5     |
| 25  | Respondent 25 | 5         | 4     |
| 26  | Respondent 26 | 5         | 5     |
| ... | ...           | ...       | ...   |

*Note: Respondent identities have been anonymized to comply with research ethics and privacy standards.*

availability, which often hindered the effectiveness and timeliness of student assistance. Through RAD, the development process was executed iteratively involving users, resulting in system features that aligned with school needs—such as digital violation reporting, student consultation recording, automated sanctions, and parental summons generation. This improvement reflects how participatory prototype refinement ensures system suitability to user requirements, consistent with findings by Hardiyanto & Andarwati (2024) and Hayati & Chotijah (2024) that user involvement at every iteration significantly enhances system acceptance and functionality.

The high level of effectiveness of the implemented system is confirmed through black box testing and user interface evaluation, which demonstrated that all functional requirements—such as login verification, dashboard navigation, reporting violations, and consultation submission—operated as expected. These empirical results align with the nature of RAD development, which emphasizes rapid validation of system functions through iterative prototyping. In addition, the user interface evaluation demonstrates that the system successfully meets usability targets, allowing counselors, teachers, and students to access features efficiently. This supports the assertion of Muthian & Amalia (2023) that user-centered prototyping generates interfaces that minimize user learning barriers and increase system acceptance, particularly in digital service environments.

The questionnaire results further strengthen the success of the implementation phase. With a cumulative score percentage

Table 4. Assessment Scale

| Rating Scale                    | Score |
|---------------------------------|-------|
| Strongly Disagree (SD)          | 1     |
| Disagree (D)                    | 2     |
| Neutral / Fairly Agree (N / FA) | 3     |
| Agree (A)                       | 4     |
| Strongly Agree (SA)             | 5     |

Table 5. Total Score

| Question                                                | Score |
|---------------------------------------------------------|-------|
| Q1: The system is easy to use                           | 190   |
| Q2: The system improves counseling efficiency.          | 186   |
| Q3: The system helps track student behavior accurately. | 194   |
| Q4: The system interface is clear and user-friendly.    | 190   |
| Q5: The system supports effective counseling services.  | 187   |
| Total                                                   | 947   |

Table 6. Score Interpretation Criteria

| Category (%) | Description            |
|--------------|------------------------|
| 0% – 20%     | Strongly Disagree      |
| 21% – 40%    | Disagree               |
| 41% – 60%    | Neutral / Fairly Agree |
| 61% – 80%    | Agree                  |
| 80% – 100%   | Strongly Agree         |

of 84.1%, respondents fell into the “Strongly Agree” category, indicating that users perceived the counseling information system as highly useful in ensuring faster, more structured, and more accurate service delivery. This outcome aligns with the increasing importance of counseling services in junior high schools in managing student academic, behavioral, and mental health needs (Andhini et al., 2024; Bariyyah et al., 2024; Elvin et al., 2024). The system effectively supports counselors in fulfilling these responsibilities by providing digital access to consultation history, violation records, and student behavior monitoring, thus closing the service gap that often occurs in settings where consultation demand exceeds counselor capacity.

The findings of this research also validate the significance of digitalization in modern counseling services. Prior studies highlight that conventional administrative recording contributes to inefficiencies, lost data, and weak monitoring (Bidayah et al., 2023; Yudiansah & Nasrulloh, 2024). The results of this study demonstrate that the shift toward digitalized counseling—consistent with the direction recommended by Alawiyah et al (2025), Khasanah et al (2022), and Muryono (2022)—overcomes these barriers by enabling real-time monitoring, automated documentation, and traceable student behavioral development. With these advancements, the system introduced at SMPN 3 Pakuhaji not only supports counseling

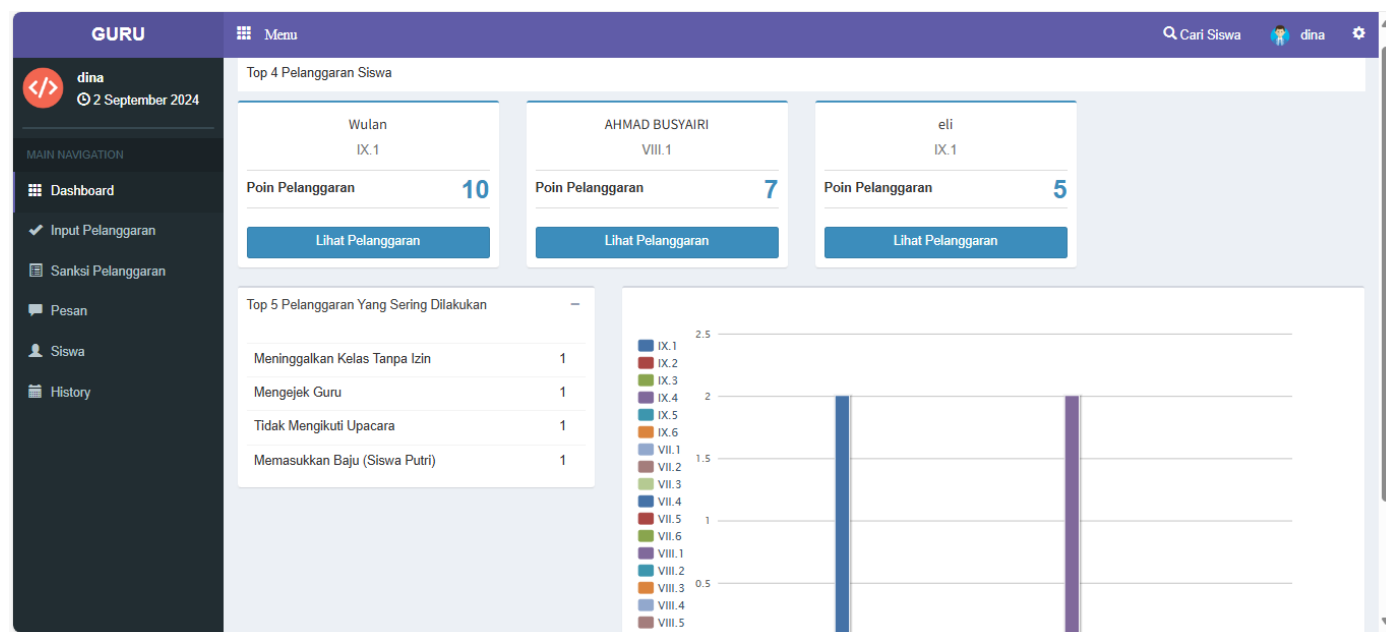


Fig. 10. Teacher dashboard view

procedures but also provides preventive support by helping educators identify recurring patterns of student violations and provide early interventions.

Overall, the results demonstrate that the RAD-based counseling information system implemented at SMPN 3 Pakuhaji successfully enhances the efficiency, accessibility, and responsiveness of counseling services. The high usability rating and strong levels of user agreement indicate that the system is capable of supporting students' learning, behavioral regulation, and emotional development—confirming research emphasizing the critical role of integrated, technology-supported counseling services in student well-being (Yunita, 2023; Zayani et al., 2025). The RAD approach reduced development time to approximately 8 weeks, compared to an estimated 12–16 weeks using conventional linear development models, highlighting RAD's effectiveness in accelerating system deployment.

## 5. Conclusion

The results of this study demonstrate that the development and implementation of a web-based guidance and counseling information system using the Rapid Application Development (RAD) method successfully addressed the limitations of the conventional counseling process at SMPN 3 Pakuhaji. Through iterative design and continuous user involvement, the system delivered core features aligned with institutional needs, including digital violation reporting, automated sanction processing, structured consultation documentation, and dashboard-based student monitoring. System testing confirmed that all functional requirements operated correctly, and the user interface was found to be intuitive and easy to navigate. Furthermore, based on questionnaire results, the system achieved a high acceptance rating, with 84.1% of respondents falling into the "Strongly Agree" category, reflecting strong perceived usefulness and high usability.

Beyond the local context of SMPN 3 Pakuhaji, this study demonstrates how RAD-based development can support

scalable and user-adaptive counseling systems in secondary education. The findings contribute to the broader field of Educational Technology by illustrating how rapid prototyping and continuous stakeholder involvement can accelerate digital transformation in student support services. Future studies may explore integrating predictive analytics or mobile-based counseling features to further enhance system scalability and student engagement.

## Data availability

All data produced or examined during this study are included within this published article. The data consists of system design documents, testing results, and questionnaire responses collected during the implementation of the guidance and counseling information system at SMPN 3 Pakuhaji.

## Declaration of competing interest

The authors declare that they have no known financial competing interests or personal relationships that could have appeared to influence the work reported in this paper.

## Authors' contributions

Muhamad Arief Yulianto conceptualized the study, designed the system architecture, conducted system development and testing, and drafted the original manuscript. Khoirunnisya contributed to data collection, system evaluation, literature review, and manuscript revision. Both authors reviewed and approved the final version of the manuscript.

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