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Designing a Student Violation Point System Based on Telegram Using PHP Programming Language

Khoirullah^{1*}, Supriadi¹, Supratman Zakir¹, Liza Efriyanti¹

¹Universitas Islam Negeri Sjech M. Djamil Djambek Bukittinggi, Bukittinggi, Indonesia

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E-mail: irulkhoirullah17@gmail.com*

A B S T R A C T

This research is motivated by an issue concerning student violations at Tugumulyo State Vocational High School which are still frequently occurring, and the recording of these student violations is manually documented in a student violation logbook, causing difficulties for the guidance and counseling teachers in managing them. Furthermore, parents face challenges in monitoring their children's discipline at school due to the insufficient delivery of information regarding student violation points. Hence, there is a need for a system capable of managing student violation data and providing information to parents regarding their children's discipline in school. This research applies the Research and Development (R&D) model. The R&D model in this research employs the ADDIE model with five stages: Analyze, Design, Develop, Implement, and Evaluate. This product has been tested for validity, practicality, and effectiveness. The results of the product's validity test obtained a score of 0.85, categorized as valid. The practicality test resulted in a score of 0.97, categorized as a very high level of practicality, while the effectiveness test yielded a score of 0.91, categorized as a high level of effectiveness. These research findings demonstrate that the integrated student violation point system through Telegram at Tugumulyo State Vocational High School has been proven to be valid, practical, and effective.

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1. Introduction

The current era of globalization in the field of education has brought significant impacts on changes in students' thinking patterns and behaviors. These changes encompass not only positive aspects but also negative consequences, particularly concerning the ethics and morals of students. Many of them are focused on the advancements of the times and misuse the influence of modernization, leading to the loss of moral values that should serve as a positive foundation [1].

The loss of ethics and morals among students, manifested in deviant behavior, is one of the many significant issues plaguing the educational sphere today. Deviations in students' ethics and morals encompass a range of behaviors, from the abandonment of fundamental moral values to engagement in actions that contradict social norms. The lack of understanding of ethical and moral values can be the root cause of students' deviant behavior. This deviant behavior among students is closely linked to juvenile delinquency, wherein adolescents are in the process of learning and developing an understanding of themselves and their surroundings, such as their family and school environments [2]. Inappropriate experiences and inadequate learning from such environments can lead students to emulate incorrect behaviors. However, the reality is that there are still many students who lack discipline and tend to deviate

from norms in their daily lives, such as breaking school rules or established norms. Situations like these need to be anticipated as they pose a threat to the future generation of the nation[3].

According to Law Number 19 of 2007 regarding Education Management Standards, schools or madrasahs are required to establish regulations and disciplinary guidelines to create a conducive learning atmosphere and environment. School discipline is sometimes utilized to impose penalties (sanctions) for rule violations, although disputes may arise regarding the methods of discipline used. One way for schools to create a deterrent effect for violators of school regulations is through the implementation of a student violation point system as a means of recording student discipline [4].

The student violation points are defined as penalties given to students following their violation, offense, or mistake against the established school rules [5]. Students who reach a certain threshold of points will face consequences such as parental notification, receiving warning letters, or potential expulsion from the school [6]. Parents or guardians also need to receive information regarding their child's violations. Therefore, a system is required to provide information about student violation points to parents. Various instant messaging applications are available, and one of them is Telegram. Telegram is chosen because it is a real-time messaging service that offers convenience to users as it can be accessed across mobile and desktop platforms [7]. Furthermore, the application is free and open-source, allowing users to develop their own applications to enhance the ease of information delivery [8].

The author interviewed the guidance and counseling teacher at Tugumulyo State Vocational High School on January 24, 2023, for this preliminary analysis. Based on the interview results with Mrs. Cahya Sukmawati, S.Pd, she mentioned that Tugumulyo State Vocational High School has been utilizing a violation point system as a disciplinary measure for students who breach school regulations. However, the student discipline at Tugumulyo State Vocational High School is still inadequate. There are problematic instances every day, such as students arriving late to school, incomplete or incorrect school attire, and even some students smoking or skipping classes. Therefore, it is necessary to follow up on these issues by assigning violation points.

The recording and calculation of student violation points are still done manually using a student violation logbook. This method inevitably complicates the guidance and counseling teachers' task in accessing student data and the historical records of students who committed violations, determining sanctions, and documenting violation data daily. Consequently, information management becomes intricate and limited. Furthermore, parents lack the opportunity to monitor their children's discipline at school due to insufficient communication of student violations from the school. This becomes a constraint experienced by guidance counselors and the student affairs department in handling student violations, resulting in delayed and inefficient information dissemination processes.

Several obstacles exist in managing student violations manually, prompting the need for a computerized system to establish an efficient workflow and alleviate the constraints in managing student violation data. Furthermore, with the implementation of this system, parents will be able to monitor their children's discipline by accessing a Telegram application, accessible via smartphones. Based on the identified issues, the author conducted an analysis and selected the title "Designing a Student Violation Point System Based on Telegram Using PHP Programming Language".

2. Method

2.1. Research Type

This research applies the Research and Development (R&D) model, which is employed to create a specific product and test it [9]. The study utilizes the ADDIE version of the R&D model, comprising five stages: analyze, design, develop, implement, and evaluate. The stages of the ADDIE model can be seen in Figure 1 [10].

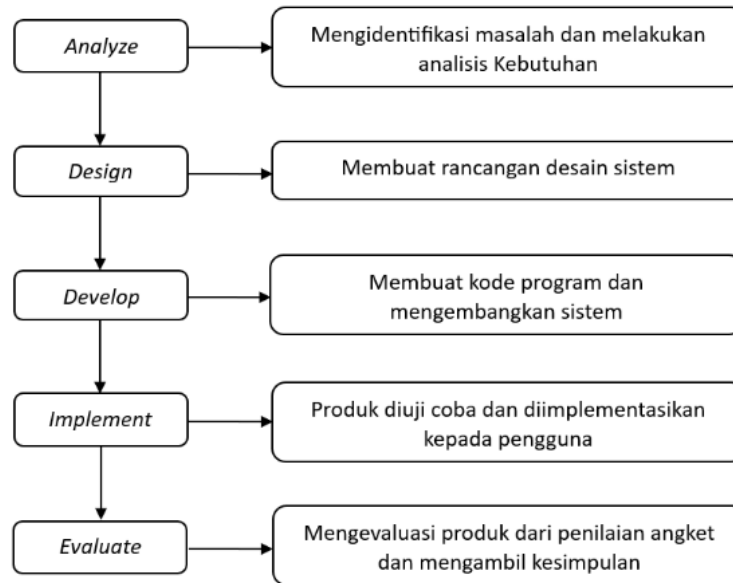


Figure 1. Stages of the ADDIE Model

2.2. Research Stages

The stages of this research can be described through the ADDIE model, namely [11]: (a) analyze, in the initial stage, the author carried out problem analysis and system requirements analysis; (b) design, the author will create an initial design by designing a system that meets user needs. This design phase includes an overall system design, UML design, database design, and system interface design; (c) develop, in the system development stage, the author engages in programming (coding), creates the Telegram bot, and conducts system testing; (d) implement, in this stage, the product is implemented for users and assessed by several validators and respondents regarding its functionality. Validation, practicality, and effectiveness tests are conducted to evaluate the product; and (e) evaluate, in the final stage, the author will evaluate the results of the system testing, which includes assessment and feedback or suggestions from the provided questionnaires.

2.3. Test subjects

This research encompasses two test subject groups. The first is the validation group, consisting of content validators, construct validators, and language validators. The second group is the field trial test subjects, including guidance counselors, subject teachers, and student guardians/parents.

2.4. Product test

This research involves product testing, which includes tests for validity, practicality, and effectiveness [12].

2.4.1. Validity Test

The validity test is employed to assess the quality of the product; therefore, it necessitates a validation test involving multiple experts. The testing process involves calculating the questionnaire scores, which contain evaluations of the product by experts, using Aiken's V formula. The Aiken's V coefficient value ranges from 0 to 1. The formula for Aiken's V is as follows [13]:

$$V = \sum s / [n(c - 1)] \quad (1)$$

Information [14]:

s: r - lo

- r: the number given by the reviewer
- lo: the lowest validity rating (for example, 1)
- c: the highest validity rating (for example, 5)
- n: the number of reviewers

The obtained validity test results are further interpreted in the decision criteria Table 1 of Aiken’s V below:

Table 1. Aiken's V Decision Criteria [15]

Percentage	Category
0,6 <	Valid
>= 0,6	Invalid

2.4.2. Practicality Test

The practicality test is used to evaluate the practicality of using the product. The testing process is carried out by calculating the results of questionnaire scores containing product assessments from testers using the Moment Kappa (k) formula [16]:

$$k = \frac{Po - Pe}{1 - Pe} \quad (2)$$

Information [17] :

k : Moment kappa states the practicality of the product.

Po: the comparison carried out is calculated by dividing the number of values given by respondents with the maximum number of scores.

Pe: the proportion that is not implemented is calculated by subtracting the maximum number of scores from the total number of scores given by respondents adding up the maximum scores.

The obtained practicality test results are subsequently interpreted in the decision criteria Table 2 for Kappa Moment below:

Table 2. Moment Kappa Decision Criteria [12]

Interval	Category
0,81 – 1,00	Very high
0,61 – 0,80	Tall
0,41 – 0,60	Currently
0,21 – 0,40	Low
0,01 – 0,20	Very low
0,00	Impractical

2.4.3. Effectiveness Test

The Effectiveness Test is utilized to evaluate how well the product aligns with the achieved objectives. The formula for the effectiveness test conducted in this study employs the N-Gain Score [18]:

$$g = \frac{S_{post} - S_{pre}}{S_{maks} - S_{pre}} \quad (3)$$

Information [18]:

S_{post} : average Post Test value

S_{pre} : average Pre Test score

S_{maks} : maximum value

The obtained effectiveness test results are subsequently interpreted in the classification Table 3 of N-Gain Scores below:

Table 3. Classification of N-Gain Score [15]

Interval	Category
(N-Gain) 0,7	Tall
0,7 (N-Gain) 0,3	Currently
(N-Gain) 0,3	Low

3. Results and Discussion

3.1. Analyze

The analysis phase is the initial step in gathering information and identifying issues, as well as defining system requirement criteria. Some of the analyzes carried out in this research include the following.

Firstly, conducting problem analysis starting from observations and interviews with the Guidance and Counseling Teacher at Tugumulyo State Vocational High School, namely Mrs. Cahya Sukmawati, S.Pd, on January 24, 2023. Based on the problem identification: there are still many students at Tugumulyo State Vocational High School who violate discipline resulting in penalty points; Student violations are still manually recorded in a student violation book; Guidance and Counseling (BK) teachers encounter difficulties in tallying student violation points because the process is done manually; Parents find it challenging to monitor their children's discipline at school due to the inadequate communication of information regarding student violation points.

Secondly, needs analysis comprises user needs analysis and system needs analysis. User needs analysis involves identifying users involved in the system, including administrators, school principals, teachers, and guardians/parents of students. Meanwhile, system needs analysis consists of functional and non-functional requirement specifications.

3.2. Design

This phase encompasses the overall system design, UML design, database design, and system interface design.

3.2.1. Overall System Design

The overall system design is a description of the overall system process flow. The following overall system design can be seen in Figure 2.

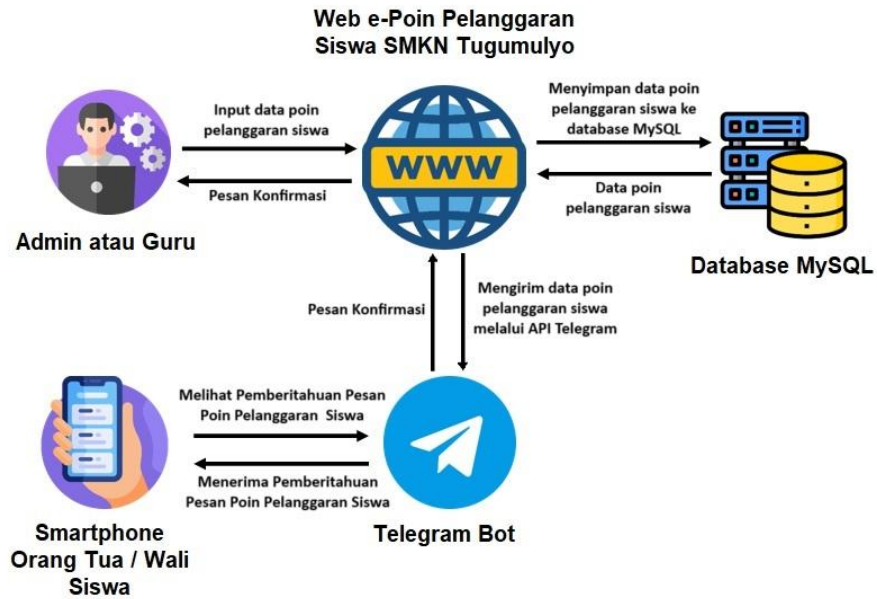


Figure 2. Overall System Design

The system's overall design diagram above illustrates the process where administrators or teachers access the SMKN Tugumulyo Student Violation Points website to input student violation data. This data will be stored in the MySQL database and sent via the Telegram API to the Telegram bot named E-POIN SISWA SMKNTGM. This bot can be accessed by guardians or parents of students to receive information about student violation data.

3.2.2. UML Design

The UML design in this system comprises the design of a use case diagram, an activity diagram, a sequence diagram, as well as a class diagram.

Usecase diagram design. The design of a use case diagram is a visual representation depicting how multiple actors interact with a system. The Design Use Case Diagram can be seen in Figure 3.

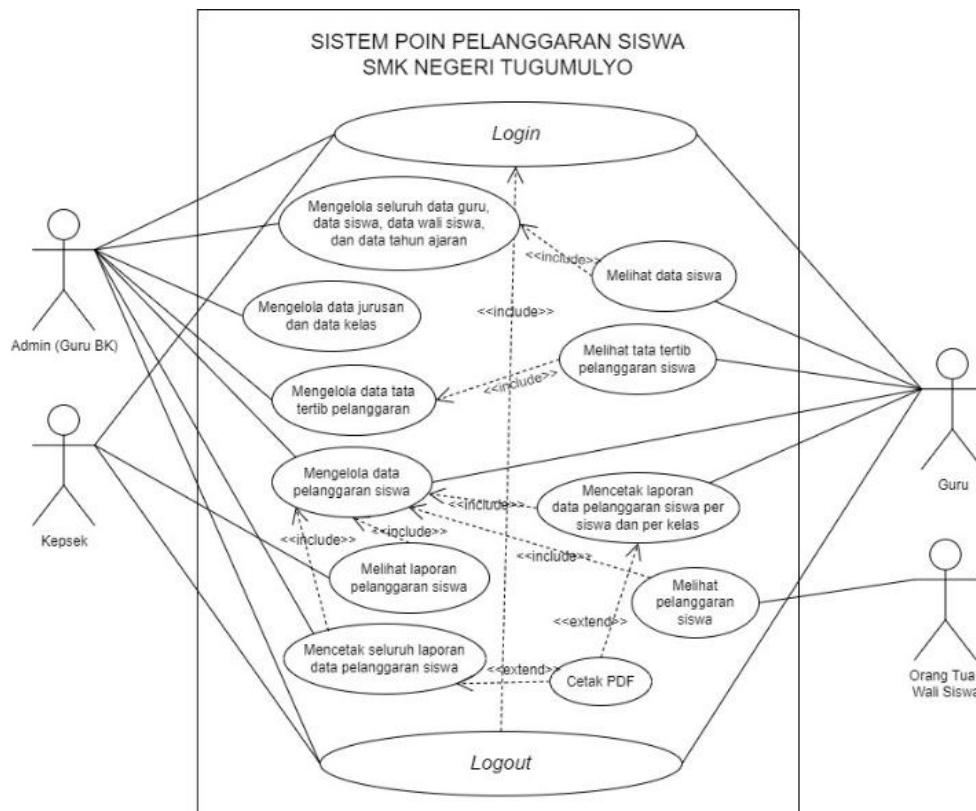


Figure 3. Usecase Diagram Design

Activity diagram design. The design of an activity diagram provides an overview of the activities or steps performed by the system. The Design Activity Diagram can be seen in Figure 4.

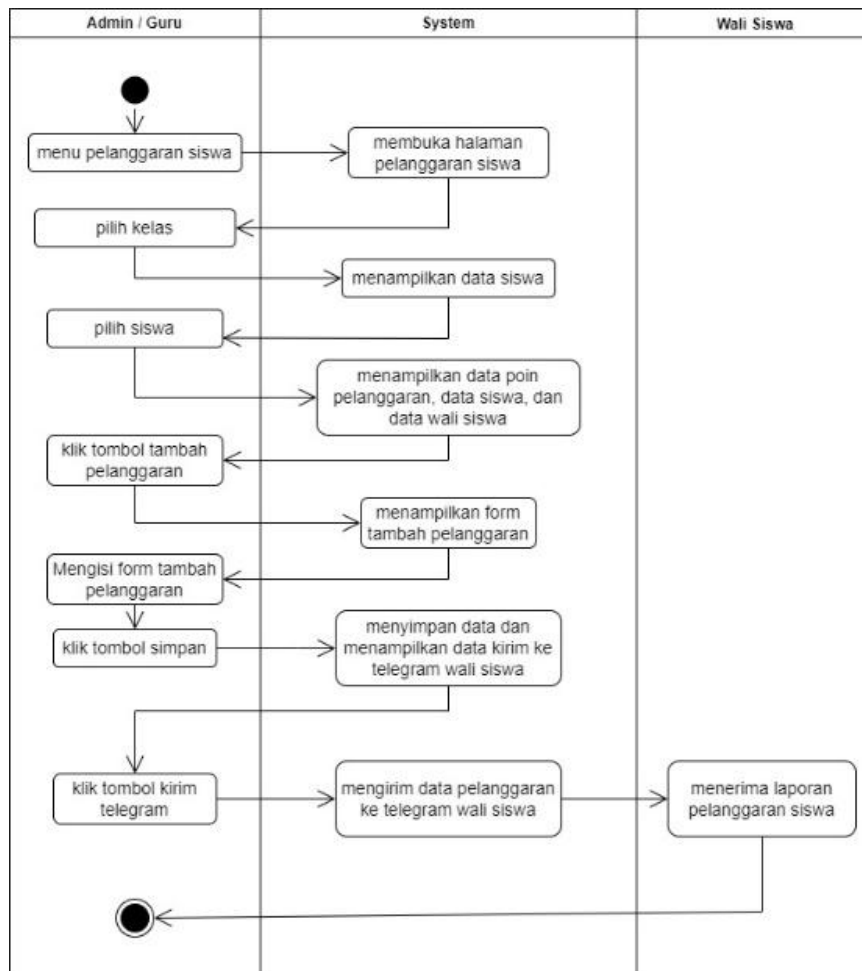


Figure 4. Activity Diagram Design

Sequence diagram design. The design of a Sequence Diagram provides a detailed overview of the objects involved as well as the messages sent and received by objects within the system. The Design Sequence Diagram can be seen in Figure 5.

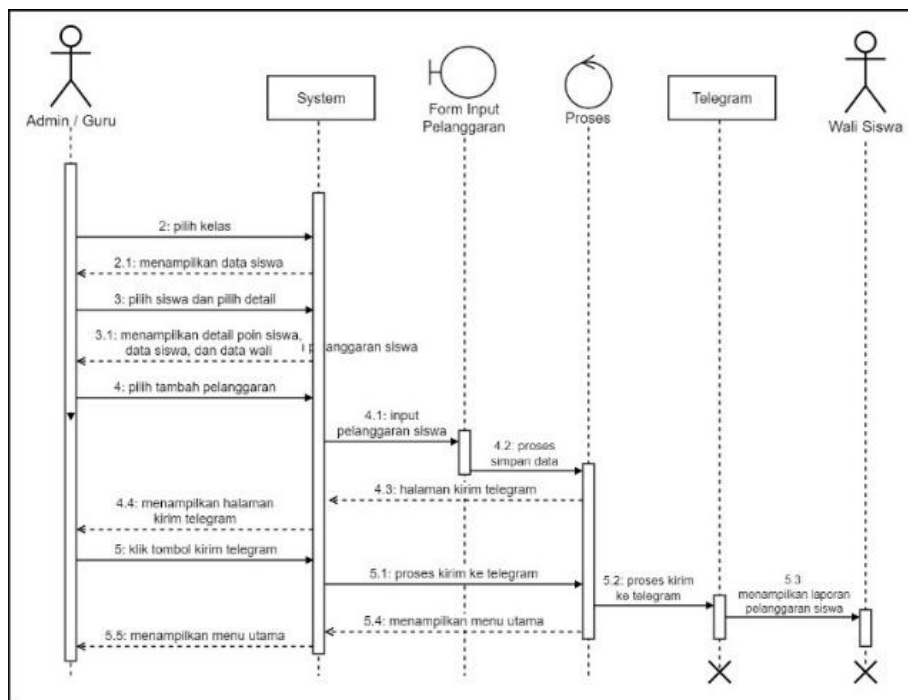


Figure 5. Sequence Diagram Design

Class diagram design. The design of a Class Diagram provides an overview of the system's structure in terms of defining classes and their attributes, as well as the relationships between each object. The Design Class Diagram can be seen in Figure 6.

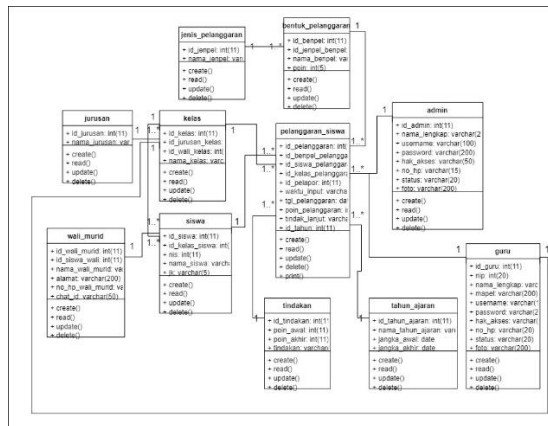


Figure 6. Class Diagram Design

The system class diagram illustrates classes, attributes, actions, and their relationships. The designed system comprises eleven classes: admin, teacher, student, guardian, department, class, academic_year, violation_type, violation_form, action, and student_violation.

3.2.3. Database Design

The database design is a blueprint of the database containing tables and their attributes for the intended system. The name of the database in this system is 'epoinsmk_e_poin,' comprising eleven tables: admin, teacher, student, guardian, department, class, academic_year, violation_type, violation_form, action, and student_violation.

3.2.4. Interface Design

The interface design represents the initial blueprint of the system's user interface to be constructed. Below are some examples of the interface designs for the system under development. As in Figure 7, Figure 8, Figure 9, and Figure 10.



Figure 7. Login Display Design

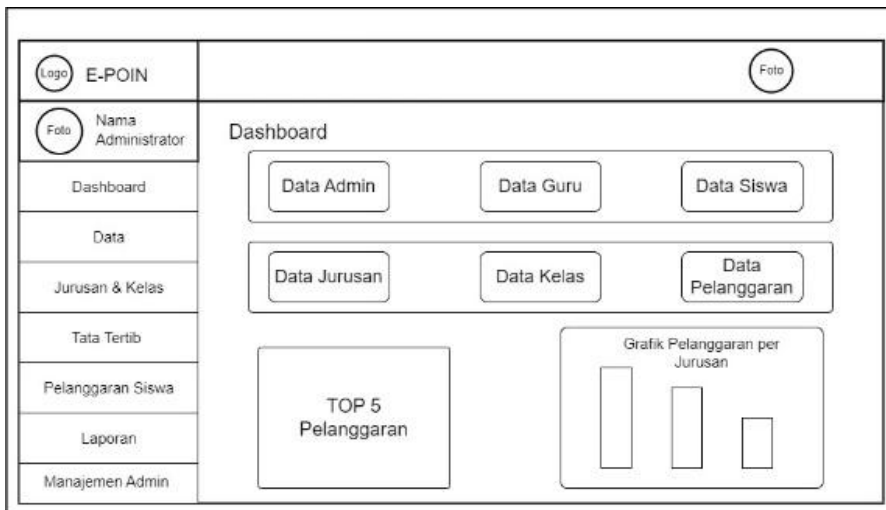


Figure 8. Admin Dashboard Display Design

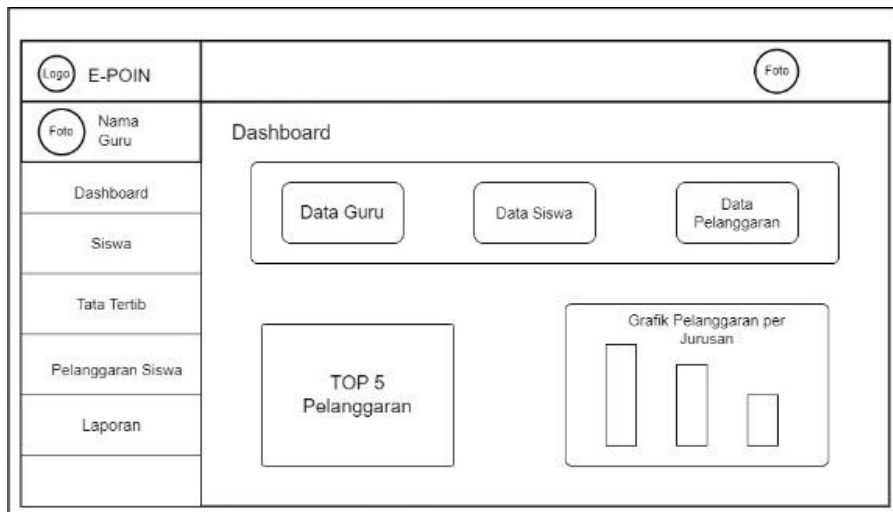


Figure 9. Teacher Dashboard Display Design

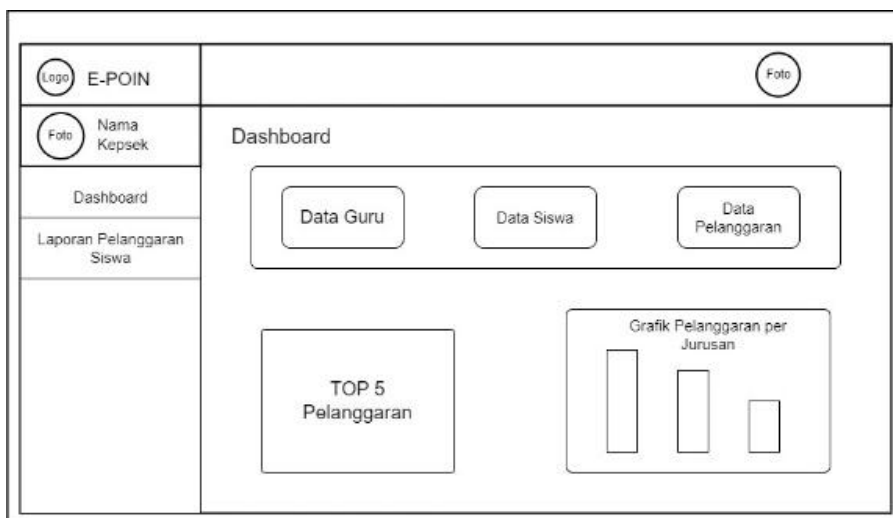


Figure 10. Principal Dashboard Display Design

3.3. Develop

The development stage involves the creation of programs (coding), the creation of a Telegram bot, and system testing. Coding is the process of creating programs based on the previous stages using PHP, MySQL, and Javascript code utilizing the provided Bootstrap framework as the application's foundation.

The Telegram bot is created using BotFather by typing the command /newbot. During this process, BotFather requests input for the bot's name and username. If the bot registration is successful, there will be a completion notification marked by the bot token information used to link the Telegram bot with the system. The outcome of the Telegram Bot creation process can be seen in Figure 11.

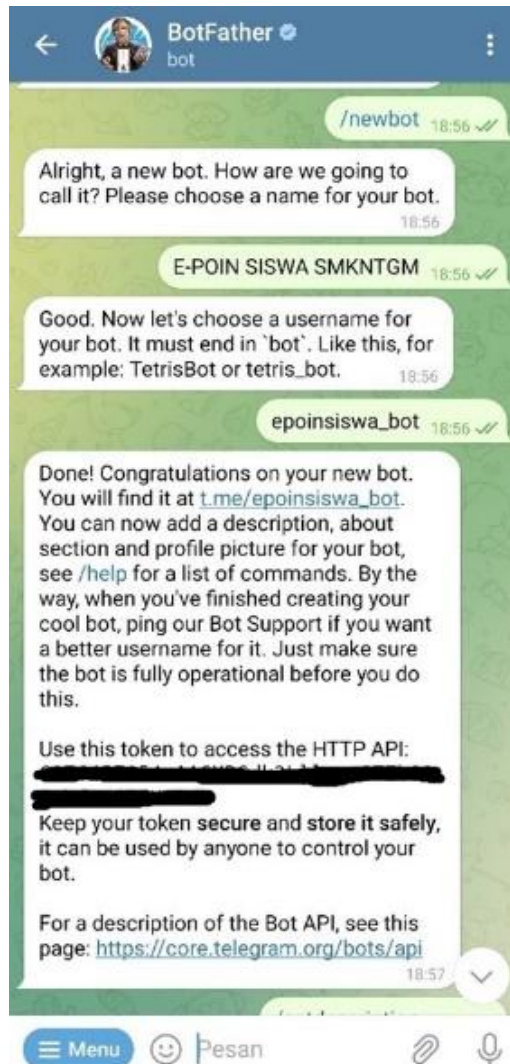


Figure 11. Creating a Telegram Bot

After successfully creating the bot, the next step involves defining commands or instructions used by users or guardians/parents of students to initiate the bot. The command to set up is by typing /start to obtain the Telegram chat ID, which will be registered in the system through the created bot, as depicted in Figure 12.



Figure 12. Command to get chat ID

Upon completion of coding and preparation of the Telegram bot, the next step involves conducting system testing. This testing utilizes Black Box Testing to detect errors and verify the proper functioning of the system's operations. The results of the system testing using Black Box Testing can be observed in Table 4.

Table 4. System Testing Results with Black Box Testing

No.	Design and Process	Which are expected	Information
1	Login page	Displays the login page	Succeed
2	Home Page (Dashboard)	Displays the main page (dashboard)	Succeed
3	Open the teacher data menu	Displays the teacher data page	Succeed
4	Open the student data menu	Displays the student data page	Succeed
5	Open the student guardian data menu	Displays the student guardian data page	Succeed
6	Open the school year data menu	Displays the academic year data page	Succeed
7	Open the department and class menu	Displays department and class pages	Succeed
8	Open the rules menu	Displays the violation type, violation form,	Succeed

		and follow-up pages	
9	Open the student violations menu	Displays the student violation page	Succeed
10	Click the violation details button	Displays the student violation details page	Succeed
11	Click the add violation button	Displays the add violation form page	Succeed
12	Click the save violation button	Save data to the database and display the send telegram page	Succeed
13	Click the send telegram button	Send violation data to the student's guardian/parent telegram	Succeed
14	Open the admin management menu	Displays the admin data page	Succeed
15	Open the highest points report	Displays the highest points report page	Succeed
16	Open student misconduct report (date)	Displays the student violation report page per date	Succeed
17	Open student (class) violation report	Displays the student violation report page per class	Succeed
18	Open the student violation chart	Displays a graphic page of student violations	Succeed
19	Click the print student violation report button per date	Displays pdf pages of student violation reports per date that can be downloaded or printed directly	Succeed
20	Click the print student violation report button per class	Displays pdf pages of student violation reports per class that can be downloaded or printed directly	Succeed

The following is the result of system development.

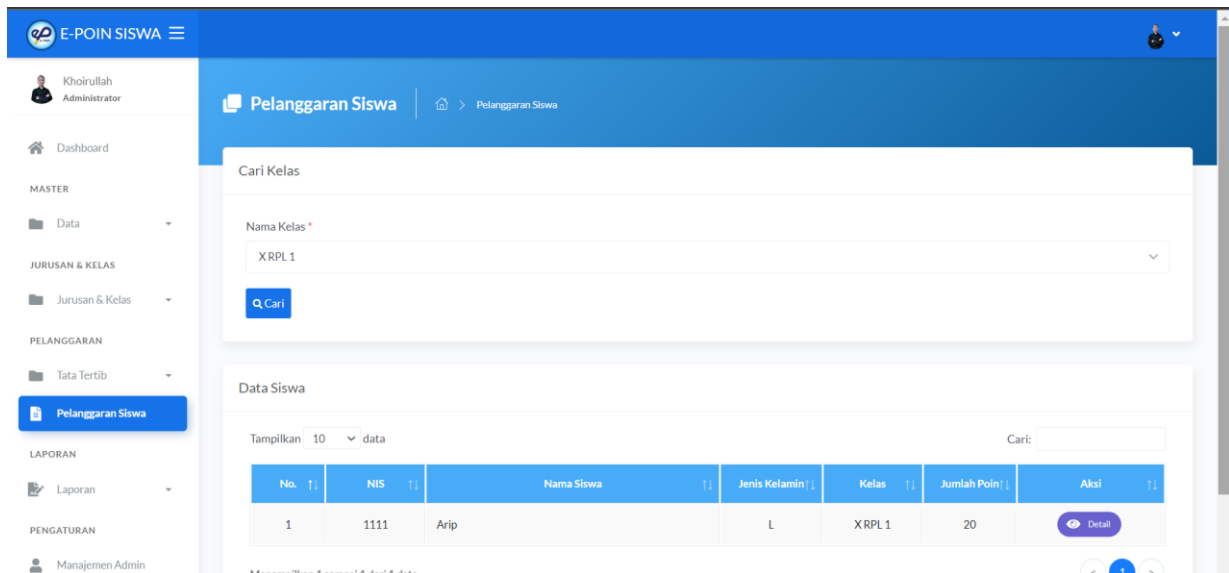


Figure 13. Student Violation Data Page

Figure 13 illustrates a page displaying student violation data from the selected/searched class. Admins and teachers can manage this student violation data. There is a 'Details' button provided to view or navigate to the detailed page of the student violation.

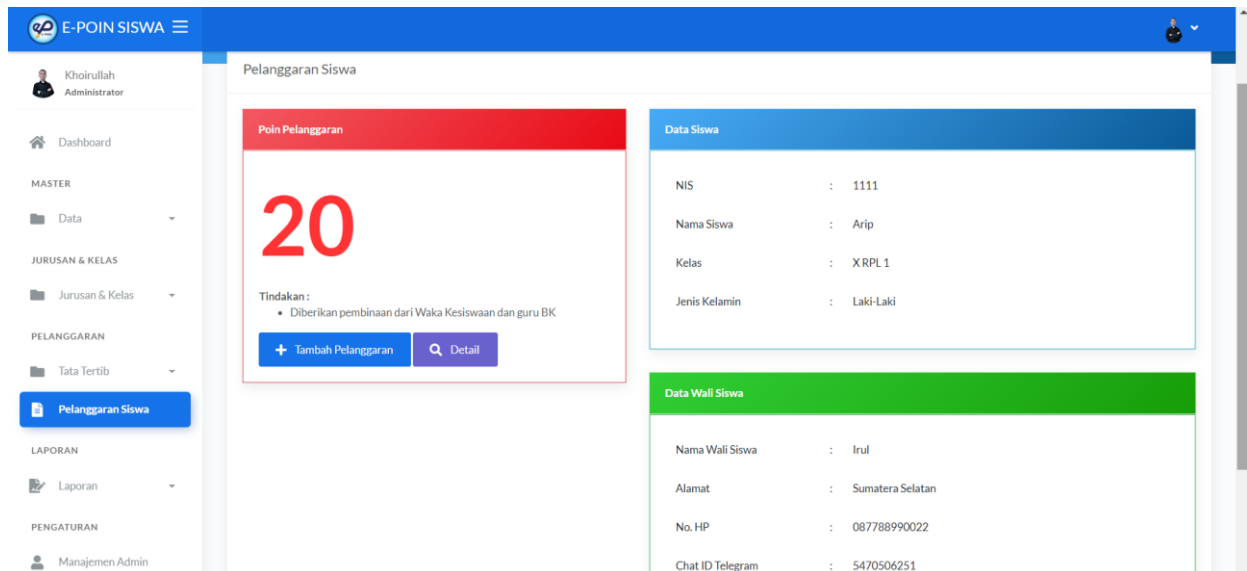


Figure 14. Student Violation Details Page

Figure 14 illustrates the detailed page of a student violation, displaying the student's violation points, selected student's information, guardian data of the selected student, an 'Add Violation' button to navigate to the page for adding a student violation, and a 'Details' button to view the details of the previously selected student violation.

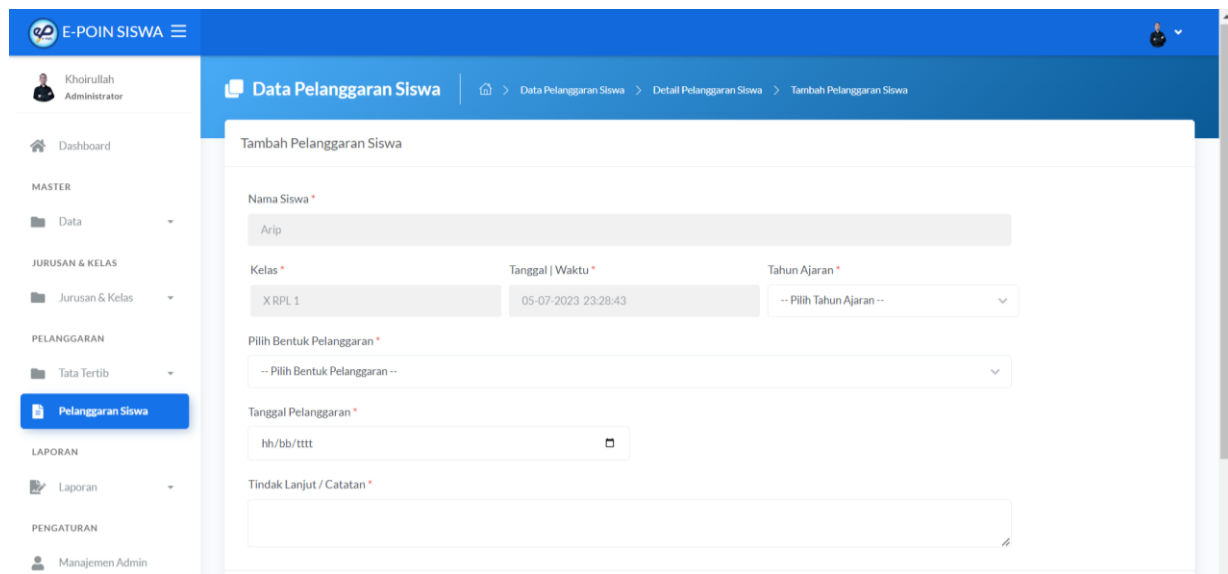


Figure 15. Add Student Violation Form page

Figure 15 depicts the form page for adding or inputting student violations. This form must be filled out by a teacher or guidance counselor and includes fields such as student name, class, date/time, academic year, violation type, violation date, and follow-up action.

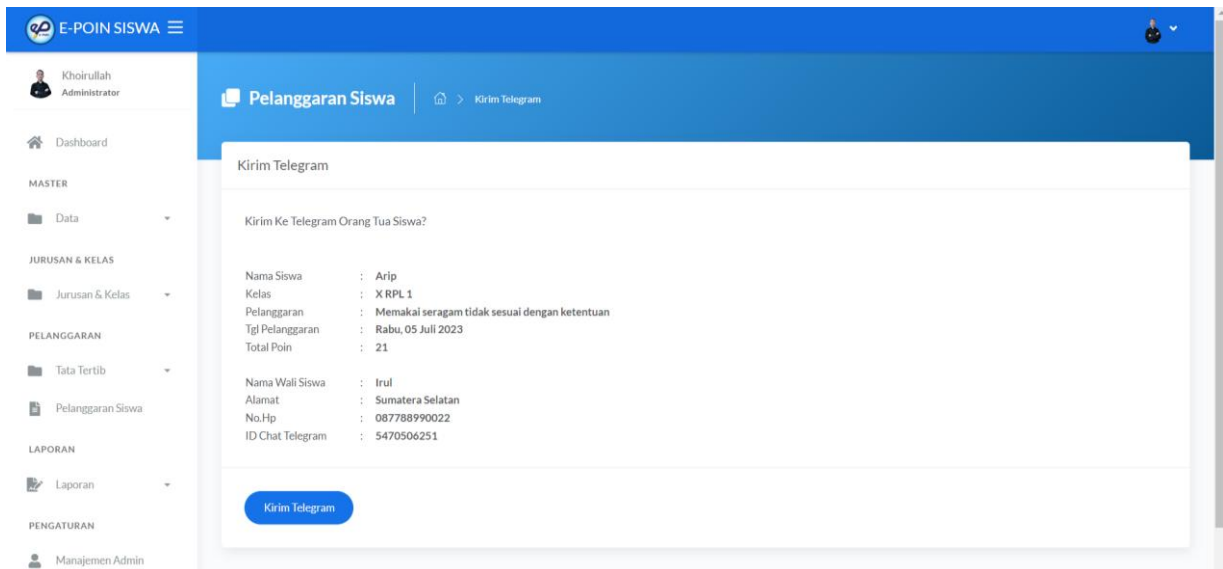


Figure 16. Send Telegram Page

Figure 16 illustrates the Telegram send page that appears after saving data from the student violation form. This page contains the student's identity along with their violation details and the identity of the student's guardian/parent, who will receive the message via the Telegram bot. When the 'Send Telegram' button is clicked, it will dispatch the student violation data to the guardian/parent's Telegram account.

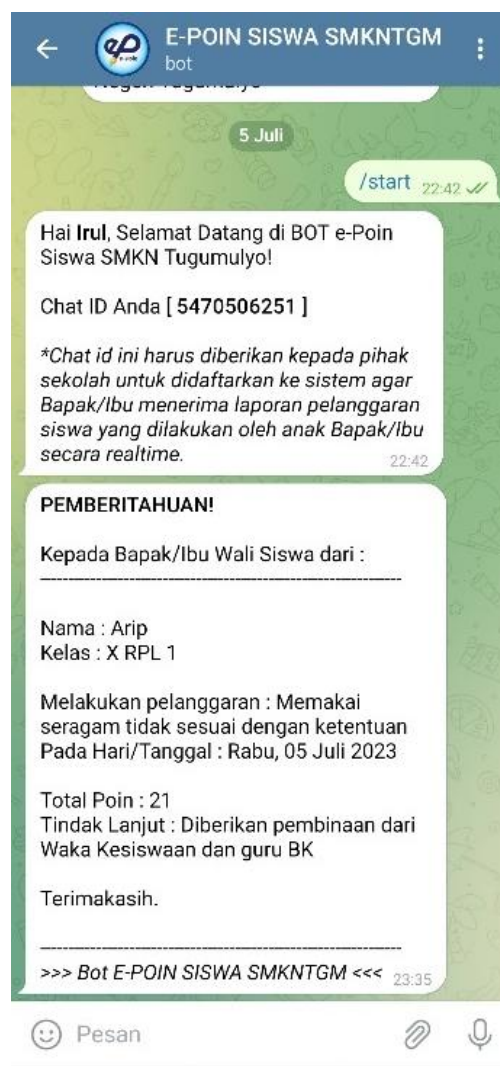


Figure 17. Results of Violation Input Successfully Sent to Telegram Bot

Figure 17 illustrates the outcome of the inputted violation successfully sent to the Telegram bot of the student's parent or guardian.

3.4. Implement

After system testing, the subsequent stage involves implementing the system product to users and conducting validity, practicality, and effectiveness assessments. The validity test is performed by two programming experts and one language expert. Practicality testing is carried out by two guidance counselors and two teachers from Tugumulyo State Vocational High School (SMK). Effectiveness testing involves two guidance counselors and three guardians/parents of students from Tugumulyo State Vocational High School. A comprehensive overview of the results from the validity, practicality, and effectiveness assessments can be found in the product test results section.

3.5. Evaluate

After the system is implemented and subjected to validity, practicality, and effectiveness tests, there are several suggestions from the testers regarding the system product, namely: (a) programming expert suggests: "enhance the PDF output format in the report for the highest points"; (b) language expert suggests: "revisit the usage of "to" or other hyphenation"; and (c) practicality tester states: "the product development is commendable; however, not all guardians/parents of students have Telegram. Hence, it's necessary to reconsider how information is conveyed to guardians/parents."

3.6. Product Test Result

3.6.1. Validity Test

Questionnaire instrument was used to conduct a validity test covering three aspects: content validation, construct validation, and language validation. Each validity test questionnaire was filled out by two experts in the field of programming and one expert in the field of language. Here are the results of the validity test calculations using Aikens'V formula.

The content validity result conducted by Mr. Hari Antoni Musril, M.Kom, obtained a value of 0.75. The construct validity result conducted by Mrs. Gusnita Darmawati, S.Pd, M.Kom, obtained a value of 0.9. The language validity result conducted by Mrs. Inggria Kharisma, M.Pd, obtained a value of 0.9.

Table 5. Average Validity Test Results

Validity	Validator	Value (V)
Content Validity	Hari Antoni Musril, M.Kom	0,75
Construct Validity	Gusnita Darmawati, S.Pd,M.Kom	0,9
Linguistic Validity	Inggria Kharisma,M.Pd	0,9
	Average	0,85

Based on the average score obtained from the three aspects of validity, a score of 0.85 was achieved. Therefore, the product of the Design of Student Violation Point System Using PHP/MySQL Via Telegram at Tugumulyo State Vocational High School is considered valid in terms of content validity, construct validity, and language validity aspects.

3.6.2. Practicality Test

The questionnaire instrument was used to carry out practicality tests which were completed by two BK teachers and two Tugumulyo State Vocational School teachers. The following are the results of practicality test calculations using the moment kappa formula.

Table 6. Average Practicality Test Results

Examiner	Value (k)
Cahya Sukmawati, S.Pd	1
Ade Oktarini, S.Pd	1
Okta Afriyanti, S.Pd	0,91
Sustani Handayani, S.Pd	1
Average	0,97

Based on the average score obtained from the four practicality testers, a score of 0.97 was achieved. Therefore, the product of the Design of Student Violation Point System Using PHP/MySQL Via Telegram at Tugumulyo State Vocational High School is categorized as having a very high level of practicality.

3.6.3. Effectivity Test

The questionnaire instrument was used to conduct an effectiveness test, which was completed by two guidance and counseling teachers and three guardians/parents of students from Tugumulyo State Vocational High School. Here are the results of the practicality test calculations using the N-Gain Score formula.

Table 7. Average Results of Effectiveness Tests

Respondent	Spre	Spost	Value (g)
Cahya Sukmawati, S.Pd	53,3	100	1
Ade Oktarini, S.Pd	33,3	100	1
Anis Refiana	43,3	93,3	0,88
Supriyanto	40	93,3	0,89
Ani Widiyanti	46,7	87	0,76
Average			0,91

Based on the average score obtained from the five respondents, a score of 0.91 was achieved. Therefore, the product of the Design of Student Violation Point System Using PHP/MySQL Via Telegram at Tugumulyo State Vocational High School is categorized as having a high level of effectiveness.

4. Conclusion

This research has resulted in a product: an integrated student violation point system via Telegram, which facilitates the management of student violation data. Moreover, this system is capable of providing real-time information to parents via Telegram regarding their child's school violations, ensuring a high level of confidentiality by utilizing a bot operated by the system, thereby allowing messages to be known only to the recipient. The validity test of the product, conducted by two programming experts and one language expert, yielded a score of 0.85, categorized as valid. Additionally, the practicality test involving two Guidance and Counseling teachers and two teachers from Tugumulyo State Vocational High School obtained a score of 0.97, categorized as highly practical. Furthermore, the effectiveness test involving two Guidance and Counseling teachers and three guardians/parents of students from Tugumulyo State Vocational High School resulted in a score of 0.91, categorized as highly effective. Therefore, based on these outcomes, the integrated student violation point system via Telegram at Tugumulyo State Vocational High School has been proven valid, practical, and effective for implementation.

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