

System Development for Learning Process Monitoring in Private Lesson Institution Using CodeIgniter Framework

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Abstract – The monitoring information system is one of the main functions in managing student data in Generasi Cerdas private lesson. Currently, the method of delivering information on the results of the learning process to the parents of students is still carried out with a conventional process, private lesson generation smart reports make reports on the results of the learning process and reports on student attendance using Microsoft Excel, then print them and give them to parents through their children. The problems that occur are often students forget to provide the report to parents and sometimes even documents are lost so parents have to ask to return to the private lesson. This study provides the results of an analysis and design of a monitoring information system that can be used to facilitate services to students in monitoring including grades and student absence. This application developed using UML Design and PHP Programming with CodeIgniter Framework and use MySQL Database. CodeIgniter is an open source framework in the form of a PHP framework with an MVC model (Model, View, Controller) for building dynamic websites. The resulting application has been able to provide information of teacher, student, student value and student absence data to assist in processing student and teacher data in the Generasi Cerdas private lesson, so that the institution has a faster, more efficient monitoring information system and easier to use.

Keywords – Learning, Monitoring, Private Lesson, CodeIgniter

I. INTRODUCTION

An information system is a system that involves information technology, including computers, software, databases, communication systems, the Internet, mobile devices and others that work specifically on tasks, interacting by informing various actors in different organizational or social contexts [1]. Application of information systems in educational institutions can make the work carried out more neatly, quickly and accurately [2]. A computerized system will make it easier and help companies make decisions [3] [4].

Private lesson is one of the activities carried out to provide assistance to students in order to get more optimal achievements or learning outcomes at the institutions where they study. Tutoring aims to make students able to adjust to the current educational situation. By following this, students will get many benefits, which are the students' understanding of subjects that have been considered difficult, developing the ability to socialize, and also improving the achievements of the students themselves.

Generasi Cerdas is one of the private lesson institution in Tangerang City. At present, the private lesson institution has problems in data management, especially in monitoring teaching and learning process, processing and checking student achievement data are still using a manual system where the data storage is still scattered in each teacher so that it has not been well documented.

The above problems can be solved by designing an information system monitoring teaching and learning process on that course based information technology. Identification of problems that exist include:

1. The process of recording data on teaching and learning process information is not efficient because it is done manually.
2. There is still a duplication of student data, especially teacher data relating to learning and teaching hours.
3. Parents have difficulty in monitoring the process of teaching and learning carried out by their children.

Based on the above, the researcher made a study to develop a web-based information system that is easy to use by teachers, students and parents, but this research is limited by the scope of limited with data management restrictions as follows:

1. Student data, subject data, lesson schedule data, student grade data and student attendance data in the course.
2. Data from teaching hours of teaching in the course. Reports containing information relating to the learning and teaching process in the course.

The learning process that is currently running increasingly depends on the use of technology and the process of integrating new technological trends into the education system is continuously being improved for better results for students wherever they are [5]. The use of technology in the learning process has the main objective of facilitating interaction between teachers, students and parents so that the objectives of the teaching and learning process can be achieved [6] [7]. The system is developed to have a dashboard, which is a menu that displays intelligent business data that is useful for the analysis process [8].

PHP is a server-side scripting language that integrates with HTML to create dynamic web pages. The purpose of server-side scripting is syntax and the commands, which are given, will be fully executed in the system [9] [10].

There are several PHP programming language



frameworks, including: CakePHP, Laravel, CodeIgniter which are widely used by information system developers, each of which has advantages.

CodeIgniter is the simplest PHP framework with the smallest number of files compared to other PHP frameworks and the CodeIgniter framework has the best performance for Complex Data, CRUD Operations, and Image Upload tasks [11].

As a framework, CodeIgniter has advantages in terms of fairly complete libraries and packages, making it easier for developers to design a website. The developer doesn't need to code everything from scratch, just use the library provided

Research on "Making SMS Gateway Application for Academic Information at Be Excellent course, Pacitan". The SMS gateway service for academic information can be used by the Be Excellent course, Pacitan to disseminate information to students and parents. The Be Excellent course can provide academic information which can be accessed by students or parents by auto response or by broadcast. With the SMS gateway service, academic information from Be Excellent can be received directly by students 'or parents' cellphones via short messages so that information can be conveyed more quickly and on target [12].

Research on "Design and Development of Information Systems for Web Based Subjects and SMS Gateway". In the previous system, parents did not get grades directly from the school except at the end of each semester, so they had difficulty knowing the development of their children's grades while at school. Therefore, the application of the SMS Gateway is expected to make it easier for parents and students to find out the value of the Enrichment Exams, Midterm Exams, and End of Semester Exams via SMS. After testing the system, it is concluded that this system can be applied in elementary schools and junior high schools [13].

The two studies above show the importance of using IT-based information systems to help the learning process and inform parents about the results, so that teachers and parents can work together to support children's education. The research carried out is applied research where the system development process uses the PHP programming language CodeIgniter framework which will make the resulting application powerful and easy to use by the user.

II. RESEARCH METHODOLOGY

2.1. Research Methods

This study applied a mixed research method (quantitative & qualitative), where data collection would be carried out by means of a survey method using a statement/questioner and conducted direct interviews with relevant parties. In this study, researchers took data from 65 respondents consisting of 30 students, 30 parents and 5 teachers.

2.2. Sample Selections

The sampling method used was purposive sampling. Sample taking with purposive sampling is a sampling technique by taking respondents selected by researchers according to the specific characteristics of the sample.

The criteria for the people chosen as respondents in this study are:

1. Knowing the role of Bimbel Generasi Cerdas as an institution engaged in education.
2. Knowing the importance of data entry activities of teaching and learning.
3. Recognizing the importance of data and the importance of having a backup of documents digitally to protect/ to reduce losses if something unexpected happens/ forces majeure.
4. Knowing the importance of data management as a stakeholder in decision making and being useful in determining development.

Recognizing that the implementation of the information system application monitoring of teaching and learning process will have a positive effect on all parties involved in the Bimbel Generasi Cerdas.

Data collection methods used in this study are:

1. Interview Methods.
Researchers have prepared a list of questions relating to information gathering, to ask: teachers, guardians of students and management of the Bimbel Generasi Cerdas.
2. Observation Methods.
Observation is an activity of direct observation of the profile of the organization and the object of research. The observation process was carried out to study data from the results of activities carried out and organizational archive documents, especially those managed by the Bimbel Generasi Cerdas, organizational goals and structure, business processes, availability of technological infrastructure, and information technology policies that exist in the Bimbel Generasi Cerdas.
3. Literature Study Methods.
Researchers collect data by studying, researching, and reading books, journals, theses, which are related to the development of monitoring information systems that will be developed.

3.4. Technical Analysis Data and Systems

In the analysis process, the analysis techniques used are:

1. Analysis techniques approach to Object Oriented Analysis (OOA) or object-oriented analysis with UML. UML is a modeling language in development, in the field of software engineering to visualize system designs [14]. The system analysis process that will be developed is carried out on the results of the stages of data collection obtained, namely from the results of interviews, surveys, direct observations and literature studies conducted by researchers to obtain specifications of the system requirements which will be developed.

2. Analysis of Functional, Non-Functional Needs of Users

Table 1. Functional and Non Functional Table

Functional Needs Analysis	
No	Management of Bimbel Generasi Cerdas wants this system to be able to:
1	Display the login menu by entering the user name and password.



2	Display the main display menu as Admin.
3	Display the student data menu as Admin.
4	Display the teacher data menu as Admin.
5	Display the lesson data menu as Admin.
6	Display the schedule data menu as Admin.
7	Display the student grades menu as Admin.
8	Display the student attendance menu as Admin.
9	Display the admin's account settings menu.
10	Display the teaching schedule for Teacher.
11	Display the main display menu as a Teacher.
12	Display the input students' attendance menu as Teacher.
13	Display the input students' grades menu as Teacher.
14	Display the teacher's account setting menu.
15	Display the main display menu as Students.
16	Display the Students' grades view menu.
17	Display the Students' attendance view menu.
18	Display the Students' account settings menu.
Non Functional	
No	Management of Bimbel Generasi Cerdas wants this system to be able to:
1	Have an attractive application framework.
2	Have a user friendly application display.
3	Be a web based.

3.5. Research Steps

In this study, the authors conducted the stages of research using the waterfall system development model.

The waterfall method is often called the classic life cycle, where it illustrates a systematic and sequential approach to software development, starting with the specification of user needs and then continuing through the stages of planning, modeling, construction, as well as the delivery of the system to the customers/ users (deployment), which ends with support for the complete software produced [15].

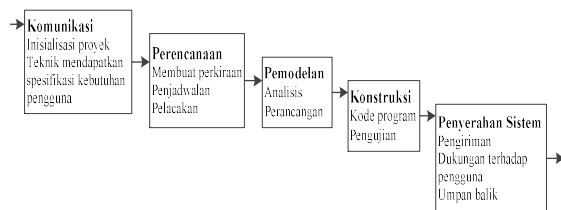


Figure 1. Model waterfall system development [15]

The research steps will go through several stages of the work process, namely:

1. Requirement Stage, the stage where the researcher determines the object of research and conducts research analysis.
2. System Design Stage, the stage where researchers conduct system design using UML, including use case diagrams, activity diagrams, sequence diagrams, state chart diagrams, class diagrams.
3. Implementation Stage, which is the stage where the researcher implements the system first developed in a small program, which is integrated in the next stage, each unit is developed and tested for its function called

unit testing.

4. Verification Stage, which is the stage of the researcher verifying all the units making this system that was developed in the implementation stage, integrated into the system after testing each unit, to find out any failures or errors.

Maintenance Stage, namely the stage that the researcher carries out maintenance, and corrects errors or failures that have not been found in the previous step.

III. RESULTS AND DISCUSSION

3.1. Use Case Diagram

The use case diagram illustrates the workflow of the system in a very simple way, the main function of the system and the various types of users who will interact with the system, as in picture 2-4.

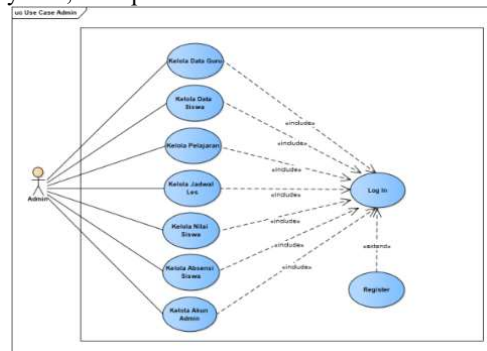


Figure 2. Admin use case diagram

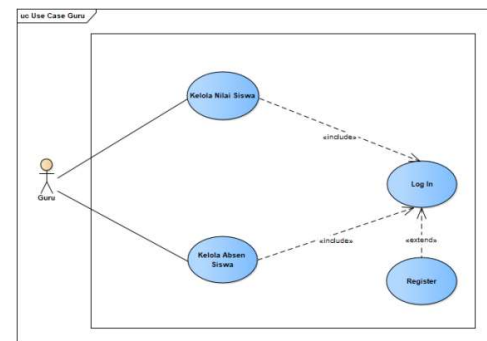


Figure 3. Teacher use case diagram

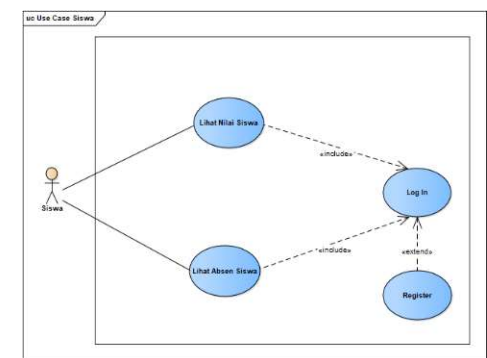


Figure 4. Student and Parent use case diagram

3.2. Sequence Diagram

Sequence diagrams are diagrams, that illustrate objects, participate in use cases and messages or information on activities carried out between them from



time to time for a use case. Figure 5 illustrates the sequence diagram of managing student grades by the admin actor.

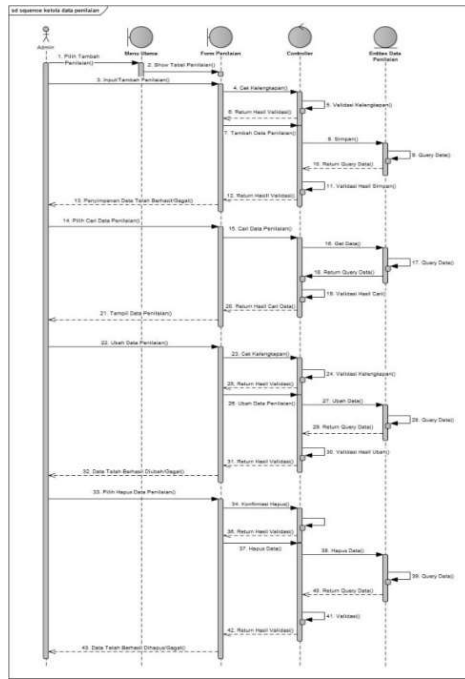


Figure 5. Sequence diagram system

3.3. Application Development Using CodeIgniter

CodeIgniter's work process is very simple, if the user wants to access the application via a browser, then the steps are:

- Each user requests the application, it will be directed to the index.php page.
- Routing will determine the flow of requests from users. If the requested page is cached, the routing will perform step 3.
- If the routing leads to caching, then the page displayed is the cached page.
- If the routing points to security, then all data from the user will be filtered to increase security before being directed to the controller.
- The controller will call the model, library, helper, and other tools needed for the application page requested by the user.
- User requests will be displayed on the screen.

3.4. GUI Design

3.4.1. Log in Menu

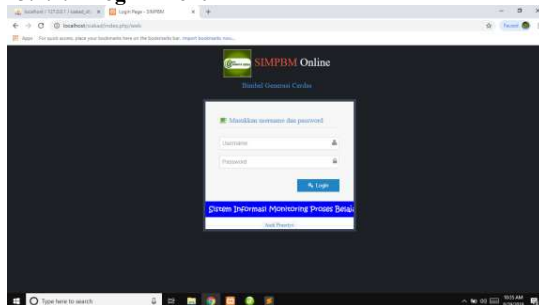


Figure 6. Log in Menu

This menu is the first menu, where the user must enter the appropriate user name and password that has been registered by the system administrator.

3.4.2. Dashboard Menu

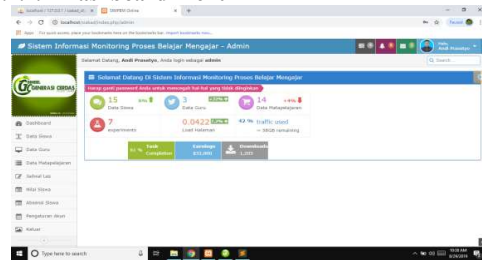


Figure 7. Dashboard Menu

This menu is what will view after the user has successfully logged into the system. In this menu, users can see the student data dashboard, subject teacher data, experimental data, the number of assignment pages and user traffic.

3.4.3. Student Data Menu

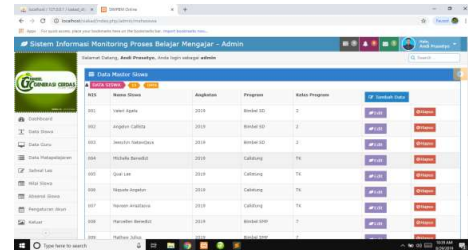


Figure 8. Student Data Menu

This menu is a menu that displays student data, data that can be seen by the user depends on the access rights the user has, if the user is a teacher, he will be able to see all the students he teaches, but if the user is a student or parent, then only data students or their child's data that can be seen by the user.

3.4.4. Managing Students Grades Menu

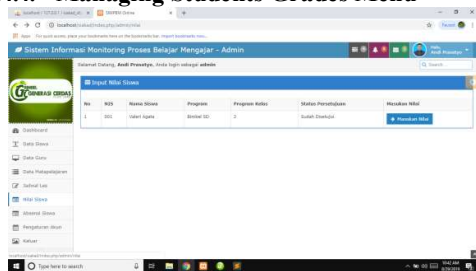


Figure 9. Managing Students grades Menu

This menu is a menu that can be used by the teacher to manage data on the students he teaches. Teachers who can view and manage student data are only teachers who teach the class of subjects they teach.

3.4.5. Managing Students Attendance Menu



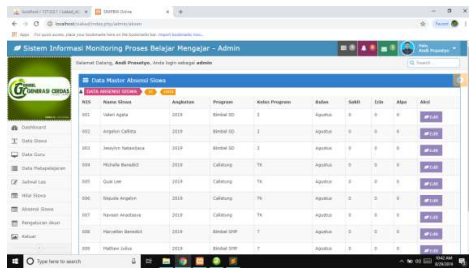


Figure 10. Managing Student Attendance Menu

This menu is a menu that displays student attendance data, data that can be seen by the user depending on the access rights the user has, if the user is a teacher, he will be able to see all the student absences he teaches, but if the user is a user. are students or parents, only the student or child absences data can be seen by the user.

3.5.Black Box Testing

System testing aims to assess the quality of the system based on black box testing with 17 test cases.

Table 2. Black Box testing

Application Name :		System Information Learning Process Monitoring at Private Lessons Institution		Testing date: 10-01-2021	
				Tester: Andi	
	Page Tested	Actor Act	System React		Result
			True	False	
A. Admin Page System					
1.	Admin Home page	Select Log in menu	Get the admin log in page	Failed to get admin log in page	valid
2.	Log in Admin	Input username and password	Get the admin main page	Failed to get admin main page	valid
3.	Log out	Select log out menu	Logged out and display the homepage	Failed to log out	valid
4.	Teachers' data	Add teacher data	Teacher data added	Display an error message if there is data that is not filled in	valid
		Change the teacher data according to the desired changes	The latest teacher data will be successfully saved	Display an error message if there is data that is not filled in	valid
		Delete the teacher data	Teacher data will be deleted	Teacher data will not be deleted	valid
5.	Students' data	Add student data	Student data added	Display an error message if there is data that is not filled in	valid
		Change student data	The latest student data will be successfully saved	Display an error message if there is data that is not filled in	valid

		Delete student data	Student data will be deleted	Student data will not be deleted	valid
6.	Subject data	Add subject data by entering all data	Subject data added	Display an error message if there is data that is not filled in	valid
		Change the subject data	The latest subject data will be successfully saved	Display an error message if there is data that is not filled in	valid
		Delete subject data	Subject data will be deleted	Subject data will not be deleted	valid
7.	Tutoring Schedule data	Add tutoring schedule data	Tutoring schedule data added	Display an error message if there is data that is not filled in	valid
		Change tutoring schedule data	The latest tutoring schedule data will be successfully saved	Display an error message if there is data that is not filled in	valid
		Delete tutoring schedule data	Tutoring schedule data will be deleted	Tutoring schedule data will not be deleted	valid
8.	Students' grades data	Add student grade data	Student grade added	Display an error message if there is data that is not filled in	valid
		Change student grade data	The latest student grade data will be successfully saved	Display an error message if there is data that is not filled in	valid
		Delete student grade data	Student grade data will be deleted	Student grade data will not be deleted	valid
9.	Students' Absence	Add student attendance data	Student attendance added	Display an error message if there is data that is not filled in	valid
		Change student attendance data	The latest student attendance data will be successfully saved	Display an error message if there is data that is not filled in	valid
		Delete student attendance data	Student attendance will be deleted	Student attendance will not be deleted	valid
10.	Changing password	Change admin password	Password will be successfully changed	Password will not be changed	valid
B. Teacher Page System					
1.	Teachers' Data	Add teacher data	Teacher data added	Display an error message if there is data	valid



				that is not filled in	
		Change the teacher data	The latest teacher data will be successfully saved	Display an error message if there is data that is not filled in	valid
		Delete teacher data	Teacher data will be deleted	Teacher data will not be deleted	valid
2.	Students grade data	Add student grade data	Student grade data added	Display an error message if there is data that is not filled in	valid
		Change student grade data	The latest student grade data will be successfully saved	Display an error message if there is data that is not filled in	valid
		Delete student grade data	Student grade data will be deleted	Student grade data will not be deleted	valid
3.	Students' attendance data	Add student attendance data	Student attendance data added	Display an error message if there is data that is not filled in	valid
		Change student attendance data	The latest student attendance data will be successfully saved	Display an error message if there is data that is not filled in	valid
		Delete student attendance data	Student attendance data will be deleted	Student attendance data will not be deleted	valid
4.	Changing password	Change teacher password	Password will be successfully changed	Password will not be changed	valid
C. Student Page System					
1.	Students' grade data	See student grade data	Display student grade data	Student grade data will not be displayed	valid
2.	Students' attendance data	See student attendance data	Display student attendance data	Student attendance data will not be displayed	valid
3.	Changing password	Change student password	Password will be successfully changed	Password will not be changed	valid

IV. CONCLUSION

The design of the monitoring information system of student learning outcomes in the Bimbel Generasi Cerdas is the development of an ongoing system. Various problems that have arisen have been attempted to be handled with this proposed new system. The conclusions that can be drawn from the development of this information system include:

1. Information system monitoring teaching and learning process that was developed has been able to process data and present it into a useful information for students, teachers and parents of students.

2. The developed teaching and learning monitoring information system can process student grades and absences data quickly, precisely and accurately.

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