

Design Analysis Application with Framework for Exam Question Evaluation

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ABSTRACT

Evaluation of questions is generally carried out by teachers after giving exams to students. The exam is a benchmark to determine students' ability to absorb the subject matter delivered by the teacher through objective and essay questions, all students are expected to be able to answer and solve these questions properly. Exams can be referred to as part of the evaluation to maintain the quality of the questions so that they remain suitable. Therefore, the teacher evaluates the questions by using item analysis manually to get the results of the value in the form of a feasible question, this method will spend a lot of time to calculate one by one the results of student answers and then recap the results of the answers for one class, besides that the accuracy of the results is also low because there can be miscalculations from the teacher that can make the question eligibility value inappropriate. The purpose of this research is to produce a system in the form of an application that is able to analyze questions so that it can help teachers get question analysis quickly. With the concept of the model, view, controller method in the codeigniter framework, a web-based application is designed. The results of the research are in the form of data per question which contains an analysis of the question of difficulty level, differentiating power and checking function by using framework codeigniter.

INTRODUCTION

Schools are one of the education systems that function to help improve human resources (Simanjorang, Risdolita, 2023). With the school, students will gain knowledge to become provisions in facing future challenges. There are also those who say that A school is an institution designated for educational activities, serving as a venue for the dissemination and acquisition of knowledge in various disciplines (Firnanda, 2020). In order to maintain its consistency in learning activities to educate students in gaining knowledge, it is necessary to evaluate learning.

Learning evaluation is very important to determine whether or not a learning system is running by educators (Warsah, 2022). Evaluation is an inseparable part of learning, with evaluation the teacher will be able to know the success rate of the learning process. The objective of evaluation is to enhance pedagogical approaches, facilitate student development and enrichment, and assign students to more suitable learning environments based on their aptitude (L, 2019). Tests or exams are used as tools that can be used to conduct evaluations, through questions given by the teacher on a particular subject.

A test is a systematic tool or way to measure a sample of behavior. As a measuring tool, the test contains various items or a series of tasks that must be done or answered by students (Suarga, 2019). In schools, tests are usually given in the form of objective and essay questions, every student finishes the test, the teacher will analyze the questions that have been given through student answers. The teacher analyzes manually by calculating the level of difficulty, differentiation and the function of the examiner. The method used by the teacher consumes a lot of teacher time and the results of the analysis calculation are also inaccurate. Based on the problems faced by the teacher, the design of a system using the code igniter framework is carried out which is able to produce an analysis in the form of difficulty level, differentiating power and the function of the examiner which can help the teacher in getting a question analysis quickly and with accurate results.

LITERATURE REVIEW

Evaluation

Evaluation is an important part of the world of education that must be carried out consistently and continuously to maintain the quality of good human resources, so evaluation can be considered Evaluation is an integral component of the learning process that cannot be dissociated from teaching activities, as it serves as a measurement tool to ascertain the extent of students' performance in mastering the instructional content presented (L, 2019).



Test

Testing is a way to determine a person's ability by asking questions either in writing, orally, or in other ways (Aryatama & Yunita, 2021). Exams can be given to students in the form of objectives or essays, for the number of questions depending on the length of the exam.

Problem Analysis

Item analysis is an evaluation of test questions aimed at identifying a set of questions that has sufficient quality (Ida & Musyarofah, 2021). In analyzing questions, there are 3 important parts, namely finding the level of difficulty, differentiating power and the function of the examiner.

Framework

Framework is a package containing functions that are commonly used in making applications. The method used by the CodeIgniter Framework is called Model - View-Controller or abbreviated as MVC. MVC separates the programming logic from the presentation (Saputra et al., 2023).

The MVC (Model View Controller) method has three components (Randa et al., 2023), namely:

1. Model, manage databases (RDBMS) such as MySQL or Oracle RDMS.
2. View, the User Interface part or the part that will be the display for end-users. View can be HTML, CSS, Javascript, JQuery and AJAX pages.
3. Controller, which is the link between the view and the model, the point is that because the model cannot be connected directly with the view or vice versa, so this controller is used as a bridge between the two.

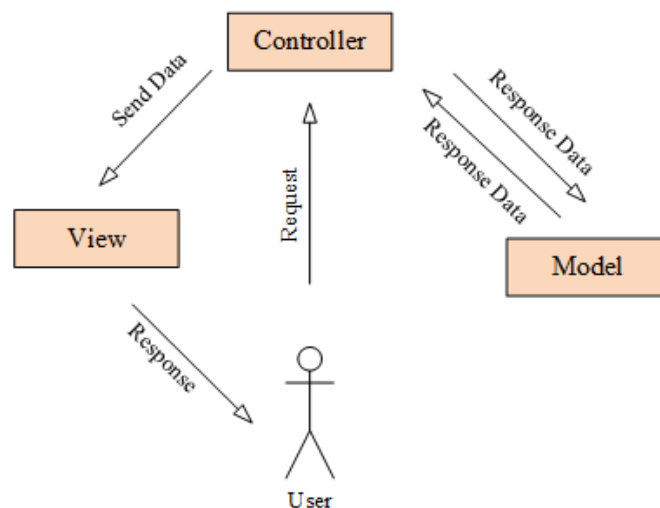


Figure 1. Model View Controller concept

Application

According to Novria (Novria Rahma et al., 2022) The application is a pre-designed program capable of executing various commands for problem-solving, utilizing one of the data processing techniques on a computer or smartphone to achieve more precise results aligned with the application's intended purpose.

Website

According to Tuti, A website is a compilation of pages that house digital data, including text, photos, animations, sound, and video, or a combination thereof, accessible via an internet connection for global viewing (Susilawati et al., 2020).

UML (Unified Modeling Language)

UML stands for Unified Modeling Language, which is a visual modeling method for object-oriented system design tools (Bemindra Alphanto Juan & Nurhasanah, 2023). UML is a language used to define, visualize, build, and document an information system. UML was developed as a tool for object-oriented analysis and design by Grady Booch, Jim Rumbaugh, and Ivar (Maulani & Santoso, 2021).

MySQL

Mysql is a database management system, which is a structured database in data processing and display. Since computers can handle large data, database management systems play a very important role in data processing, this is very necessary because the data must be organized according to the needs of the user. wearer (Pratomo & Mantala, 2016).

METHOD

In this study, the authors used three data collection techniques according to Nurseptaji (Nurseptaji, 2021) including:

1. Observation, a data collection technique by making direct observations on the conditions or situation of a subject in the study in order to obtain the data needed by the researcher.
2. Interview, this data collection technique is carried out by asking a question or asking questions directly to the teacher to find out the necessary data that has a relationship with question analysis.
3. Literature Study, a data collection technique using books, scientific journals, or various types of sources that are credible and relevant to this research.

The following are the stages in designing applications for analysis:

1. Analyzing the data, the data was obtained from questions and answer keys made by the teacher and the results of student answer sheets. Then the data is selected based on the teaching teacher, subject and class. Data taken from one class, one subject and one teacher as sample data.
2. The data that has been selected is designed in the form of a database so as to produce table relationships in the database. Furthermore, the design of the input form of question data and answer keys in the form of objective or multiple choice questions. While the output form is in the form of student answer sheets and for the results of item analysis in the form of difficulty level, differentiating power and function of the examiner.
3. The next stage is coding into the form of an application using the Codeigniter framework as an engine and Bootstrap as a basic display.
4. The next stage is testing with the blackbox method to students by giving exams in the form of questions on the subjects that have been sampled earlier to find out whether the results are in accordance with what we designed earlier.
5. The final stage evaluates if there are input or output errors that are not appropriate at the analysis and design stage.

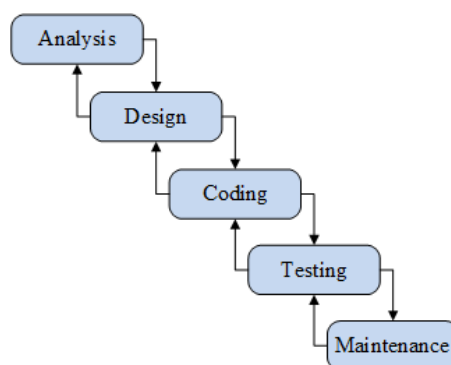


Figure 2. Stages of Application Design

RESULT

In this section of the results will be shown the results of the research, the results will be presented in the form of images along with an explanation of the image.

Use Case Diagram

Use case diagrams are part of the Unified Modeling Language that describes the functions of the system. Use cases have the aim of showing the interaction between actors and the system. The form of actor interaction with the system can be seen in Figure 3:

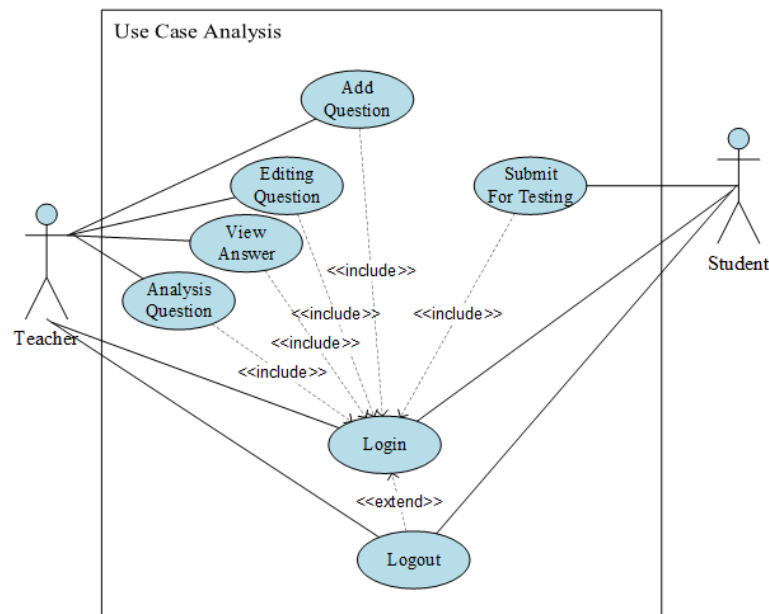


Figure 3. Use Case Analysis

From Figure 3, it can be seen that the system has 7 use cases and has teacher actors, student actors who interact with the system, where teachers interact with 6 use cases and students interact with 3 use cases.

In this section will display the results of the question analysis design using the codeigniter framework, as for the results such as the user login page, user dashboard page, student answer results and question analysis, which can be seen in Figure 4 below:

Figure 4. User Login Page

Before entering the dashboard page, users must log in by entering the appropriate username and password. The login page is important here to distinguish users based on access rights. There are several users such as teachers and students, where access rights here are in the form of a menu that can be accessed by users after they log in.

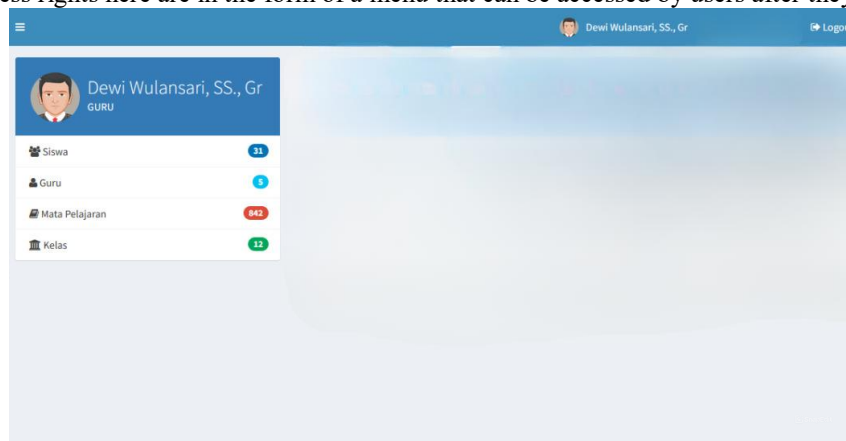


Figure 5. Teacher Dashboard Page

This dashboard page, teachers can proceed to access the dashboard page, here teachers can enter questions based on their respective subjects and add, edit and delete questions. In addition, teachers can also see the results of student answers by selecting the exam results menu. Furthermore, teachers can easily analyze by selecting the question analysis menu that is already available, teachers can make the results of this analysis as an evaluation in making the next question or deleting questions that are not suitable for testing.

Nama Siswa : DEA KRISTIN
NIS : 8763
Kelas : RUANG 1 (SATU)

Mata Pelajaran : Bahasa Inggris

SOAL Objektif

1. The following text is for number 1-3 Recycling is a collection, processing, and reuse of materials that would otherwise be thrown away. Materials ranging from precious metals to broken glass, from old newspapers to plastic spoons, can be recycled. The recycling process reclaims the original material and uses it in new products. In general, using recycled materials to make new products costs less and requires less energy than using new materials. Recycling can also reduce pollution, either by reducing the demand for high-pollution alternatives or by minimizing the amount of pollution produced during the manufacturing process. Paper products that can be recycled include cardboard containers, wrapping paper, and office paper. The most commonly recycled paper product is newspaper. In newspaper recycling, old newspapers are collected and searched for contaminants such as plastic bags and aluminum foil. The paper goes to a processing plant where it is mixed with hot water and turned into pulp in a machine that works much like a big kitchen blender. The pulp is screened and filtered to remove smaller contaminants. The pulp then goes to a large vat where the ink separates from the paper fibers and floats to the surface. The ink is skimmed off, dried and reused as ink or burned as boiler fuel. The cleaned pulp is mixed with new wood fibers to be made into paper again. Experts estimate the average office worker generates about 5 kg of wastepaper per month. Every ton of paper that is recycled saves about 1.4 cu m (about 50 cu ft) of landfill space. One ton of recycled paper saves 17 pulpwood trees (trees used to produce paper). 1. What is the third step of recycling paper products?

Jawaban Siswa : C. Screen and filter the pulp to remove smaller contaminants
Jawaban Benar : D. Put the pulp to a large vat to separate the ink from the paper fibres
Keterangan : JAWABAN SALAH

2. Which of the following is NOT the benefit of recycling?

Jawaban Siswa : A. It costs much money for the process of recycling
Jawaban Benar : A. It costs much money for the process of recycling
Keterangan : JAWABAN BENAR

Figure 6. Student Answer Page

No	Soal	Tingkat Kesukaran		Daya Beda		Butir Pengecoh		
		indeks	Kategori	indeks	Kategori	Opsi	indeks	Kategori
1	Have you ever wondered how people get chocolate from? In this article we'll enter the amazing world of chocolate so you can understand exactly what you're eating. Chocolate starts with a tree called the cacao tree. This tree grows in equatorial regions, especially in places such as South America, Africa, and Indonesia. The cacao tree produces a fruit about the size of a small pine apple. Inside the fruit are the tree's seeds, also known as cocoa beans. The beans are fermented for about a week, dried in the sun and then shipped to the chocolate maker. The chocolate maker starts by roasting the beans to bring out the flavour. Different beans from different places have different qualities and flavor, so they are often sorted and blended to produce a distinctive mix. Next, the roasted beans are winnowed. Winnowing removes the meat nib of the cacao bean from its shell. Then, the nibs are blended. The blended nibs are ground to make it a liquid. The liquid is called chocolate liquor. It tastes bitter. All seeds contain some amount of fat, and cacao beans are not different. However, cacao beans are half fat, which is why the ground nibs form liquid. It's pure bitter chocolate. The text is about ...	0.90	Sangat Mudah	1.23		A	6.45%	Berfungsi
						B	0%	Kurang Berfungsi
						C	3.23%	Kurang Berfungsi
						D	90.32%	Kunci Jawaban
						E	0%	Kurang Berfungsi
						O	0%	-

Figure 7. Analysis Page

DISCUSSION

From the results of the trials conducted, it can be concluded that teachers can easily get the results of analyzing questions and no longer need to do it manually. System testing is done using the blackbox method, the system has input results that match user needs. The features of the application are also very easy for users to use. Teachers can easily do question management and monitor the results of answers from students and analyze questions by selecting the menu that is already available.

CONCLUSION

Based on the question analysis design using the codeigniter framework, a system is produced that is able to analyze questions that are feasible or not feasible in mathematics subjects. After this application, teachers no longer need to use manual methods to get results that require a long time and low accuracy of results. From the results of the analysis the teacher can use it as a reference in making better questions for the next test to remove questions that are not feasible. For future research, it is possible to use an expert system in analyzing questions or using the Laravel framework to support system design.

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