Implementation of Multiple Intelligences Determinant Applications for Junior High School Students Using Web-Based Likert Scale Method

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ABSTRACT

Multiple intelligences or commonly called multiple intelligences are various skills and talents that students have to solve various problems in learning. The problem in this research is how is the process of developing applications for determining multiple intelligences for junior high school students using the method web-based Likert scale?, how is the feasibility of the application for determining multiple intelligences for junior high school students using the web-based Likert scale method?, and how is the effectiveness of using the application for determining multiple intelligences for junior high school students using the web-based Likert scale method?. In the development of this web-based application system using the PHP programming language and MySQL database. This type of research is research and development (R&D) with the Likert scale method. With a population of 21 students of SMP Negeri 2 Sayung Demak and a sample of 21 students of class VIII F. Based on the User Acceptance Test for students, it produced a number of results covering several aspects, namely in terms of usability, in terms of convenience and in terms of appearance, it produced an average percentage of 84%. These results are included in the criteria for strongly agree.

Keywords: Multiple Intelligences; Web Application; Likert scale

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1. INTRODUCTION

The development of information technology (IT) is very rapid, the need for a concept with an IT-based learning/teaching mechanism is inevitable. Needs are very important in the world of education such as processing academic values and making reports on student learning outcomes. The need for accurate and appropriate information is needed by teaching staff to know the development of students [1].

Education is believed to be one way to create a just and prosperous society. Education itself certainly cannot be separated from the teacher as a teacher and students as students. However, in the course of the educational process so far, there are still many things that do not reflect the actual learning process, where students are given the freedom to develop their intelligence [2].

Mistakes that have been made by teachers may still be made, namely assuming that the success of students is only measured from the cognitive aspect, namely logic and language. Teachers are more willing to impose themselves without developing the greatest potential in students who are able to bring big changes to the students themselves.

Many of the students do not understand about multiple intelligences or the types of intelligence that exist in the theory. By knowing self-intelligence from multiple intelligences, it can help someone to know their intelligence.

Some teachers tend to only value logic and language skills by ignoring balanced attention to students who have other intelligences such as being good at playing musical instruments, designers, dancers, singers, and others. It is unfortunate that currently many students have different intelligences, but do not get good reinforcement from the teacher himself [3].

Every child in this world has various intelligences in different levels and indicators. This shows that all children, in essence, are intelligent. The difference lies in the level and indicators of intelligence. These differences are determined by various factors. One of them is the stimulation given to children.

According to the psychometric approach, intelligence is seen as a different psychological trait in each individual. Intelligence can be estimated and clarified based on intelligences tests. Intelligence measurement figure Alfred Binet said that intelligence is an ability that consists of three components, namely (1) the ability to direct thoughts or actions (2) the ability to change the direction of thoughts or actions, and (3) the ability to criticize one's own thoughts and actions or actions. autocritism. According to him, intelligence is something that is functional so that the level of individual development can be observed and assessed based on certain criteria [4].

Another educational expert from Harvard University named Howard Gardner argues that there are no humans who are not intelligent. This paradigm opposes the intelligent-unintelligent dichotomy theory. Gardner also opposes the notion of "intelligent" in terms of IQ (intellectual quotion), which according to him only refers to three types of intelligence, namely logic-mathematical, linguistic, and spatial. Henceforth, Howard Gardner, then raises the term multiple intelligences. The term was later developed into a theory through elaborate research, involving anthropology, cognitive psychology, developmental psychology, psychometry, biographical studies, animal physiology, and neuroanatomy [5].

Until now, to find out intelligence is still in the form of a questionnaire which is generally given to junior high school / high school students whose aim is about the future after graduating from school. For ordinary students, they do not know more about what type of intelligence is dominant. In making a system that aims to determine the dominance of a person's intelligence so that it can be used, a website-based application with an offline system is needed that can be used without the need for an internet connection.

Based on the results of interviews with the coordinator of guidance and counseling teachers. It is known that guidance and counseling teachers have given several types of assessments to students, one of which is the multiple intelligences test. This multiple intelligences test was obtained from Google and then given to students. However, the guidance and counseling teacher did not know whether the multiple intelligences test obtained was valid or invalid. In addition, guidance and counseling teachers require the cost of printing and copying multiple intelligences tests which still use sheets of paper containing questions given to students, after which students are asked to fill in the existing questions, then collect them back to the guidance and counseling teacher [6].

Of all these activities, guidance and counseling teachers are very time consuming and very ineffective because starting from the process of working to the process of drawing conclusions they still use the manual method. It is feared that it will have an impact on the conclusions that will be produced that are not in accordance with the students' work because during the process of drawing conclusions the guidance and counseling teachers can cause boredom and boredom. And the use of words or language in each question on the multiple intelligences test makes students confused because they don't understand it [7].

For guidance and counseling teachers expect a multiple intelligences test tool that has good validation. The language used in each question item is easily understood by students. This is expected for the renewal of the multiple intelligences test to facilitate the performance of guidance and counseling teachers when calculating and drawing conclusions practically and automatically. In conclusion, guidance and counseling teachers expect a valid and practical multiple intelligences test tool. So that guidance and counseling teachers can synergize with homeroom teachers, subject teachers, guardians or parents of students, the school environment, and the community. And it is hoped that the school will be able to accommodate the potential of each student with a variety of different and unique patterns of thought [8].

Therefore, by facilitating and facilitating the performance of guidance and counseling teachers at SMP Negeri 2 Sayung in exploring and recognizing the potential of their students. And as an effort to support the improvement of the quality of guidance and counseling services. As well as making students able to recognize and explore the potential contained within themselves.

2. LITERATURE REVIEW

A. Multiple Intelligences

The word multiple is linguistically multiple or multiple as in the term multiple choice which means multiple choices. The word multiple in the sense of multiple intelligences here has the meaning of multiple intelligences. Multiple intelligences is the ability to solve problems, to get specific answers and to learn new material quickly and efficiently.

Intelligence as a biopsychological potential to process specific forms of information in certain ways. And Gadner gives a definition of intelligence as the ability to solve problems faced in life, the ability to make or do something useful in life.

Intelligence is often defined as the general mental ability to learn and apply knowledge in environmental manipulation, as well as the ability to think abstractly. Intelligence is the ability to adapt to the environment, the capacity to reason and think abstractly, the ability to understand relationships, evaluate and judge, and the capacity to generate productive and original thoughts [9].

Based on the definitions from the experts above, the authors conclude that multiple intelligences is a theory of multiple intelligences which explains that individuals have a tendency to nine intelligences, namely intrapersonal intelligence, interpersonal intelligence, visual-spatial intelligence, kinesthetic intelligence, musical intelligence, linguistic intelligence, logical-mathematical intelligence, naturalist intelligence and existential intelligence. To create innovative products that are beneficial to the environment and the ability to solve and solve problems in their lives.

In the book multiple intelligences, Tadkiroatun Musfiroh, Yaumi and Ibrahim reveal that multiple intelligences are divided into nine types of multiple intelligences, namely [10]:

1) Verbal-Linguistic Intelligence
   This intelligence is indicated by a person's sensitivity to sound, structure, meaning, function of words, and language.
2) Logical-Mathematical Intelligence
   This intelligence is characterized by sensitivity to logical patterns and has the ability to digest these patterns, including numerics and able to process long lines of thought.
3) Visual-Spatial Intelligence
   This intelligence is characterized by the sensitivity to perceive the visual-spatial world accurately and transform the initial perception.
4) Musical Intelligence
   This intelligence is characterized by the ability to create and appreciate rhythms, patterns, tone points, and tone colors, as well as the ability to appreciate forms of musical expression.
5) Kinesthetic Intelligence
   This intelligence is characterized by the ability to control body movements and the ability to manage objects.
6) Interpersonal Intelligence
   This intelligence is characterized by the ability to digest and respond appropriately to the moods, temperaments, motivations, and desires of others.
7) Naturalist Intelligence
   Intelligence is characterized by the ability to distinguish the members of a species, recognize the existence of other species, and map the relationship between several species, both formally and informally.
8) Intrapersonal Intelligence
   Intelligence is characterized by the ability to understand one's own feelings and the ability to distinguish emotions, as well as knowledge of one's own strengths and weaknesses.
9) Existential Intelligence
   Intelligence is characterized by the ability to think something essential, concerning the existence of various things, including life and death, good and evil.

B. Likert scale

The basis of the Likert scale theory is derived from classical test theory. Classical test theory distinguishes between true scores and observed scores. True score is the theoretical value of each subject on the construct or variable that we want to measure. While the observed score is the real value obtained from the measurement process. It is assumed that each subject has a true score on the construct that we want to measure. We can't see the true score directly but we can conclude from the observed score. According to classical test theory, each observed score consists of two components, namely the true score and random error (random measurement error) and is written:

$$O = T + E$$

Where O is the observed score, T is the true score and E is the random measurement error. Random measurement error is assumed from the population with the mean = zero. The implication is that with multiple observations, the random measurement error value tends to be on average equal to zero.

The Likert scale states that each question item is designed as an observation of the desired trait. Each question item is measuring the true score. If the average value (or sum) of each question item is calculated, the measurement error is assumed to be close to zero so that the estimation result becomes a true score. Measurement error is inversely related to reliability. The greater the measurement error, the worse the reliability value. Thus, one way to increase reliability is to increase the number of question items. This is the basis of the Likert scale theory using a sufficient number of question items to produce a good reliability score [11].

3. RESEARCH METHOD

The waterfall model is a traditional software development process that is commonly used in most software development projects. This is a sequential model, so the completion of one set of activities leads to the start of the next activity. It is called a waterfall because the process flows "systematically from one stage to another in a downward fashion". Establish a framework for software development. Several variants of the model exist, each using a different label for each stage. In general, however, this model is considered to have six distinct stages as shown in figure 6 namely: Requirements analysis, design, implementation, verification, installation and maintenance.
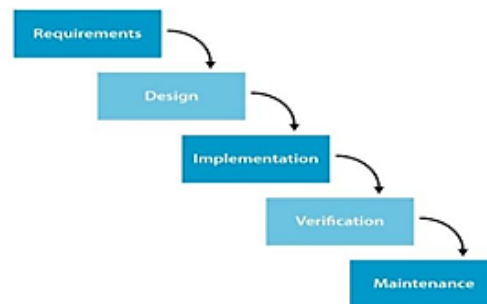
Image 1. Waterfall Model

The following is an explanation of the stages carried out in the waterfall model:
a. System Survey
   The system design process performs a complete data requirements analysis to determine the problems or needs that arise.
b. System Analysis
   The analysis phase is based on activities and tasks where the current system is studied in more depth, conceptions and reviews are made to become the basis for the new system to be built. At the end of this stage half of the activities of the system development effort to determine student learning styles are completed. Wrong
   One of the most important goals at this stage is to define a running system. The data needed is to determine students' intelligence, the types of multiple intelligences intrapersonal, interpersonal, visual-spatial, kinesthetic, musical, logical-mathematical, linguistic, naturalist, existential. The system can determine student intelligence correctly.
c. System Design
   The system design process divides the requirements in this system hardware or software. At this stage, a UML Application for Determining Multiple Intelligences for Junior High School Students will be made with a Web-Based Likert Scale Method including Use Case Diagrams, Activity Diagrams, Squence Diagrams, and User Interfaces.
d. System Implementation
   This stage is a procedure carried out to complete the system design contained in the approved system design document and test, install and start using the new system or the system that has been repaired. The

purpose of this implementation phase is to complete the approved system design, test and document the required system programs and procedures, ensure that the BK teachers involved can operate the multiple intelligences determinant application for junior high school students using the web-based Likert scale method.

e. System maintenance

This is usually the longest phase of the life cycle. The system is installed and used. Maintenance includes correction of various errors that were not found in the application of determining multiple intelligences for junior high school students using the web-based Likert scale method in the previous stages, improvement of the implementation of system units and development of system services.

4. **RESULT AND ANALYSIS**

a. Design

System design is used to describe the workflow of the system so that it is more structured and clear, then UML diagrams are used, namely use case diagrams and class diagrams.
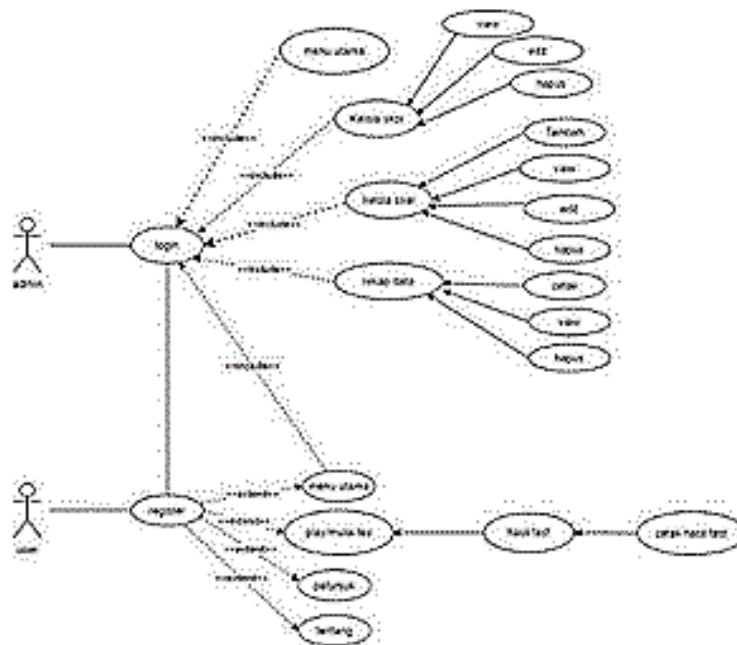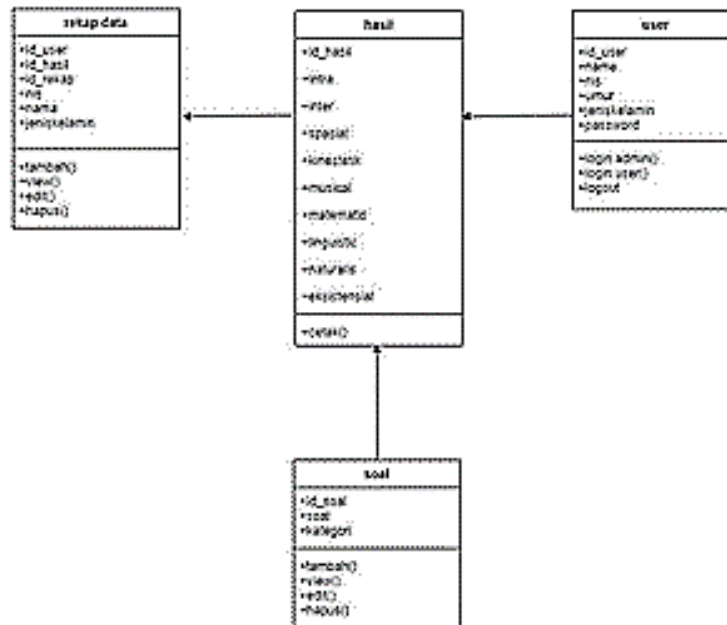

Figure 2. Use case diagrams

Figure 3. Class diagrams

b.   Implementation
     The results of the construction of this system can be seen in Figure 4 which shows the login page, Figure
     5 shows the results

Figure 4. Login

Figure 5. Results

c. Discussion

From the results of the research above, then:

The development of the application for determining multiple intelligences for junior high school students using the web-based Likert scale method has 5 stages, namely analysis, system implementation design, system testing and maintenance.

The first stage is analysis, at this stage several kinds of analysis have been produced, requirements analysis consisting of hardware and software, analysis of data requirements and functional requirements analysis. At this stage the aim is to find out what is needed in the process of making, installing an application.

The second stage is system design, namely the Unified Modeling Language (UML) design stage which includes use case diagrams, activity diagrams, sequence diagrams and class diagrams. In addition, this system design stage aims to design concepts from the website or web which includes the preparation of questions in the form of user interface design and materials needed in making

application. The design of the user interface is made as attractive as possible without forgetting its functional value. So that it can be used easily and pleasantly for users. The results of this stage will be used as a guide in the implementation stage of making the application.

The third stage is implementation, which is the stage where the application begins to be developed using the Sublime Text 3 application in making the Web, and Corel Draw 2019 (64 bit) is used to create background designs and some display needs to make it more attractive.

The fourth stage is system testing. Testing of this system consists of black-box testing, white-box testing, user acceptance test, and device testing. In this black-box test, there are 9 test indicators, where this test was carried out by 2 informatics lecturers. The results of the black-box test show that the success rate has a percentage of 100%, while the failure rate has a percentage of 0%, so it can be concluded that the system is running according to its functionality and provides results as expected. Then on the white test box, the resulting cyclomatic complexity is 1.

The fifth stage is maintenance, where at this stage improvements are made to the answer menu design that is less attractive and design changes obtained from the test results which of course get some bugs that need to be fixed to return to the previous stage so as to produce a better multiple intelligences determination application.

5. CONCLUSION

Based on the results of the design and implementation, it can be concluded as follows:

1) An application is produced that can be used as a tool for determining intelligence in junior high school students.

2) Making this application has been developed by applying the Likert scale method.

3) Web application testing using three tests, namely black box testing, white box testing, and user acceptance tests. In the black box test, the percentage of 100% achieved and 0% failed and in the user acceptance test it was 84%. With the results of the web application testing that has been done, it shows that the application is feasible to use.

4) Based on the test results on 21 students, there are 4 students intrapersonal intelligence, 3 students interpersonal intelligence, 2 students visual-spatial intelligence, 2 students kinesthetic intelligence, 2 students musical intelligence, logic-mathematical intelligence 4 students, linguistic intelligence there are 0 students, there are 3 students naturalized intelligence, and there is 1 student existential intelligence.

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