Information System for Determining Student Achievement Using the K-Means Method

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ABSTRACT

Value is an important thing in the world of education and requires a special processing and policy, both in its use, maintenance and recording. Because of the importance of using this value, it is necessary to carry out systematic and effective processing of the values obtained by students. Processing grades consisting of formative grades, assignment grades, and semester grades for each student. To calculate the student's grades, the K-Means method was used to determine students who excel at SMA Swa Bina Karya. The information system for determining outstanding students at Swa Bina Karya High School is still manual. Where the process of recording and calculating student grades is still manual where the recording of each student's grades is recorded in the gradebook owned by each homeroom teacher so that the process of making class ranking reports requires a lot of time and the resulting information is less effective and efficient. To be able to overcome this frequent problem, the authors designed a system for determining student achievement using the K-Means method using Microsoft Visual Basic.Net 2008 and the database used was Sql Server 2008. With the design of this system, the homeroom teacher and school principal can receive more accurate and timely class ranking reports. Besides that, this system also helps admin work much more effectively and efficiently.


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1. INTRODUCTION

Currently, technological advances are felt in our daily lives, the technology created is becoming more optimal in line with global needs and competition (Septira, 2022), (Wardana, Saksono, & Yudiastuti, n.d.). With intense competition in the global world, we are encouraged to do a job correctly, quickly and thoroughly to achieve optimal results without compromising quality (Firdianti, 2018), (Andriani et al., 2022). Therefore computers enter into human life as a tool to facilitate work (Harahap & Dar, 2018), (Hasbialloh & Jakaria, 2018).

The use of the k-mean method in determining students who excel at the Swa Bina Karya Private High School (SMA) is to accelerate teachers and schools to find out which students get the best grades in the current school year. The aim of schools in general is to produce superior students to maintain the good name of the school.

The author conducted research at the Private High School (SMA) Swa Bina Karya which is located at Jl. Student P. Brayan Workshop Medan. Swa Bina Karya Private High School (SMA) is a
private school that has a fairly complete laboratory such as a Lab. Language, Labs. Computers, Labs. Biology, Lab. Chemistry and has quite a lot of classrooms.

The information system for determining student achievement in Private High School (SMA) Swa Bina Karya, still uses the average student achievement score for each semester which is written in the grade book for each homeroom teacher(Amar, 2016),(Kuspiyah, 2008). Where the method of finding the highest score for students who excel is only based on the average value of achievement each semester. This will make the process even longer because to find students who excel takes a long time in terms of retrieving data from the value of each student's report card(Riski, 2017),(UGM, 2016).

2. RESEARCH METHOD

2.1 Existing System Analysis
In completing this thesis the author uses 2 (two) study methods, namely
a. Field Study
This research is direct research on research objects that will be used to obtain data by:
   a) Observation
      In this observation method the author is given the opportunity to make direct observations on one of the homeroom teachers.
   b) Interview
      In collecting this data the writer conducted interviews and asked questions directed at the problem of giving grades. The interview was conducted on one of the homeroom teachers.
   c) Sample
      Take examples of the data needed, especially savings and loan transaction data, customer data and others.
b. Library Studies (Library Research)
   In this library research the author quotes several opinions or theories from several reading books or textbooks used during lectures. This is intended to provide a strong theoretical basis through the books or literature available in the library, both in the form of lecture materials and brochures related to the title raised by the author.

2.2 Analysis of existing systems
The presentation of the report on the determination of outstanding students at the Private High School (SMA) Swa Bina Karya still uses the average student score each semester which is written in the homeroom teacher's grade book. The data needed in preparing this report is in the form of student identification numbers, student names, student grades. So that you can know the size of the value of each student.

2.3 Research sites
This research was conducted at the Swa Bina Karya Private Senior High School which is located at Jl. Student P. Brayan Workshop Medan.

3. RESULTS AND DISCUSSIONS

3.1 Results Display
This chapter will explain the appearance of the design results of the Information System for Determining Outstanding Students at Swa Bina Karya High School with the aim that readers or users can understand each form in the application program, so that it can help readers or users in implementing or carrying out work of the system being built.
a. Admin Login Display Form
   This page is the initial display when the user accesses the application program before entering the main menu, which can be seen in Figure 1. following:
b. Main Page Display
The results of the main page display that the author made can be seen in Figure 2 below:

Figure 2. Main Menu Display

c. Value Master Form View
The results of the display of the value master page that the author made can be seen in Figure 3 below:

Figure 3. Display of Value Master Form
d. Display of Student Master Form
   The results of displaying the student form page which is useful for viewing a list of students
   that the author has made, can be seen in Figure 4 below:

   ![Figure 4. Display of the Student Master Form](image)

   Figure 4. Display of the Student Master Form

  

e. Display of the Subject Master Form
   The results of the display of the subject form pages which are useful for viewing subject
   data taught at the Swa Bina Karya High School that the author made, can be seen in Figure 5.
   below:

   ![Figure 5. Display Subjects](image)

   Figure 5. Display Subjects

  

f. View of the Subject Master Edit Form
   The results of this form page display, which is useful for changing and adding to the subject
   data taught by the author, can be seen in Figure 6 below.

   ![Figure 6. View of the Subject Master Edit Form](image)
g. Class Master Form view
   The results of the class form page display which is useful for viewing all class data that the
   author has created, can be seen in Figure IV.8. as follows 7. Following

h. Display Output Accessed by the Homeroom Teacher
   The results of the display of the report page which can be accessed by each homeroom
   teacher which is useful for seeing the ranking of the class he teaches, can be seen in Figure 8.
   Following;
Figure 8. Rank Display by Class

i. Rating Calculation Output Display
   The results of displaying reports that are useful for showing how to calculate class ratings that the author made, can be seen in Figure 9. Following:
### Figure 9. Display of Rating Calculation Method

#### j. Display Output Accessed by the Principal

The results of displaying the report page which is useful for viewing student grade ratings are based on student classes with other classes in the same 1 class group that the author made, can be seen in Figure 10. Below;
3.2 Trials

The result of the application of the information system for determining outstanding students at Swa Bina Karya High School is to provide convenience to homeroom teachers and school principals in determining their high achieving students in a short time. In this application, the author uses the Visual Basic 2008 programming language with SQL Server 2008 database data storage. At this stage it also explains how the results of the system evaluation are carried out. Black-box testing is a testing method in which the assessment of the application lies not in the specification of the logic/function of the application, but in input and output. With the various inputs provided, it will be evaluated whether a system/application can provide output that is in accordance with the expectations of the tester.

The stages of determining student rankings are as follows:

a. Enter student grades

Each student's score is entered, starting from formative grades, semester grades, and assignment grades for each subject, shown in the figure:

4. CONCLUSION

After describing the workflow for making this system, several things can be taken conclusion as follows: This system makes it easy for Admins to input and maintain student value data. It makes it easy for the homeroom teacher to see the development of student grades based on the class they care for. The reports generated can help the Principal to see student achievement performance. Can be used as a medium for making the right decisions for students who excel.
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