Decision Support System for Assessment of Learning Process Using Simple Additive Weighting

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Abstract

Lecturers are entitled to get promotions and awards in accordance with their academic performance. Service of teaching and learning process of quality and professional will affect hope and feeling of satisfaction for student to spirit in follow lecture. Performance appraisal according to the favorite lecturer selection guidelines are (a) giving the syllabus at the beginning of the semester, (b) teaching on time, (c) mastering the taught material, (d) correcting assignments and timely grades and (e) serving academic guidance students well. Lecturers who can be elected are a lecturer who have given lectures on all courses in the department at least two semesters and are not currently following the learning task and has provided academic guidance services at least two semesters. Because there is no objective method to decide better and faster, based on existing data. Making the information system that can provide recommendations needed a proper method of decision making. Simple Additive Weighting (SAW) method is appropriate for the decision-making process because it can determine the weight value for each attribute, then proceed to the ranking process that will select the best alternative from some of the best alternatives.

Keywords *— Decision Support System, Assessment, Learning Process*

1. INTRODUCTION

In article 74 it is emphasized that the award can be given by the government in the form of service marks, special promotions, financials, certificates and/or other forms of award, while article 57 (1) states that lecturers who are favourite, exceptionally dedicated and/or work in special areas are entitled to appreciation. Health Polytechnic of Health Ministry Banten is one unit technical execution environment of health under and responsible to the Head of PPSDM Health, and led by a Director who is responsible for carrying out health education, research and carry out community services and in carrying out administrative duties scouted by the Head of the Center for Education and Training of Health Workers, while the academic technical is fostered by the Ministry of Education and Culture.

Teaching and learning process evaluation system that is currently underway in Tangerang Department of Nursing in health polytechnic of Banten is still done manually, both technically and administratively in the management of teaching and learning process assessment, the data there are several problems, namely in the process of charging invalid data, the process of finding old data, data archiving is often lost, the management of the report process is long, not well coordinated in each related section, invalid data when selecting lecturers on the placement plan for lecturers who will become favourite lecturers.

Starting from the initial approach stage: lecturer selection process, registration and interview; assessment stage: preparation process, data collection, weighing data, analysing data using data analysis; service type and lecturer placement: evaluating assessment process development, process type services, lecturer requirements and lecturer placement in the part to be addressed.

Performance evaluation in accordance with the guidelines for selecting favourite lecturers is (a) providing syllabus at the beginning of the semester, (b) teaching on time, (c)

mastering the material taught, (d) correcting assignments and giving grades on time and (e) serving academic guidance student well. Lecturers who can be selected are lecturers who have given lectures in all study programs in their majors for at least two semesters and are not currently studying, and have provided academic guidance services for a minimum of two semesters. Considering the important role of lecturers, their presence in educational institutions must be able to motivate themselves and develop themselves in order to improve work to the fullest. One input that can be obtained by lecturers to motivate and develop them is by evaluating the teaching and learning process of them. Students make an assessment of the lecturer, with the Indonesian lecturer association as its facilitator. The effort of the Department of Nursing provides all the components directly or indirectly to support the course of the learning process. To provide the expected services and services felt by Tangerang Nursing Department students.

Based on these problems, the researchers an aim to produce systems of information provide the necessary recommendations in making the right decision. The Simple Additive Weighting method is expected to be suitable for the decision making process because it can determine the weight value for each attribute, then proceed to the ranking process which will select the best alternative from a number of the best alternatives. The strength of the Simple Additive Weighting model compared to other decision making models lies in its ability to carry out assessments more precisely because it is based on criteria and weights that have been determined.

Some research about decision support systems with various methods. Among them using Windows Apache MySQL PH P and PHP programming, the Simple Additive Weighting approach [1], regarding the design of decision support systems, other studies [2], has parallels with the research discussed in this paper because it uses a decision support system. This decision support system research is to obtain decision data on relevant results [3], while research on this decision support system uses Waterfall development [4]. Research [1], [2], [3] and [4] is not as ratings on the learning process and also not has not yet determined the research of the selection of the most favourite lecturers.

Research that uses decision support system, the development system of linear sequential model, or so-called waterfall model with the method of Fuzzy Multiple Attribute Decision Making [5] the research similar to those discussed in this paper, but not yet discuss the specific assessment of learning, but rather the feasibility of place.

Other research [6], discusses the advantages of reducing the bias that may occur in the analysis, can immediately find out the results in the form of priority order/rating of job promotion advantage assessment. Other publications [8], report on website-based research to find out the feasibility of a place. Meanwhile, there are also similar studies that use Sstem Development Life Cycle based development models [9]. However, research [6], [8] and [9] have not yet discussed the assessment of teaching and learning as part of the object of research but only discuss the advantages of promotion of position and place.

Another research report source [7], uses the balanced scorecard method in developing a website-based system of evaluating lecturer performance in teaching and learning. Another report [10], presents a website-based decision support system to find out using a black box. However, in the two studies not yet describe the implementation of the tri dharma of higher education by a lecturer because it does not cover research and community service.

2. RESEARCH METHOD

The decision support system in this study was carried out in two stages. The first activity consisted of collecting data in accordance with the guidelines for choosing favourite lecturers from Banten Poltekkes and the second stage was making the system design. The data collection is done with the approach of observation to the Department of Nursing polytechnic Health Banten, interviews with the questionnaire indicators questions and determination of value that has been filled by students, processed and taken a random sampling to obtain these

values in gave the admin for insert into the matrix to do the calculation by using the simple additive weighting method , so that the final value (Vi) is obtained from the sum of the multiplications of normalized matrix row elements (R) with the preferred weight (W) corresponding to the matrix column elements (W), and library studies of books, journals, relevant previous articles and research. The system design is done using the simple additive weighting method [15]. The system design is described in the form of actor identification, Use case, System scenario, Activity diagram and Sequence diagram. In the design of this system can be accessed by the admin and chair of the department (as the recipient of the report). To describe the system that produced the prototype system is described in terms of a user interface design of decision support systems in the learning process. Research activities and stages in general are aimed showing in Table 1.

Table 1. User Classification

NO.	USER CLASSIFICATION	POSITION	RESPONSIBLE	MINIMUM REQUIREMENTS	INFORMATION
1.	ADMIN	SUB UNIT LEADER	Drafting a plan Management administration include system management application and database : collection of archives, the organization of appraisal PBM Reporting system activities Implement monitoring, system evaluation	1.Ability computer and operated right 2. Having an understanding of managing data and having knowledge of application networks and databases.	Have access rights as administrator : Update , Delete, edit, add, save
2.	HEAD OF DEPARMENT	HEAD OF PROGRAM	Is the head of the Department Responsible for determining who the lecturers will be selected and assessed, monitoring system	1. Having basic skills in the computer field 2. Can operate the internet.	Recipient of the report, and signing of the final results

This is also different from other studies [11], which use decision support systems in the website-based teaching and learning process with the simple additive weighting method. To display accurate data according to ranking of the resulting weight value.

Similar research that uses a simple additive weighting approach, in making design assessments of teaching and learning processes of lecturers to students [12]. Similar decision support system methods are also available in other publications [13], [14]. However, research [11], [12], [13] and [14] also have not discussed decision support systems as objects in research teaching and learning.

Noting the results of a review of the literature conducted, it is known that the decision support system in the teaching and learning process discussed in this paper is important, and has differences with previous research, as well as having novelty. The difference and novelty is to use simple additive weighting and prototype methods at the design stage. In addition, this study provides a system of solutions to the Polytechnic of Ministry Health in particular Nursing Department in the selection of favorite lecturers.

Besides using the prototype approach, the decision support system model in this study also uses the simple additive weighting method in Windows Apache MySQL PH P and PHP programming [15]. Simple additive weighting method is used at the design stage. Simple additive weighting method is used with the aim of speeding up the design process and making the application developed. This is because the simple additive weighting method allows the use of elements that already exist on an existing system, which can be used on a system that is being developed.

The final decision making process of teaching and learning process that is produced is done by the system admin and head of department approach [16]. The approach of testing the results of this system is to use a comparison between Microsoft Excel calculations with the simple additive weighting method that looks for the weighted sum of the performance ratings

on each alternative of all variables. So that the fundamental difference of the two criteria for this method is the value obtained by the criteria for each alternative, but getting the same final result.

That used on the grounds that the simple additive weighting model developed by Windows Apache MySQL PHP and PHP based website programming. To get the results of evaluations that focus on the model, the evaluation is done by stating that ranking the results of these values obtained values higher than the other values, so that A18 is identified the best alternative. The results of the assessment are given to the Chair of the Department as a report, based on the application of a decision support system for the assessment of the teaching and learning process using simple additive weighting methods to be the best alternative/favorite lecturer.

Evaluation is done by calculating the decision support system with the simple additive weighting method, in functional trials and structural trials. This research test uses accuracy with standard measurements, can reach the right target. This accuracy theory can be seen by trial one to nine steps. Where repeated measurements of accuracy theory in unchanging conditions get the same results. If the input does not match the category of each page, then the process is cancelled, so the system returns to process the input in accordance with the category of the page to be processed, after the category is inputted and in accordance with the category, the process continues and looks at the final ranking and reporting results to completion.

3. RESULTS AND DISCUSSION

3.1 System Design

The system design consists of function design which includes use case, system scenario, activity diagram and sequence diagram; system design, and system implementation. In the design of this system can be accessed by the admin and chair of the department as the recipient of the report. That the admin has the ability to computer and operated right, and have an understanding of managing data and having knowledge of network applications. Who has access rights to the system with updates, delete, save, edit and add. The Head of the Department is a user who monitors and is responsible for determining who lecturers will be selected and assessed by students, so that they get a report on the decision support system in the assessment of the teaching and learning process using the simple additive weighting method up to the signing of the report.

3.1.1 Use Case Diagrams

Analysis of Decision Support Systems Using Simple Additive Weighting Method at the Polytechnic of the Ministry of Health Banten, Tangerang Department of Nursing, this is in the form of Use Case analysis. There are several Use Case that includes the processes such as Use case diagrams, system scenarios and activity diagrams.

Admin manages data values (mandatory values must not be empty), manages criteria data (the system has 5 criteria categorized as C1, C2, C3, C4 and C5), manages alternative data (the intended alternative is the lecturer as an alternative whose performance is assessed in teaching and learning process from lecturer / alternative1 to A19), managing ranking data (after the admin has entered the values, alternatives, criteria and weights that have been determined, the system will process the calculation using the simple additive weighting method until the final results and ranking) and provide a report (this system application shows a report on the final results of the teaching and learning process method saw) and a report on the final results of this system, the admin reports to the head of the department.

3.1.2 Activity Diagram

Figure 2 shows that the Admin opens the login page, inputs the username and password, the system validates the login, if the system displays the next menu, the home page. Admin opens the page Spk, after that admin inputting the data of the preference value, and the system displays the information and the number of values, the value category is processed by the system. If the admin inputs criteria, the system displays the name, type and weight of the criteria so that the criteria category is processed by the system. If the admin inputs alternative data, the system displays alternative names and results, so that alternative categories are processed by the system. After the activity is carried out the system will manage and process the calculation of decision support systems using the simple additive weighting method. The system processes like the saw method and if it matches the category of the page that has been filled everything will be processed and the final ranking results will come out. If the input does not match the category of each page, then the process is cancelled, so the system returns to process the input in accordance with the category of the page to be processed, after the category is inputted and in accordance with the category, the process continues and looks at the final ranking and reporting results to completion.

3.1.3 Class Diagram

Class Diagram of Teaching and Learning Process Assessment, that: Students know the indicator of the question, know the description of the value to assess the lecturer and the value given to the admin. Admin enters username and password, if successfully entered the home menu.

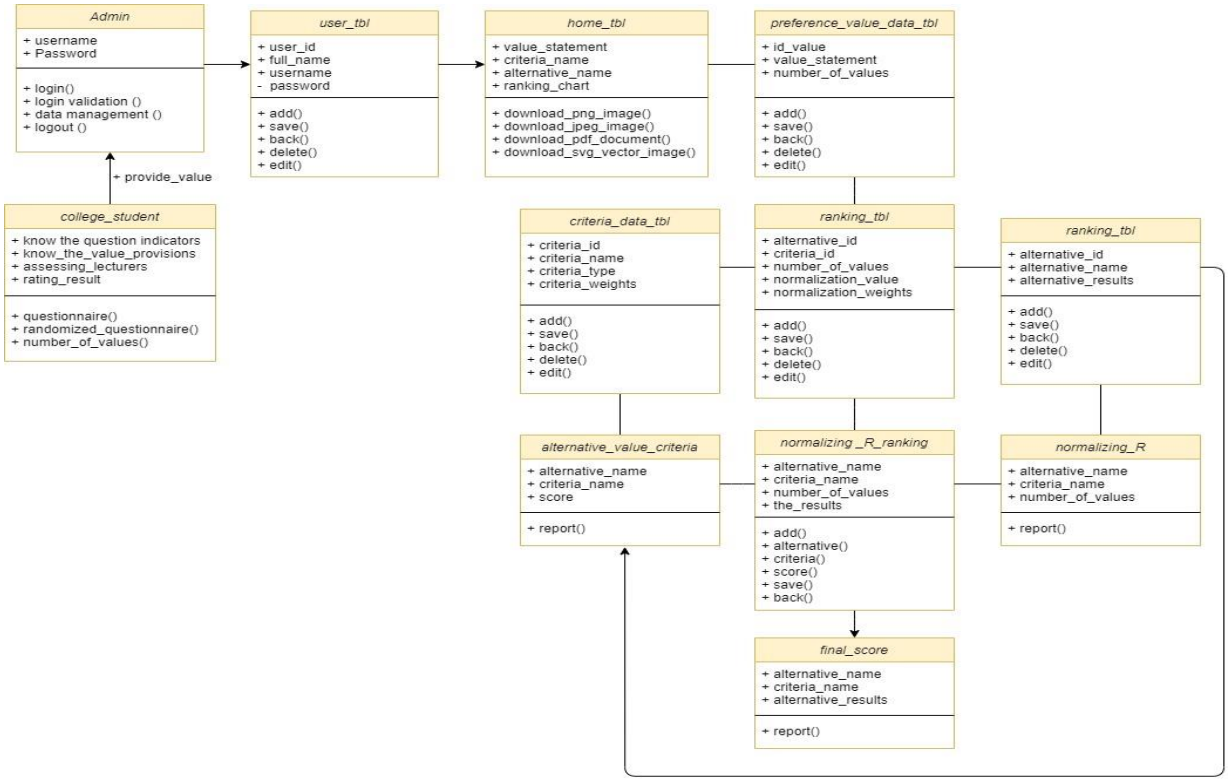

Figure 1. Class Diagram of Teaching and Learning Process Assessment

Admin manages users on the system. Admin enter the value of each alternative to several criteria in accordance with the specified weights, enter criteria and enter alternatives into the system. The system processes and processes values into the expected value. Admin reports the results of the value of the decision support system to the chair of the department.

3.1.4 Prototyping

The system that has been built and is expected to provide an interface that is easy to understand is also used by users showing in Figure 2, Figure 3, Figure 4, Figure 5, and Figure 6.

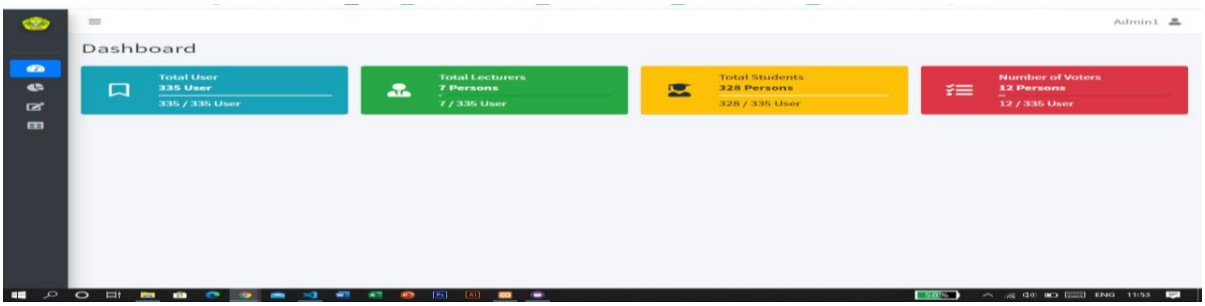

Figure 2. Dashboard

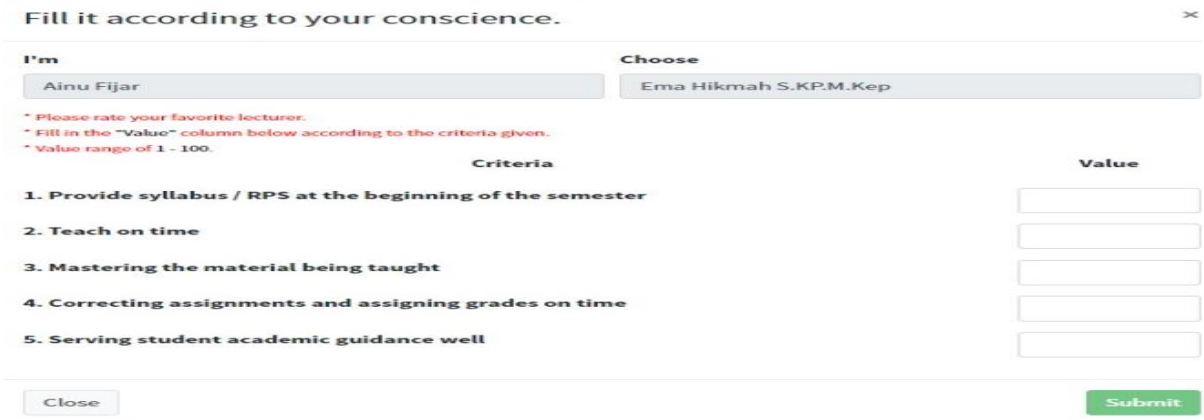

Figure 3. Criteria Form

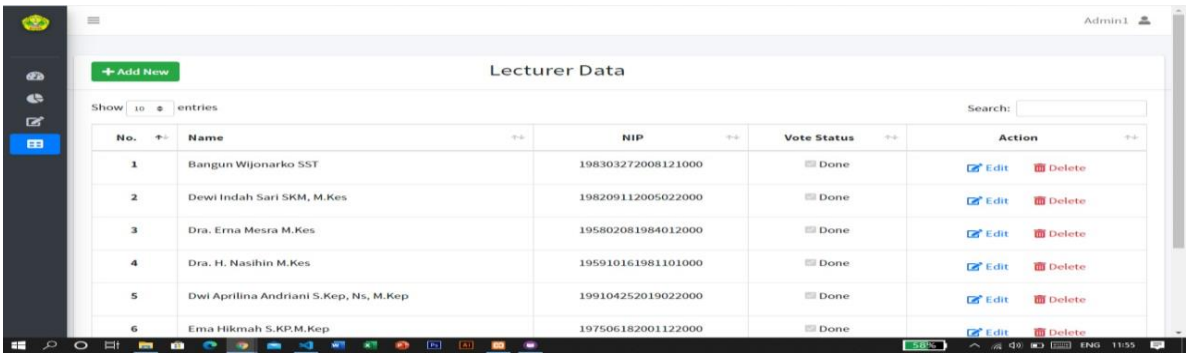

Figure 4. Alternative Form

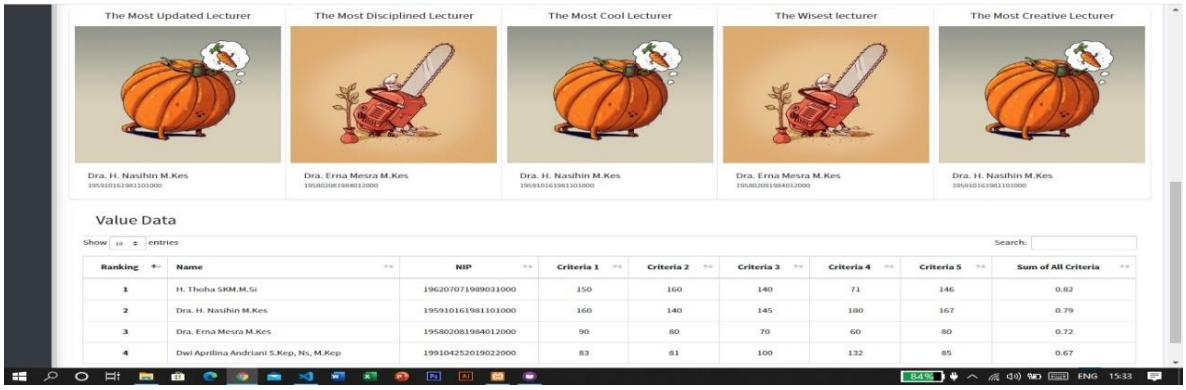

Figure 5. Alternative Criteria Value Report Form

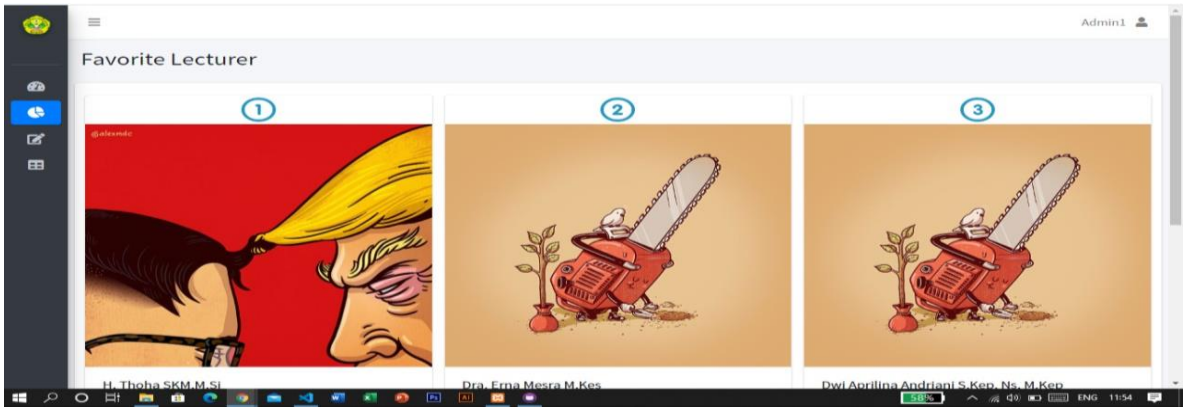

Figure 6. Ranking Form

3.1.5. Evaluation

Functional and structural testing is a testing phase that aims to find out whether part of the system process is running in accordance with their respective functions. The results of the implementation of this application can be developed using the AHP method, Three and other methods, so that it can be used as the main foundation to support the decision to choose a favourite lecturer.

Table 2. Functional and Structural Trials

No	Page	Description of Requirement	Functional	Information	Structural Test Results
1.	Login	User Verification	System security	Function	Corresponding
2.	Home	Main course	As a menu page	Function	Corresponding
3.	Score	Lecturer grades entry	Look for it	Function	Corresponding
4.	Criteria	Criteria data processing	Add, search, edit, delete	function	Corresponding
5.	Alternative	Alternative data processing	Add, search, edit, delete	function	Corresponding
6.	Rank	Process and display the value results	Process values by method, displaying calculation and analysis results	function	Corresponding
7.	Report	Showing report	Showing final grade results	function	Corresponding
8.	Logout	Exit the system	Exit the menu	function	Corresponding

Based on the results of these tests, it can be concluded that the application of decision support systems for teaching and learning process evaluation is focused on decision support systems with the design of Multi Attribute Decision Making and Simple Additive Weighting, and development methods that use prototyping, Unified Modelling Language and PHP MySQL. However, the need for further system development to get maximum results. The

results of this research can be one of the system evaluation which is development for education institution likes the others evaluation system [17].

4. CONCLUSION

Activities that have been carried out during the design up to the implementation and testing of decision support systems in the teaching and learning process evaluation in achieving favourite lecturers with the acquisition of this best value. The application of the Simple Additive Weighting method, is one of the supporting methods in the decision support system in evaluating the teaching and learning process of lecturers, because where the results of the decision make lecturers the highest grades are favourite lecturers.

In designing decision support systems for teaching and learning process evaluation using the Simple Additive Weighting method, using Unified Modelling Language and PHP MySQL programming. For how do ranking alternative obtained from an assessment of the lecturers weight calculation using the Simple Additive Weighting which is the sum of weighted (interview head of department) that is focused on decision support system design Multi Attribute Decision Making and Simple Additive Weighting, and with the development method used in the design of this system, using prototyping. In this study as a reference and reference in the conduct integration with other information systems in the Polytechnic of Nursing Department of the Ministry of Health Banten Tangerang, so it will be easier for users.

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