Measuring the level of student satisfaction in the open final exam system using correlation analysis

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Abstract. The management of student final assignments must change along with the outbreak of the covid19 virus and causing the pandemic so that online-based learning is implemented. This research was carried out to produce software using MVC Framework for managing student final assignments, starting from proposal seminars, and guidance and up to the awareness exam. By looking at the application of the open journal system, the software for managing this final project is made to resemble that software. The results of using this application are measured and analyzed using correlation analysis. The results of the correlation test for the validity of the data show that the value of $r_{count} > r_{table}$ and the value of sig.(2-tailed) <0>. The results of the reliability test correlation showed that the Cronbach's Alpha value was > 0.7 so the questionnaire data was declared RELIABLE or consistent. The correlation between OFES and its users has proven to be very good with the average value of user satisfaction is 94%, this can be seen in the improvement in the quality of service to its users.

Keywords: student satisfaction, OFES, correlation analysis.

1 Introduction

Universities, both private and state, always apply standard student admission standards so that the outcomes of students who have completed their studies are also well controlled. The process of admitting new students uses machine learning [1]. The selection mechanism can also take advantage of online or paperless exams with the result that the time spent on online tests is faster[2]. Online-based exams that are built can also apply a method, including machine learning[3], to predict exam results, web application-based online exams are also applied to learning Java programming[4]. In Ghana, the basic education process involving students, teachers, and schools is managed managerially by utilizing an intelligent system[5]. At Malang State University, the educational process during Covid19 was studied, because, during that time, the education process in Indonesia was carried out online which included midterms, assignments, and final exams[6]. The success rate in learning with benchmarks for midterms, assignments, and final exams can be predicted, the prediction system utilizes

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data[7] from the last semester to predict the current semester. The impact of Covid-19 on education was examined using decision tree algorithms[8] and the Naïve Bayes method[9] so that it can be used to improve the quality of education and its implementation.
The use and integration of modern technology in education will benefit teaching, learning, and research. As a result, technology has the potential to change the way learning takes place and make it more accessible to a wider audience. It will also give students more freedom by allowing them to access education anytime, anywhere [10].

The difference between the system developed and common LMS is that this system has different business processes and is adapted to campus needs. Personal system development makes this system smaller, lighter and does not require additional libraries that can burden the system in general. Moodle is one example of an LMS that is commonly used in an educational environment. The empty Moodle app is 81MB in size, while the empty OFES app is 29MB in size. Moodle opens in 1.33 s while this application opens in 721 ms.

This research is related to the field of higher education at the Adisutjipto Yogyakarta Dirgantara Institute of Technology to manage student final assignments and final exams online using a web-based application. The design of this application was inspired by an open-based application for journal management known as the open journal system (OJS). The use of OJS for the governance of this journal has contributed to the USA having a significant influence on the progress of Open Access to Scientific Publishing [11]. The amount of data in the form of articles in OJS, which number in the thousands, makes users take a long time to select articles that are appropriate to their fields, so content-based filtering is needed[12]. The increasing number of articles submitted and published on an OJS continues to increase and be improved so that open-based scientific developments can be accessed by anyone and from anywhere, one way to improve is with gamification techniques[13].

From 2019 to 2021, a pandemic occurred due to the spread of the coronavirus which caused restrictions and isolation at the state to provincial level. This has an impact on the world of education as well, one of the impacts felt is the hindrance in the final assignment guidance process between the supervising lecturer and the students he is guiding. Several universities have anticipated this by building an information system for the management of final project guidance[14], [15]. In addition to online guidance, the final assignment exam is also prepared to be carried out online and the data is properly recorded[16]–[18]. The difference between previous research related to final assignment governance and final assignment exams in previous studies and our research lies in the use of correlation analysis which we have also used to measure performance in the Yogyakarta city government[19].

Correlation analysis was used because the main purpose of this study was to confirm and investigate the validity and reliability of the tool's structural variable after undergoing sentence modification and the use of the Likert scale. This research is focused

on developing a final assignment management system that is in accordance with campus business processes. This system also facilitates the academic community in managing student final assignments.

2 Research Method

This study uses tests to improve the quality of guidance in the process of completing the final project. By using quantitative data obtained from a direct survey of final-year students who are completing their final assignment. The data obtained is comparative data from systematic manual final assignment guidance and using an automatic system. Then the data will be analyzed using correlation analysis so as to produce a value that will later be used to find out how much improvement is in the final assignment guidance process using the system that has been built. By using this correlation analysis method, it will be known whether there is a relationship between manual guidance and automatically using the system. The data that has become the result will be described as there is a purpose to making conclusions in this study (see Fig. 1) .

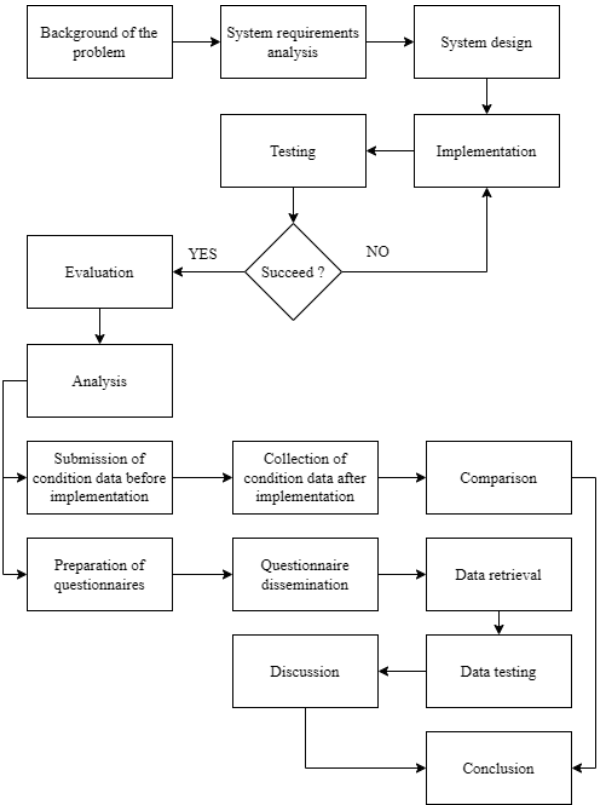

Fig. 1. Figure Research Flowchart

The subject of this research is the final assignment guidance system, namely the Open Final Exam System (OFES) at the Adisutjipto Aerospace Technology Institute. While the object of this research is final-year students who are carrying out the final assignment guidance process with a supervisor. This study uses a variable that will test OFES on improving the performance of final-year student guidance. Each variable has indicators which are then made into several questions which can be seen in Table 1.

Table 1. Question list table

Variable	Question	Code
Improving the quality of services for information dissemination	Can be accessed anywhere and anytime	Q1
	There is a discussion room that makes it easy to communicate between lecturers and students	Q2
	Provision of up-to-date information	Q3
	The results of dissemination can be easily documented offline	Q4
	The data has been presented based on its classification	Q5
User satisfaction	I like the look of this website	Q6
	Not slow, even when opened using a device	Q7
	I find it easy to understand how to operate the website	Q8
	I get fast responses in interaction	Q9
	Trustworthy content	Q10

The data collection technique in this study was to use a questionnaire instrument, namely a data collection technique using a questionnaire. The questionnaire contains questions to respondents which are made in the form of a closed questionnaire where alternative answers, so the respondent only needs to choose one of the answer options that have been provided. The questionnaire was distributed to respondents using Google Forms. And the results can be seen directly from the features available from the Google form.

This research instrument uses an ordinal scale so that answers can be directly measured and analyzed. The answer categories have levels but the distance between categories cannot be considered the same. The measurement scale in this study refers to the Likert Scale where each answer is given a weight with the following details:

1. Answers Strongly Agree (SS) are scored
2. Answer Agree (S) is given a score
3. Disagree Answers (TS) are scored
4. Strongly Disagree (STS) answers are scored

3 Result and Discussion

The results of the OFES software design (see Fig. 2) require the user to enter a username and password to enter the main menu. If the username and password are incorrect, you cannot continue access to the next page.

Fig. 2. Login Menu

OFES software is tested directly and indirectly. Directly by providing outreach to students, lecturers, and officials on how to use OFES. Indirect testing is used to find quantitative data to do a correlation analysis of the data. Quantitative data is obtained by changing the qualitative data from a questionnaire distributed using a Likert scale.
A questionnaire consisting of 10 questions. The 10 questions consist of 5 (five) questions for variable X (Improvement of Service Quality for Dissemination) and 5 (five) questions for variable Y (User Satisfaction). Questionnaire data was collected through Google Forms which were distributed via the OFES application to the respondents. Based on the results of the questionnaire data obtained, the data collected amounted to 54 data. After 54 data were collected from the respondents, several tests were carried out including data quality tests which consisted of validity tests, reliability tests, and a Likert scale.
Validity testing in this study was carried out statistically using the Pearson Product Moment technique with SPSS. The validity test connects each question score with each total score obtained. The following is in Table 2.

Table 2. The output of Pearson's Product Moment Validity Test

		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	∑
Q1	Pearson Correlation	1	,463**	,633**	,430**	,551**	,550**	,501**	,451**	,488**	,448**	,723**
	Sig. (2-tailed)		,000	,000	,001	,000	,000	,000	,001	,000	,001	,000
	N	54	54	54	54	54	54	54	54	54	54	54
Q2	Pearson Correlation	,463**	1	,584**	,532**	,646**	,678**	,563**	,550**	,619**	,547**	,799**
	Sig. (2-tailed)	,000		,000	,000	,000	,000	,000	,000	,000	,000	,000
	N	54	54	54	54	54	54	54	54	54	54	54
Q3	Pearson Correlation	,633**	,584**	1	,578**	,634**	,577**	,347*	,503**	,571**	,546**	,776**
	Sig. (2-tailed)	,000	,000		,000	,000	,000	,010	,000	,000	,000	,000
	N	54	54	54	54	54	54	54	54	54	54	54
Q4	Pearson Correlation	,430**	,532**	,578**	1	,534**	,378**	,665**	,640**	,563**	,597**	,757**
	Sig. (2-tailed)	,001	,000	,000		,000	,005	,000	,000	,000	,000	,000
	N	54	54	54	54	54	54	54	54	54	54	54
Q5	Pearson Correlation	,551**	,646**	,634**	,534**	1	,634**	,510**	,556**	,548**	,679**	,808**
	Sig. (2-tailed)	,000	,000	,000	,000		,000	,000	,000	,000	,000	,000
	N	54	54	54	54	54	54	54	54	54	54	54
Q6	Pearson Correlation	,550**	,678**	,577**	,378**	,634**	1	,505**	,459**	,528**	,546**	,757**
	Sig. (2-tailed)	,000	,000	,000	,005	,000		,000	,000	,000	,000	,000

	N	54	54	54	54	54	54	54	54	54	54	54
Q7	Pearson Correlation	,501**	,563**	,347*	,665**	,510**	,505**	1	,677**	,500**	,493**	,739**
	Sig. (2-tailed)	,000	,000	,010	,000	,000	,000		,000	,000	,000	,000
	N	54	54	54	54	54	54	54	54	54	54	54
Q8	Pearson Correlation	,451**	,550**	,503**	,640**	,556**	,459**	,677**	1	,766**	,577**	,801**
	Sig. (2-tailed)	,001	,000	,000	,000	,000	,000	,000		,000	,000	,000
	N	54	54	54	54	54	54	54	54	54	54	54
Q9	Pearson Correlation	,488**	,619**	,571**	,563**	,548**	,528**	,500**	,766**	1	,641**	,810**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000		,000	,000
	N	54	54	54	54	54	54	54	54	54	54	54
Q10	Pearson Correlation	,448**	,547**	,546**	,597**	,679**	,546**	,493**	,577**	,641**	1	,771**
	Sig. (2-tailed)	,001	,000	,000	,000	,000	,000	,000	,000	,000		,000
	N	54	54	54	54	54	54	54	54	54	54	54
∑	Pearson Correlation	,723**	,799**	,776**	,757**	,808**	,757**	,739**	,801**	,810**	,771**	1
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	,000	,000	,000	
	N	54	54	54	54	54	54	54	54	54	54	54

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The N value indicates the amount of data that is counted, namely 54 data. The two asterisks in the amount column indicate that the significant value used is 5%. Based on the N and significant values, the r_{table} value is 0.2221. These numbers can be searched using the r_{table} value distribution.

The Pearson Product Moment correlation coefficient in the table above shows r_{count}. The basis for making a decision on the validity test uses r_{count} and sig.(2-tailed) values, as follows:
1. If $r_{count} > r_{table}$, then the data is said to be VALID.
2. If $r_{count} < r_{table}$, then the data is said to be INVALID.
3. If sig.(2-tailed) < 0.05, then the data is said to be VALID.
4. If sig.(2-tailed) > 0.05, then the data is said to be INVALID.

The following in Table 3 is an analysis of the results of the Pearson Product Moment validity testing data. Table 3 is a table showing the results of the validity test of each question submitted to 54 respondents with the number that has been obtained. Q1 to Q5 are questions that consist of variable X (Improvement of Service Quality for OFES Information Dissemination). Whereas Q6 to Q10 are questions for the variable Y (User Satisfaction). Based on Table 3 above, the $r_{count} > r_{table}$ and the sig.(2-tailed) value <0.05, it can be concluded that there is a relationship between each question and the number. Thus, it can be interpreted that the question items or questions on the questionnaire are VALID.

Table 3. Analysis of validity test results

No	Correlation	r_{count}	r_{table}	Sig.(2-tailed)	Hasil
1	Q1	0,7232	0,222	0,000	VALID
2	Q2	0,7985	0,222	0,000	VALID
3	Q3	0,7755	0,222	0,000	VALID
4	Q4	0,7570	0,222	0,000	VALID
5	Q5	0,8084	0,222	0,000	VALID
6	Q6	0,7571	0,222	0,000	VALID
7	Q7	0,7385	0,222	0,000	VALID
8	Q8	0,8014	0,222	0,000	VALID
9	Q9	0,8101	0,222	0,000	VALID
10	Q10	0,7707	0,222	0,000	VALID

Reliability testing in this study was carried out statistically using the Alpha Cronbach technique using the SPSS application. This test was conducted to determine the extent to which the results of this study remained the same when measurements were made

several times. The reliability test was carried out simultaneously on all the question items in the questionnaire. The basis for decision-making can be seen from the value of Cronbach's Alpha as follows:
1. If Cronbach's Alpha > 0.7, then the data can be said to be RELIABLE.
2. If Cronbach's Alpha < 0.7, then the data can be said to be NOT RELIABLE.

Table 4 is the first output of the reliability test. The table is a Case Processing Summary, which provides information about the number of samples or the number of respondents which is denoted by N, namely 54 respondents. The amount of valid data in the table is 100%, which means that there is no blank data or all respondents answered all questions. Table 5 is the second output of the reliability test results using SPSS. Table 6 is the Reliability Statistics, where the N of items shows the information on the number of questions in the questionnaire, namely 10 items. Cronbach's Alpha shows a reliability coefficient value of 0.924. Based on Cronbach's Alpha value, which is 0.924 > 0.7, it means that this questionnaire is RELIABLE or consistent.

Table 4. Case Processing Summary Reliability Test

		N	%
Cases	Valid	54	100
	Excluded	0	0
	Total	54	100

Table 5. Reliability Statistic

Cronbach's Alpha	N of Items
0,924	10

Table 6 is the third output of the reliability test results using SPSS. The table above provides information on Cronbach's Alpha values for each of the question items in the questionnaire. The Cronbach's Alpha value can be seen in the Cronbach's Alpha if the Item Deleted column in the table above. Based on the results obtained, it is known that Cronbach's Alpha value is > 0.7, so it can be concluded that all questionnaire questions are RELIABLE or consistent.

Table 6. Reliability Test Items-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach's Alpha Item Deleted
Q1	38,26	18,950	,640	,921
Q2	38,52	18,971	,743	,914
Q3	38,44	19,119	,715	,916
Q4	38,46	19,461	,696	,917
Q5	38,43	19,079	,757	,913
Q6	38,44	19,233	,692	,917

Q7	38,46	19,763	,678	,918
Q8	38,46	18,631	,741	,914
Q9	38,70	18,477	,751	,914
Q10	38,48	20,103	,725	,917

In obtaining data to determine service quality improvement for information dissemination, the authors used the self-report method or interviews with several study program parties, namely the heads of industrial engineering, electrical engineering, and informatics engineering study programs to find out how students and lecturers process their final project guidance.

In the interview process conducted with the head of the industrial engineering study program, electrical engineering, and informatics engineering, several questions were asked, including:

1. What are the stages of students in submitting a final project proposal?
2. How does each study program determine the final assignment supervisor?
3. What are the stages or processes of final assignment guidance carried out by students and lecturers?
4. What are the stages for students in submitting their final project getting the minutes related to the presentation schedule and listening to the results of graduation?
5. How does each study program record student data in completing the final project?

Based on the results of the interviews conducted, there are several answers as follows:

1. In submitting a final project proposal to an industrial study program, students will choose a theme that matches the title they submitted from the 14 themes provided by the study program. Then students will collect the files needed in submitting a final project proposal. While the stages of submitting a final assignment proposal in the electronics study program, students can apply for a final project proposal submission by attaching the required files and will be scheduled for every week on Friday at 13.00, but not always the schedule set on that day because it is adjusted to busyness than the product itself. Then in informatics engineering, students in submitting a final project proposal by accessing the submission link that has been provided by the study program and then inputting the requested files on the link, and will get a proposal seminar schedule via student email.
2. In industrial engineering, students will get supervisors 1 and 2 and their examiner lecturers after they submit a final project proposal. For electrical engineering itself, after students submit their final assignment proposals, students will get whom their supervisor is via email sent from the study program. Whereas in informatics engineering, students are allowed to choose supervisor 1 according to the concentration the student is interested in. In the process of selecting Supervisor 1, students can inquire about the quota for supervisors in the study program. After they get Supervisor 1 and submit proposals and conduct seminars, students will get Supervisor 2 after the results of the meeting held by the lecturers.

3. In industrial engineering, the guidance process was carried out during Covid 2 years ago, namely via email or WhatsApp. Whereas when offline, the mentoring process is carried out face to face while revising the final report section through scribbles on the report. Whereas in electrical engineering the guidance process is carried out between lecturers and students, which depends on the students and lecturers how to schedule in carrying out final assignment guidance. Likewise, with informatics techniques, the guidance process carried out between lecturers and students is different, there are guidance processes that are carried out online or offline depending on the situation when you want to do guidance. But for the offline guidance process for Supervisor 2, students must ask for a certificate in the study program to be given to Supervisor 2 when they want to do guidance.
4. In industrial engineering, the stage in submitting registration is by submitting it to the study program, then attaching the required files and then the students will be notified of the registration schedule. When students have made a roundup and will listen to the results of graduation, the examiner will give an assessment on the assessment letter, and student graduation results can be obtained with 3 choices, namely not passing, passing, or graduating with improvement. Whereas in electrical engineering, students will make submissions to the study program by filling in all the required files. After the submission is made, the study program will first check the submitted files. If the files comply with the requirements, the study program will make a registration schedule for the student. But if the submission files are not appropriate, the study program will notify the student via student contact. In the electrical engineering students' awareness test, there are two awareness assessments, namely pre-awareness, and awareness. The pre-awareness is an assessment carried out by the supervisor while the awareness-raising is carried out by the examiner. The graduation results are obtained immediately when students have finished conducting the awareness session. The graduation results consist of several choices, if students do not meet the graduation results they will be offered whether to repeat the trial or receive a graduation result with sufficient grades. And for informatics engineering, the process of submitting a trial is carried out by inputting the files on the link provided by the study program, then the study program will send a schedule of hearings via email. Prior to conducting the awareness meeting, students are required to submit 3 copies of their thesis files to the study program, a maximum of H-1 compared to the awareness meeting schedule. In informatics engineering graduation results are also given 3 options, namely not passing, passing, and graduating with improvement.
5. All student data from industrial engineering, electrical engineering, and informatics to find out how long it took students to complete their final project, all of which can be seen from the student graduation decree recap data in Excel.

So based on the results of the interviews described, a comparison table was made between before and after the service quality improvement was carried out which can be seen in Table 7.

Table 7. Comparison before and after

Before	After
Submission of the final project proposal is done offline.	Submission of final project proposals online using the OFES application.
Supervisors are obtained when submitting final project proposals and one can choose 1 supervisor lecturer	In the OFES application, getting a supervisor is the same as doing it offline, it's just that the supervisor in the OFES application is inputted by each study program admin to students who have submitted final project proposals.
Guidance for final project reports is done offline by bringing printed final project reports or done online via Whats Up or e-mail or other media, where lecturers often experience difficulty in finding guidance files sent by students.	With the OFES application, task report guidance can be structured and well-directed so that lecturers have no difficulties in checking student guidance files, and students can also notify supervisors that they have sent guidance files and save money on printing the final project report.
Submission of registration is done offline and graduation results are still being carried out using assessment paper	With the OFES application, students can submit assignments online, and pass results can be inputted by the examiner who can input whether the student has revisions or not.
Looking at the recap data of each student's graduation decree in Microsoft Excel.	There is no feature to view student summary data that have completed their final project.

The success of improving information dissemination services in the OFES application can be measured based on user satisfaction through scientific research conducted by the author. Based on the results of the correlation test for the validity of the data, it shows that the $r_{count} > r_{table}$ and the sig.(2-tailed) value <0.05, the data is declared VALID. Whereas the results of the correlation test for reliability show that Cronbach's Alpha value is > 0.7, so the data is stated to be RELIABLE or consistent. Then it was tested again by conducting a Likert scale test to measure the attitudes and opinions of users of the OFES application. Based on the results of the Likert scale, the results show that all respondents AGREE with the features available in the OFES application. So it can be concluded that there is a relationship between improving service quality for information dissemination in OFES applications and user satisfaction. This means that users are satisfied with OFES application services.

4 Conclusion

Academic services for students for final assignments can be transferred from offline or face-to-face to online without reducing quality. The process of completing the final project carried out by students can be monitored not only by the supervising lecturer but by officials related to the completion of the student's final project. The results of the correlation test for the validity of the data show that the value of $r_{count} > r_{table}$ and the value of sig.(2-tailed) <0>. The results of the reliability test correlation showed that the Cronbach's Alpha value was > 0.7 so the questionnaire data was declared RELIABLE or consistent. The correlation between OFES and its users has proven to be very good, this can be seen in the improvement in the quality of service to its users. The average value of user satisfaction is 94% of 54 respondents.

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