Digitizing the School Administration Management System at SMAN 12 Bandung and its Evaluation with the System Usability Scale

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Article Info	ABSTRACT
	Education administration is one of the vital information in learning activities. Education administration can increase the productivity of teachers and will make learning activities more focused and structured. Digitalization of education administration will help teachers manage education administration, especially planning for learning. Moreover, this application will help teachers assign students scores based on their attitudes. This system will use Laravel as a base along with a spiral model for the SDLC, and use the System of Usability Scale For Evaluation (SUS). This application is Considered easy to use because it gets the 'acceptance' grade based on acceptance, a "C" grade on the class scale, a "good" grade on the adjective rating, and a "B" grade on the percent rank. This application only needs slight requirements for adjustments, socialization, and training for teachers to be accustomed to the system.

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1. INTRODUCTION

The word administration comes from Latin which consists of two words, namely the word *ad* and *ministrrte*. The word *ad* means "to" and *minister* means "to serve" and "to help". Besides that, administration can mean "regulating" or "maintaining" [1].

The administration is important in education because the administration not only records the value and the financial part but also runs organizational processes efficiently and effectively as planned [2]. The purpose of education administration, in general, is that all activities support the achievement of educational goals [3].

The purpose of education has been regulated and explained in UU No.20 Tahun 2003 concerning the national education system. This constitution contains all matters relating to the implementation of education in Indonesia.

In addition, according to Hendra and Afriansyah [4] in their journal, educational administration aims to facilitate administrative work in the field of education; create a work climate that fosters honesty, trust, and sincerity in work; increase morale and enthusiasm among the individuals in it; make changes in the educational process that encourage students to grow as a whole; linking the educational process and development goals in society. Therefore, it can be concluded that with the implementation of good education administration, the learning process will become more focused and more structured.

Based on the results from an interview with a school supervisor in Bandung City who is also a former physics teacher at SMAN 12 Bandung, it's known that it is difficult for teachers to ask for data on learning/educational administration. When they asked about education administration, teachers always argued that their data was still on their laptops and had not been printed, or had not been worked, because the administration of education has become a burden for teachers.

This research is to create an educational information system that can digitize teacher learning administration data. Apart from that, this system hoped would help teachers assess the value of attitudes and lead to a lack of data on student attitudes. The author expects the system information to have high usability, so it's easy to use by teachers at SMAN 12 Bandung. Therefore, the author will be using the System Usability

Scale (SUS) method for the evaluation. The author uses the SUS method instead of the Heuristic Evaluation because the author can use the SUS method even though the amount of data received is small. In addition, it is more effective because it can clearly distinguish when the teacher can use existing applications properly [5].

2. RESEARCH METHOD

The research method for this application is to use the Research and Development method. Research and development methods are research methods used to produce products and test the effectiveness of these products [6]. In this study, the resulting product is an information system for education administration for SMAN 12 Bandung.

The development of this application uses the Spiral Model. The spiral model is a Software Development Life Circle (SDLC). The spiral model is a software development process that combines designs and prototypes in stages, so software developed has less risk because all applications have several iterations/development stages [7].

The following is a brief description of the steps used in the spiral model in each iteration:

1. Planning. This phase contains the system requirements required by users and system analysts

2. Risk analysis. This phase is to minimize the risks that arise during application development. The result from this prototype is a prototype of the application.

3. Development. The application development phase of the prototype from the previous period.

4. Evaluation Phase. In this phase, the author will evaluate the application to determine whether to continue to the next iteration.
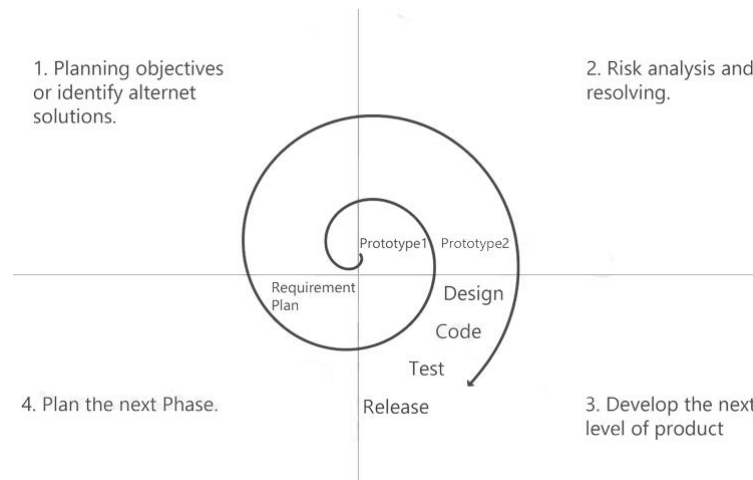

Figure 1. Spiral Model

This application uses the MVC format as its base. MVC stands for Model, View, and Controller. Each component of MVC has its task and function in application development. MVC is an architecture used by the website industry to develop web applications that are easy to make.

MVC consists of three components, namely Model, View, and Controller.

A. Model, Model components relate to user-owned data stored in the database.

B. view, view component relates to the view viewed by the user.

C. Controller, controller component functions as a liaison system between the model and the view. The controller is where the logic is Processed and the data passed to view component

To test this application, the author will use a black box system. The black box testing system is one of the techniques for software testing whose purpose is to determine the usability or functionality of an application [8].

The reason for using a black box system compared to a white box is that the black box system does not require knowledge of coding and is more focused on the functional requirements of the application.

The evaluation will focus on the usability of the application because the target users are teachers at SMAN 12 Bandung some of them are not proficient in using computers. Therefore, the author will use the SUS evaluation to prioritize usability and the application many people in various circles can use. The instrument is from the instrument created by Sharfina [9] as described in Table 1.

Table 1. Instrument

No	Question	Option (Choose One)				
		Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	I think that I would like to use this system.					
2	I found the system unnecessarily complex					
3	I thought the system was easy to use					
4	I think that I would need the support of a technical person to be able to use this system.					
5	I found the various functions in the system were well integrated.					
6	I thought there was too much inconsistency in this system.					
7	I would imagine that most people would learn to use this system very quickly.					
8	I found the system very cumbersome to use.					
9	I felt very confident using the system					
10	I needed to learn a lot of things before I could get going with this system.					

After the data is collected from the results of the evaluation conducted by the teachers of SMAN 12 Bandung with predetermined instruments, calculate the data in the following way:

1. For odd question
$$value_1 = Score\ Option - 1$$
2. For even question
$$value_2 = 5 - Score\ Option$$

After we get both values, they will enter into the following formula:

$$value_{total} = (value_1 + value_2) * 2.5$$
$$value_{final} = \frac{value_{total}}{total\ respondents}$$

To determine the grade of the SUS assessment result, we can use two methods. The first way is to see from the acceptability, grade scale, and adjective rating. Assessment is using the image below [10].
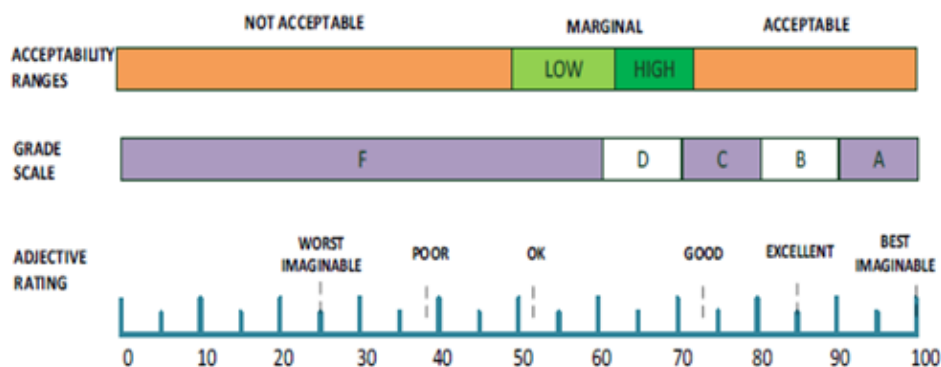
Figure 2. Assessment Grade

As for the second method, it is seen from percentile rank has an A to F rating described in table 3.3 below.

Table 2. Percentile Rank

Value total	Letter Grade	Scoring
Higher than 80.3	A	Very Good
Between 68 and 80.3	B	Good
68	C	Moderate
Between 51 and 67	D	Poor
Lower Than 51	F	Awful

An application is good when the total score obtained is more than or equal to 68, then a revision is required when the score is below 68.

3. RESULT AND ANALYSIS

This research consists of 2 iterations of the Spiral Model, wherein each iteration has a design, risk analysis, development, and trial & evaluation. The evaluation will use the SUS evaluation and be carried out in the second iteration, while the test will use the Black Box technique.

3.1. RESULT

3.1.1 First iteration

The first iteration of this application discusses the student's daily incident journal that will affect the student's attitude score.
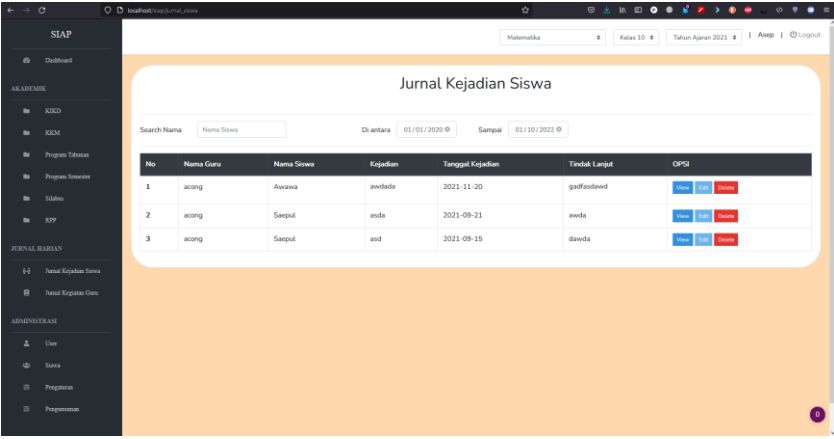
3.1.1.1 Planning
    a.   Admin Functional Requirements
- Can manage student incident journal
- Can view student incident journal
- Can manage teacher activity journal
- Can see the teacher's activity journal

    b.   Teacher Functional Requirements
- Can add to the student incident journal
- Can manage student incident journal
- Can view student incident journal
- Can add to the teacher's activity journal
- Can manage teacher activity journal
- Can see the teacher's activity journal

    c.   Headmaster Functional Requirements
- Can view student incident journal
- Can see the teacher's activity journal

3.1.1.2 Risk Analysis
The second stage contains several risks that may occur during application development. In the first iteration, the author worried that the teacher got a problem adding activity journals.
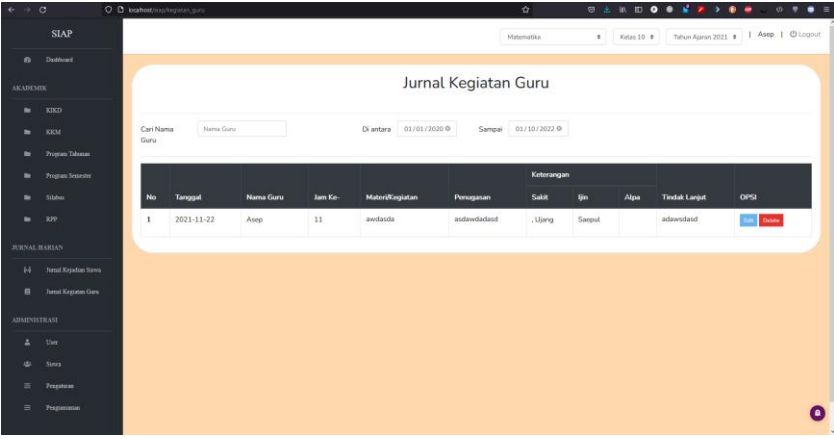
3.1.1.3 Development
The third stage is the application development period in the first iteration. Contains Activity Diagram, Use Case Diagram, ERD, and final view. Here is some views from the system in the first iteration :

Figure 3. View Of "*Jurnal Kejadian Siswa*"

Figure 4. View Of "*Jurnal Kegiatan Guru*"

3.1.1.4 Evaluation Phase

At this phase, the application will get some trial and evaluation. This trial uses a black box technique to determine whether it can continue or not.

The test results in the first iteration are as follows :

Table 3. Test Results in First Iteration

No	Menu	Input	Expected Results	Result	Checkmark
1	Add student events	Student's name, date of occurrence, the event, follow up	If the data is correct, the data will go into the database. If there are blanks, then the data will not be inputted	The data go into the database, and if the data is empty, a warning will appear.	Match
2	Add teacher activity	Date, Class, Hour-, contents /activity, task, absent, follow up	If the data is correct, the data will go into the database. If there are blanks, then the data will not be inputted	The data go into the database, and if the data is empty, a warning will appear.	Match
3	Edit student events	date of occurrence, event, follow up	If the data is correct, the data will go into the database. If there are blanks, then the data will not be inputted	The data go into the database, and if the data is empty, a warning will appear.	Match
4	Edit teacher activity	Date, Class, Hour-, contents /activity, task, absent, follow up	If the data is correct, the data will go into the database. If there are blanks, then the data will not be inputted	The data go into the database, and if the data is empty, a warning will appear.	Match

3.1.2 Second iteration

The second iteration of this application focuses on learning tools such as lesson plans, syllabus, and others.

3.1.2.1 Planning

  a. Admin Functional Requirements
- Can add and remove 'KIKD'
- Can see all learning media for all subjects

  b. Teacher Functional Requirements
- Can change the content of learning media
- Can see learning devices according to the subjects

  c. Headmaster Functional Requirements
- Can see all of the learning devices

3.1.2.2 Risk Analysis

The second stage contains several risks that may occur during application development. Some of them are as follows:

1. Admin has difficulty adding KIKD
2. Teachers have difficulty changing learning tools

3.1.2.3 Development

The third stage is the application development period in the second iteration. Contains Activity Diagram, Use Case Diagram, ERD, and final view. Here is some view from the system in the second iteration :

Figure 5. View of KIKD

Figure 6. View of KKM

Figure 7. View of PROTA

3.1.2.4 Evaluation

In the second iteration, the test was carried out with Black Box testing was tested by the resource person, with the following results:

Table 4. Test Result in Second Iteration

No	Input	Expected Results	Result	Checkmark
1	Subject, Class, Semester, KI Pengetahuan, KD Pengetahuan, KI Keterampilan, KD Keterampilan	If the data is correct, the data will go into the database. If there are blanks, then the data will not be inputted	The data go into the database, and if the data is empty, a warning will appear.	Match
2	Intake, Daya Dukung, Kompleksitas	If the data is correct, the data will go into the database. If there are blanks, then the data will not be inputted	The data go into the database, and if the data is empty, a warning will appear.	Match
3	Content, Time	If the data is correct, the data will go into the database. If there are blanks, then the data will not be inputted	The data go into the database, and if the data is empty, a warning will appear.	Match
4	Activity name, Month, Week	If the data is correct, the data will go into the database. If there are blanks, then the data will not be inputted	The data go into the database, and if the data is empty, a warning will appear.	Match
5	Activity, Scoring, Source	If the data is correct, the data will go into the database. If there are blanks, then the data will not be inputted	The data go into the database, and if the data is empty, a warning will appear.	Match
6	Purpose	If the data is correct, the data will go into the database. If there are blanks, then the data will not be inputted	The data go into the database, and if the data is empty, a warning will appear.	Match

The evaluation uses the System Usability Scale (SUS) method by giving a questionnaire to the teachers while explaining how to use the application and try the application directly.

Below are answers to the results of giving questionnaires to teachers at SMAN 12 Bandung regarding the applications made.

Table 5. Questionnaires Result

No	Respondent	1	2	3	4	5	6	7	8	9	10
1	Respondent 1	5	1	5	1	5	1	5	1	5	5
2	Respondent 2	4	2	4	3	4	2	4	2	4	5
3	Respondent 3	5	1	5	1	5	1	5	1	5	1
4	Respondent 4	4	3	3	4	3	2	3	1	3	5
5	Respondent 5	4	2	4	3	4	2	4	2	3	5
6	Respondent 6	5	4	5	2	4	2	4	2	4	4
7	Respondent 7	3	3	4	2	4	2	3	2	4	4
8	Respondent 8	5	1	5	4	5	1	5	1	5	5
9	Respondent 9	5	1	5	4	4	2	5	1	4	4
10	Respondent 10	5	1	5	5	5	1	5	1	5	5
11	Respondent 11	5	1	5	5	5	1	5	1	5	5
12	Respondent 12	5	1	5	2	4	1	5	1	5	4
13	Respondent 13	5	1	4	2	4	2	4	2	3	3
14	Respondent 14	5	2	4	3	5	2	5	1	4	5
15	Respondent 15	5	4	4	4	4	2	5	2	4	5

Information :

Score 1: Respondents choose "Strongly Disagree".
Value 2: Respondents choose "Disagree".
Value 3: Respondents choose "Neutral".
Value 4: Respondents choose "Agree".
Value 5: Respondents choose "Strongly Agree".

Table 6. Scoring based on SUS Standard (Before times 2.5)

No	Responden	1	2	3	4	5	6	7	8	9	10	Total
1	Responden 1	4	4	4	4	3	4	4	3	4	0	34
2	Responden 2	3	3	3	2	3	3	3	3	3	0	26
3	Responden 3	4	4	4	4	4	4	4	4	4	4	40
4	Responden 4	3	2	2	1	2	3	2	4	2	0	21
5	Responden 5	3	3	3	2	3	3	3	3	2	0	25
6	Responden 6	4	1	4	3	3	3	3	3	3	1	28
7	Responden 7	2	2	3	3	3	3	2	3	3	1	25
8	Responden 8	4	4	4	1	4	4	4	4	4	0	33
9	Responden 9	4	4	4	1	3	3	4	4	3	1	31
10	Responden 10	4	4	4	0	4	4	4	4	4	0	32
11	Responden 11	4	4	4	0	4	4	4	4	4	0	32
12	Responden 12	4	4	4	3	3	4	4	4	4	1	35
13	Responden 13	4	4	3	3	3	3	3	3	2	2	30
14	Responden 14	4	3	3	2	4	3	4	4	3	0	30
15	Responden 15	4	1	3	1	3	3	4	3	3	0	25
	Total	55	47	52	30	49	51	52	53	48	10	447

For further calculations, look for the overall SUS score by finding the average of the total SUS scores. From 15 respondents, the total value is 1,117.5. Therefore, the calculation is as follows:

$$value_{final} = \frac{1.117,5}{15}$$

$$value_{final} = 74,5$$

Table 7. Scoring Based on SUS Standard (After times 2.5)

No	Responden	Total
1	Responden 1	85
2	Responden 2	65
3	Responden 3	100
4	Responden 4	52,5
5	Responden 5	62,5
6	Responden 6	70
7	Responden 7	62,5
8	Responden 8	82,5
9	Responden 9	77,5
10	Responden 10	80
11	Responden 11	80
12	Responden 12	87,5
13	Responden 13	75
14	Responden 14	75
15	Responden 15	62,5
	Nilai$_{total}$	1.117,5

3.2. ANALYSIS

Based on the results of the calculation of the SUS score of each respondent, the highest score obtained is 100, and the lowest score is 52.5, with the mode 62.5.
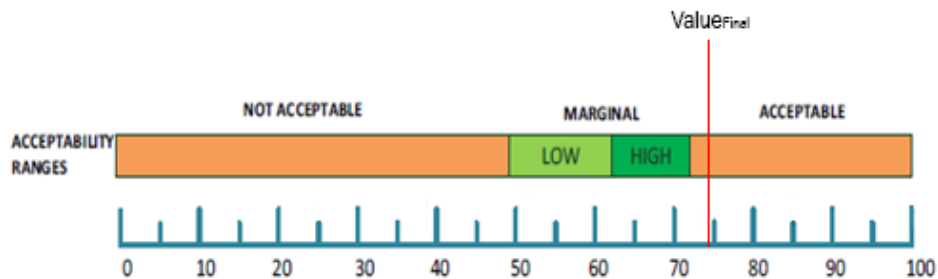
3.2.1 Acceptability

Figure 8. Acceptability Score

Based on Figure 8, the SUS assessment for acceptability is divided into 3, namely unacceptable and acceptable, while the values between 50 and 62 are the lower limit and 62 to 70 are the upper limit where the application is accepted, but it is still much to be done.

This application gets a score of 74.5 and belongs to the "Acceptable" rating. Therefore, this application is "acceptable".
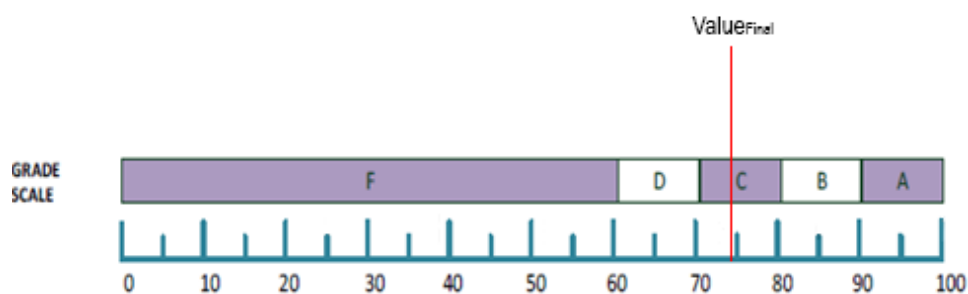
3.2.2 Grade Scale

Figure 9. Grade Scale

Based on Figure 9, the SUS assessment uses the Grade Scale divided into five levels, A to F, where A is the highest level, and F is the lowest level. This application gets a level C which is sufficient but not very good.
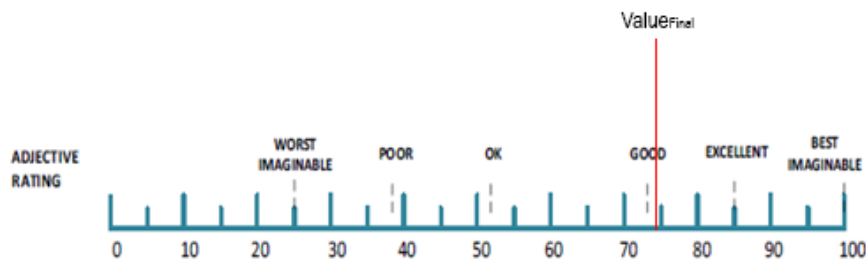
3.2.3   Adjective Rating

Figure 10. Adjective Rating

Adjective assessment is divided into six levels, lowest, worst imaginable, poor, ok, good, excellent, and best imaginable. Everything refers to the final value obtained.

In this application, obtaining a score of 74.5, this application is in the Excellent is sufficient.

3.2.3.4 Percentile Rank
Percentile rank assessment has several differences from the three methods previously described. This assessment uses an average SUS score, and the score for this application is 68. The rank is split into several sections, from A to F. percentile rank divides the grades based on the percentile of the average or overall SUS score.
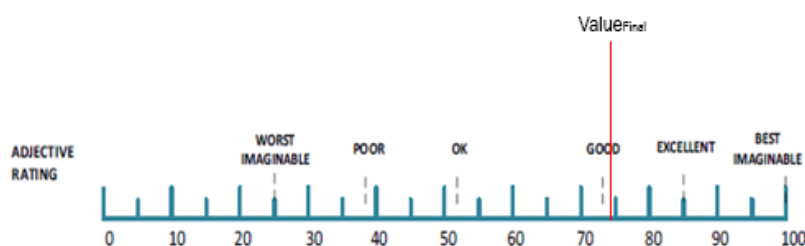

Figure 11. Percentile Rank

From Figure 11, we can see that the minimum limit for an application is considered sufficient is 68, where the percentile value of the overall SUS score is.
This application gets a score of 72.5, and it is in section B means Good. Therefore, this application is good when viewed from the percentile rank.

4.   CONCLUSION
This application is to help teachers to carry out assessments and carry out their obligations to make learning tools easier to use the concept of digitization. All of the data is integrated into one network and makes teachers not need to report regularly to the principal/deputy principal because the results of their work can be seen directly by school officials.

The teachers accepted the application. We can see from the results of the SUS assessment that prioritizing the usability of an application has satisfactory results. Based on the 'acceptability', it gets an "acceptable" value, then based on the grade scales is at level C, then based on the adjective rating get a rank of "Good" and the last one based on 'percentile rank' it gets a B rank.

REFERENCES

[1]   C. A. Tjeriawan, "Pentingnya Mempelajari Administrasi dan Supervisi Pendidikan." 2019, doi: https://doi.org/10.31219/osf.io/utdxh.

[2]   N. sari, "Pentingnya Administrasi Dan Supervisi Pendidikan." 2019, doi: 10.31227/osf.io/82urz.

[3]   Irsyad, "Kajian Administrasi Pendidikan Di Dunia Pendidikan," *J. Al-Irsyad*, vol. Vol VIII, no. 1, pp. 131–138, 2017.

[4]   R. M. Hendra and H. Afriansyah, "Pentingnya Administrasi Pendidikan di Sekolah," pp. 1–3, 2019, doi: 10.31227/osf.io/zg2sw.

[5]   U. Ependi, T. B. Kurniawan, and F. Panjaitan, "SYSTEM USABILITY SCALE VS HEURISTIC EVALUATION: A REVIEW," *J. Simetris*, vol. 10, 2019.

[6]   A. G. Eka and W. Wuryanta, "Digitalisasi Masyarakat: Menilik Kekuatan dan Kelemahan Dinamika Era Informasi Digital dan Masyarakat Informasi," *J. Ilmu Komun.*, pp. 131–142, 2013.

[7]   A. Alshamrani and A. Bahattab, "A Comparison Between Three SDLC Models Waterfall Model, Spiral Model, and Incremental/Iterative Model," *IJCSI Int. J. Comput. Sci. Issues*, vol. 12, no. 1, pp. 106–111, 2015, [Online]. Available: https://www.academia.edu/10793943/A_Comparison_Between_Three_SDLC_Models_Waterfall_Model_Spiral_Model_and_Incremental_Iterative_Model.

[8]   A. Verma, A. Khatana, and S. Chaudhary, "A Comparative Study of Black Box Testing and White Box Testing," *Int. J. Comput. Sci. Eng.*, vol. 5, no. 12, pp. 301–304, 2017, doi: 10.26438/ijcse/v5i12.301304.

[9]   Z. Sharfina and H. B. Santoso, "An Indonesian adaptation of the System Usability Scale (SUS)," *2016 Int. Conf. Adv. Comput. Sci. Inf. Syst. ICACSIS 2016*, pp. 145–148, 2016, doi: 10.1109/ICACSIS.2016.7872776.

[10]   Rasmila, "Evaluasi Website Dengan Menggunakan System Usability Scale (SUS) Pada Perguruan Tinggi Swasta di Palembang," *J. Sist. Inf.*, vol. 4, pp. 89–98, 2018.