



# The Effect of the Use of Collaborative Educational Supervision on Increasing Lecturer Performance in Online Learning

Ari Lestari

Informatics Management Study Program  
College of Management Informatics and Computer Logic, Indonesia

Email : AriLestari79a@yahoo.com

## ARTICLE INFO

## ABSTRACT

### Article history:

Received: Jan 19, 2022

Revised: Feb 01, 2022

Accepted: Feb 22, 2022

### Keywords:

Learning,  
Education,  
Supervision,  
Collaborative,  
Periodic,  
Strategy

Based on article 20 of the Law on Teachers and Lecturers, it is explained that in carrying out professional duties, there are several obligations that must be fulfilled, namely planning, implementing and assessing and evaluating learning, improving and developing qualifications and competencies, having objective actions, upholding the rules that have been outlined and maintaining and foster a sense of national unity and integrity. One of the indicators of success in improving the quality of education is that the learning process is not just about imparting knowledge, but is more focused on internalizing the development of cognitive, affective and psychomotor aspects as well as bathing. Then the collaborative education supervision is carried out periodically and gradually which will result in an improvement in learning which can be achieved by measuring the value obtained by students in one unit such as a semester or department. In general, the use of collaborative supervision has an influence on performance by looking for forms or methods or learning strategies that are in accordance with the majors taken by students.

Copyright © 2022 Jurnal Mantik.  
All rights reserved.

## 1. Introduction

At this time, the world of education is faced with a formidable challenge, namely the problem of the quality of education. This problem is important and urgent to be solved, because it involves the interests and expectations of society in general. Everyone wants reliable and decent quality education that can solve life's problems. The expectations of the community must be taken seriously by the parties involved in the implementation of education.

The feasibility of teaching is not enough to only be measured based on formal education but must also be measured based on the ability of lecturers in teaching and material mastery sessions, mastering, choosing and using methods, media and learning evaluation. Lecturers are required to manage the room, which is to provide conducive conditions in carrying out teaching and learning activities, a comfortable and safe environment, providing a sense of calm, so that students feel at home studying in the course tutors, and so on. In addition, as professional educators, lecturers are required to always be able to carry out their duties with dedication and high discipline. So that the implementation of learning can run as expected, and also the educational goals can be achieved. Lecturers are an important component to carry out learning well. For this reason, lecturers must have good performance.

The implementation of supervision is not only carried out by the appointed supervisor (quality assurance unit), but also must be carried out by the head of the study program as a leader in a study program who has the obligation to provide information or insight to lecturers about the rules and obligations that must be fulfilled by lecturers and carry out supervision. on their performance.

The head of the study program in carrying out direct coaching serves the teaching staff in this case is the lecturer to help lecturers develop their ability to achieve the planned teaching goals for students both increasing knowledge and teaching skills, providing input for lecturers who are having difficulties, increasing



commitment, ability and motivation. Because by increasing the ability and work motivation of lecturers, the quality of learning can increase.

In this study, the author tries to examine and explore supervision (Chairman of the Study Program) related to the performance of lecturers, caused by: (1). There is a tendency to weaken the performance of lecturers during the pandemic where based on observations, namely the occurrence of lecturers who provide material that is not in accordance with the learning design that has been given, lecturers do not study according to the time given, teaching lecturers do not have detailed material preparation only in the form of an outline without explanation, lecturers do not have student absenteeism, (2) the implementation of supervision carried out by the study program has not been carried out as well as possible by the lecturers, (3) the decrease in lecturer performance is one of the causes of the decline in the final grades obtained by students.

## 2. Method

This type of research is action research with descriptive analysis, which emphasizes the discussion of data and research subjects by presenting data systematically.

The data used in this study is primary data, namely data obtained from research conducted from the first source. The data was obtained directly from respondents who became the object of research by observation. There are several stages used, namely:

- a. Data collection stage  
At this stage, observations, interviews, document collection and literature methods will be used
- b. Information Needs Analysis  
Carry out data and process analysis activities
- c. Cycle Implementation (I and II)  
Collecting data on the results of activities carried out and their reflections
- d. Evaluation Method  
Planning for problem identification and analysis of interim process results
- e. Stage of Evaluation of the results of the process after testing

The data that has been collected was analyzed using qualitative and quantitative analysis. Qualitative analysis is used to explain changes in the behavior of lecturers in learning and behavior of researchers in carrying out supervision of lecturers. The quantitative analysis is used to determine the success of lecturers and students based on the competency standards that have been set as follows.

- Value 81 – 100 = very good (A) successful
- Value 76 – 80 = good (B) successful
- Value 55 – 75 = enough (C) not yet successful
- Value 0 – 54 = less (D) has not been successful

In addition to simple analysis, a paired sample t test (paired sample t test) is used, which is a test using a t distribution on the significance of the difference in certain mean values of two unrelated sample groups. As for the case of this study, the paired sample T-test was used differently. Paired sample T-test is a test conducted on two paired samples. Paired samples can be interpreted as samples with the same subject but experiencing two different treatments (Budi, 2006).

## 3. Result and Discussion

### 3.1 Implementation Result

The results of the first cycle can be seen in the following table

**TABLE 1.**  
RESULTS OF DETERMINATION OF CYCLE I. PLANNING

No.	Indicator	Number of Lecturers	Number of Successful Lecturers (Score > 75)	% Success
1	Describing Learning Objectives	8	6	75



No.	Indicator	Number of Lecturers	Number of Successful Lecturers (Score > 75)	% Success
2	Determine material according to competence	8	6	75
3	Organizing materials by order or groups	8	6	75
4	Allocate time	8	8	100
5	Determine the learning method	8	5	62.5
6	Designing learning procedures	8	5	62.5
7	Determining learning media	8	6	75
8	Determine appropriate learning resources (in the form of books, modules, computer programs and the like)	8	7	87.5
9	Determine the appropriate assessment technique	8	5	62.5
	Average Success			75.00

**TABLE 2**  
RESULTS OF IMPLEMENTING ACTION LEARNING CYCLE I

No	Indicator	Number of Lecturers	Number of Successful Lecturers (Score > 75)	% Success
1	Open the lesson with the right method	8	7	87.5
2	Presenting subject matter systematically	8	6	75
3	Applying predetermined learning methods and procedures	8	6	75
4	Organize student activities at the course tutor	8	7	87.5
5	Determining learning media	8	5	62.5
6	Using learning resources	8	6	75
7	Motivate students in various positive ways	8	7	87.5
8	Interact with students using communicative language	8	6	75
9	Provide questions and feedback	8	6	75
10	Concluding learning	8	6	75
11	Use time effectively	8	6	75
	Average Success			77.27

**TABLE 3**  
RESULTS OF ASSESSING LEARNING ACHIEVEMENT CYCLE I

No.	Indicator	Number of Lecturers	Number of Successful Lecturers (Score > 75 )	% Success
1	Prepare questions/assessment tools	8	6	75
2	Carry out the assessment	8	6	75
3	Checking answers/scores	8	5	62.5
4	Assessing learning outcomes	8	7	87.5
5	Processing learning outcomes	8	5	62.5
6	Analyze learning outcomes	8	6	75
7	Summarizing learning outcomes	8	6	75
8	Compile learning outcomes reports	8	8	100
9	Fixing questions/assessment tools	8	8	100
	Average Success			79.17

**TABLE 4**  
RESULTS OF IMPLEMENTING FOLLOW UP ON CYCLE I PENILAIAN ASSESSMENT RESULTS

No.	Indicator	Number of Lecturers	Number of Successful Lecturers (Score > 75)	% Success
1	Identifying the need for follow-up on the results of the assessment	8	5	62.5
2	Develop a follow-up program	8	6	75
3	Carry out follow-up	8	4	50
4	Evaluating the results of the follow-up on the results of the assessment	8	4	50
5	Analyzing the results of the evaluation of the follow-up program on the results of the assessment	8	3	37.5
Average Success				55

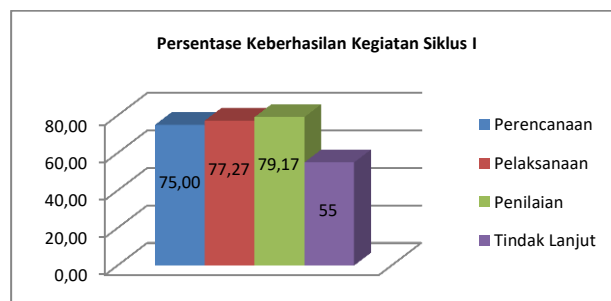


Figure 1. Cycle I

Based on the descriptions and reflections above, researchers, lecturers and researchers carry out follow-up actions related to the actions that need to be taken in the second cycle, both related to planning, implementation, and assessment.

a. Follow-up Supervision Planning Cycle I

Supervised lecturers are assisted by researchers to make learning plans whose criteria are based on the indicators that have been made

b. Follow-up to the Implementation of Cycle I . Supervision

In the first cycle, the implementation of supervision was focused on cooperation in learning for the subject teachers. senior lecturers or lecturers who have been able to assist junior lecturers or lecturers who have not been able to carry out learning. The learning examples need to be considered by the incompetent lecturer. Senior lecturers or those who are able to carry out learning give examples to junior lecturers (lecturers who are not yet capable) in opening lessons by apperception and exploring student schemata related to the previous material. Lecturers carry out learning in accordance with the plans made together by paying attention to the steps in the lesson plan.

c. Follow-up Learning Assessment Cycle I

Things that need to be implemented as improvements to cycle I are:

- 1). The making of the test grid is focused on the objective description and one non-objective description.
- 2). The implementation of the assessment is grouped into two, namely in the process, which is in the form of questions that are answered directly by students, the second is questions that are made to be done after the learning process.
- 3). Lecturers always discuss with fellow lecturers or with researchers to determine scores, weights, analysis of items, and improvement of questions, conclude results and report assessment results.

d. Implementation of Follow-up Assessment Cycle I.

In this assessment section, the lecturer discusses with other lecturers to determine the follow-up assessment because there are many parts that have not been understood by the lecturers. For this reason, there are several recommendations that need to be followed up in cycle II, namely: Lecturers of Informatics Management STMIK Logic need workshops on follow-up assessments, to discuss: (a) identification of follow-up assessment results, (b) preparation of follow-up programs, (c) carry



out the follow-up, (d) evaluate the results of the follow-up, (e) analyze the results of the evaluation of the follow-up program on the results of the assessment.

### **3.2 Cycle II Result and Findings**

Cycle II was carried out based on the findings of cycle I. The parts that were already good were maintained, while the parts with a small percentage of success were improved in this second cycle. Based on the reflection and implementation of the follow-up cycle I, the description of the results and findings that need to be followed up are as follows.

#### **a. Cycle II Supervision Planning**

Lecturers discuss with school researchers to formulate goals to be achieved in learning. The objectives are based on indicators or subject matter and indicators of lecturer competence that have been formulated. The results of making these devices are understood together before being given to students.

#### **b. Implementation of Cycle II Supervision**

The research instrument in cycle II still uses the instrument that has been made.

#### **c. Cycle II Supervision Assessment.**

In cycle II the instruments used are:

- 1). Prepare questions/assessment tools in accordance with predetermined performance indicators/criteria and carry out assessments.
- 2). Checking answers/providing test scores for learning outcomes based on predetermined performance indicators/criteria and processing assessment results
- 3). Analyze the results of the assessment (based on the level of difficulty, discriminatory power, validity and reliability)
- 4). Summarize the results of the assessment clearly and logically (for example: interpretation of the trend of assessment results, student achievement levels, etc.)
- 5). Compile a report on the results of the assessment and make improvements to the questions/assessment tools

#### **d. Follow-up on Cycle II Assessment Results**

This activity is carried out by the lecturer in the last part after carrying out the assessment with the aim of analyzing the assessment program and improving the results of the assessment.

#### **e. Cycle II Researcher Action**

The action of the researcher in the implementation of the first cycle of supervision is as follows. (1) Researchers provide indicators that must be achieved during preparation, implementation, and assessment a week before the implementation of supervision, (2) Researchers ask lecturers to fill out the assessment format to be achieved, one week before the implementation of supervision, (3) Researchers discuss preparations with lecturers who will be supervised, (4) Researchers observe lecturers during supervision by collaborating directly in PBM, (5) Researchers discuss with lecturers after carrying out supervision, (6) Lecturers and researchers analyze student learning outcomes and make joint reports about learning. (7) Lecturers and researchers analyze programs that have been made to be improved if they are not suitable.

#### **f. Cycle II Reflection**

##### **1). Reflection on Cycle II Supervision Planning**

After carrying out discussions with lecturers and researchers, the researchers wrote the results of the reflection as follows.

- a). Describing learning objectives 8 Lecturers with 100% presentation, based on these data have been able to describe learning objectives. For this reason, this model is maintained.
- b). Determining the material in accordance with the competencies that have been determined as many as 8 Lecturers with a 100% presentation. It turns out that the lecturer has been able to determine the learning material that is in accordance with his competence. Lecturers are easier to carry out their duties if educational supervision is carried out collaboratively with researchers.

- c). Organizing material based on sequence and groups of 6 Lecturers with 75% presentation. In this section, lecturers are able to organize material in the form of concepts, principles, procedures, and facts.
  - d). Allocate time as many as 8 Lecturers with 100% presentation. The activities in this section are maintained, namely determining the time allocation through lecturer workshops at schools guided by researchers.
  - e). Determine the appropriate learning method as many as 6 Lecturers with 75% presentation. Many lecturers have implemented learning methods that lead to student centers. Things like this need to be maintained. Lecturers and researchers need to collaborate in teaching and then discuss it through discussions at the school MGMP.
  - f). Designing learning procedures as many as 6 Lecturers with 75% presentation. In determining the procedure is closely related to the learning method. Therefore, there is a need for improvement in this area. There is 1 lecturer who is still stuck with procedures that threaten students if they are less able or violate learning.
  - g). Determine the learning media/practice equipment (and materials) that will be used as many as 6 Lecturers with 75% presentation. It turns out that in this section there are already many lecturers who use the media around the subject teachers. This can be seen in the results above.
  - h). Determine appropriate learning resources (in the form of books, modules, computer programs and the like) as many as 8 Lecturers with 100% presentation. In determining learning resources, lecturers have varied. It was also able to adjust to the basic competencies that must be mastered by students.
  - i). Determine the assessment technique as many as 8 Lecturers with a 100% presentation. The techniques used by lecturers in compiling assessments have varied. Some use portfolios, performance, projects, quizzes, psychomotor.
- 2). Reflection on the Implementation of Cycle II Supervision
- The results of the reflection on the implementation of supervision and after discussions with the lecturers are as follows.
- a). Open the lesson with the appropriate method. On average, lecturers are able to open lessons with the right method. There are 8 lecturers who are considered able to open lessons correctly or with a percentage of 100%. Based on the percentage above, lecturers need to maintain this method.
  - b). Presenting subject matter. In presenting the subject matter, the average lecturer is good and based on observations there are 7 lecturers who are categorized as good. If it is a percentage, it has reached 87.5%. In cycle II, many lecturers were able to present the material in the right order. For this reason, the material mastery model in collaborative educational supervision needs to be maintained.
  - c). Applying learning methods and procedures that have been determined amounted to 6 lecturers with a percentage of 75%. Lecturers in using learning methods have led to the CTL model.
  - d). Regulating student activities in the course of 8 lecturers with a percentage of 100%. Based on these data, lecturers are able to manage course tutors. The principal must continue to motivate these lecturers.
  - e). Using learning media/practice equipment (and materials) that have been determined, there are 6 lecturers with a percentage of 75%. Many lecturers use tools that can strengthen learning.
  - f). Using learning resources that have been selected (in the form of books, modules, computer programs and the like) amounted to 8 lecturers with a percentage of 100%. In this section the lecturer is no longer a problem. However, the principal must continue to motivate the lecturers.

- g). Motivating students in various positive ways, totaling 8 lecturers with a percentage of 100%. Many lecturers have motivated students. Activities like this need to be maintained
  - h). Interacting with students using communicative language totaling 8 lecturers with a percentage of 100%. Activities like this need to be maintained
  - i). Provide questions and feedback, to find out and strengthen student acceptance in the learning process totaling 6 lecturers with a percentage of 75%. There are already many lecturers who give questions as feedback. This is because there is cooperation between the supervised lecturer and the researcher.
  - j). Concluding the learning amounted to 8 lecturers with a percentage of 100%. After the first cycle was carried out, then the lecturers and researchers discussed how to conclude the learning turned out to bring satisfactory results. It turned out that all the lecturers were able to conclude the lesson.
  - k). Using time effectively and efficiently amounted to 8 lecturers with a percentage of 100%. In cycle II, it turned out that all lecturers were able to use time effectively and efficiently. This method needs to be maintained.
- 3). Reflection on Cycle II Supervision Assessment  
The results of the reflection on the supervision assessment section and after discussions with the lecturers are as follows.
- a). Prepare questions/assessment kits in accordance with predetermined performance indicators/criteria totaling 7 Lecturers with a percentage of 87.5%. There is still one lecturer who has not been able to compile the assessment questions because they are still not in accordance with the indicators. Based on the observation/analysis, it turned out that the lecturer at the meeting with the researcher did not enter because of illness. Because of this, lecturers who have not succeeded need to study alone with lecturers who are capable.
  - b). Carrying out assessments totaling 6 lecturers with a percentage of 75%. Almost all lecturers have carried out the assessment according to the rules. Students may not open, ask other students. Things like this need to be done because the assessment is to measure students who are capable or not.
  - c). Checking answers/providing test scores on learning outcomes based on predetermined performance indicators/criteria totaling 6 lecturers with a percentage of 75%. Lecturers have been able to give score questions. The way it has been done needs to be maintained.
  - d). Assessing student learning outcomes amounted to 8 lecturers with a percentage of 100%. Because all lecturers have been able to maintain this indicator.
  - e). Processing the assessment results amounted to 8 Lecturers with a percentage of 100%. Lecturers have been able to process grades ranging from scoring weights to giving students grades.
  - f). Analyzing the results of the assessment (based on the level of difficulty, discriminatory power, validity and reliability) totaled 7 lecturers with a percentage of 87.5%. There are 1 lecturers who cannot analyze questions and lecturers who are reluctant to analyze or do not want to analyze so they forget how to analyze. To deal with this, schools need to hold discussions with the incompetent lecturers by bringing in resource persons.
  - g). Summarizing the results of the assessment clearly and logically (for example: interpretation of the trend of assessment results, student achievement levels, etc.) totaling 6 lecturers with a percentage of 75%
  - h). Compile reports on the results of the assessment totaling 8 Lecturers with a percentage of 100%. This section needs to be maintained because it is 100 percent successful in learning.
  - i). Fixing questions/assessment tools totaling 8 Lecturers with a percentage of 100%. All lecturers in cycle II were able to correct questions that were not valid. That's why the lecturer still maintains how to fix the problem.

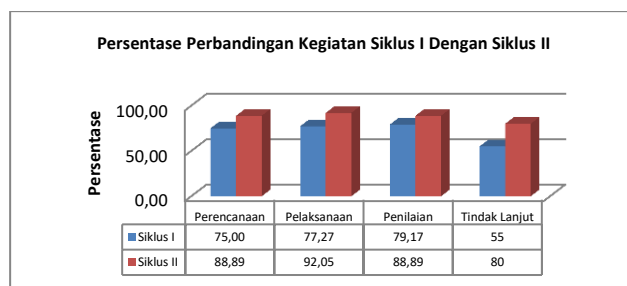


Figure 2. Cycle II

j). Results of Action Research Cycle II

Based on the description and reflection above, researchers, lecturers and researchers stopped this action research because the results obtained after the action, both those carried out by researchers and lecturers were satisfactory. Lecturers' actions that can improve the results of lecturer supervision are as follows.

a. Supervision Planning

The actions of lecturers and researchers in planning collaborative educational supervision that can improve lecturer performance are:

- 1). Lecturers and researchers always work together in making preparations for supervision. This collaboration includes determining assessment instruments, implementation, and results assessment.
- 2). After the supervision instrument was completed, the lecturer was given an assessment format a week before the supervision was carried out and the researcher always asked about the lack of ability and lack of clarity of the assessment format.
- 3). The researcher asked the learning tools a week before the implementation, both related to learning and assessment.

b. Implementation of Supervision

- 1). Lecturers and researchers always work together to carry out learning.
- 2). In the implementation of supervision, lecturers feel comfortable when teaching because researchers in supervising are like lecturers who teach together in lecturers of courses.
- 3). The lecturer gives an assessment of the process based on the preparations made with the researcher.
- 4). Researchers and lecturers discuss the advantages and disadvantages of learning.

c. Supervision Assessment

- 1). Lecturers carry out assessments based on programs that have been made.
- 2). Assessment is focused on the form of objective descriptions and non-objective descriptions.
- 3). The preparation of the questions was carried out in a collaborative manner with the researcher.
- 4). Correction of evaluation results is carried out directly by the lecturer after learning.
- 5). Lecturer concludes student learning outcomes and reports the results

d. Follow-up Research Results

- 1). Lecturers and Researchers follow up on the results of the assessment

e. Researcher Action Results

The results of the reflection on the implementation of supervision and after discussions with the lecturers are as follows.

- 1). Researchers provide indicators that must be achieved during preparation, implementation, and assessment a week before the implementation of supervision,
- 2). The researcher asks the lecturer to fill out the assessment format to be achieved, one week before the implementation of supervision,

3.3 Discussion

The first finding is that lecturers' performance increases in making lesson plans. This happened because of the collaboration between the lecturers who support each other and were given direction by the researcher. Steps that can improve the performance of lecturers in making learning preparations are: (1) Researchers provide a supervision format and supervision schedule at the beginning of the school year or the beginning of

the semester. Implementation of supervision is not only done once, (2) Researchers always ask the development of making learning tools (reminding how important learning tools are), (3) one week before the implementation of supervision of learning tools, Researchers ask the format of the assessment, if the format is given at the beginning of the school year lost, the lecturer in question is asked to photocopy the archive. If there are still many such formats, the lecturer will be given back. Along with giving/asking for the format, the researcher asks for the collection of learning tools that he has made to examine the advantages and disadvantages, (4) The researcher gives special notes on the sheet to be given to the lecturer who will be supervised. (5) Researchers in assessing learning tools are attentive and do not reflect as assessors. Researchers act as a collaboration. (5) Researchers in assessing learning tools are attentive and do not reflect as assessors. Researchers act as a collaboration. (5) Researchers in assessing learning tools are attentive and do not reflect as assessors. Researchers act as a collaboration.

The second finding is that lecturers' performance increases in assessing student achievement. In action research conducted at STMIK Logic's Informatics Management, it turns out that the implementation of collaborative educational supervision periodically has a positive impact on lecturers in preparing questions/assessment tools, implementing, examining, assessing, processing, analyzing, concluding, compiling reports and fixing questions. Before collaborative educational supervision was held, many lecturers had difficulties in carrying out assessments. The steps taken in periodic collaborative educational supervision that can improve the performance of lecturers are: (1) Researchers discuss with lecturers in making assessment tools before supervision is carried out,

The third finding, lecturer performance increases in preparing learning programs, implementing learning, assessing learning achievement, and carrying out follow-up on student achievement results.

**TABLE 5**  
TEST RESULTS PAIRED SAMPLE T TEST

		Paired Differences					t	df	Sig. (2-tailed)
		mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Cycle I - Cycle II	-1.96375E1	5.27847	2.63924	-28.03673	-11.23827	-7,441	3	.005

From the data above, it can be concluded that the value of t arithmetic is  $-7.441 < t_{table}$  of 2.353, then  $H_0$  is accepted, which means that there are differences in the results of the process from cycle I to cycle II in improving lecturer performance.

#### 4. Conclusion

Researchers who come from peers can make it easier for lecturers to follow up on the results of student achievement assessments. Researchers who come from peers can facilitate communication between lecturers in carrying out follow-up on the results of student achievement assessments. The implementation of periodic collaborative educational supervision can improve the performance of lecturers in carrying out the follow-up to the results of the student learning achievement assessment with the following steps. (1) Researchers and lecturers jointly make a follow-up program on the results of the assessment, (2) Researchers provide examples of follow-up implementation, which is finally continued by lecturers in the actual implementation, (3) Researchers invite discussion to lecturers who have made, implemented, and analyze follow-up programs. Based on the improvement in the performance of lecturers, both lesson plans, implementation of learning, assessment of learning outcomes, and implementation of follow-up on student assessment results, it turns out that it affects student test results.

#### 5. References

Anggraeni, et al. 2017. The Effect of Emotional Intelligence and Affective Commitment on Employee Performance Using Organizational Citizenship Behavior (OCB) as an Intervening Variable (Case Study at PT Sari Warna Asli Unit 1 Karanganyar). IAIN Surakarta



- Ministry of National Education, 2005. Law No. 14 of 2005, Concerning Teachers and Lecturers, Jakarta: Ministry of National Education.
- Depdiknas RI, 2004. Law No. 20 on the national education system (SISMPIKNAS) Jakarta: Depdiknas.
- Director General of Education and Culture, 2004, Elementary School Teacher Competency Standards, Jakarta: Directorate of Education Personnel
- Djohar. 2006. Teachers, education and their development (Application in Education in the Teacher Law). Jakarta : Rajawali Press
- Fauzi, A., and Nugroho, RH, 2020. Performance Management. Publisher: Airlangga University Press, Surabaya.
- Ghozali Imam (2009). Multivariate Application with SPSS Program. Diponegoro University Publisher. Semarang
- Ondi, Saondi & Aris Suherman. 2010. The Ethics of the Teaching Profession. Bandung: Aditama.
- Pianda, D., 2018. Teacher Performance Covers Teacher Competence, Work Motivation and Principal Leadership. CV. Traces, West Java
- Priansa, 2018, HR Planning & Development. Bandung. Alfabeta.
- Rivai, 2004, Human Resource Management for Companies, First Edition, Jakarta, PT. King Grafindo Persada.
- Sagala, 2010. Supervision of Learning in the Educational Profession. Bandung: Alfabeta.
- Supardi, 2017, The Effect of Supervision of Madrasah Principals in Improving Teacher Performance, Didactic Studies
- Saragih H. et al., 2012., Analysis Information System Of Inpatient Billing System's Support For Consumables Logistics Using PIECES Framework: Case Study Promedika Hospital., Faculty of Engineering and Computer Science-Bakrie University.
- Satrio AW, 2005., Evaluation of College Student Academic Administration System Using PIECES Framework Analysis Method

