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Analysis of Mathematics Lesson Plan for Primary School Teacher Education Students

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ABSTRACT
The background of this research was the need to know the pedagogical competence of primary school teacher education students in making a lesson plan for mathematics learning. The purpose of this study was to determine the suitability and the errors in mathematics lesson plans written by PSTE students. This study used a combined method / mixed method by combining qualitative methods and quantitative methods. The results of this study concluded that the lesson plans for mathematics learning developed by PSTE students were not following the defined systematics, and there were some errors found in the lesson plans components. This research can be used as a foundation for further research to improve the pedagogical competence of PSTE students in making lesson plans for mathematics learning in primary schools.

Keywords: *Lesson plan, PSTE, Matehamtics.*

1. INTRODUCTION

A teacher acts as a crucial component in the education system, especially in the learning system [1]. Teachers have a great responsibility for the learning process. Teachers must be professional. Professional teachers can master science and learning models, can motivate students, and have broad insights [2]. These three things can be achieved by teachers if they can master four teacher competencies, namely pedagogical competence, personal competence, social competence, and professional competence [3]. In a hierarchical system, pedagogical competence comes first because pedagogical competence underlies other competencies. The teacher can obtain this pedagogic competence from the learning process [4]. This pedagogic competence aims to manage and implement the learning process and is related to the process of achieving student learning goals [5]. Therefore teachers must be able to master this pedagogic competence.

In general, pedagogical competence is closely related to the implementation of learning, which includes planning, implementing, and assessing learning. Planning in learning aims to guide teachers in implementing a systematic and orderly learning process [6]. The learning plan prepared by the teacher is written in the lesson plan. Lesson plans describe learning procedures to achieve a defined basic competency [7]. Lesson plans must be developed by teachers so that teachers can set strategies in the learning process to achieve the objectives of learning mathematics in primary schools.

Mathematics learning must be taught in primary schools [8]. The objective of mathematics learning is closely related to everyday life [9-11]. Learning mathematics in primary schools aims to understand mathematical concepts and use reasoning to solve problems in everyday life and be able to communicate them. This objective underlies mathematics learning to be maximally taught in primary schools.

However, many studies stated that the mathematics learning process does not run optimally so that the quality of learning is low [12-14]. This fact triggered researchers to observe and interview primary school teachers. Based on observations, mathematics learning gets the lowest score among other subjects. Based on the interview analysis, this happened because the teacher did not master the pedagogic competence of learning mathematics in primary schools. The results of the lesson plan analysis support the statement above. It turns out that the teacher has not mastered pedagogical competence in making lesson plans. The teacher stated that this had been obtained during lectures in primary school teacher education.

These results raise a question for PSTE lecturers. The teacher stated that the lesson plans made had followed the knowledge obtained during learning at the primary school teacher education level. It means that there are problems related to the process of making a lesson plan during studying in college. Primary school teacher education is a study program that produces graduates to be prepared to become primary school teachers with four competencies. One of them is pedagogical competence to make lesson plans. It is necessary to analyze the mathematics lesson plan in primary schools to find out the ability of PSTE students.

The purpose of this study was to determine the suitability of lesson plans written by PSTE students in mathematics learning and the errors found in mathematics lesson plans written by PSTE students. In general, other studies only focus on the analysis of lesson plans written by teachers, while this study focuses on prospective primary school teachers, namely PSTE students.

2. RESEARCH METHODOLOGY

This research used a mixed-method, which combines qualitative methods and quantitative methods. This approach involves philosophical assumptions, the application of qualitative and quantitative approaches, and mixing the two approaches in one study. This method aims to collect and analyze data in a more comprehensive, valid and reliable manner.

The population of this study is the mathematics lesson plan written by the second batch PSTE students totaling 210 pieces. The research sample was taken as much as 25% of the total population from 6 classes. So that the lesson plans analyzed were 53 pieces.

The instrument used in this study was the observation/guideline sheet. Data collection was done by collecting documents in the form of lesson plans from students. Data analysis was carried out in the following steps: (1) identifying lesson plan documents; (2) analyzing the content of the lesson plan; (3) verifying error data, and (3) making conclusions.

3. RESULT AND DISCUSSIONS

The results of this study are as follows:

3.1. The suitability of lesson plans for mathematics learning prepared by PSTE Students

A lesson plan assessment was carried out based on Permendikbud number 22 of 2016 to answer the formulation of the first problem regarding the suitability of lesson plans for mathematics learning. The lesson plan components based on Permendikbud number 22 of 2016 are school identity, subject identity, class/semester, subject matter, time allocation, learning objectives, basic competences and competency achievement indicators, learning materials, learning methods, learning media, learning resources, learning steps and assessment of learning outcomes.

Aspects of school identity, subject identity, class/semester, subject matter, and time allocation get a score of 5 (Very Good) with a percentage of 100%. Meanwhile, other components get the following results:

3.1.1. Basic competencies and competency achievement indicators

The results of formulating competency achievement indicators can be seen in the following table.

Table 1. Competency Achievement Indicators

No	Results	Number	Percentage
1	Bad		
2	Less Sufficient		
3	Sufficient	39	72.22
4	Good	15	27,78
5	Very Good		

From table 2 as much as 29.63% of PSTE students are good at formulating learning objectives, and as many as 70.37 are sufficient. This number shows that many students are sufficient in formulating learning objectives.

3.1.2. Learning objectives

The results of formulating learning objectives can be seen in the following table.

Table 2. Formulating Learning Objectives

No	Results	Number	Percentage
1	Bad		
2	Less Sufficient		
3	Sufficient	8	70.37
4	Good	6	29,63
5	Very Good		

From table 2 as much as 29.63% of PSTE students are good at formulating learning objectives, and as many as 70.37 are sufficient. This number shows that many students are sufficient in formulating learning objectives.

3.1.3. Learning objectives

The results of formulating learning objectives can be seen in the following table.

Table 3. Preparing Learning Materials

No	Results	Number	Percentage
1	Bad		
2	Less Sufficient		
3	Sufficient	31	57,41
4	Good	23	42,59
5	Very Good		

From table 3, as much as 42,59% of PSTE students are good at preparing learning materials, and as many as 57,41% is sufficient. This number shows that many students are sufficient in preparing learning materials.

3.1.4. Learning objectives

The results of selecting Learning methods can be seen in the following table.

Table 4. Selecting Learning Methods

No	Results	Number	Percentage
1	Bad		
2	Less Sufficient		
3	Sufficient	40	74,07
4	Good	14	25,93
5	Very Good		

From table 4, as much as 25,93 % of PSTE students are good at selecting Learning methods, and as many as 74,07% is sufficient. This number shows that many students are sufficient for selecting Learning methods.

3.1.5. Learning Media

The results of selecting learning media can be seen in the following table.

Table 5. Selecting Learning Media

No	Results	Number	Percentage
1	Bad		
2	Less Sufficient		
3	Sufficient	35	64,81
4	Good	19	35,19
5	Very Good		

From table 5, as much as 35,19 % of PSTE students are good at selecting learning media, and as many as 35,19% is sufficient. This number shows that many students are sufficient in selecting learning media.

3.1.6. Learning Resources

The results of selecting learning resources can be seen in the following table

Table 6. Selecting Learning Resources

No	Results	Number	Percentage
1	Bad		
2	Less Sufficient		
3	Sufficient	36	66,67
4	Good	18	33,33
5	Very Good		

From table 6, as much as 33,33 % of PSTE students are good at selecting learning resources, and as many as 66,67 % is sufficient. This number shows that many students are sufficient in selecting learning resources.

3.1.7. Learning Steps

The results of selecting Learning methods can be seen in the following table.

Table 7. Designing Learning Steps

No	Results	Number	Percentage
1	Bad		
2	Less Sufficient		
3	Sufficient	43	79,63
4	Good	11	20,37
5	Very Good		

From table 7, as much as 20,37 % of PSTE students are good at designing learning steps, and as many as 79,63 % is sufficient. This number shows that many students are sufficient for designing learning steps.

3.1.8. Learning Outcomes Assessment

The results of developing a learning assessment can be seen in the following table.

Table 8. Developing learning Assessment

No	Results	Number	Percentage
1	Bad		
2	Less Sufficient		
3	Sufficient	41	75,93
4	Good	13	20,37
5	Very Good		

From table 8, as much as 20,37 % of PSTE students are good at developing learning assessments, and as many as 75,93 % is sufficient. This number shows that many students are sufficient in developing learning assessment.

To simplify the presentation, take a look at the following summary

Table 9 Summary of the assessment components of the lesson plan components

No	Components	Percentage				
		B	LS	S	G	VG
1	Basic competencies and competency achievement indicators	-	-	72,22	27,78	-
2	Learning objectives	-	-	70,37	39,63	-
3	Learning materials	-	-	57,41	42,59	-
4	Learning method	-	-	74,07	25,93	-
5	Learning Media	-	-	64,81	35,19	-
6	Learning Resources	-	-	66,67	33,33	-
7	Learning steps	-	-	79,63	20,37	-
8	Learning outcome assessment	-	-	75,93	20,37	-
Average				70,14	30,65	

From table 9, the average assessment component of the lesson plan is 70.14% this is categorized as sufficient. Only 30.65% is categorized as good. This assessment proves that the lesson plan for mathematics

learning in primary schools is not following the required systematics.

3.2. Errors in math lesson plans Compiled by PSTE Students

Several problems were found in analyzing the errors in the mathematics lesson plan compiled by PSTE students. Analysis conducted as follows.

Table 10 Example analysis of lesson plan compiled by PSTE students

No	Aspects Analyzed	Analysis Results
1	Accuracy of basic competencies and competency achievement indicators	The achievement indicators are not good for basic competencies
2	Accuracy of learning objectives	Learning objectives do not achieve the expected indicators
3	Selection of learning materials	The learning material is not comprehensive
4	Accuracy of learning method	The learning method is not good for the material characteristics
5	Selection of learning media	Learning media is not suitable for the material
6	Selection of learning resources	Learning resources only use student books
7	Accuracy of learning steps	The learning steps are not specific
8	Completeness of learning outcomes assessment	The assessment instrument is incomplete, there is no assessment analysis technique.

Table 10 is an example of the analysis form of the lesson plans that has been conducted Each lesson plan is analyzed and some errors are found in the mathematics lesson plans made by PSTE students. These errors occur in 1) The achievement indicators do not include the expected basic competencies. 2) The learning objectives developed by PSTE students only focus on the minimum achievement of learning indicators. 3) The learning materials developed are too general. 4) The learning methods are not following the characteristics of learning mathematics in primary schools. 5) The learning media is not relevant to the material. 6) The learning resource used is only student books. 7) The learning steps are not following the chosen learning method. 8) the learning outcomes assessment is incomplete, such as assessment rubrics and assessment analysis techniques. These results prove that there are still many errors in making mathematics lesson plans by PSTE students.

The results of this study are in line with Wikanegsih's research which states that many Indonesian teachers are not proper at making Indonesian language lesson plans [15]. Research conducted by Ernawati and Safitri stated that there were still many errors found in the lesson plans made by language teachers [16]. This research is supported by Haqiqi's research that there are still many mistakes in making science lesson plans [17]. However, this research is different because the object of study is PSTE students as prospective primary school mathematics teachers.

A lesson plan is a learning tool that must be developed by the teacher [18]. A lesson plan is a plan or learning procedure that must be prepared by the teacher before teaching to achieve learning objectives [19]. In compiling a lesson plan, teachers must pay attention to the principles of its development. The principles of developing lesson plans, namely 1) lesson plans must pay attention to individual differences in learners. 2) lesson plan must develop student participation. 3) learning developed in the lesson plan is student-center. 4) develop a culture of reading and writing. 5) there is a feedback process. 6) there is an association between Basic Competencies, learning materials, learning activities, competency achievement indicators, assessments, and learning resources in a whole learning experience. 7) facilitate the thematic learning process. 8) maximize the application of information and communication technology [20] (Permendikbud Number 22 of 2016). This principle must be developed in the process of making lesson plans by teachers.

The lesson plan serves as a teacher's guide in carrying out the learning process in the classroom. This lesson plan will create a systematic and directed learning process so that teachers can easily teach students to achieve learning goals [21]. This lesson plan needs to be taught to students, especially PSTE students. However, this research proves that the lesson plans made by PSTE students in mathematics learning are not following the actual lesson plans so that there are many mistakes made by PSTE students in each component of the lesson plans.

The results of the study indicate that there is a mismatch between basic competencies, indicators, and learning objectives. Indicators and learning objectives are different things. Competency achievement indicators are behaviors to show the achievement of basic competencies [22]. Competency achievement indicators include knowledge, attitudes, and skills. Competency achievement indicator is a formulation of ability that must be done by students to demonstrate the achievement of basic competencies [23]. Thus, the competency achievement indicator is a measure of the achievement of basic competency. While the learning objectives means the process and expected learning outcomes of students according to basic competencies. These learning objectives include the abilities that will be achieved by students during the learning process and the final results of learning in a basic competency [24].

Teachers can organize learning objectives to meet all basic competencies. Learning objectives must refer to the indicators given, or at least the learning objectives must contain two aspects: Audience (students) and Behavior (ability) [25].

The results of the study stated that the learning materials developed were still too general and not developed other mathematical aspects. A teaching material must contain relevant facts, concepts, principles, and procedures, and written in the form of points following the formulation of competency achievement indicators [26]. This learning material aims to make it easier for teachers to develop learning to achieve learning objectives. The results of the study found that many of the learning methods chosen were not following the characteristics of mathematics learning in primary schools. The learning method aims to create a learning atmosphere so that students achieve basic competencies or predetermined indicators [27-28]. The selection of learning methods follows the situations and conditions of students. Besides, the selected learning media is not relevant to the material. Learning media is the media that will be used in the learning process. Learning media must be following the characteristics of students, teachers, environment, and material [29-30]. This learning media aims to make it easier for students to receive learning information from the learning media used.

The results of the study stated that there was only one learning resource, namely student books. Learning sources are references, objects, or materials for learning activities, in the form of paper and electronic media, also the physical, natural, social, and cultural environment [31]. Learning resources used in learning activities must be following the objectives, indicators, and basic competencies. Learning resources used are not only textbooks but can be magazines, electronic media, learning environments, living environments, interviews, and so on. The results of the study stated that the learning steps were not following the chosen learning method. The steps in each learning activity are introductory, core, and closing. These three activities must be following the chosen learning method. Introductory activities are the initial activities in a meeting to generate motivation and focus the attention of students to actively participate in the teaching and learning process. Core activities contain systematic steps that students go through to construct knowledge following their respective frames of work. The closing activity aims to end the learning activity by making a summary/conclusion, assessing and reflecting on the learning outcomes of students, and follow-up learning (activities outside of class, at home, or assignments as part of a remedy). These three activities must be following the chosen learning method [32].

The results of this study indicate that the assessment of learning outcomes is incomplete, such as assessment rubrics and assessment analysis techniques. Learning assessment is carried out using tests and non-tests in written and oral form, performance enhancement, attitude measurement, assignment, project or product assessment, portfolio use, and self-assessment. The description of the assessment types in the lesson plan must be following the learning activities. For example, if students get a task to make observations in the field, then the assessment carried out is an assessment of the observation process and the results of the observation (products) made by the students. This assessment must measure the achievement of competencies so that if the results are not following competence, there will be remedies for students whose scores are below the Minimum Mastery Criteria (MMC).

Furthermore, it needs the need analysis of local wisdom based on the learning model *"Tau Jalan Nan Ampek"*. It buit the model based on the criteria that must be considered in this case, namely: (a) the model that should be oriented to students, both their basic abilities and learning styles; (b) based on a systems approach; (c) empirically tested. It was combined the three steps approach with Contextual Teaching and Learning.

4. CONCLUSION

This study concluded that the lesson plans for mathematics learning developed by PSTE students were not in accordance with the requested systematics. There are still many errors found, namely 1) The achievement indicators do not include the expected basic competencies. 2) The learning objectives developed by PSTE students only focus on the minimum achievement of learning indicators. 3) The learning materials developed are too general. 4) The learning methods are not following the characteristics of learning mathematics in primary schools. 5) The learning media is not relevant to the material. 6) The learning resource used is only student books. 7) The learning steps are not following the chosen learning method. 8) the learning outcomes assessment is incomplete, such as assessment rubrics and assessment analysis techniques. These results prove that there are still many errors in mathematics lesson plans made by PSTE students.

AUTHORS' CONTRIBUTIONS

The first author contributed to this study as data collectors and the second and third authors contributed as guides in the research process.

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