



Didactic Design of Lesson Study-based Microteaching Learning for Prospective Mathematics Teacher Students

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Abstract

The basic objective of the microteaching course is to support the implementation of apprenticeship 3 (teaching practice) in the seventh semester at school. So far, the practice of teaching in the classroom by students is often constrained by the readiness of students in preparing these teaching tools. To overcome these obstacles, it is necessary to design a didactic condition according to the obstacles experienced by students, to be able to guide students in carrying out teaching practices properly. This process requires planning (plan), implementation (do), and reflection (reflection) of learning so that the microteaching learning process is carried out based on lesson study. The purpose of this study was to develop a didactic design in microteaching learning for lesson study-based mathematics teacher candidates. The research method used is qualitative in the form of didactic design research. Based on the implementation of the didactic design of lesson study-based microteaching learning for prospective mathematics teacher students, it is concluded that this didactic design can be used as alternative learning to overcome the learning obstacles experienced by students in microteaching learning.

Abstrak

Tujuan dasar dari mata kuliah microteaching adalah untuk mendukung pelaksanaan magang 3 (praktek mengajar) pada semester VII di sekolah. Sejauh ini, praktik mengajar di kelas yang dilakukan mahasiswa sering terkendala oleh kesiapan mahasiswa dalam mempersiapkan perangkat pengajaran tersebut. Untuk mengatasi hambatan tersebut, perlu dirancang suatu kondisi didaktis sesuai hambatan yang dialami mahasiswa, agar mampu membimbing mahasiswa dalam melaksanakan praktik mengajar dengan baik dan benar. Proses tersebut membutuhkan perencanaan (plan), implementasi (do) dan refleksi (reflection) pembelajaran, sehingga proses pembelajaran microteaching dilakukan berbasis lesson study. Tujuan penelitian ini adalah untuk mengembangkan desain didaktis pada pembelajaran microteaching bagi mahasiswa calon guru matematika berbasis lesson study. Metode penelitian yang digunakan adalah metode kualitatif berupa penelitian desain didaktis. Berdasarkan implementasi desain didaktis pembelajaran microteaching berbasis lesson study pada mahasiswa calon guru matematika disimpulkan bahwa desain didaktis ini dapat digunakan sebagai alternatif pembelajaran untuk mengatasi hambatan belajar yang dialami mahasiswa pada pembelajaran microteaching.

Keywords: didactic design, microteaching, lesson study

INTRODUCTION

The University of Muhammadiyah Tangerang, Faculty of Teacher Training and Education (FKIP) mathematics education study program requires students to take Microteaching courses in the 6th semester to prepare students for the implementation of the 3rd internship process at school in the VII semester. Microteaching is a course for the teaching profession in a functional position as a teacher (Depdiknas, 2002). Microteaching is a directed design to train prospective teachers in implementing the teaching process (Helmiati, 2013). Microteaching learning studies knowledge and understanding of classroom processing, basic teaching skills, and remedial teaching so that it can be applied in the classroom. As prospective teachers, students are required to be able to master the basic concepts of Microteaching well. Students have the opportunity to train themselves to demonstrate the teaching process in front of the class in a conducive atmosphere so that mental readiness, skills, and interrelated student performance can become guidelines for practical teaching in schools (Sukmawati, 2019). This readiness becomes a guideline for students in carrying out the learning process in the classroom in the apprenticeship 3 programs to become a professional teacher.

Under experience as lecturers in Microteaching courses, students make mistakes in preparing for classroom teaching practices, starting from learning tools, teaching practice to competence as educators. Based on research that has been done previously (Sukmawati, 2019), some students do not prepare learning tools properly and correctly so that their teaching practices are not suitable for these learning tools. Students also lack control over the class, are nervous, and not confi-

dent when teaching, so they are not communicative and have active interactions with students. Students are lacking in preparing starting from the material, learning methods, and teaching materials used to the assessment process of mastery of the material that has been given. All these preparations are written in the Learning Implementation Plan (RPP). This situation is not expected for the realization of the Microteaching learning objectives, because there are still students who experience problems in implementing classroom teaching practices in this course. A fundamental question arises about the causes of this obstacle, namely whether the explanation at the beginning of the lecture regarding the preparation that must be done by students cannot be understood well by students.

Based on direct observations of students when the teaching practice process in the classroom takes place, it is known that students experience obstacles in conditioning the class according to the approach/ method/ learning model used, formulating teaching materials according to the learning approach/ method/ model and conducting evaluations related to competencies expected. These obstacles need to be overcome immediately so that students do not make mistakes in preparing for classroom teaching practices. To overcome these obstacles, it is necessary to design a didactic situation according to the obstacles experienced by students, to be able to guide students in carrying out teaching practices in the classroom properly and correctly.

The interaction between lecturers, students, and learning materials is described as a didactic triangle by (Kansanen, 2003). The interaction in the didactic triangle describes the pedagogical relationship between lecturers and students and the didactic relationship between students and learning material, as

well as the didactic pedagogical predictive relationship between lecturers and material. These interactions or relationships serve as guidelines in formulating Microteaching learning designs. The pedagogical relationship refers to the learning approach/method/model used, the didactic relationship refers to the skills of the lecturer in designing the teaching materials used, while the pedagogical didactic anticipatory relationship refers to the learning design based on student response predictions (Mardiana, H., Mulyana, E. H., & Leo, 2013). Pay attention to the interactions shown in Figure 1 below!

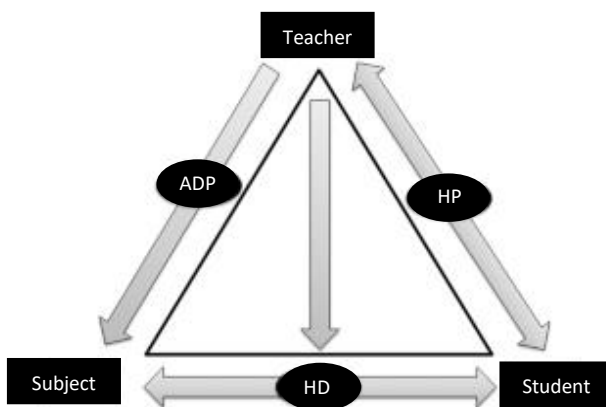


Figure 1. Modified Didactic Triangle

The role of a teacher in creating a didactic situation to create a learning situation in student activities is very important, so a teacher must be able to create a didactic relationship between students and learning material to create a perfect didactic situation for students (Suryadi, 2010). The Microteaching learning process refers to a didactic situation depicted in a didactic triangle. The application of teaching practices in Microteaching learning requires planning (plan), implementation (do) and reflection (reflection/ see) of the teaching practices carried out by students so that the Microteaching learning process is carried out based on Lesson Study. The implementation of Lesson Study on Microteaching has been carried

out by several researchers, including (Aryulina, 2010), who stated that Lesson Study helps students train themselves in implementing the teaching process through the stages of planning, implementing the teaching process, to collaborative reflection. Besides, the lesson study strategy is used as a skill to organize activities in learning related to efforts to master basic teaching skills through guided and independent training (Ismail, 2015). Through the application of Lesson Study, students can formulate together in groups to determine the desired learning activities according to the basic teaching skills to be used, so that students can apply the teaching process properly and correctly.

The desired process in the Microteaching learning design is the implementation of the Lesson Study strategy in a didactic triangle interaction. Lesson Study strategies provide opportunities for students to formulate the desired activities in the teaching process according to the selected material to the learning approaches/ methods/ models used. The interactions that occur are the pedagogical relationship between lecturers and students and didactic relationships between students and learning materials, as well as the didactic pedagogical predictive relationship between lecturers and material.

According to these assumptions, it is necessary to design a didactic situation in Microteaching learning based on Lesson Study so that this research is entitled Didactic Design of Lesson Study-based Microteaching Learning for Prospective Mathematics Teacher Students. The formulation of the problem examined in this study is "How to design Microteaching learning based on Lesson Study for prospective mathematics teacher students?"

Didactical Design Research (DDR)

The application of didactical design research in educational research was popularized by Suryadi (Suryadi, 2010) who supported the Metapedadidactic theory for mathematics learning. Suryadi formulated DDR into three stages, starting from the prospective analysis before learning to predict conditions that would occur to those that might occur in learning. This stage consists of repersonalization (activities to understand personal / student barrier analysis), recontextualization (activities to arranging teaching materials according to what students need), to predict the responses that will be given and received from students. Metapedadidactic analysis during learning, the process of implementing activities that present the relationship between the three aspects, namely educators (lecturers), students (students), and teaching materials. The final stage is a retrospective analysis to compare the two previous stages. This is done to produce the ideal didactic design.

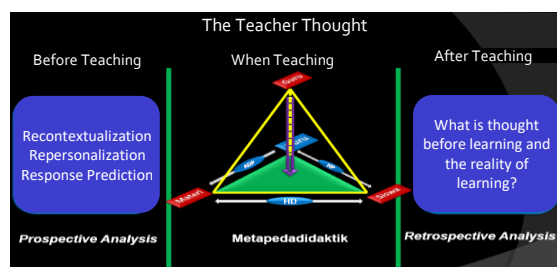


Figure 2. *Didactical Design Research Scheme*

An educator designs learning starting by sequencing the learning activities of students so that they can describe a didactic situation that will occur in learning (Setiadi et al, 2017; Rudi et al, 2020). According to previous research, an educator needs to have the ability to predict the situation in learning so that the response is received and given by students so that the objectives of learning can be achieved (Lidinillah, 2012; Anggraini, 2021). The

role of an educator in the metapedadidactic stage is related to the ability to build a modified didactic triangle relationship in Figure 1. A prediction of changes in circumstances that may occur requires pedagogical didactic anticipation from educators so that the didactic pedagogical situation will run dynamically according to the design in the prospective analysis. The entire role of the educator underlies the creation of a didactic triangle relationship from a lesson. The educator should understand the barrier of learning to improve the quality of teaching (Prabowo and Juandi, 2020).

Microteaching

According to (Helmiati, 2013), Microteaching is a guidance program in capacity-building training as an educator, starting from prospective teachers in education and for teachers in the profession. Microteaching is a training method in teaching performance in a limited (micro) scope to hone teaching skills in simplified and isolated situations (Netriwati, 2018; Ünlü, 2018). Microteaching emphasizes a simulation of classroom teaching by students. The implementation of Microteaching from lesson planning is followed by the implementation of individual teaching (Kusmawan, 2017; Reddy, 2019). Microteaching focuses on specific skills, namely: 1) preliminary skills, variations and descriptions of stimuli, 2) skills in using instructional media, 3) clarification skills with examples, reinforcement, and monitoring, and 4) question and answer and student response (Iksan, Z. H., Zakaria, E., & Daud, 2014; d'Alessio, 2018).

Microteaching involves teaching skills that will be evaluated by students and lecturers. After the teaching practice, discussions were held through evaluator comments. Teaching practices that incorporate all teaching skills are carried out for

about 30 to 40 minutes. The time is adjusted to the actual teaching in the school. This teaching practice involves four skills involved in teaching: introduction, learning, evaluation, and closing. The introduction is made at the beginning of learning which includes increasing students' interest and motivation to learn. Learning is all the processes that occur during teaching to achieve planned goals. The learning skills and objectives developed in these 30–40-minute lessons are comprehensive (Richard, 2021). Evaluation is carried out to determine the level of ability or learning outcomes of students after studying the material given. Skills to close teaching begin by concluding together on the material being studied, then it can be ended with giving assignments as an exercise to deepen the abilities of students.

Lesson Study

Lesson study is a procedure carried out by teachers in Japan in an organized manner to evaluate the success of learning to improve student learning outcomes (Garfield, 2006). The main objective of Lesson Study is to get the best insight into the learning process, outcomes that directly benefit the teacher at large, structured learning through the cooperation of all parties, improve pedagogy, because teachers can hone insights through discussions with other teachers. The application of Lesson Study-based learning can improve the ability of teachers to prepare lesson plan learning tools, carry out learning in class, and improve student learning outcomes (Tadanugi, 2015). According to Santyasa (2009), that lesson study provides a process for collaborating and designing learning to evaluate the success of teaching strategies that have been implemented as an effort to improve student learning processes and acquisition (Vitantri, C. A., & Asriningsih, 2016).

The stages of implementing Lesson Study consist of planning (plan), implementation (action/ do) and observation, and reflection (reflection/ see) on the planning and implementation of the learning (Lewis C. C., 2002). The teachers work together in formulating lesson plans by the conclusions from the results of the analysis of needs and problems at the planning stage. The implementation stage is the action or action of a teacher in realizing learning according to the formulated lesson plans, while the teacher colleagues observe or observe the learning process. The reflection stage is carried out as an effort to improve the learning process in the form of discussions with fellow teachers about problems that arise during the implementation of the action to realize the lesson plans that have been formulated together.

METHOD

The purpose of the implementation of this research is to design a product in the form of a Microteaching learning design for 6th-semester students of the Mathematics education study program FKIP UMT. The learning design that will be developed is reflected in the lesson plan and teaching materials that contain didactic situations in Microteaching learning. The research method used is DDR which has been previously described in Figure 2.

The focus of the initial stage is to produce Microteaching teaching materials by students' practical teaching skills. Preliminary research (Sukmawati, 2019) was carried out by researchers to gain insights regarding student barriers in teaching practice. Microteachings teaching materials are prepared based on these insights to be able to guide students in preparing and carrying out teaching practices in class. The teaching materials are ar-

ranged based on Lesson Study in the process of implementing teaching practice by students. Through Microteaching teaching materials, students are directed to form a teaching practice team which is a Lesson Study group. Each group will take the Lesson Study procedure in the form of a plan-do-see. Then, in turn, they will carry out teaching practices according to the results of the Lesson Study group discussions. Teaching materials were tested on a limited basis on research subjects so that they could become a reference in improving the Microteaching teaching materials.

This DDR research uses instruments in the form of didactic design of Microteaching learning, questionnaires, and teaching practice observation sheets. Didactic design of Microteaching learning functions in testing didactic designs or implementation. The questionnaire functions to explore student responses during learning. Meanwhile, the observation sheet functions to observe student activities in the implementation of teaching practice during the didactic design trial. The determination of the percentage level of respondents for each statement in the questionnaire used the following score interpretation criteria (Riduwan & Akdon, 2014).

Table 1. Score criteria Interpretation

criteria (%)	classification
$80 < P \leq 100$	Very strong
$60 < P \leq 80$	Strong
$40 < P \leq 60$	Enough
$20 < P \leq 40$	Weak
$0 < P \leq 20$	Very weak

The indicators of success in the didactic design of Microteaching learning based on Lesson Study through the Didactical Design Research stages carried out are classified as strong.

RESULT AND DISCUSSION

Research Result

The first step in this research is to analyze the didactic situation before learning which is in the form of a Hypothetical Didactic Design including ADP. This analysis activity requires a preliminary study related to the learning barriers that are lazy for students in the Microteaching course. This analysis of learning barriers becomes a reference for compiling learning tools that contain syllabus, student worksheets, and predictions of didactic responses and anticipation (Firmansyah, 2017). This information was obtained from preliminary research that had been done previously (Sukmawati, 2019).

Based on the results of the research, the obstacles that help students are (1) Arranging learning tools following the material to be presented, (2) implementing the learning stages that have been selected, (3) class mastery during the teaching practice process, (4) mastery of pedagogic competencies, social competence, and professional competence. Based on the information on student barriers, the initial step of the Prospective Analysis stage (Figure 2) can be done by compiling the stages of the didactic situation expected in Microteaching learning. The planning is contained in Microteaching teaching materials based on Lesson Study.

The composition of the subjects in Microteaching teaching materials based on Lesson Study are (1) Learning Process and Activities, (2) Micro Learning, (3) Basic Teaching Skills, (4) Assessment in Micro-Learning. The textbook helps guide students in preparing for teaching practice in Microteaching courses. This is so that the expected and designed didactic situation can be carried out properly and correctly.

The next step is metapedadactic analysis or implementation of the didactic

situation that has been designed (Figure 2). At this stage, students have been divided into Lesson Study groups. Each group will apply the steps in the Lesson Study procedure, namely the plan-do-see. The teaching practice process will be carried out in turn by each member of the Lesson Study group. Each member will plan a teaching practice (plan), then one member implements (do) or practices teaching in front of the class while the other members observe the teaching practice. Observations were made referring to the observation sheet contained in the Microteaching teaching materials based on Lesson Study used by students.

Observations in the Lesson Study stage are related to (1) preparation for learning (teaching practice) including making learning tools such as lesson plans, teaching materials/worksheets, and assessment/assessment, (2) practicing each basic teaching ability including opening and closing lessons, explaining skills, classroom management skills, variation, and questioning skills (3) provision of appropriate assessments covering cognitive, affective and psychomotor aspects.



Figure 3. Guidance and explanation from the lecturers



Figure 4. Teaching Practice

The next procedure in Lesson Study is the reflection (reflection/ see) on the planning and implementation of teaching-learning/ practice, to improve the quality of learning carried out by students. This process allows students to repack

and improve subsequent teaching practices that will be carried out by other Lesson study group members. Reflection is carried out by observing and analyzing the observation sheets that have been obtained from the observation activities during the teaching practice process. The results of the reflection activities serve as guidelines for further teaching practice activities. The procedure of the Lesson Study will continue to be repeated until all students practice teaching in front of the class. The following are the results of the calculation of the student teaching practice assessment:

Table 3. Teaching Practice Score by the Students

Lesson Study Group	Teaching Practice				Average
	1	2	3	4	
I	58	63	68	72	65
II	70	72	78	80	75
III	68	74	77	79	75
IV	75	79	80	82	79
V	78	80	83	85	82
Overall Average					75

Table 4. Teaching Practice Score by the lecturers

Lesson Study Group	Teaching Practice				Average
	1	2	3	4	
I	65	68	71	73	69
II	70	74	75	77	74
III	73	74	76	79	76
IV	76	78	82	83	80
V	77	80	81	83	80
Overall Average					76

The outcome of the final stage of DDR is a retrospective analysis. Analysis that relates the results of a hypothetical didactic situation analysis with the results of the metapedadidactic analysis. The result of this analysis is that there is a correspondence between the planned didactic situation with the metapedadidactic (teaching practice) which was carried out by 75-76 percent. This result is the average of all aspects of the assessment, starting from the preparation of learning tools, the suitability of teaching practice implementation with the lesson plans compiled to

the students' ability in class mastery through basic teaching skills as well as pedagogical competence, personality, social skills to the professionalism of a teacher.

Discussion

Based on the analysis of the results of the preliminary study, a review was made of every aspect of student barrier in taking Microteaching courses. The first aspect is to arrange learning tools according to the material to be presented. A teacher must have a systematic preparation and implementation of learning. These preparations can be designed and arranged in learning tools (Susanto & Retnawati, 2016). Learning tools include lesson plans, textbooks, student worksheets based on the learning model so that they are all related to one another (Ramadhani, 2016). The function of learning devices is to guide the learning flow, measure the success of learning, as well as media or tools to make it easier for teachers to facilitate learning. Learning tools that must be prepared by students in teaching practice are RPP (Learning Implementation Plan), learning media, teaching materials and LAS (Student Activity Sheets), and learning evaluation.

The basics in the preparation of learning tools are contained in Microteaching teaching materials based on Lesson Study in chapter 1, namely Learning Processes and Activities. The subject matter of this chapter directs students in arranging learning tools. The explanation of the material in chapter 1 was carried out by the lecturer (researcher) at the first meeting on the Microteaching course. The lecturer explains the important points in each learning device that will be compiled, such as an example of preparing a lesson plan according to the 2013 curricu-

lum, the use of learning media, formulating teaching materials for LAS, and measuring the expected competency abilities of students. This is done so that students have a good picture of the learning tools that will be used in the practical teaching process in front of the class (Figure 3).

The second aspect is the application of the selected learning stages. Each lesson has a teaching and learning strategy that is used as an intermediary for the material to be presented. Teaching and learning strategies are a choice of several models, methods approaches used to implement learning in the form of procedures followed by teachers and students to achieve the learning objectives that have been formulated (Nurdyansyah & Toyiba, 2018). Students have acquired knowledge of the strategies that can be used in the Mathematics Teaching and Learning Strategies course (SBMM). The SBMM course provides knowledge and practice for prospective teachers to be able to choose the right method in managing the class efficiently (Yenni, 2017). This course describes methods, models, and learning approaches that can be used in the learning process. In this case, the lecturer as a researcher only reviews the important points needed to be related to learning strategies that can be used by students in preparing teaching practices, such as the duration required, the correct sequence of procedures, and the appropriateness of the learning strategy with the material taken.

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the appropriateness of the learning strategy with the material taken (Ifrianti, 2018). The four competencies must be mastered properly by a teacher.

This mastery is the fourth aspect that becomes an obstacle in Microteaching learning. The students have acquired knowledge related to the four competencies in the Teaching Professional Ethics course. Through this course, students understand insights related to the basic concepts of professional ethics, the teaching profession, professional teachers, the code of ethics for the teaching profession, teacher professional association organizations, and teacher professional development (Ansyah, 2017). This subject describes the competencies that must be possessed by a teacher both in pedagogical aspects, personality aspects, social aspects, and professional aspects of a teacher's performance. For this reason, the lecturer as a researcher only directs students to review the material in the course.

All the four aspects of these obstacles become a reference in formulating a didactic situation that will be carried out in the form of a Hypothetical Didactic Design. Students discuss the Hypothetical Didactic Design at the second meeting after getting a description of the implementation of teaching practice in Microteaching learning from the lecturer (researcher). Students formulate a design from a description of the situation that will occur in teaching practice in front of the class. (Figure 3). The results of this discussion determine the readiness of students in planning teaching practice to represent the plan in front of the class.

The implementation of the Metapedadidactic stage requires each student to take turns teaching practice, starting from group I to V and each group consisting of 4 students. This group, called the Lesson Study group, will apply the plan - do - see stages. The planning stage includes all the

preparations made by students before doing the do stages. The implementation of teaching practice is carried out at the do stage accompanied by observations by lecturers (researchers) and students in their groups.

The results of the calculation analysis of the assessment of teaching practice are listed in tables 3 and 4. The average for each group is in the range of $60 < P \leq 80$ where the score interpretation criteria are strong. The same is true for the analysis of all stages of DDR. These results indicate that the implementation of teaching practices that have taken place has good criteria. This finding was strengthening the previous research that was practicing teaching increase the quality of prospective teacher (Liu, 2017; Asrial et al, 2019).

CLOSING

Conclusion

The description of the discussion based on the results of the research obtained shows that the resulting stages of designing Microteaching learning based on Lesson Study are in a good category. The implementation of the didactic design of learning Microteaching based on Lesson Study for student mathematics teacher candidates shows that this didactic design can be used as an alternative to learning to overcome learning barriers experienced by students in Microteaching learning.

Suggestion

The suggestion that the researcher can share is that the readiness of students in taking Microteaching courses is needed for mastery in the fields of pedagogical competence, personality competence, social competence, and professional competence towards the criteria of the teacher profession. Researchers also hope

that the didactic design of lesson Study-based Microteaching learning can also be applied to Microteaching learning in other study programs under the Faculty of Teacher Training and Education (FKIP).

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