International Journal of English Language and Pedagogy (IJELP)
Vol. 1 No. 1 pp. 1-9
ISSN: …., DOI: https://doi.org/10.33830/ijelp.v1i1.5145

DEVELOPING TEACHERS SKILL IN CREATING PROBLEM-BASED LEARNING TOOLS: LESSON STUDY-BASED RESEARCH

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Article Info

Article history:

Received 02, 03, 2023
Revised 20, 04, 2023
Accepted 16, 05, 2023

Keywords: (3 – 5 keywords)

Problem-based learning
Lesson study
Learning tools

ABSTRACT

The study depicts the teachers' skill development of creating problem-based learning tools. It took 32 students of the PPG study program that has reached the phase of developing teaching and learning tools. Observation sheets, interviews, and documentation taken from the developed lesson plan done by students-teacher were used as the instruments. The results show a good improvement from cycle one to cycle two. Learning tools consisting of lesson plans, teaching materials, media, LKPD and assessment instruments produced by participants demonstrate the application of collaborative learning models (PBL and PjBL), contextual teaching materials and *up-date* internet-based learning media (application *Word Wall*, *Quizizz*), interesting worksheets and assessment instruments that are in accordance with KD and GPA that have been set at the beginning.

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1. INTRODUCTION

The In-service Teacher Professional Education Program (PPG) is one of the policies of the Ministry of Education and Culture to finalize and complete in-service teacher certification, as highlighted in Law Number 14 of 2005 for teachers and lecturers. One of the competencies that directly relates to students in the classroom is pedagogic and professional competence. According to [1] pedagogic competence is a set of abilities related to teaching and learning interactions between teachers and students in class. Professional competence is a mastery of broader and deeper learning materials including mastery of the subject curriculum material and the substance of the science that houses the learning material and mastering the scientific structure and methodology. Teachers are required to be able to develop and implement the learning tools in the classroom as their professional and pedagogical competencies. Currently, some schools still implement 2013 curriculum, and some implement the new term of the curriculum which is called *'Kurikulum Merdeka'*. The learning tools that must

be developed in the two curricula do have differences but are not significant. Some of the differences include the term Learning Outcomes and learning objectives.

A professional teacher is one of the determining factors for the success of the teaching and learning process in the classroom. The ability to design quality learning tools shows teacher readiness in teaching. Based on the results of interviews with teachers participating in In-service PPG, information was obtained that teachers generally only use Learning Implementation Plans (RPP) that have been developed by the National Education Office or MGMP. Teachers also have not been able to develop innovative learning tools that can foster a pleasant learning atmosphere and are able to develop all the potential of students.

The majority of teachers consider that the lecture method is the most effective method for teaching. Teachers rarely develop and use student worksheets and media in the implementation of learning. Teachers generally use worksheets developed by publishers. Teachers also have not used teaching materials in a varied manner, only using teaching materials in student books and teacher books. Teachers only use ready-made learning tools and rarely try to develop them according to the needs of the school.

Based on the description above, the problems that arise are: 1) the teacher's lack of ability in developing quality learning tools, 2) the teacher's lack of ability in developing quality learning media and instruments for learning outcomes assessment, 3) the teacher's lack of ability in mastering the concepts of scientific material that are relevant, 4) the results of teacher training that have been carried out have not been implemented properly by teachers to improve the quality of learning in the classroom, 5) the principle of collaboration has not been developed in the development of teacher professionalism through lesson study.

Preliminary research conducted by [2] also concluded that after the implementation of Lesson Study assistance: 1) in terms of mastery of the material, the teacher experienced an increase in understanding, especially in fraction operations and the broad concept of flat shapes which were originally seen as a difficulty to teach them to students, 2) teachers experienced an increase in professionalism, especially in preparing lesson plans. RPP is the main tool for learning, therefore with the perfection of RPP as an indicator the teaching and learning process will run well and in the end, it will be able to improve student achievement.

PPG is a government program that aims to produce professional teachers. PPG activities take the form of teacher coaching in the context of developing the four competencies that a professional teacher must have [3]. Professional development, competency and certification are links in the effort to improve teacher quality as mandated in Law no. 14 of 2005. PPG graduates who are expected to be able to face the MEA 2015, include:

1. The ability to master learning material broadly and deeply which allows guiding students to achieve competency standards [4].
2. Mastering the science of education, development and guiding students.
3. Mastering learning in the field of study: learning and learning, learning evaluation, learning planning, learning media, research for improving learning in the field of study [5].
4. Able to carry out the practice of learning in the field of study.
5. Have personality integrity which includes physical-motor, intellectual, social, conative and affective aspects.
6. Social competence is the ability to establish social relations directly or use media at school and outside of school.

PPG has a very good impact in its implementation [6]. Even though teachers have had a lot of teaching experience, in reality misconceptions are still found in the field and they have not updated their knowledge regarding learning materials, use of technology, use of media, etc. Learning materials are developing quite rapidly so that teachers are required to always update their knowledge so that they can organize learning in an innovative way. In addition to material, approaches, methods, and learning techniques have also undergone significant changes [7]. Currently, the government is intensifying student-centered learning [8]. Student-centered learning will help students explore their abilities [9]. In addition to exploring students' abilities, a student-centered approach will also help students to be active and creative and want to be

involved in learning.

With regard to competency development, there are many ways that teachers can improve these four competencies. One of them is by learning the experiences of other teachers. Techers can share their experiences through *Lesson Study*. *Lesson Study* is a model of developing the coaching career through collaborative and sustainable getting-to-know assessments based totally on the concept of collegiality and mutual mastering to construct a getting-to-know network [10].

2. LITERATURE REVIEW

2.1. Problem-based Learning

Problem-based learning (PBL) is a teaching method that has been effectively utilized for more than three decades and is increasingly being embraced across various fields. It is a student-centered approach to teaching (and curriculum) that enables learners to carry out investigations, merge theoretical concepts with practical applications, and employ expertise and abilities to create a feasible resolution to a specific challenge. [11]. This summary offers a concise account of the past events, followed by an analysis of the resemblances and disparities amidst PBL and alternative practical techniques for instruction, and pinpoints some of the obstacles that PBL needs to overcome in the future.

Project-Based Learning (PBL) is a pedagogical (and syllabic) methodology that puts learners at the center of the learning process, enabling them to investigate, blend theory with practice, and employ their knowledge and abilities to devise a feasible resolution for an assigned issue. Project-Based Learning (PBL) is a pedagogical (and syllabic) methodology that puts learners at the center of the learning process, enabling them to investigate, blend theory with practice, and employ their knowledge and abilities to devise a feasible resolution for an assigned issue. [11]. The University of Delaware (http://www.udel.edu/pbl/) maintains a dynamic problem-based learning program and organizes yearly instructional seminars for educators aspiring to serve as mentors. The incorporation of PBL into several undergraduate programs is being carried out by Samford University in Birmingham, Alabama (http://www.samford.edu/pbl/). Since 1985, the Illinois Mathematics and Science Academy has been offering an all-inclusive PBL syllabus to high school learners and operates as a hub for problem-based learning research, catering to numerous students and educators.

The essential characteristics of PBL are:

1. Students must take ownership of their own education.
2. The problem simulations used in problem-based learning must be ill-structured and allow for free inquiry.
3. Education ought to encompass a diverse array of fields or topics.
4. Collaboration is crucial
5. The knowledge gained by students during their self-directed learning is integrated into the problem-solving process through reexamination and resolution.
6. Concluding examination of the acquired knowledge from dealing with the issue and a discourse on the acquired concepts and principles are imperative.
7. Self-evaluation and evaluation by peers upon the conclusion of each task and at the culmination of every academic module are recommended to be conducted.
8. The exercises conducted in problem-centered education should be highly esteemed in practical life.
9. It is important that student evaluations accurately assess their development toward the objectives of problem-oriented education

10. Problem-based learning must be the pedagogical base in the curriculum and not part of a didactic curriculum.

2.2. Lesson Study

Lesson Study is an exercise that can stimulate the establishment of a learning community (learning society) that consistently and systematically engages in self-enhancement, both at the personal and administrative level. [12]. At first, Lesson Study was implemented only in basic education, but in its development, *Lesson Study* also widely applied in universities.

The benefits of *Lesson Study* are: (1) Diminishing the estrangement of educators in the development and execution of instruction and its enhancement. (2) Assist instructors in examining and evaluating their education. (3) Enhance the comprehension of educators regarding the subject matter, curriculum coverage, and progression. (4) Assist teachers in directing their support towards all student educational endeavors (5) Improve instructor performance accountability. (6) Exchange opinions on students' ways of thinking and learning. (7) improve cooperation among other educators in learning. (8) Improve the quality of teaching staff and learning, which in turn leads to the improvement of the quality of graduates. (9) Educators have many opportunities to infuse meaningful pedagogical ideas into learning practices so that they can change the perspective of learning and learn about learning practices from the student's perspective (10) Improve classroom learning practices. (11) Improving writing skills for papers or textbooks [13]. Lesson study positively impacts teachers' meaningful and applied learning and negatively impacts problematic learning [14] Another positive impact is developing students' critical thinking through classroom learning [15].

The implementation of *Lesson Study* adopts a cycle system, where each cycle is carried out in 3 stages, namely (1) planning (*plan*), (2) implementation (*do*), (3) Reflection (*syes*). The cycle is described as follows:

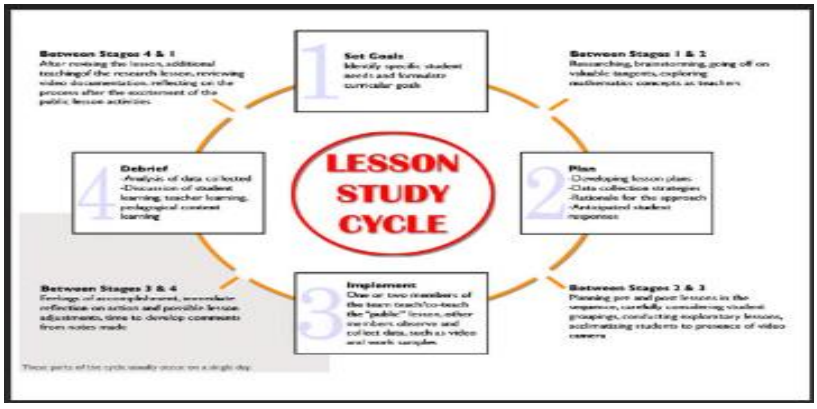

Figure 2.1
The Cycle of Lesson Study

The intent and goal of this lesson research team was to enable students to participate more actively in the classroom. According to [16], observations during a course show how students perceive the course and what they have learned. Post-class discussions focused on good learning outcomes demonstrate the relationship between teacher instruction, student activity, and student learning. The goal of the lesson study activity is to increase the readiness of the learning tools of teachers participating in the PPG. It is hoped that lesson study will be

incorporated into the activities of creating learning tools, so that PPG participants can consistently improve the quality of their learning by engaging in quality learning.

2.3. Learning Tools

Learning tools are a variety of tools that can be used in the classroom to support student learning, ranging from traditional tools to high-tech options. It can be included also lesson plan, materials, students' worksheet, teaching media and instruments for evaluation. Learning tools play an important role in delivering materials and processing information for the students. [17] states, "Planning is the systematic process of deciding what and how your students should learn."

Learning tools are a set of learning resources used by educators and students in learning activities [18]. Learning tools can be in form of syllabus/semester learning plans (*Program Semester*), implementation learning plans (RPP), teaching materials, worksheet, learning achievement tests. Learning tools need to be immeadiately adapted to the needs of the times, because of their vital position as the basis for the development of the learning process. Learning tools also can be used to improve learning achievement [18]; [19]; [20] The better the learning tools, the better the process and results will be.

3. METHOD

This research is a qualitative research with a qualitative descriptive approach. The study involved 32 of his PPG students who had already gone through the learning tool preparation and learning practice stages. These phases are executed as follows:

Lecturer guidance on the process of creating problem-based learning tools through classroom learning. This phase includes the readiness and completeness of the learning tools to be used. This includes a learning delivery plan that applies problem-based learning model (problem-based learning), materials, media, student worksheets, and assessment tools.

3.1 Defining Model Teacher

Each participant had to appear to be teaching in each cycle, but to be a discussion (lesson), all participants agreed to choose a model teacher who appeared to be teaching.

At the level of plan or planning, the lecturer gives directions and re-checks the learning tools made, discusses the learning media to be used, teaching materials to be developed, LKPD for students and checks the completeness of the assessment instruments. Also, at this planning stage, the supervising lecturer provides activities hands-on to apply the learning syntax of *Problem based Learning* in designing learning activities in lesson plans, teaching participants how to use electronic learning media as well as using internet-based assessment applications. Furthermore, participants make learning tools and consult them with the supervisor before proceeding to the implementation stage (*do*). At this stage, the model teacher carries out learning practices according to what has been planned. Participants who are not model teachers will act as observers who will see and evaluate the learning carried out by the model teacher, especially the integration between planning (RPP) and the learning steps. After the observation and implementation stages are carried out, the next stage is for the participants and the supervisor to reflect (*see*). The participants, including the model teacher, were asked to state the results of their observations. After all participants expressed their observations, then the problems were discussed and solutions were sought so that they would not reappear in the next cycle. Measurement of participants' increased skills in developing *Problem Based Learning* tools were seen from the learning device products produced. The data is obtained from the implementation sheet of *Lesson Study* in each individual which will then be described.

3.2 Carry out Plan, Do, See

In addition, participants create learning tools and consult with supervisors (do) before proceeding to the implementation phase. In this phase, the model teacher follows the plan and conducts learning practices. Participants who are not the model teacher act as observers who see and evaluate the learning done by the model teacher, especially the integration of planning (RPP) and learning steps. After the observation and implementation phase has been conducted, the next phase is reflection by participants and supervisors (see). Participants, including model teachers, were asked to report their observations. After all participants expressed their observations, the problem was discussed and a solution was sought to prevent it from recurring in the next cycle. Measures of participants' improved skills in developing problem-based learning tools were observed across the manufactured learning device product. Next, we describe the data obtained from each individual's lesson study implementation sheet.

4 RESULTS AND DISCUSSION

The results obtained in this research shows an improvement from the first cycle to the second cycle. This increase can be seen from the making of learning tools The results obtained in this research shows an improvement from the first cycle to the second cycle. This increase can be seen from the making of learning. Improvements in the learning tools can be seen from: 1) the selection of learning models, 2) the decrease in GPA from Basic Competency is already good, 3) contextual teaching materials and up *to date*, 4) Selection of appropriate technical support learning media when learning 5) assessment instruments that are already HOTS and relevant to KD and GPA. The implementation of learning also shows the teacher's skills in carrying out plans that have been made in learning tools. Even though there were still problems with learning steps that were missed or mixed up, in the second cycle everything went better. Below are descriptions of activity plans, executions and references in each cycle.

Table 1
Data on Cycle 1

Plan	***Do***	***See***
In the first plan, the supervisor provides insight and enlightenment about innovative learning devices. Lecturers and participants also share teaching experiences, discuss learning problems encountered. Furthermore, participants plan learning activities by compiling learning tools consisting of lesson plans, teaching materials, media, LKPD and assessment instruments.	Participants apply learning tools according to plan and other students become observers.	Performance in cycle one was good enough although there were still some obstacles, including: 1. There are still teachers who forget the series of activities so that there are steps that are not carried out or are randomized. 2. The use of media has not been maximized because there are technical problems 3. Time management still needs to be improved 4. There are still assessment instruments that are not HOTS yet

In the first cycle, the result was that many participants were able to develop innovative learning tools. However, obstacles were still found, including teachers who forgot the series of activities so that there were steps that were not carried out or were randomized. This is because these teachers are still accustomed to monotonous learning with the dominance of

lectures and practice questions only. Another obstacle is when teachers want to apply technology in learning, it is still not optimal because there are technical problems, such as power outages, LCD projectors that are not compatible with laptops, and wi-fi networks that are less stable. Next is an assessment instrument that still do not provide HOTS questions. This is the impact of the KKO selection in GPA which is still in LOTS area so that the question items made are also in LOTS area. Another thing to improve is time management. There are teachers who still performed lack time when teaching. This must be retrained by compiling the learning steps in the lesson plan more carefully and thoroughly.

Table 2
Data on cycle 2

Plan	***Do***	***See***
In the second plan, the supervising lecturers and participants share information related to the preparation of teaching tools and practices in cycle one. Lecturers and participants discuss the strengths and weaknesses found so that the preparation of tools and subsequent practices can be even better.	Participants use the material according to the plan, and other students are observers	Performance in the second cycle experienced a good increase. The constraints faced are more to technical problems. There are areas where there is a lot of rainfall, so electricity and wi-fi are often disrupted. There are also those who are constrained by supporting facilities and infrastructure.

However, the learning tools produced in the second cycle are better than the first cycle. The practice of teaching and learning process also experienced a good improvement. This result was in line with what the previous research claimed when performing lesson study and found out it impact to the teachers' skill development, especially in developing learning tools [21]. The constraints faced are more to technical problems. There are some areas of the research where there was a lot of rainfall, so it affected the electricity and wi-fi connection. There are also those who were constrained by supporting facilities and infrastructure for example, the limitations of LCD projectors, laptops that do not support application implementation and unstable wi-fi networks.

5. CONCLUSION

Preparation of innovative learning devices with methods *Lesson Study* through steps plan, *do*, *see*, has a good impact on improving skills in designing innovative learning tools. These skills are also complemented by teaching practice using carefully designed tools. The results show a good improvement from cycle one to cycle two. Learning tools consisting of lesson plans, teaching materials, media, LKPD and assessment instruments produced by participants demonstrate the application of collaborative learning models (PBL and PjBL), contextual teaching materials and *up-date*, internet-based learning media (application *Word Wall, Quizizz*), interesting worksheets and assessment instruments that are in accordance with KD and GPA that have been set at the beginning.

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