

Adopting Lesson Study to Enhance Pre-Service Teachers' Pedagogical Knowledge

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Abstract

Most pre-service teachers work individually in preparing their teaching and learning activities and rarely work closely with others. The purpose of this research was to investigate pre-service teacher pedagogical knowledge through lesson study. Data were collected with the use of an interview and observation. Qualitative data were analyzed in four stages: organizing data, exploring and sorting data, descriptive analysis, invention interpretation, and validation. Results indicated that lesson study enhanced pedagogical knowledge of the pre-service teacher in planning, preparation, teaching strategies, problem-solving, classroom management, questioning skills, and assessment. Lesson study enhanced the pre-service teacher's experience by comprehensively focusing on all facets of school in learning and teaching settings offering learning experiences.

Keywords: lesson study, pedagogical knowledge, pre-service teachers, teaching practices

Introduction

Teaching practice is one of the keys to reach the effectiveness of achieving pre-service teachers' content and pedagogical knowledge. Teaching practice is designed to provide opportunities for the pre-service teachers to apply the acquired knowledge during a course and to develop their professionalism based

on pedagogical competence, personal competence, professional competence, and social competence according to their subject area. Actual learning in school can be different from what they learn in college (Zeichner, 2010). Instruction is a learning and practical activity, but it may be necessary to “move learning to teach from the level of ritual to the principled level” (Russell, 1993), from “teaching as telling” to “teaching for understanding” (Lewis, 2000). Instruction is a complex matter of how teacher practices will depend on the purpose of the lesson, where pupils' understanding is the key to the teaching and learning process.

Pre-service teachers, regardless of their subject, deserve equal opportunities to learn how to teach in professional experience settings. Pre-service teachers are learners, and the learners need goals. Most of the pre-service teachers in our study work individually in preparing their teaching and learning activities. They are isolated and rarely work closely with others. Nevertheless, a pre-service teacher needs another pre-service teacher as a partner to share and to think about all the issues in class, for sharing their experiences and problems faced to improve the teaching and learning quality (Ward, Ayvazo, & Lehwald, 2014). Pre-service teachers not only have extensive and profound knowledge, but also must make it public, shareable, and verifiable (Hiebert, Gallimore, & Stigler, 2002). The pre-service teacher is expected to have sufficient content knowledge and pedagogical knowledge. They need methods and ways to define and make out the assembly of pedagogical knowledge (PK) because it cannot be done by itself.

Shulman (1987) presented a particular view of the term “pedagogical knowledge,” as a concern for reinstating content as a critical facet of teacher knowledge. Pedagogical knowledge is structured in a task-based way, like structure, motivation, classroom management, adaptively, assessment (König, Blömeke, Paine, Schmidt, & Hsieh, 2011; König & Kramer, 2016). Pedagogical knowledge is essential for pre-service teachers' attainment of effective teaching practices, it includes an understanding of the concepts, strategies for teaching, curricula, and implementation of content, which helps the student to learn (Hudson, 2007; Smith, 2000)1996. The teacher can transform understanding, performance skills, or desired attitudes or values into pedagogical representation and actions. These are ways of communicating; showing, enacting, or representing ideas so that the unknowing student can understand, and the unskilled student becomes adept.

Lesson study is a familiar research topic, which has been discussed by researchers in the world. Lesson study involves a small team working together to design, teach, study and refine a class lesson (Cajkler & Wood, 2016; Lewis & Perry, 2015). Lesson study is a means of enabling teachers to develop and study their teaching practices (Panbanlame, Sangaroon, & Inprasitha, 2014), and it has been proven

to facilitate the improvement of teachers' competences (Lewis & Tsuchida, 1999). Lesson study holds varied steps according to several experts. Lewis (2002) stated four steps, Fernandez & Yoshida (2004) explicitly declared six stages, while Stigler & Hiebert (2009) posited eight steps. The numbers of stages of lesson study may be different, but it has the same goal, which is to facilitate teacher collaboration involving collaboration in planning, implementing the results of planning, making observations, and collaborating in reflection.

Methodology

Research Question

The presented study uses a qualitative exploratory method. The exploratory approach is based on three essential steps, i.e., observation, searching for patterns, and making conclusions. The study emphasizes the analysis of the pre-service teachers' pedagogical knowledge in more detail and depth. The research question is the following: How does lesson study construct pedagogical knowledge of pre-service teachers?

Setting and Participants

The setting of this research is one of the vocational high schools in Surakarta, Indonesia. The participants are ten pre-service civic teachers and four civic mentors. In addition, the researcher as a university lecturer took part in this research. The pre-service teachers included eight females and two males in their twenties and their third year of civic education. The four mentoring teachers teach in the tenth and eleventh grades. Ethical approval to undertake this study was sought from the school, and informed consent assured confidentiality and anonymity.

Data Collection and Analysis

Data were gathered over three months and collected by interview and observation, involving field note and video recording. The participants were interviewed individually before and after engaging in LS. The pre-service teachers answered open-ended questions about the lesson study implementation. The interviews were used explicitly to explore the pre-service teachers' pedagogical knowledge. A field note was recorded throughout the study. Notes were taken through observation and group interactive sessions. Audiovisual data were collected from all the LS stages. This is the main component to interpret the learning process and answer the research question. The primary data were analyzed and described qualitatively

through four stages: organizing data, exploring and sorting data, descriptive analysis, discovery interpretation, and validation. At the initial stage, the researchers read and collect research data into a folder or matrix according to the type of data obtained. Next, the researchers interpret the data to find out the suitability of the data. Data that is not deemed relevant is sorted or reduced to look for confirming and disconfirming evidence that supports the research framework. The sorted data are then read in more detail to provide text data information. The results are then analyzed descriptively to answer the problem statement and to look for precious findings, limitations of the study, and suggestions needed for further research. Furthermore, the data obtained is validated using triangulation.

Results

The results indicated that lesson study enhanced pedagogical knowledge of the pre-service teachers in planning, preparation, teaching strategies, problem-solving, classroom management, questioning skills, and assessment. The activities description of each component of pedagogical knowledge is presented in Table 1.

Table 1. Visible activities of pre-service teachers' pedagogical knowledge

Pedagogical Knowledge	Visible activities of pre-service teachers
Planning	<ul style="list-style-type: none"> • Discussing obstacles and challenges • Determining learning objectives • Designing lesson plans to make them more visible and contextual
Preparation	<ul style="list-style-type: none"> • Brainstorming the selected concept • Reading various literature • Ensuring concepts and eliminating misconceptions • Preparing media, laboratory equipment, and other resources
Teaching strategies	<ul style="list-style-type: none"> • Arranging students in groups or pairs • Observing student activities/ focusing on a specific activity • Finding the complexity of factual teaching and learning • Speculating on specific instructions to achieve learning objectives
Problem-solving	<ul style="list-style-type: none"> • Addressing the issue • Working backward to solve the problem • Simplifying the problem
Classroom management	<ul style="list-style-type: none"> • Providing reinforcement • Spreading attention • Giving instructions

Pedagogical Knowledge	Visible activities of pre-service teachers
Questioning skills	<ul style="list-style-type: none"> • Giving opportunities for students to ask and answer questions • Generating various questions and using varied question words • Providing questions and answers clearly
Assessment	<ul style="list-style-type: none"> • Giving formative, summative, and process assessment • Using the mode of record keeping assessment

Planning

The pre-service teachers identified student difficulties and challenges in the specific subject content knowledge, determined the learning objectives and formulated a teaching problem. It was intended to reflect on and realize a good lesson plan, which makes student think contextually. The teacher candidates investigated how the pupil learns, how they make sense of the subject matter, what kind of difficulties they may have, they predicted how the student responds to questions and problems. It was deemed crucial to explain how to make learning effective and efficient. They put themselves in the position of students and imagined what it would be like to do lesson activities. One of the pre-service teachers shared her reflections: “this was the best planning that I had ever followed; we stayed focused on designing a lesson plan to be more contextual.” The preservice teachers also entailed timetables, schedules of lessons, serving to have an insight into their teaching plans. The planning time arrangement was based on the curriculum, school culture, mentor experience, classroom situations, materials, student abilities, and learning resources. The schedule of other activities in the school that could prevent teaching and learning activities was also considered since it was affected by the learning atmosphere. They allocated time and correctly communicated them in their planning.

Preparation

Every lesson required different preparations. The research indicated that the pre-service teacher was able to prepare a well-planned lesson. The pre-service teacher who acted as a model teacher needed to prepare the lesson physically and mentally as well as possible. Physical preparation was conducted on the subject matter/content knowledge, student worksheets, and media. Mental preparation included guidelines on how to avoid anxiety, nervousness, and lack of confidence. They claimed: “we were nervous to become a model teacher, there was a lot of preparation to be completed and executed.” Teacher preparation was the key and produced significant consequences to the pupils. In the different subject matter

areas, the ways of addressing the content structure of knowledge also diverge, which was to think appropriately about the content knowledge, which required going beyond the understanding of the facts and concepts of the domain. The pre-service teachers prepared the concept of the subject matter by reading widely from the literature and researching scientific journals. The pre-service teachers claimed that “as preparation, we read a lot of literature and articles more deeply.”

Teaching strategies

The use of teaching strategies is needed for teacher candidates to set the environment and learning atmosphere. Selecting teaching strategies played an essential role to achieve the learning objectives. The teaching strategies were adapted to the context of the subject matter, students' conditions, media, and school infrastructure. The pre-service teachers speculated on how specific instructional and learning strategies would help students to achieve the lesson goal. The implementation of lesson study gave a lot of consideration for the pre-service teachers concerning what learning strategies should be adopted. Exchanging ideas, cooperation and collaboration made them understand what approaches should be used, why they were practiced, and when they should be applied. They planned the set-up of the class, where the students' desks were arranged in groups of four students or in pairs. The students were arranged in groups so they could collaborate with each other. Small teamwork would assist the pre-serviceteachers to arrange student activities. They were creative in using a variety of teaching strategies and trying new approaches. One participant said: “I looked at the lessons from a different view.”

Problem-solving

Problem-solving ability was substantial for the prospective teachers, who were still inexperienced. Skills in solving problems needed to be improved since they did not have enough experience such as in-service teachers. Sometimes, what was planned was not compatible with the implementation. This required the teacher's ability to address the issue without disrupting the learning process. Pre-service teachers need practice to understand how to solve problems during a lesson. The LS team provided four methods for problem-solving: (1) use trial and error to develop problem-solving capabilities; (2) work backward to solve the problem; (3) do not panic and simplify the problem to be more manageable; (4) propagate observing other teachers, it will increase knowledge about solving a problem. One participant said: “the experience of being an observer made me think faster in solving the problems; it seems that the solution comes out itself to my mind.”

Classroom management

Classroom management was one of the tasks that are intended to create a conducive learning environment. Classroom management expertise related to the teacher's specific knowledge and skills belongs to the area of pedagogical knowledge, thus contributing to an essential component of teacher professional competence. Successful and proficient classroom organization appears primarily for effective teaching by ensuring acceptable behavior. Regarding classroom management, the student teachers were required to understand the performance of students such as appropriate and inappropriate behavior, provide reinforcement, responsibility, spread attention, give instructions, and set the course of the learning process. Lesson study helped the pre-service teachers in managing the classroom atmosphere. They built more in-depth and were more concerned with fundamental endurance and classroom management. This research indicated that the ability of the pre-service teacher's classroom management increased significantly, the teachers and students were more interactive, the students behaved more politely, thus making the environment more conducive to learning.

Questioning skills

The ability to ask and answer questions is central to the learning and teaching process. The pre-service teachers had opportunities to pose questions in every phase of the learning process. They were in charge to explore the ability of students through questions that sometimes had to be generated automatically without a script. Effective questioning can encourage and activate students' thinking, develop their recognition and organize the class. Good questioning skills explore the maximum ability of students, explaining something that was still abstract and provide a challenge to make the student think critically. Lesson study helped the future teachers develop their questioning skills. There was a higher-level vocabulary in asking questions to the student. One participant stated: "the skill of asking looks easy, but it is tough since the higher-level thinking questions should appear automatically, without scripts. Lesson study helped me in adding vocabulary and knowledge to questioning."

Assessment

Assessment is essential for teachers to achieve student learning competence. The LS team designed a variety of assessment, i.e., formative, summative, portfolios, reporting, and daily notes. Some achievement criteria were determined to assess student activities. One participant reflected: "we cannot evaluate the students based solely on the test, but how they learn is also part of the assessment." Lesson study

gave a new perspective to the pre-service teachers, i.e., to be a professional teacher you need good assessment. All matters related to the student should be included in the description. The prospective teachers admitted that an understanding of the learners is an essential factor and needs to be recognized to assess students' academic achievement. One of the participants claimed: "I am more convinced to become a teacher."

Discussion

Lesson study advanced the pre-service teachers' pedagogical knowledge in planning, preparation, teaching strategies, problem-solving, classroom management, questioning skills, and assessment. All the aspects were constructed in depth and in detail in accordance with the curriculum, students' understanding of the concepts of the subject matter, prediction of student responses, teaching strategy and evaluation of the learning process. The context of expert-enhanced lesson planning was appropriate as one means of mitigating the lack of confidence in science teachers as part of their practice (Yeigh, 2016). The student teachers got valuable input, which was beneficial for the improvement their pedagogical knowledge. The pre-service teachers reflected critically on their work and were made conscious of their experience, which enabled the quality and effectiveness of their teaching. They engaged in exploring their experience in order to achieve their pedagogical knowledge. In short, reflection is considered an intellectual ability.

The pre-service teachers considered their teaching practice as improved as a result of participating in lesson study. Lesson study prepared the pre-service teachers for conveying their ideas, sharing their experience and difficulties. The effects of lesson study, including the processes of planning, collaborating, observing, researching, reflection, and discussion, have led to professional growth that will have a lasting impact on teacher instructional practices. According to Carbach & Fischer (2017), the main aim of the education for sustainable development activities is to improve and enhance students' educational experience by comprehensively focusing on all facets of school in learning and teaching settings and the broader landscape of institutions offering learning experiences.

Lesson study has significantly contributed to improving the pre-service teachers' knowledge and skills in teaching. Discussion and collaboration in lesson study help them to enhance their pedagogical knowledge and make the learning process more active and interactive. In this case, the pre-service teachers cannot work individually, collaborators and partners are needed. Wang & Odell (2002) claimed

that learning to teach requires social interaction and social relationship. Lesson study is a meaningful and manageable level of analysis for investigating, constructing teaching and learning. During lesson study, the pre-service teachers were enthusiastically involved in scheming and sustaining the teaching experience. It was challenging in increasing their professional understanding and competences. Lesson study guided the pre-service teachers' prospective thinking, predicting possible problems, solutions, responses, and ways in which the pupil can react (Fernandez, 2002). Lesson study is the evidence of teaching improvement, where the pre-service teachers get an essential insight into how the student learns, what student restriction there are, and how they can interpret their ideas. Lesson study is a framework in which pre-service teachers can learn how to investigate the teaching and learning process.

Conclusion

The research evidently indicated that lesson study inevitably built the pre-service teachers' pedagogical knowledge involving planning, preparation, teaching strategies, problem-solving, classroom management, questioning skills, and assessment. Lesson study improved and enhanced the pre-service teachers' experience by comprehensively focusing on all facets of school. Two things must be considered in lesson study for prospective teachers: open-mindedness in accepting criticism and confidence. Further research is needed to examine more deeply the sustainability problem for pre-service teachers and mental preparation of prospective teachers.

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