



Teacher as Learning Educator and Researcher: Phenomena of Lesson Study Community Activities

Eny Winaryati¹(✉), Zanaton H. Iksan², Rose A. Rauf³, Budiono¹, Iwan Junaedi¹,
Dodi Mulyadi¹, Eko A. Purnomo¹, and Madya G. Aditama⁴

¹ Universitas Muhammadiyah Semarang, Semarang, Indonesia
enywinaryati@unimus.ac.id

² Universiti Kebangsaan Malaysia, Bandar Baru Bangi, Malaysia

³ University of Malaya, Kuala Lumpur, Malaysia

⁴ Universitas Muhammadiyah Kendal Batang, Kendal, Indonesia

Abstract. Collaborative learning in solving problems is a feature of Lesson Study (LS). The purpose of this article is to analyze the teacher as an educator and learning researcher from the phenomenon of Lesson study activities in the Muhammadiyah School Lesson Study Community. The research method used was based on qualitative data using a phenomenographic approach, based on the individual experiences of the LS TEAM. Researchers carry out category descriptions, resulting in a building of information as a complex representation of information experience. The results of this study are: (1) there is an expansion of mastery of the content of learning materials by the teacher; (2) Teachers have the skills to manage classes with appropriate learning approaches; (3) The learning approach strategy used encourages linguistic, cognitive, affective and psychomorphic improvement of students; (4) creating a school culture and environment that is conducive to collaborative activities; (5) encourage students to think critically; (6) increase the teacher's insight into students and their learning; (7) encouraging teachers to design and implement lesson plans innovatively and creatively; (8) the teacher has skills in providing leverage (scaffolding) in anticipating students' thoughts as well as carefully observing class activities; (9) increase the teacher's insight into students and their learning; (10) the continuity of learning research skills by teachers; (11) improve the learning practice community in a professional manner; (12) there is a transformation of learning from isolated individuals to collectives and communities. The recommendations are: it is necessary to expand the continuous strengthening of the LS community, and form groups to research learning in schools.

Keywords: teachers as educators · learning researchers · activity phenomena · lesson study communities

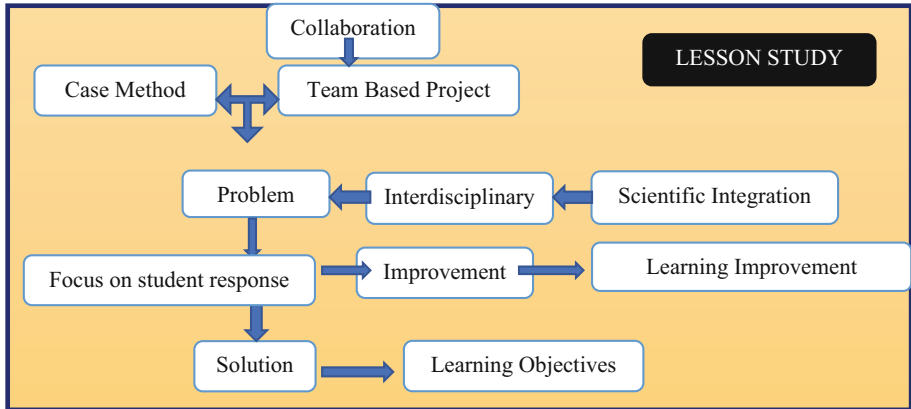


Fig. 1. Implementation of Case Method and Team Based Project in achieving learning objectives

1 Background

Learning in the twenty-first century necessitates the incorporation of the Case Method and Team-Based Project learning techniques into the curriculum. Among the recommended learning paradigms are Inquiry Learning, Discovery Learning, Project-Based Learning, and Product-Based Learning, among others. As a result of student problem-solving activities, the implementation of the aforementioned learning results in learning projects or products. Team-Based Problem-Solving Project-Based Learning Is a Characteristic of Lesson Study (LS).

LS activities are carried out by teachers to solve fundamental problems faced by teachers, students, or in learning. The teacher as a team solves learning problems by preparing lesson plans and implementing them. LS is carried out to obtain data on how students learn in solving a case/problem that is solved in groups. The character of this collaboration characterizes LS activities. Characteristics of collaboration, providing opportunities and opportunities, where all members of the LS team will learn from each other, share, complement each other, provide information to each other, (Lee Bae et al. 2016; Lee 2015; Lewis et al. 2019). It was supported by oleh Wang, et al. (2020), that interdisciplinary collaborative learning will provide many inputs for improving learning. The concept is solving problems by using the integration of several intersecting sciences.

2 Literature Review

This LS activity and the related learning enhancements will occur continuously. Developing a habit of ongoing professional learning is part of the aim of the teacher education programme, as well as a requirement for the implementation of LS (Mostofo 2014; Hadfield, & Jopling 2016). Teachers will recognize and understand the learning process carried out by their students, as a basis for better teaching improvement (Lee 2015; Lewis et al. 2019). This is evidenced by the fact that, following the See exercise, the teacher receives recommendations based on an evaluation of the students' responses to

the learning they are engaging in. The instructor will modify the learning approach or strategy that will be used in the future lesson. There is a fresh knowledge of how to learn most effectively. The requirements of scientific research expertise have enhanced learning (Lynch, & Sell 2014). This indicates that teachers have a role as learning researchers to increase their knowledge of teaching methods and content (Bussi, et al. 2017). This implementation requires the teacher to have research skills, in order to achieve effective teaching goals (Hadfield, & Jopling 2016). Huang et al. (2010) deliver, teacher collaboration and teaching researchers work together to design, deliver, and revise lessons to promote high-quality student learning.

The purpose of this article is an analysis of the teacher as an educator and learning researcher from the phenomenon of lesson study activities in the Lesson Study Community of Muhammadiyah Schools.

3 Research Method

The focus of this research is to analyze teachers as educators and learning researchers from the phenomenon of Lesson study activities in the Muhammadiyah School Lesson Study Community. Analysis was carried out to obtain experience information, understanding, responses obtained from LS team members. Knowledge, experience, and reasoning from each teacher obtained data based on the beliefs they understood, which were expressed and understood in different ways. Experience was the relationship between object and subject that includes both, (Marton 2000, p.105). The phenomena obtained were the basic assumptions of the phenomenographic approach (Marton 1986). This is the basis for choosing a phenomenographic approach as a methodology to answer the objectives of this study.

Phenomenography was a qualitative research that was developed based on an empirical approach by identifying individual teachers (LS team members) in experiencing, conceptualizing, perceiving, and understanding various phenomena that arise from LS activities. LS activities were based on solving learning problems. The essence of phenomenography was to conceptualize a phenomenon (Marton 1986; Uljens 1996).

3.1 Research Object and Subject

This phenomenographic research project was an object of study, as a phenomenon to be understood, by adopting a positive attitude towards learning, focusing on understanding and conception, (Silverman 2000, p.10). The phenomenographic approach used is based on constructivist-interpretive as the hallmark of this study. The research is focused on the meaning of “collective” as a conception of knowledge resulting from the identification of various individual experiences of the LS team. The subjects of this study were 3 schools of the Muhammadiyah School LS Team, they are SD Muhammadiyah Sodagaran Wonosobo, SMP Muhammadiyah 1 Semarang, and SMK Muhammadiyah Pracimantoro Wonogiri.

The focus on object and subject relationships is based on the conception presented by Marton (1988). The focus is on the relationship between individual experiences in

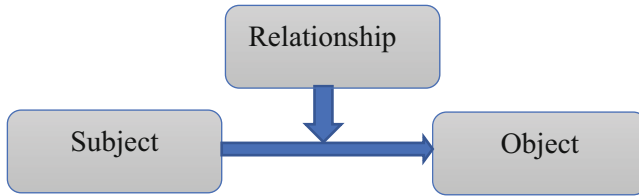


Fig. 2. Graphical representation of a conception (Bruce 2002)

the LS community, with the phenomena of their experiences in LS activity situations. Bruce (2002) illustrated this conception diagrammatically in the following way:

A series of phenomena of the LS team members related to the teacher's role as educators and learning researchers in LS activities, will eventually produce a "description category". Category descriptions were the ways that researchers produced to describe qualitatively different ways of experiencing a phenomenon, originating from the participants, (Marton & Booth 1997).

In this research, the object is the phenomenon of LS activities related to the teacher's role as an educator and learning researcher. While the subjects are model teachers, observer teachers and school principals, who are sources of information.

The researcher will carry out an analysis to organize into descriptive categories, both data related to the subject and the object. Subjects are individual conceptions of the LS Team and objects are phenomena of LS activities related to the topic of teachers as educators and learning researchers. Each teacher will have individual conceptions, as a result of experiencing, interpreting, understanding, feeling the phenomenon of LS activity. The researchers interpret these individual conceptions, become a descriptive category, and identify these conceptions so that they have meaning.

The subjects of this study were model teachers, observation teachers, and school principals who served as information providers. The focus is on.

Muhammadiyah schools in Central Java. The purpose of this study is to identify this learning object by evaluating the relationships between the teacher, the LS team, the researcher, and the observed events. The researcher's link to the examined phenomenon, which shapes their perspective and analysis.

3.2 Researched Aspects

Learning experience is something that can be seen through the what and how aspects of the experience. The "what" aspect is the direct object of learning which is the content of the construct studied as the phenomenon under study. The "how" aspect refers to the learner's approach to achieving his task. In other words, how do students understand and learn the construct in question. How is it more directed to the way LS learning actions are carried out, learning objects do not directly refer to the goals to be achieved by the learner (Marton, and Booth 1997). Phenomenon recording data is written in the form of a description and then analyzed.

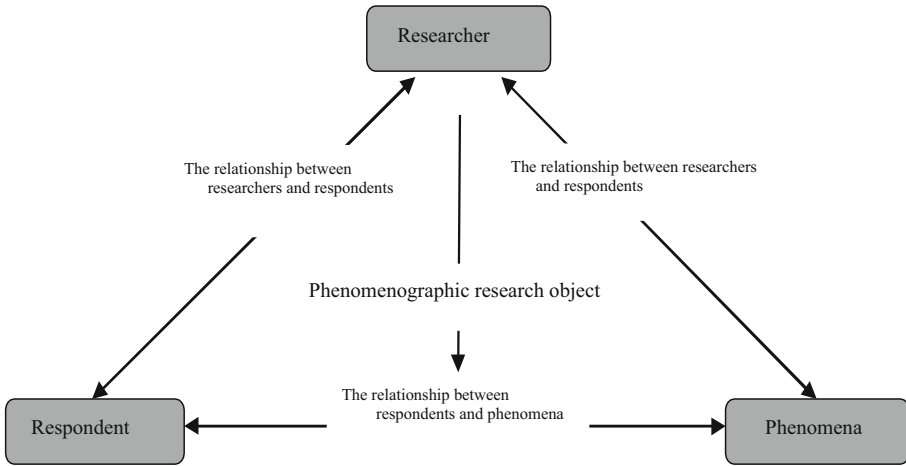


Fig. 3. Phenomenographic research object (Stamouli and Huggard, 2007)

Table 1. Record Data Category Description

Aspect	Target	Strategy	Phenomenon	Indicator
What aspect	Direct object of learning	It is the content of the construct studied as the phenomenon under study	1. The teacher’s relationship as an educator with lesson study activities	Related experience: 1. Material content 2. Class management 3. Learning strategy 4. Collaborative culture 5. Student competence 6. Learning preparation 7. Learning Implementation 8. Insight into students 9. Learning research 10. Professional learning 11. The LS Community
Aspect How	The learner’s approach to LS activities	Action learning: the experience of the way in which the learning action is carried out	2. The teacher’s relationship as a learning researcher with lesson study activities	
	The goals to be achieved by the teacher	indirect learning objects	3. The relationship between teachers as educators and learning researchers with lesson study activities	

4 Result and Discussion

4.1 Research Result

The data of the research were obtained by filling in a qualitative questionnaire. The data is separated between model teachers, observer teachers and school principals. Incoming responses are collected and reduced according to the research topic, data is organized in order to provide conclusions to purify meaning.

4.2 Discussion

The following is an explanation of the phenomenon of experience that can be explained:

4.2.1 Teachers as Educators in Lesson Study Activities

Each school was formed by an LS Team consisting of 1 model teacher, 2 observer teachers, 1 school principal. The LS activities carried out are compiling design chapters and design lessons, open classes, and reflections, as well as feedback for the next LS activities. Activities at the PLAN, DO and SEE stages are always carried out collaboratively by the LS Team.

The implementation of the plan is based on the problems faced related to learning, both those faced by teachers and students, material that is considered difficult, the application of inappropriate methods, learning that takes a long time, inappropriate assessments, etc. This problem will be solved through proper planning in the design chapter and design lessons. In-depth planning, with various experiences and references supported by LS team members, will result in good design chapters and design lessons. Collaborative planning above will produce active learning, with a learning approach to solving existing problems.

Aforementioned data is relevant with Dewey (1971) that planning should always start from the experience and skills that students have previously acquired. At the time of DO, the growth of experiences possessed by students will be a consideration for the learning carried out by the teacher. One of the conditioning factors of Dewey's education is problematization. Problems become the basis for planning and implementing learning, so that meaningful knowledge occurs. At the time of learning there will be problem solving through previous experiences experienced by students, where they not only develop techniques but also intelligence and morality. And see its integral development. Past experiences as leverage, to explore the present and build the future. So that learning will be dynamic, with active participation of students (Dewey 1971). The classroom becomes an active space for scientific discovery as a starting point that allows students to reconstruct and analyze everything. Students become active learning agents of education, with a life history of real life activities (Dewey 1971; Marques 2001). The above was emphasized by Vygotsky, who said that children's self-regulation in the problem-solving process would develop after adult guidance. Children will restructure their ability to solve problems through a series of experiments based on social characteristics. (Van der Veer 2014).

LS activities are carried out collaboratively. This is in line with that cooperative learning, develop the capacity of communication and cooperation. Teamwork will encourage

Table 2. Stages of Analysis

Subject	Conception	Category Description
Model teacher	There was an expansion of mastery of the content of learning material by the teacher. Through discussion on lesson planning has encouraged all team members to complement each other. This will increase mastery of the material content	A
	Teachers have the skills to manage classes with a variety of appropriate learning approaches. The learning approach is based on previous learning experiences	C
	Encourage teachers to design and implement lesson plans in an innovative and creative way. Lesson planning is based on student experience and recommendations from the LS Reflection activity	C
	The teachers have skills in providing leverage (scaffolding) in anticipating students' thoughts as well as carefully observing class activities. Assistance is given to students based on the teacher's responses/feedback to the responses shown in student behavior and activities. sCaffolding is provided according to student needs	A, C
	The continuity of learning research skills by the teacher. The teacher conducts learning based on existing learning problems, both from students, teachers or material content, then the teacher changes his learning strategy. This indicates the existence of learning research	B, C
Observer teacher	The learning approach strategy used encourages linguistic, cognitive, affective and psychomorphic improvements in students. The learning approach used by the teacher is carried out to improve learning covering 3 assessment domains, namely: affective, psychomotor and cognitive, including linguistic skills	A
	Encourage students to think critically. LS encourages problem-based learning that must be completed by students and teachers. This encourages students' thinking skills	A, B

(continued)

fostering an attitude of solidarity, and students will follow social processes. Dewey's

Table 2. (continued)

Subject	Conception	Category Description
	Increase teachers' insight about students and their learning. Observational orientation towards student activity has encouraged teachers to understand student characteristics and then follow up through learning approaches	A, B, C
	Improving the learning practice community in a professional manner. LS has encouraged teachers to do their best learning, by conveying their learning experiences. It encourages teachers to evaluate the learning they have done and improve it, as well as inform the good practices they have	B, C
Headmaster	A school culture and environment that is conducive to collaborative activities is formed. LS activities encourage learning processes that are carried out collaboratively and encourage continuity	A, B, C
	Increase teachers' insight about students and their learning. LS activities, require teachers to understand, learn, respond to student activities and carry out enrichment using a variety of relevant references, to improve the quality of learning	A,B, C
	There is a transformation of learning from isolated individuals to collectives and communities. LS activities encourage teachers to share, exchange information. Thus encouraging personal best practice experiences to be disseminated	A,B, C

Notes:

- A. The phenomenon of the teacher as an educator in LS activities
- B. The phenomenon of the teacher as a learning researcher in LS activities
- C. The phenomenon of teachers as educators and learning researchers in LS activities

pedagogical principle, that education is from by and for the community, thus prioritizing responsible citizenship, in solving problems faced by modern society by developing critical thinking skills and capacities. Strengthened by Vygotsky's theory where social and communicative utterances undergo a series of transformations and finally become inner speech, which has an impact on self-regulation and allows reflection, so that it becomes self-confidence, which brings children's independence. Child independence occurs after benefiting from instructions and suggestions that are almost within reach; with the help of instructions, the child is able to do what is in the zone of his closest intellectual development. This is what gives direction that class discussions with peers who are more capable can promote the zone of proximal development of students and bring

about student independence, to find problem-solving strategies and children's readiness to enter new stages of development, (Van der Veer 2014).

From the explanation above, there are pedagogic values that can be found. The analysis is based on the pedagogic characteristics conveyed by an educational figure, namely John Dewey. John Dewey is a pioneer of the science of educational psychology. Education is a phenomenon created by and for society, based on scientific method approaches (experiments) to gain an understanding of meaning (Dewey 1971; Silva & Tavares 2010). It is consistent that Lesson Study affects student learning by bringing the teacher's learning 'meaning-oriented' (Vermunt, Vrikki, Warwick, & Mercer 2017; Vermunt, Vrikki, Van Halem, & Mercer 2019).

Education is a means to build a better human and society, and a place for people who seek the truth. Education in the form of schools as a place to develop students' capacity to think and teach that the future (Dewey 1971; Pimenta 2010; Silva & Tavares 2010). Experiments with a broader investigative attitude, to ensure the learning of solid scientific knowledge, by linking technology and other social and environmental issues under consideration, by producing outputs in the form of projects and products, known as "Active Pedagogy". At that time, the discussion was based on the conception that education is a life process and school should represent current life as real life. There are five steps to the learning approach that refers to the Scientific Experiment Method: 1) Activities, 2) Problems, 3) Data collection, 4) Hypotheses, and 5) Experiments, known as Dewey's five methodological steps.

The LS is a professional development model that includes cycles of collaborative development of lesson plans, lesson delivery along with class observations, debriefing and after-lesson reflection, and revision. That through LS teachers will experience new changes including: transformation of knowledge and skills, as well as community building. Inform each other of the progress experienced by teachers, and expand the reach of the community that is formed. They are involved in a joint effort to develop knowledge and skills together (Huang, et al. 2010).

Professional development includes a cycle of collaborative development of lesson plans, delivery of lessons together with class observations, debriefing and after-lesson reflection, and revision (Huang and Bao 2006; Yang and Ricks 2013), as a form of LS activity. Lesson Study both content and pedagogical knowledge and skills, and an open implementation component that is learner-centered, (Lerman and Zehetmeier 2008, p. 139).

Lesson study (LS) is a practice that has been accepted internationally as a useful process for teacher professional development (Mostofa 2014). LS contributes to teacher active learning (Bocala 2015), is an effective practice for enhancing learning to support teacher success in teaching (Stigler & Hiebert 2017); (Chong & Kong 2012). The success of this learning will be promoted as the development of teacher pedagogical content knowledge.

4.2.2 Teachers as Researchers in Lesson Study Activities

The implementation of lesson study activities by the LS team has had an impact on research skills for teachers. This can be observed from the definition of research and its characteristics. The word research consists of two syllables, re and search, which means

re-search, which applies continuously. Research is a structured investigation that makes use of accepted scientific methodologies to solve problems and create new generally accepted knowledge. Research is a step-by-step process used to collect and analyze information to increase our understanding of a topic or problem. The scientific method consists of systematic observation, classification and interpretation of data. Research in common parlance refers to the search for knowledge. Research is defined as a scientific and systematic search for related information on a particular topic, to obtain solutions to problems or to find and interpret new facts and relationships. Research as a systematic effort to gain new knowledge. Research encourages curiosity which makes it possible to investigate and achieve a fuller and more complete understanding of the unknown (Kothari. C.R. (2004); Singh 2006; Creswell; Payton 1979; Walliman & Walliman 2011).

According to Clifford Woody (1927) research is a careful or critical investigation or examination in search of facts or principles, to ascertain something. Research is a prolonged, intensive and purposeful search, which indicates that research is a method of critical thinking. Slesinger and Stephenson (1930) convey that research is the manipulation of things, concepts or symbols for the purpose of generalization in order to expand, correct or verify knowledge, whether that knowledge helps in theory construction or in practice. Research is a search for truth with the help of studies, observations, comparisons and experiments. In short, the search for knowledge through objective and systematic methods, finding a solution to a problem. Research refers to a systematic method consisting of expressing problems, formulating hypotheses, collecting facts or data, analyzing facts and reaching certain conclusions either in the form of solutions to those concerned Kothari. C.R. (2004).

Research will look for answers to certain questions that have so far not been answered and the answers depend on human effort, based on available facilities. Research is a process until a reliable solution is produced for a problem through the planned and systematic collection, analysis, and interpretation of data. Crucial to research is the process of advancing knowledge and enabling people to relate more effectively to their environment in order to achieve their goals and to solve problems, as an effective way of solving scientific problems (Singh 2006; Payton 1979).

Research's contribution to knowledge building as a social process in which findings are accepted as knowledge begins with the choice of a research problem. Among the characteristics of research are: (a) Research is directed at solving a problem; (b) Research is very purposeful; (c) Research involves seeking answers to unsolved problems; (d) Research is carefully recorded and reported; (e) Research emphasizes the development of generalizable principles or theories that will assist in predicting future events; (f) Research is based on observable experience or empirical evidence; (g) Research demands accurate observations and descriptions; (h) Research activities are more often characterized by carefully designed procedures that always apply rigorous analysis; (i) Research requires expertise i.e. the skills needed to carry out an investigation by searching related literature and to understand and analyze the data collected (Singh 2006).

The definitions and characteristics of the research above are also found in learning based on LS activities. The school LS team collaboratively designs lessons, in the form of chapter designs and lesson designs. The results of this planning form the basis for implementing learning activities in class, followed by reflection on student responses,

in order to provide recommendations for the next form of learning activity. Learning activities through LS are carried out based on the problems faced by Tik LS and students. The LS team will carry out PLAN activities based on the problems to be resolved. Learning carried out at the DO stage focuses more on how students respond to their learning. How students solve problems that must be solved in groups illustrates student activities in learning. The reflection carried out by the LS team is to find solutions that are produced through a discussion process, based on field observation data and facts, to be followed up in the next LS activity.

The LS activity figure above is very close to the research characteristics. Scientific research in learning is to take the experimental scientific method as one of the methods and models of learning. This experimental method is a method that intellectually encourages learning and produces productive performance (Dewey 1971). Akiba et al. (2019) stated that in reflection activities there is a process of discussing, and reviewing lessons and instructions to increase thinking about potential re-implementation; and finally, spreading the lesson and why so others can learn from it. Continuous cyclical activity becomes the character of the teacher’s self-evaluation of his learning. They describe lesson study as collaborative classroom research in which a group of teachers seeks to enhance learning, and encourages students to engage collectively (Dudley, Xu, Vermunt, & Lang 2019). Data collection was carried out through observation, reflective journals, video recordings, and interviews. Overall, these initiatives provide a valuable learning space to improve educational competence (Hervas 2020).

The explanation above illustrates that the lesson study activity is a continuous professional development, where the success of this learning becomes a practical learning activity that identifies four learning concepts in group members. There is a conceptual change in students’ understanding, approaches to learning, teaching and learning experiences of teachers, student center learning, (Towaf 2016). In Dewey’s pedagogy, experience is defined in a way similar to reflective thinking, which suggests that the research process, when done properly, is an educational experience. Learning transforms through iterative cycles of designing, teaching, and revising, and unintentionally making learning research a practice that occurs (Ericsson et al. 1993). Good practices

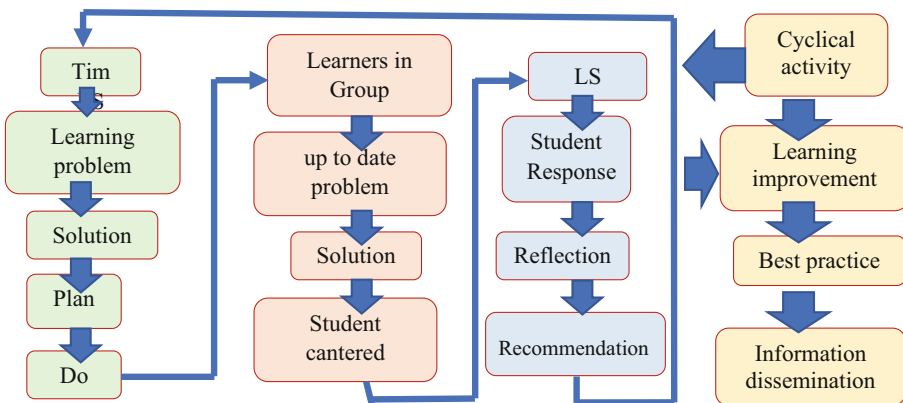


Fig. 4. The teacher’s activity as a researcher in implementing the LS cycle

that occur will be a means of information. This is the reason for the need to publish good practices in the form of scientific article writing.

Lesson study as collaborative classroom research in which a group of teachers seeks to improve outcomes for students involved collectively (Dudley, Xu, Vermunt, & Lang 2019). Teacher professional knowledge and competence can be increased through learning which is the basis in China as a teaching research activity, (Huang, & Han 2015). The application of LS will encourage teachers to conduct research, both to record the implementation of LS, choose the right teaching strategies and methods, formulate recommendations and design the implementation of the next lesson.

4.2.3 Teachers as Educators and Learning Researchers in Lesson Study Activities

Action research was conducted in the classroom as an important means of promoting learning outcomes and solving teaching problems encountered in the classroom. Action research in the classroom could be a means of developing teaching approaches that include linguistic, cognitive, affective and psychomorphic learners, (Fareh, & Saeed 2011). Taking into account the explanation above that LS as a program is suitable to provide research practice learning professionals and to review and broaden their understanding of concepts and processes. All members of the LS team experienced an increase in understanding and mastery of information, and the quality of learning will increase, (Chong & Kong 2012).

Successful implementation of LS is reframing schools as learning organizations requiring the development of a school culture and environment that is conducive to collaborative activities. Participants were given the freedom to think critically, design and implement innovative lesson plans, anticipate students' thinking and closely observe class activities, and to give teachers a central role in developing these practices, and increase teachers' insights about students and their learning (Sarkar Arani, Shibata, & Matoba 2007). Implementation of LS could improve teacher professionalism and learning quality, (Stigler & Hiebert 2017).

LS encourages the birth of a permanent awareness to be a good and professional teacher. There are 3 reasons for this awareness, namely (1) teaching is a very complex job and requires extensive knowledge; (2) teaching practice in the classroom must always be supported and refreshed by continuous research results; (3) the teacher always updates with research results, both made by themselves and read, in order to become a better teacher, (Snowman, et al. 2012). Learning transforms through iterative cycles of designing, teaching, and revising, and unintentionally making learning research a practice that occurs (Ericsson et al. 1993). Given that LS is carried out collaboratively, it will improve teaching within the professional practice community (Yang & Ricks 2013). The school LS team worked together to develop learning research to pursue excellence in teaching, and the school-based learning research group was born. The LS team will engage in joint efforts to develop knowledge collectively, in order to achieve the goals of effective teaching that have been agreed upon by the LS community of practice.

The results of the research above provide an explanation that when the teacher implements learning by applying LS activities, then: (1) There is an expansion of mastery of the content of learning material by the teacher; (2) Teachers have the skills to manage classes with appropriate learning approaches; (3) The learning approach strategy used

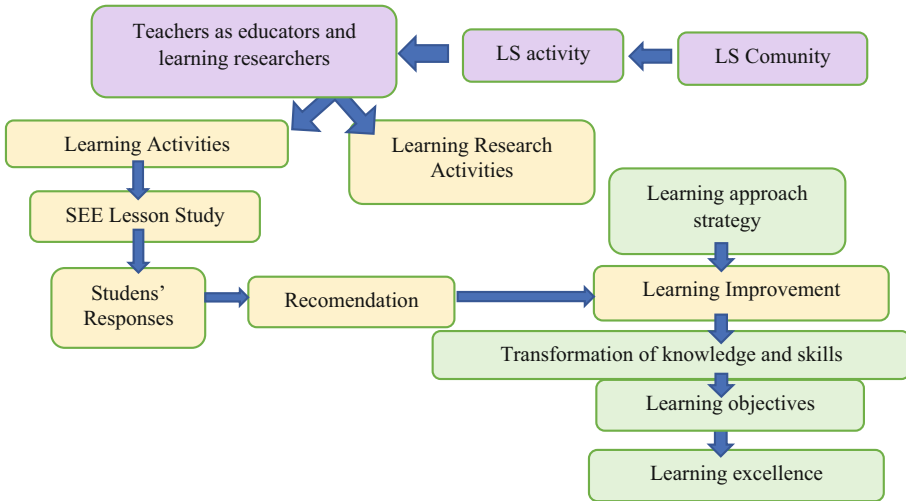


Fig. 5. Teachers as educators and researchers in achieving learning excellence

encourages linguistic, cognitive, affective and psychomorphic improvement of students; (4) creating a school culture and environment that is conducive to collaborative activities; (5) encourage students to think critically; (6) increase the teacher’s insight into students and their learning; (7) encouraging teachers to design and implement lesson plans innovatively and creatively; (8) the teacher has skills in providing leverage (scaffolding) in anticipating students’ thoughts as well as carefully observing class activities; (9) increase the teacher’s insight into students and their learning; (10) the continuity of learning research skills by teachers; (11) improve the learning practice community in a professional manner; (12) there is a transformation of learning from isolated individuals to collectives and communities.

5 Conclusion

Analysis of the teacher as an educator and learning researcher from the phenomenon of Lesson study activities in the Muhammadiyah School Lesson Study Community, has resulted in several conclusions: (1) There is an expansion of mastery of the content of learning material by the teacher; (2) Teachers have the skills to manage classes with appropriate learning approaches; (3) The learning approach strategy used encourages linguistic, cognitive, affective and psychomorphic improvement of students; (4) creating a school culture and environment that is conducive to collaborative activities; (5) encourage students to think critically; (6) increase the teacher’s insight into students and their learning; (7) encouraging teachers to design and implement lesson plans innovatively and creatively; (8) the teacher has skills in providing leverage (scaffolding) in anticipating students’ thoughts as well as carefully observing class activities; (9) increase the teacher’s insight into students and their learning; (10) the continuity of learning research

skills by teachers; (11) improve the learning practice community in a professional manner; (12) there is a transformation of learning from isolated individuals to collectives and communities.

6 Suggestion

There is a need to continuously expand the strengthening of the LS community. It is necessary to form groups to research learning in schools.

Acknowledgments. Great thanks delivered to Universitas Muhammadiyah Semarang which facilitated the research project. Deepest appreciation gave to LS Community as partner to the research happened.

Authors' Contributions. The Contribution of authors were distributed into: author 1: organizing the whole research; authors 2,3,4: collecting the data and analysing the results; authors 5,6: Preparing the research script; authors 7, 8: finalizing and reviewing the research script.

References

- Akiba, T., Sano, S., Yanase, T., Ohta, T., & Koyama, M. (2019). *Optuna. Proceedings of the 25th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining*. <https://doi.org/10.1145/3292500.3330701>
- Bocala, C. (2015). *From Experience to Expertise. Journal of Teacher Education*, 66(4), 349–362. <https://doi.org/10.1177/0022487115592032>
- Brasil (1997). *Parametros Curriculares Nacionais: Introducao (1 e 2 ciclos)*. Secretaria de Educacao Fundamental, Brasilia: MEC/SEF. 1v. <http://portal.mec.gov.br/seb/arquivos/pdf/livro01.pdf>
- Bruce, C. (2002). Frameworks guiding the analysis: Applied to or derived from the data? Paper presented at the International Symposium on Current Issues in Phenomenography.
- Chong, W. H., & Kong, C. A. (2012). *Teacher Collaborative Learning and Teacher Self-Efficacy: The Case of Lesson Study. The Journal of Experimental Education*, 80(3), 263–283. <https://doi.org/10.1080/00220973.2011.596854>
- Coenders, F., & Verhoef, N. (2018). *Lesson Study: professional development (PD) for beginning and experienced teachers. Professional Development in Education*, 1–14. <https://doi.org/10.1080/19415257.2018.143005kothar>
- Creswell, J. W., Seagren, A., & Henry, T. (1979). Professional development training needs of department chairpersons: A test of the Biglan model. *Planning and Changing*, 10, 224–237.
- Dewey decimal classification and relative index. Ed. 18. First published anonymously in 1876 under title: A classification and subject index. 2d- 14th editions published under title: Decimal classification and relativ index. 54 (2), 202–217. <https://doi.org/10.1111/ejed.12337>
- Dewey, J. (1971) *How We Think: A Restatement of the Relation of Reflective Thinking to the Educative Process*, 2nd revised edn. Chicago, IL: Henry Regnery.
- Dewey, J. (2007 [1916]), *Democracy and Education*, Teddington: Echo Library.
- Diane Vizine-Goetz & Joan S. Mitchell (2001) Dewey 2000, *Journal of Library Administration*, 34:1-2, 103-109, https://doi.org/10.1300/J111v34n01_16

- Dudley, P., Xu, H., Vermunt, J., & Lang, J. (2019). Empirical evidence of the impact of lesson study on students' achievement, teachers' professional learning and on institutional and system evolution. *European Journal of Education : research, development and policy*, 54(2), 202-217. <https://doi.org/10.1111/ejed.12337>
- Dudley, P., Xu, H., Vermunt, J., & Lang, J. (2019b). Empirical evidence of the impact of lesson study on: students' achievement, teachers' professional learning and on institutional and system evolution. *European Journal of Education*
- Ericsson, K.A., Krampe, R. and Tesch-Romer, C. (1993), "The role of deliberate practice in the acquisition of expert performance", *Psychological Review*, Vol. 100 No. 3, pp. 363-406.
- Fareh, S., & Saeed, A. T. (2011). *The teacher as researcher in the context of language teaching. Procedia - Social and Behavioral Sciences*, 15, 153–159. <https://doi.org/10.1016/j.sbspro.2011.03.066>
- Hadfield, M., & Jopling, M. (2016). Problematizing lesson study and its impacts: Studying a highly contextualized approach to professional learning. *Teaching and Teacher Education*, 60, 203- 214
- Hervas, G. (2020). Lesson study (jugyou kenkyuu) as an educational development practice for faculty members at the University of Barcelona. *ETH Learning and Teaching Journal*, Vol 2, No 2, 2020. *ETH Learning and Teaching Journal*, Vol 2, No 2. <https://learningteaching.ethz.ch> | ISSN 2624–7992 (Online)
- Huang and J. Bao (2006). "Towards a model for teacher's professional development in China: Introducing keli". *Journal of Mathematics Teacher Education* 9 (3), pp. 279–298 (cit. on p. 1128, 1129).
- Huang, H., Yu, Z., Zhang, S., Liang, X., Chen, J., Li, C., Ma, J., Jiao, R. (2010). Drosophila CAF-1 regulates HP1-mediated epigenetic silencing and pericentric heterochromatin stability. *J. Cell Sci.* 123(16): 2853–2861. DOI. <https://doi.org/10.1242/jcs.063610>
- Huang, R., & Han, X. (2015). *Developing mathematics teachers' competence through parallel lesson study. International Journal for Lesson and Learning Studies*, 4(2), 100–117. <https://doi.org/10.1108/ijlls-10-2014-0037>
- Kothari. C.R. (2004). *Research Methodology. Methods and Techniques.* (second revised edition). New Age Internasional Publishers. ISBN (13) : 978–81–224–2488–1
- Lee Bae et al. (2016). A coding tool for examining the substance of teacher professional learning and change with example cases from middle school science lesson study. *Teaching and Teacher Education* 60 (2016) 164e178. o). <https://doi.org/10.1016/j.tate.2016.08.016>
- Lee, C.K. (2015). Examining education rounds through the lens of lesson study, *International Journal of Educational Research*. <https://doi.org/10.1016/j.ijer.2015.07.001>
- Lerman, S & Zehetmeier, S, (2008). FACE-TO-FACE COMMUNITIES AND NETWORKS OF PRACTISING MATHEMATICS TEACHERS. In book: *International handbook of mathematics teacher education*, Vol. 3: Participants in mathematics teacher education
- Lewis, C., & Perry, R. (2017). Lesson study to scale up research-based knowledge: A randomized, controlled trial of fractions learning. *Journal for Research in Mathematics Education*, 48(3), 261–299. <https://doi.org/10.5951/jresmetheduc.48.3.0261>
- Lewis, M. (2019). Mathematics lesson study around the world: theoretical and methodological issues. *Research in Mathematics Education*, 21(1), 100–104. <https://doi.org/10.1080/14794802.2018.1563563>
- Lynch, D. and Sell, K.(2014). The Teacher Researcher Premise. In Sell, K and Lynch, D. (2014) *The Teacher as Researcher: Case Studies in Educational Research*. Oxford Global: Tarragindi. Pp11–25.
- Marques, R. (2001). *Professores, família e projecto educativo*. Porto: Asa Editores.
- Marton, F. (1986). Phenomenography: A research approach to investigating different understandings of reality. *Journal of Thought*, 21(3), 28-43.

- Marton, F. (1988). Phenomenography: Exploring different conceptions of reality. In D. F. Fetterman (Ed.), *Qualitative approaches to evaluation in education: The silent scientific revolution* (pp. 176–205). New York: Praeger.
- Marton, F. (2000). The structure of awareness. In J. Bowden & E. Walsh (Eds.), *Phenomenography* (pp. 102–116). Melbourne: RMIT University Press.
- Marton, F., & Booth, S. (1997). *Learning and awareness*. Mahwah, NJ: Erlbaum.
- Mostofo, J. (2013). Using lesson study with preservice secondary mathematics teachers: Effects on instruction, planning, and efficacy to teach mathematics (Doctoral dissertation, Arizona State University, USA), available at <http://repository.asu.edu/items/16460> (assessed 14 august 2016)
- Mostofo, J. (2014). The impact of using lesson study with pre-service mathematics teacher. *Journal of Instructional research*, 3, 55-63
- Pimenta, S. G. O. (2010). *Estágio na formacao de Professores: Unidade teoria e prática* (9th ed.)? Sao Paulo: Cortez.
- René van der Veer. (2007). *Lev Vygotsky*. (Series editor, Richard Baily; Series title, Continuum Library of Educational Thought, volume 10). London, UK: Continuum International Publishing Group. 169 pages. ISBN: 978-0826484093 (Hardcover)
- Sarkar Arani, M. R., Shibata, Y. & Matoba, M. (2007). “Delivering Jugyou Kenkyuu for Reframing Schools as Learning Organizations: An Examination of the Process of Japanese School Change”, *Nagoya Journal of Education and Human Development*, Vol. 3, pp.25-36.
- Silva, L. P., & Tavares, H. M. (2010). *Pedagogia de Projetos: Inovacao no Campo Educacional*. *Revista da Católica*, 2, 236–245. <http://catolicaonline.com.br/revistadacatolica2/artigosv2n3/16-Pedagogia.pdf>
- Silverman, D. (2000). *Doing qualitative research: A practical handbook*. London: Sage.
- Singh, Y.K. (2006). *Fundamental of Research Methodology and Statistics*. New Age International (P) Limited, Publisher. ISBN : 978–81–224–2418–8
- Slesinger, D. and Stephenson, M. (1930) *The Encyclopaedia of Social Sciences*. Vol. IX, MacMillan Publications.
- Snowman, J. et al. (2012). *Psychology Applied to Teaching*. Wadsworth. ISBN. 1111356122, 9781111356125
- Stigler, J.W & Hiebert, J. (2017), *The Culture of Teaching from: International Handbook of Teacher Quality and Policy* Routledge
- Towaf, S.M. (2016). Integration of lesson study in teaching practice of social study, student teacher to improve the quality of learning and promotion of a sustainable lesson study. *Journal of Education and Practice*, 7(18), 83-91.
- Uljens, M. (1996). On the philosophical foundations of phenomenography. In book: *Reflections on phenomenography – Toward a methodology?* (pp.105–130). Publisher: Göteborg: Acta Universitatis Gothoburgensis.
- Van der Veer, R. (2014). *Lev Vygotsky*. London, UK: Bloomsbury.
- Vermunt, J. D., Vrikkki, M., van Halem, N., Warwick, P., & Mercer, N. (2019). The impact of Lesson Study professional development on the quality of teacher learning. *Teaching and Teacher Education*, 81, 61–73. <https://doi.org/10.1016/j.tate.2019.02.009>
- Vermunt, J., Vrikkki, M., Warwick, P., & Mercer, N. (2017). Connecting teacher identity formation to patterns in teacher learning. In book: *The SAGE Handbook of Research on Teacher Education* (pp.143-159). Publisher: SAGE reference
- Walliman, N. (2011). *Research Methods the Basics*. Routledge. <https://doi.org/10.4324/9780203836071>
- Wang, H.-H., Charoenmuang, M., Knobloch, N. A., & Tormoehlen, R. L. (2020). *Defining interdisciplinary collaboration based on high school teachers' beliefs and practices of STEM integration using a complex designed system*. *International Journal of STEM Education*, 7(1). <https://doi.org/10.1186/s40594-019-0201-4>

- Woody, C. (1927) The Values of Educational Research to the Classroom Teacher, *The Journal of Educational Research*, 16:3, 172-178, <https://doi.org/10.1080/00220671.1927.10879779>
- Yang and T. Ricks (2013). “Chinese lesson study: Developing classroom instruction through collaborations in school-based teaching research group activities”. In: *How Chinese teach mathematics and improve teaching*. Ed. by Y. Li and R. Huang. New York: Routledge, pp. 51–65 (cit. on p. 1128).
- Yang, Y. and Ricks, T.E. (2013), “Chinese lesson study: developing classroom instruction through collaborations in school-based teaching research group activities”, in Li, Y. and Huang, R. (Eds), *How Chinese Teach Mathematics and Improve Teaching*, Routledge, New York, pp. 51-65.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter’s Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter’s Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

