Lesson Study: Its Influence on Planning, Instruction, and Self-Confidence of Pre-Service Mathematics Teachers

Julio J. Villalon

West Visayas State University, Iloilo City, Philippines;
Iloilo National High School, Iloilo City, Philippines

This mixed-method research aimed to determine the influence of lesson study on planning, instruction, and self-confidence of pre-service mathematics teachers. Ten pre-service teachers coming from a certain state college in Iloilo City were purposively chosen to be the participants of the study. Results revealed that the lesson study process had a very high influence on the instructional planning of the pre-service teachers teaching Grade 8 mathematics. The collaborative planning demonstrated improvement of planning skills of the pre-service teachers, open mindedness for corrections, and opportunity for further collaboration. In collaboratively planning the lesson, the pre-service teachers felt more confident in their ability to plan mathematical lessons in Grade 8 and thus, lesson quality had been improved. In the first implementation of the lesson study, pre-service teachers had a basic performance in delivering the lesson to their students. As the innovation progressed, the pre-service teachers were getting better in delivering the lesson. In the last implementation of the lesson study, they were considered proficient pre-service teachers in terms of instruction. Pre-service teachers started from teaching the collaboratively planned lesson and gradually progressed to showing their own style of teaching. The lesson study clearly afforded the pre-service teachers the opportunity to explore different ways to teach. Furthermore, the pretest mean scores in the self-confidence survey were classified as showing high confidence while the posttest mean scores were classified as showing very high confidence. In addition, the pre-service teachers increased their confidence to teach mathematics from collaborative planning, teaching, debriefing, revising, and re-teaching. Significant increase existed in the self-confidence of pre-service teachers before and after the conduct of the lesson study. Likewise, there was a significant improvement in the mean scores of pre-service teachers' teaching effectiveness between the first and last implementation of the lesson study. Finally, pre-service teachers were able to produce lesson plans as resource materials for mathematics as a result of lesson study.

Keywords: instruction, lesson study, planning, pre-service teachers, self-confidence

Introduction and Literature Review

Republic Act Number 10533, otherwise known as the Enhanced Basic Education Act of 2013 of the Republic of the Philippines, promulgates to improve the quality of basic education and adequately prepares high school graduates to be ready for higher education, work or employment, middle skills development, and entrepreneurship and make them globally competitive (Republic Act No. 10533, 2013). Thus, the K to 12 curriculums have been implemented in the hope that the Department of Education (DepEd) would produce

holistically developed learners who have 21st century skills and are prepared for higher education, middle-level skills development, employment, and entrepreneurship.

To answer the call of the DepEd to improve the quality of basic education especially the teaching of mathematics, there is a need to identify several factors that contribute to the quality of mathematics teaching and learning in schools, such as the role of teacher and students, school facilities, the general environment, school management, and so on. This study focused on the teacher as the most important factor in influencing the improvement of teaching, specifically on teaching mathematics in secondary schools. The DepEd, Teacher Education institutions, and other educators have been exerting efforts by conducting in-service trainings, seminars, workshops, and conferences to improve teaching quality.

Lesson study is a teacher-directed program for improving instruction. It focuses on improving students' learning by systematically refining the lesson used for instruction. Teachers involved in lesson study meet regularly to plan, implement, test, and revise lessons, sometimes according to a theme or focus previously agreed on but always with the intent to improve students' learning (McMahon & Hines, 2008; Fernandez & Yoshida, 2004; Lewis, 2002).

This study aimed to determine the influence of lesson study on planning, instruction, and self-confidence of pre-service teachers to teach Grade 8 mathematics.

Specifically, it sought answers to the following questions:

1. To what extent does lesson study influence instructional planning of pre-service teachers teaching Grade 8 mathematics?
2. How does lesson study influence instructional planning of pre-service teachers teaching Grade 8 mathematics?
3. To what extent does lesson study influence instructional effectiveness of pre-service teachers teaching Grade 8 mathematics?
4. How does lesson study influence instructional effectiveness of pre-service teachers teaching Grade 8 mathematics?
5. To what extent does lesson study develop the self-confidence of pre-service teachers teaching Grade 8 mathematics?
6. How does lesson study develop the self-confidence of pre-service teachers teaching Grade 8 mathematics?
7. Is there a significant difference in the self-confidence of pre-service teachers before and after the conduct of lesson study?
8. Is there a significant difference in the mean scores of pre-service teachers' instructional effectiveness between the first and last implementation of the lesson study?

The hypotheses to be tested were as follows:

1. There is no significant difference in the self-confidence of pre-service teachers before and after the conduct of lesson study.
2. There is no significant difference in the mean scores of pre-service teachers' instructional effectiveness between the first and last implementation of the lesson study.

Methodology

This study employed the quantitative-qualitative methods to examine the influence of lesson study on the

planning, instruction, and self-confidence of pre-service teachers to teach Grade 8 mathematics. Specifically, the Convergence Model of Triangulation Design was used wherein data had been collected separately and the results were merged.

Furthermore, phenomenological method is also incorporated in the hope that the researcher could gain some insights into the world of his or her participants and to describe their perceptions and reactions (Fraenkel & Wallen, 2009). The epistemology of this investigation was based on constructionism which holds that learning can happen most effectively when people are also active in making tangible objects in the real world.

Participants

The participants were the fourth year Bachelor of Science in Secondary Education students of a certain state college in Iloilo City majoring in mathematics.

There were 29 secondary education students majoring in mathematics, but only 10, chosen through purposive sampling, were considered for this investigation. All the 10 chosen pre-service teachers were teaching Grade 8 mathematics in different schools in the Division of Iloilo under the supervision of the person in-charge of the student teaching of a certain state college in Iloilo City and the assigned cooperating teachers of their respective schools.

Instruments

This study used the following instruments to gather the quantitative and qualitative data needed to determine the influence of lesson study on planning, instruction, and self-confidence of pre-service teachers to teach Grade 8 mathematics. The researcher used six instruments, namely: Lesson Study Instructional Effectiveness Rubric, Lesson Study Instructional Planning Questionnaire, Field Notes and Video Analysis, Pre-service Teacher Weekly Reflections, Semi-Structured Interviews, and Mathematics Teacher Self-confidence Survey.

Procedure

Permission to conduct the investigation was asked from the President of a certain state college in Iloilo City and from the Dean of the College of Education. After permission was granted, the researcher began to identify the pre-service teachers who were assigned to teach Grade 8 mathematics and then briefed them about the process of lesson study. Each pre-service teacher had been requested to sign a consent form to be a participant in the study.

Video presentation was shown to the pre-service teachers as an eye-opener on lesson study. There were 10 participants in the study and they were grouped into two: Group 1 was composed of pre-service teachers assigned to teach in schools outside Iloilo City and Group 2 was composed of pre-service teachers assigned to teach at Iloilo National High School and Jaro National High School.

The mathematics teacher self-confidence survey was administered to all the participants during the first meeting and the result served as the pretest scores. After the survey, the pre-service teachers were briefed about the lesson study cycle.

While working on a study lesson, the members of each group jointly drew up a detailed plan for the lesson, and then one of the members from the lesson study team was chosen randomly to teach the lesson to the class. The lesson was video recorded and the researcher took field notes at the back of the classroom while other group members observed the lesson.

The group then gathered together for a debriefing session following the lesson. The pre-service teacher who taught the lesson was requested to reflect first on the lesson and teaching followed by the discussion of

other members about their observations of the lesson. The researcher acted as facilitator during the debriefing sessions.

After the debriefing session, the researcher gave more feedback based on the field notes taken during the lesson. Each pre-service teacher was required to write weekly reflections about the process and their feelings about the conduct of the lesson study.

The group then revised the lesson, and another pre-service teacher was chosen to implement it in a second classroom, while group members served as observers. The group gathered together again to discuss the observed instruction.

Finally, the first version and final version of the lesson and teaching were used to score each lesson study team on the lesson study instructional effectiveness rubric.

At the end of the lesson study process, lesson study instructional planning questionnaire and mathematics teacher self-confidence survey were administered.

Results and Discussion

Influence of Lesson Study on Instructional Planning

The pre-service teachers showed consistent growth for the construct planning from the lesson study instructional effectiveness rubric indicating improvement in lesson planning from the first teaching to the last teaching. In support of this finding, the construct collaborative planning from the lesson study questionnaire had a mean score of 3.86 out of a possible 4.0. This demonstrated that the pre-service teachers “strongly agreed” collaborative planning had a very high influence on their planning. The construct of revising lessons had a mean of 3.84 while the construct debriefing lessons, a component of the lesson study process although not directly focused on planning, also affected their revisions of future lesson plans. The mean for debriefing was 3.74. The pre-service teachers were very confident that planning collaboratively both before and after teaching in the classroom improved their lessons. Thus, the quantitative data clearly demonstrated that this lesson study had a very high influence in the planning of the pre-service teachers in this study.

Emerging themes from the lesson study instructional planning questionnaire. Two themes emerged from the lesson study instructional planning questionnaire: Collaborative planning developed self-confidence to teach mathematics, and debriefing sessions and lesson revision improved the lesson quality.

Emerging themes from the pre-service teachers’ weekly reflections. Three themes emerged from the weekly reflections of the pre-service teachers about the lesson study. The first theme was about the collaboration in making lesson plan. The second theme that came from the pre-service teacher reflections was about on improving self-confidence in teaching. The third theme was on emphasizing student’s activity.

Emerging themes from the semi-structured interviews. Semi-structured interviews were conducted to all pre-service teachers who had participated in the lesson study after the innovation. The themes emerged are: collaborative planning increases the skills of the pre-service teachers in lesson planning, collaborative planning enables the pre-service teachers to use the appropriate strategy to teach the lesson, and collaborative planning helps the pre-service teachers to achieve the objectives of the lesson. The second theme from the semi-structured interview is on improving self-confidence. Based on the interview of the pre-service teachers, most of them claimed that their self-confidence to teach mathematics has improved because of the lesson study. The third theme that emerged in the semi-structured interview is on emphasizing on students’ activity. It is the part of planning of the pre-service teachers the activity to be given to the students. The fourth theme is about

debriefing. Pre-service teachers noted that the comments and suggestions from the group were used for the improvement of the next teaching.

Influence of Lesson Study on Instructional Effectiveness

Five topics were considered in this lesson study, namely: If-Then Statements, Systems of Linear Equation, Triangle Inequalities, Side-Angle-Angle (SAA) Postulate, and Parallel Lines and Transversal. Means and standard deviations of the first and last teaching of each topic were computed.

The results demonstrate gains between means of the first and the last teaching as the innovation proceeded through the second or third rounds of the lesson study.

Furthermore, the over-all mean of the last teaching is 3.37. This implies that pre-service teachers are getting better in delivering the lesson to the students. Thus, they are considered a proficient pre-service teacher. It shows that pre-service teacher's plans and practice reflect accurate understanding of prerequisite relationships among concepts and topics. Pre-service teacher's instructional purpose for the lesson is clearly communicated to students and explanation of content is appropriate and connects with students' knowledge and experience. Pre-service teacher's successfully engages most students in class discussion. The learning tasks and activities are aligned with instructional outcomes and are aligned to challenge student thinking. The pacing of the lesson is appropriate, providing most students the time needed to be intellectually engaged. Table 1 presents the data.

Table 1

Means and Standard Deviations of the First and Last Teaching

Topic	First teaching			Last teaching		
	<i>SD</i>	<i>M</i>	<i>Description</i>	<i>SD</i>	<i>M</i>	<i>Description</i>
If-Then Statements	0.36	1.38	Unsatisfactory	0.29	3.43	Proficient
Systems of Linear Equation	0.30	2.14	Basic	0.47	3.13	Proficient
Triangle Inequalities	0.17	2.18	Basic	0.22	3.22	Proficient
SAA Postulate	0.22	2.47	Basic	0.29	3.30	Proficient
Parallel Lines and Transversals	0.27	2.65	Proficient	0.18	3.78	Distinguished
Over-all	0.26	2.16	Basic	0.30	3.37	Proficient

Note. The description is based on the following scale: 3.50-4.00—Distinguished; 2.50-3.49—Proficient; 1.50-2.49—Basic; and 1.00-1.49—Unsatisfactory.

Table 2

Mann-Whitney U Test Comparing the First Teaching and the Last Teaching

	System of Linear Equation	If-Then Statements	SAA Postulate	Triangle Inequalities	Parallel Lines and Transversal
Mann-Whitney <i>U</i>	5.00	0.000	0.000	0.000	0.000
<i>Z</i>	-3.42	-3.81	-3.27	-3.82	-3.84
Asymp. Sig. (2-tailed)	0.001	0.000	0.000	0.000	0.000

To determine if a significant difference would exist between the means of the first teaching and the last teaching, Mann-Whitney *U* test was employed. Table 2 shows that there was a significant improvement in the mean scores of pre-service teachers' teaching effectiveness between the first teaching and last teaching System of Linear Equations ($z = -3.42$, $p = 0.001$), If-Then Statements ($z = -3.81$, $p = 0.000$), SAA Postulate ($z = -3.27$, $p = 0.000$), Triangle Inequalities ($z = -3.82$, $p = 0.000$), and Parallel Lines and Transversals ($z = -3.84$,

$p = 0.000$). This means that the pre-service teachers performed better in the last teaching of the abovementioned topics. Table 2 presents the data.

Emerging themes from field notes and video analysis. Field notes were used to offer feedback during the debriefing sessions following each teaching episode. There were three themes that emerged in this source of data. The first was teacher-centered to student-centered. In the first round of teaching of the pre-service teachers, it was noted that they tended to monopolize the discussion and students were just listening to the teacher. Twenty minutes before the class ends, the pre-service teacher gave a group work to a group of more than ten students per group. Since it was a big group, pre-service teacher would find it difficult to manage and most of the students were not working or cooperating with their group mates. In the field notes, the author wrote that most of the pre-service teachers teaching in the first round had a difficulty to check whether the students had learned or not because the pre-service teacher talked more while the students exclusively listen and pre-service teachers showed less confidence in teaching the topic that they had collaboratively planned. Sample researcher's comments during the first teaching as stated in the field notes:

Pre-service teacher did not follow the collaboratively-planned lesson and started the presentation of the lesson by giving problems which involved fractions and large numbers for the topic systems of linear equation. During the group work, pre-service teacher had a difficulty in checking if all the members of the group were participating or not because there were 15 students per group. It can be seen in the face of the pre-service teacher that she was not confident in front of the students and she did not even bother to correct the wrong solution of the students.

The transition from teacher-centered to student-centered instruction started to show up in the next teaching episode of the same topic. After the debriefing session of the first teaching, the lesson study group had to revise the lesson plan that would make it more student-centered. The author has pointed out in the field notes that,

Pre-service teacher started to ask students to predict what will happen to the measures of the angles of the similar triangles if the length of the sides be increased. In the first teaching, students were not asked but they were just told that the angles remain the same.

Instead of listening to the pre-service teacher exclusively, students were encouraged to interact, ask questions in case of confusion, and participate actively in the class discussion. Group work with at most five students per group was encouraged and students learn to collaborate and communicate with one another. Enough activities were given to the students to reinforce the learning of the students. The author has also stated in the field notes that students were more interested in learning activities where they can interact with one another and participate actively in the class discussion and in the group work.

The second theme that emerged on this source of data was about the practice teaching of the pre-service teacher using lesson study increases the quality of teaching. In the field notes and video analysis, the author has noted that pre-service teachers have improved the quality of their teaching from the first teaching to the last teaching as the innovation progressed. Their collaborative planning, re-teaching, and revising the lesson plan had greatly influenced the quality of teaching of the pre-service teachers as shown in the video. The rating given by the observers also indicated that teaching of the pre-service teacher had increased from first teaching to the last teaching.

The third theme was about the pre-service teacher's own teaching style. In the field notes and video analysis, the author has noted that pre-service teachers have their own teaching style. The same lesson plan was taught differently by the pre-service teachers. For example, in the lesson If-Then statement, Student-Teacher A

started the lesson by asking the students about their problems encountered in school and what have you done to solve the problem? After the students had responded the questions, Student-Teacher A proceeded to present the topic If-Then statement. In the next teaching, Student-Teacher B started the lesson by asking the students the same questions asked by Student-Teacher A. However, Student-Teacher B explained further the problems and solutions presented by the students. Student-Teacher B connected it to the topic If-Then statement and summarized the discussion by stating that “for every action we make, there is always a reason behind it.”

There were some pre-service teachers who used laptop and projector to present the lesson and others simply used the chalkboard and Manila paper to present the lesson.

Three themes from field notes and video recordings were related to instructional strategies. The first theme was the shift from teacher-centered approach of the pre-service teachers to teach mathematics to student-centered approach. The pre-service teachers were trying to revise their lesson plan after the debriefing session to make it more student-centered. The second theme from the field notes was about the practice teaching of the pre-service teachers using lesson study improves the quality of teaching. This is confirmed from the quantitative data that the over-all mean increased from 2.16 to 3.37. It can be inferred that the pre-service teachers improved their instructional ability by practicing more and receiving feedback after the debriefing sessions. The third theme from the field notes and video analysis was about the pre-service teachers own teaching style. Evidence demonstrated that each pre-service teacher has their own way of teaching the collaboratively-planned lesson as the rounds of the lesson study progressed.

The triangulation of quantitative and qualitative results from the Lesson Study Planning and Instructional Rubric, field notes and video analysis demonstrate that the lesson study did greatly influence the instructional ability of the pre-service teachers. Pre-service teachers went from teaching the collaboratively-planned lesson to gradually showing their own style of teaching as the lesson study progressed.

Self-Confidence of Pre-Service Teachers

The survey results indicated that there was an increase from the pretest to posttest with means and standard deviations of 2.87 (0.17), interpreted as high confidence; and 3.61 (0.21), interpreted as very high confidence, respectively. The results indicate that at the start of the study the pre-service teachers have already a high confidence to teach mathematics to Grade 8 students. However, when lesson study was introduced to and applied by the pre-service teachers as innovation to teach mathematics, the mean score has increased and the confidence level of the pre-service teachers became very high confidence.

Statistical Package for Social Sciences (SPSS) converts the Wilcoxon Signed Ranks Test to a z -score that can be tested for significance under the normal curve (Ho, 2014). Using the 0.05 level of significance and a two-tailed test, the critical values of z are -1.96 and +1.96. Since the obtained value of z (-2.81) exceeds the critical values, it is concluded that the lesson study is effective in developing the self-confidence of pre-service teachers teaching Grade 8 mathematics. Table 3 presents the data.

Table 3

Wilcoxon Signed Ranks Test of the Mathematics Teachers' Self-Confidence Survey

	Posttest-Pretest
Z	-2.81*
Asymp. Sig. (2-tailed)	0.005

Note. * $p < 0.01$.

Based on the analysis of the qualitative data from mathematics teachers' self-confidence survey, pre-service teachers' weekly reflections, and semi-structured interviews only one theme emerged: improving self-confidence in teaching mathematics. Pre-service teachers became more confident in teaching in front of the students. By the end of the lesson study process, the pre-service teachers were much more confident to be a real teacher after graduation in college.

The semi-structured interview also demonstrated that the lesson study had improved the self-confidence of the pre-service teachers as the second theme emerged in this source of data. The pre-service teachers gradually built their confidence from the first teaching to the last teaching as mentioned during the interview. The reflecting, debriefing, revising, and re-teaching also helped to build confidence to teach the lessons.

Findings

The findings of the study were as follows:

1. The lesson study process had a very high influence on the instructional planning of the pre-service teachers teaching Grade 8 mathematics.
2. In collaboratively planning the lesson, the pre-service teachers felt more confident in their ability to plan mathematical lessons in Grade 8, and thus lesson quality was improved. Collaborative planning demonstrated improvement of planning skills of the pre-service teachers, open-mindedness for corrections, and opportunity for further collaboration.
3. In the first implementation of the lesson study, pre-service teachers had basic performance in delivering the lesson to their students. As the innovation progressed, the pre-service teachers were getting better in delivering the lesson. In the last implementation of the lesson study, they were considered proficient pre-service teachers.
4. Pre-service teachers started from teaching the collaboratively planned lesson and gradually progressed to showing their own style of teaching. The lesson study clearly allowed the pre-service teachers the opportunity to explore different ways to teach.
5. The pretest mean scores in self-confidence survey were described as high confidence while the posttest mean scores were described as very high confidence.
6. The pre-service teachers increased their confidence to teach mathematics from collaborative planning, teaching, debriefing, revising, and re-teaching.
7. Significant increase existed in the self-confidence of pre-service teachers before and after the conduct of the lesson study.
8. There was significant improvement in the mean scores of pre-service teachers' instructional effectiveness between the first and last implementation of the lesson study.

Conclusions

In view of the findings, the following conclusions were drawn:

Lesson study can become a supportive framework for the reflective collaboration of teachers as they strive to improve instruction. Findings of this investigation have shown that through lesson study experience, pre-service teachers were able to observe students' responses to instruction, focus on student learning, and revise a lesson accordingly.

The pre-service teachers as participants, were able to work together to connect what they learned in their college classes with what happens in an actual classroom lesson; they learn early in their careers the skills and

benefits of collaboration; and they learn the power of observation and analysis of student thinking and begin to develop the skills to conduct it.

Through lesson study, the pre-service teachers have moved from a teacher-centered approach to a more student-centered approach in their lesson planning and instruction. In addition, the conduct of lesson study greatly influenced pre-service teachers on their instructional planning and instructional effectiveness as revealed in the different themes that emerged from the different sources of data.

By doing lesson study, pre-service teachers develop a better understanding of what it takes to plan and teach a good lesson. They learned a lot about what the other pre-service teachers are thinking when they are developing a lesson, observing the lesson, and evaluating the lesson. Pre-service teachers mentioned that observing somebody's teaching, combined with trying out similar lessons on their own, and was the best way to learn how to teach.

Increased self-confidence to teach mathematics was also revealed in this investigation. Several themes emerged from the data about improving self-confidence as a result of the lesson study, indicating that practicing lesson study helped the pre-service teachers to build their self-confidence to teach mathematics and that the increased confidence that they have gained had a positive impact on their effectiveness as future teachers.

The collaborative aspect of lesson study had the largest influence on the teaching of the pre-service teachers. Collaborative nature of lesson study improved their teaching through sharing of ideas, working together to remedy challenges, and building their confidence as teachers. The efforts manifested through collaboration led to the development of work that is content focused, student-centered, and reflective of one's own teaching practice. Thus, building a strong collaborative foundation is the key to the success of lesson study.

Implications

The findings of the present investigation have led to certain implications for theory and practice in relation to the influence of lesson study on planning, instruction, and self-confidence of pre-service teachers to teach Grade 8 mathematics.

Theory and research provide excellent starting points for understanding what good instruction is, and in a perfectly controlled world, the best practices documented by research might be the same in every classroom. But in the real world, every class is different. Lesson study assumes that teachers need to look for evidence of students' learning, motivation, and development in their own classrooms and does not assume that a strategy will work automatically simply, because it has been proven through research.

Lesson study by pre-service teachers teaching mathematics in Grade 8 revealed a significant influence on planning, instruction, and self-confidence. It is implied that the pre-service teachers transformed new learning into their own style of teaching as outlined in the four quadrants in Vygotsky's Space. The first quadrant relates to the appropriation of particular ways of thinking through interaction with others. This was demonstrated during the collaborative planning of the pre-service teachers and how they acquired different teaching strategies from their group mates. The second quadrant is individual transformation. This was confirmed in the gradual shift of the planning of the pre-service teachers from a teacher-centered to a more student-centered approach of teaching. The third quadrant is the publication of new learning through talk or action. This was evident through the final lesson plan as a result of the collaborative planning of the pre-service teachers to be used in the classroom. The fourth quadrant focuses on the conventionalization of that practice. This stage was verified later in the innovation as the pre-service teachers used their own way of teaching the collaboratively planned lesson.

Increased teaching confidence was reported as being a benefit of lesson study. Practicing lesson study reaffirmed theories on teaching and teaching practices that it helped to build the self-confidence of the pre-service teachers to teach mathematics and the increased confidence that they gained had a great influence on their effectiveness as teachers. Thus, in this investigation, the increased self-confidence of pre-service teachers from practicing lesson study may also contribute to improve student achievement.

Through the findings of this investigation, in-service and pre-service teachers are encouraged to deepen their own practice and participation in lesson study their knowledge of students' development and how to cultivate rich learning.

Lesson study improved the teachers' reflective thinking about teaching especially when they worked in a learning community (Cheng, & Yee, 2011). Lesson study provided an avenue of support for teachers to experiment with different teaching approaches. When professional development was embedded in these teachers' practice that included planning, observing, critiquing, and collaborating, it led to their professional growth. The pre-service teachers in this investigation believed that such growth will have lasting impact on their instructional practices in the future.

Recommendations

On the basis of the findings, conclusions, and implications of this investigation, the following are recommended:

Lesson study should be included in the teaching strategies subjects in college especially those in Teacher Education Institutions, so that when the education students undergo practice teaching they can form a group and use it as an innovation.

School principals or cooperating teachers are encouraged to support pre-service teachers' involvement in lesson study by allowing them to attend the meetings required by the team to formulate and decide which topics to consider for the lesson study, even if it may be conducted in school or in other schools.

Curriculum planners may include trainings on lesson study for pre-service teachers or even for in-service teachers to be conducted as teachers' motivation to improve the quality of teachings and can be a model for teachers' ongoing professional development and enhance the teaching skills for the better implementation of the K to 12 curriculums of the Department of Education.

Writers of books on pedagogy are likewise encouraged to write about lesson study for the development of new ideas for teaching and learning as well as images of good teaching practices in the classroom.

It is also recommended that for those teachers who want to use lesson study for a start, it would be better to form a group of teachers teaching in the same school, because proper grouping is important and it would be difficult for several unconnected teachers to suddenly be thrown in together to build a vision and work toward a common goal.

The group size of the lesson study group should be ideally 3-5 per team. If there are only two, there is no balance in views expressed; if there are six or more, there is not enough time for everyone to participate in the planning and review sessions and it would be difficult to release such a large number of teachers at one time.

Members of the lesson study group are recommended to plan a lesson that would expose students to different solutions to a problem in order to help them develop good problem-solving skills.

Other researchers who want to try lesson study are recommended to explore different models for further investigation.

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