

LESSON STUDY AS GRADUATE SCHOOL STUDENTS' OUTPUT IN FOUNDATION OF MATHEMATICS DURING INNOVATIVE CLASS

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ABSTRACT

Graduate school in Marikina Polytechnic College has transformed its mode of teaching from face-to-face to online setup and is classified by the college as an innovative class. Thus, an appropriate learning assessment should be conducted throughout the innovative class. Lesson study was chosen to be one of the outputs in Foundation of Mathematics for MAT-Math graduate school students (also professional teachers who continued their studies) as a learning assessment. This proceeds to the objective of this study, which is to determine the personal learning of graduate school students and their teaching and learning as professional teachers after doing lesson study. The method used in this research is social impact assessment. Reflections of graduate school students on the conducted series of lesson studies were collected and analyzed through a thematic approach. Furthermore, this study shows that graduate school students learning after conducting lesson studies are valued in collaboration, openness to continuous improvement, technological and pedagogical knowledge enrichment, and writing scholarly works. Also, this study discusses the impact of lesson study to graduate school students' teaching and learning: plan-teach-reflect cycle implementation, teaching creatively and innovatively, focus on students' learning, current issues awareness in teaching and learning, and pedagogical confidence. Consequently, it is suggested to use the lesson study as a learning assessment for graduate school students since, it is also considered as continuing professional development for teachers.

Keywords: Lesson Study, Graduate School Students, Social Impact Assessment, Philippines

INTRODUCTION

In response to the COVID-19 pandemic of the education community, many schools from different countries have exerted efforts for the continuity of students' learning through the internet, videos, television, and even radio. This can also be seen in higher education; they have replaced their mode of learning face-to-face to online learning (OECD, 2020). Having the online mode of learning, in some countries

like Uzbekistan, Kenya, and India shows a decline in performance in low-income students due to a lack of resources such as smartphones, these smartphones become the bridge for teachers in providing instructions (Sparks, 2022). Connecting to teachers' instructions or way of teaching is the assessment to measure students' performance in specific competencies. Developing assessment activities in your teaching is an excellent way to evaluate your students'

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learning. With the online mode of learning, you can use online quizzes, dialogues simulations, drag-and-drop activities, game-based learning, open-ended questions, peer evaluations, essay, online polls, discussion or forum posts, online interviews, fill-in-the-blanks and puzzles (Raouna, 2022).

Likewise in the Philippines, e-learning (an online mode of learning) become a trend, from discussion of the topic, and sharing of learning resources to learning assessment. This becomes a challenge in the Philippines' education since instructors must identify the appropriate e-learning tool for them to deliver their lessons and assess their students' learning (Bandalaria, 2018). Many assessment practices were used in the Philippines to measure students' learning. In higher education, the student was assessed through the categories of; (1) assessment for career/industry readiness and development of essential skills; (2) mounting assessment system to support instruction; and (3) collaborative and reflective assessment process (Sarmiento et al., 2020).

The collaborative and reflective assessment process became the focus of this study. One of these collaborative and reflective assessments is Lesson Study (Norwich et al., 2014). Lesson study is the collaborative professional development of teachers in Japan that will help improve the teaching and learning that take place in their classrooms (Næsheim-Bjørkvik & Larssen, 2019). Also, lesson study is now acknowledged as continuing professional development in the United States and the United Kingdom and no doubt to improve teaching and learning.

Moreover, with current issues encountered by the Philippines, Lesson study can enhance the educational system of the country, especially in the field of Mathematics (Elipane, 2017). This could help the teachers give a deeper and more contextualized learning based on the culture and condition of the institution. As the Marikina Polytechnic College change its mode of teaching, from face-to-face class to innovative class (Diokno, et. al., 2022), many continuing professional development is needed, from knowledge-based, to mental-

based (Ong, et.al., 2019) and technology-driven training and seminars, for teachers and the students to catch up with the arising modernization in teaching and learning. This became the foundation of this study, on what kind of assessment could be given to the graduate school students that will improve their professional and that is Lesson Study.

OBJECTIVES OF THE STUDY

In the conduct of this study, the researcher used reflective analysis to evaluate the impact of doing lesson study in the Foundation of Mathematics on Graduate School Students. Specifically, this study aimed to determine the perceived personal learnings of graduate school students after conducting a series of lesson studies in the Foundation of Mathematics, and the impact/s of doing a series of lesson studies in the Foundation of Mathematics on their teaching and learning.

METHODOLOGY

The method used in this research is social impact assessment. Social impact assessment is a process to understand the possible after-effect of a proposed action, which is conducting series of lesson study in this study (Sure Impact, 2023). The participants of this research was chosen through a purposive sampling (Palinkas et al., 2013) which are the graduate school students who are taking Foundation of Mathematics in Marikina Polytechnic College, concurrently the participants are also professional teachers of different schools in eastern part of Manila namely; Antipolo City, Marikina City, Pasig City and Quezon City.

The study started in providing training about the lesson study to the participants on how to conduct it in classrooms. After a series of lesson studies, the participants are requested to submit reflection paper about their learnings and perceived impact of doing the lesson study. This was patterned in the Gibb's Reflective Cycle (Rumson, 2018). Analysis of the

reflections was done with a thematic approach (Vaismoradi et al., 2013). Ethical consideration was manifested; privacy, safety, and anonymity of the participants (Wang & Redwood-jones, 2001), and pseudonyms were used to represent graduate school students for their rights to anonymity.

RESULTS AND DISCUSSION

After analyzing the reflection of the graduate school students (also known as professional teachers), it was separated into two major themes; (1) graduate students' learning after doing the lesson study, and (2) the lesson study's impact to graduates school teaching and learning.

1. Graduate School Students' Learning after doing Lesson Study

During the lesson study, Graduate School students became not stagnant on learning only the topics in the foundation of mathematics but were allowed to learn beyond mathematics. These newfound learnings during the implementation of lesson study are discussed below:

1.1. Value in Collaboration

According to Richit et al. (2021), doing a lesson study enriches several aspects of collaboration among professional educators. And doing lesson study as an output for the Foundation of Mathematics not only enhances their collaborative practices with other professional teachers but also the value of collaboration. Value in collaboration is an activity wherein teachers appreciated what they learned from other professional educators; teaching styles and strategies, lesson planning, and classroom management using different platforms (Thompson, 2015). To support this theme, below is some statements excerpted from the reflections of the Graduate School Students:

Indeed, collaboration and sharing of best practices are essential for us educators to find better ways to respond to the learning needs of the learners.” – GS Student A

“I learned that lesson study focus(es) on working for better improvement on the specific topic, this helps me to realize the goodness of working together for the improvement of us as teachers. Lesson Study gives knowledge on how teachers like me improve my teaching strategies for my students.” – GS Student B

1.2. Openness to Continuous Improvement

Doing Lesson Study in the Foundation of Mathematics makes graduate school students open to continuous improvement in education. Continuous improvement in education is a science that emphasizes innovation in the classroom, changes that enhance the usual knowledge gained, and increasingly scale the learnings you currently have in specific specialization (Leopold & Kaltenecker, 2015) Some graduate school students freely accept to change their old practices in teaching and proudly acknowledge what they have learned from other professional educators. This was seen in some graduate student's reflections:

“Lesson study allowed me to view my instruction ‘through the eyes of students and colleagues.’ It was a humbling experience, and it reminded me that even the best plans can be revised and enhanced.” – GS Student C

“Lesson study enables me better to understand my teaching methods. This helps us widen our knowledge with regard to the subject matter. And it also reminds us that even the finest preparations may be modified and strengthened.” – GS Student D

1.3. Technological Knowledge Enrichment

Students' expectations shifted drastically because learners of the 21st Century have used gadgets at home which make them want to have technology-assisted teaching and learning at schools (School Specialty, 2020). This expectation has become a concern of current professional teachers who have to be more technological in teaching mathematics. And with the Lesson Study as an output in Foundation of Mathematics, professional mathematics teachers were able to showcase new technology applications that could help other professional mathematics teachers explore new technological tools that might help them improve their students' learning. To support this argument, below are some quoted reflections of the graduate students:

I learned how we can integrate Mathematics not just only with the other subjects but also with technologies, using different applications.” – GS Student E

“I learned that there are lots of interactive tools, websites, and apps that can be used in delivering lessons. Each interactive tool makes learning more interesting and fun.” – GS Student F

1.4. Pedagogical Knowledge Enrichment

Learning mathematics also depends on what teaching strategies are being used by their teachers. Learners tend to listen more to the discussion with interesting and new pedagogy designs. Using traditional teaching leads to failure of the learning process (Khalaf & Zin, 2018) This became a dilemma for mathematics teachers who use common and old strategies in teaching the said subject but when they have done the lesson study, it is found that they have to gain more knowledge on what appropriate and interesting pedagogy to be used for their students' learning improvement. To prove this

proposition, below are some reflections of the Graduate School students:

I learned a lot while doing the lesson study as I saw different pedagogies in teaching a lesson and various innovations that could make the students' learning more engaging and meaningful.” – GS Student G

“Doing lesson study has given me a lot of teaching strategies that I can use both in face-to-face learning and in online classes. It enhances my skills and ideas because of the different techniques that have been presented by different groups. I've learned to widen my ideas on how to effectively teach students while they are also enjoying.” – GS Student H

1.5. Writing Scholarly Works

As the graduate school students conducted Lesson Study, students required to write the result in a publishable format. Most of the graduate school students do not have experience in writing a scholarly works such as the lesson study but when it was integrated in Foundation of Mathematics as an output for the said course, many of the students learned to write scholarly works. This was supported by some of the graduate school students' reflections.

“There are many things that I have learned in the lesson study. First and foremost, I have Learned how to create a lesson study paper using the IMRAD method.” – GS Student I

“Furthermore, writing our lesson study enhanced my thought organization skills and it also refreshed me in composing scholarly articles.” – GS Student J

In summary, doing a lesson study provides graduate school students, also known as professional teachers, the opportunity to be in the process of professional development, specifically with the above-mentioned themes. Hence this is much suggested that Filipino Teachers must do research lessons or lesson studies to gain better teaching and learning for their students. Just like in Japan and parts of North America, Lesson Study is now the primary form of professional development of their teachers that supports teaching development and teaching practices (Yu, 2021).

2. Impact of Doing Lesson Study on Graduate School Students' Teaching and Learning

According to Somma (2016), doing lesson study provides impact to the teaching and learning of teachers, as if it is professional development for them. In this research, some of these impacts have been identified after the Graduate School students conducted lesson studies and it has been discussed below:

2.1. Plan-Teach-Reflect Cycle Implementation

In the study of Behling, et.al (2022), it was stated that the Plan-Teach-Reflect cycle must be used as a basis of teacher education programs for the enhancement of professional teachers. However, the plan-teach-reflect cycle, also known as the teachers' reflective cycle, is evident in doing lesson study which makes professional teachers understand better their teaching practices in a collaborative way (Gutierrez, 2015). This is proven by some of the reflections of the graduate school students:

"It (lesson study) gives us teachers the opportunity to plan, teach, observe, and critique our practice and gained a better understanding of the delivery of instruction." – GS Student K

"Lesson study will greatly help me in better planning, teaching, observing, and refining lessons." – GS Student L

2.2. Teaching Creatively and Innovatively

Creativity and innovation are needed in today's education system since learners from today's generation are into social media and technological devices (Seechaliao, 2017). Teaching these students creatively and innovatively allows learners to understand concepts, improves learners' thinking capacity, and boosts learners' problem-solving skills in a fun and interesting way (Sharna, 2022). As such, this becomes a reflection of several graduate school students after doing lesson studies to attain better learning for their students. Following is some of the graduate school students' reflection:

"Lesson study enables me to enhance both student learning and my teaching. I can be more creative and innovative because of that (doing lesson study). It allows me a wide range of options for how to present my lectures." – GS Student M

"Lesson study influences my teaching and learning in that it inspires me to consider the best ways to interact with students and share ideas using a new application that might help students understand the lesson that I am teaching..." – GS Student N

2.3. Focus on Students' Learning

In the new era of education, hardware, and software are becoming more critical and complicated to use in teaching. Having said that, professional teachers are likely to provide more support to their students for better learning when using different technology in learning mathematics (Means, 2010). Understanding and focusing on students'

learning other than the subject content is an important practice in teaching and learning (Alter & Coggshell, 2009; Burn & Mutton, 2015). This practice becomes visible in graduate school students after doing a series of research lessons, to support this argument below are some reflections of graduate school students:

“Lesson study engaged professional development to improve my ways of teaching and become the active participant for improvement of students learning.” – GS Student O

“Since (then) I learned about lesson study, I am now doing my best to craft lessons that are engaging for the students.” – GS Student P

2.4. Current Issues Awareness in Teaching and Learning

Lacking gadgets, load expense, poor internet connection, students' lack of focus on online discussion and parents' lack of knowledge of their child's lessons are some identified concerns and issues identified in the Philippines' current education system (*Education Issues in the Philippines: The ongoing struggle*, 2021). And as a professional teacher, if you are acknowledging these issues and concerns in education, you are also genuinely showing commitment to teaching that could have a good impact on teaching and learning (Swain, 2022). This action has been revealed in the reflections of the graduate school students:

“I have been using the app that we featured in our lesson study which is Whiteboard.fi, me and my students are used to utilizing the said application and we find it as a great tool in assessing students' skills and competencies. But after the online demonstration and focus group discussion, I realized the risks we may encounter while using the app.” – GS Student Q

“Not all interactive tools are effective in all lessons, so as a teacher we need to be more creative and explorer in our class. Wherein we need to check what is more effective and efficient to use in these types of learners.” – GS Student R

2.5. Pedagogical Confidence

Confident teachers are more likely to provide innovative teaching strategies that focus improvement on students' learning (Nundy et al., 2009). Additionally, as identified by James Eison in his article “Confidence in The Classroom: Ten Maxims for New Teacher” in the year 1990, pedagogical confidence is developed when teachers are understanding what is associated with teaching such as knowing what the needs of students are in learning such topic (Burkett, 2015). Exposing the confidence of graduate school students after doing lesson study supports the propositions of Nundy and Burkett. This can be seen in some reflections of the Graduate School students as an impact on their teaching and learning. Below are some quoted reflections of the graduate school students:

“Lesson study made me miss teaching mathematics more, it's been 5 years. Since I am currently a high school araling-panlipunan teacher, I am unable to utilize/apply the knowledge/understanding I learned from each group, particularly that factoring lesson using math tiles. That method was new to me. And at some point, I'm excited to teach it. I want to teach mathematics again.” – GS Student S

“This makes me realize more of improving oneself, that I should pursue in studying, for me to become a better, competitive, and innovative teacher for my students. I believe “I cannot share something that I don't have in me”. If I

want better students, then that should start from their teacher, and that teacher is me” – GS Student T

The above-observed impact of doing a series of lesson study, it has shown an improvement in the teaching and learning of graduate school students who are taking the Foundation of Mathematics. These observations of the graduate school students, who are also professional teachers, second the motion of Suhaili's, et. al. (2014) observations of their teacher-participants, who also have done lesson studies. They state that teachers who practice research lessons, also known as lesson study, have developed positive effects on their teaching skills, classroom management, and problem-solving skills.

CONCLUSION

With the results from the analysis of the submitted reflections of the graduate school students who are taking Foundation of Mathematics at Marikina Polytechnic College, the following learnings of the participants are (1) value in collaboration; (2) openness to continuous improvement; (3) technological knowledge enrichment; (4) pedagogical knowledge enrichment; and (5) writing scholarly works.

Moreover, it was observed that there are positive impacts on the teaching and learning of graduate school students after doing a series of lesson studies which are: (1) plan-teach-reflect cycle implementation; (2) teaching creatively and innovatively; (3) focus on students' learning; (4) current issues awareness in teaching and learning; and (5) pedagogical confidence.

RECOMMENDATION

Thus, the researcher is suggesting that it is possible to use Lesson Study as an output in Foundation of Mathematics because it does not only improve the graduate school students content knowledge but also beyond the content of the course, like personal development and

teaching and learning which can be considered as their continuing professional development. And since the study used qualitative impact assessment of lesson study to graduate school students, it is suggested that test its impact in a quantitative approach and conduct the study not only in the MAT-Math Students but also in different programs of the college.

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