

Students' Performance in Science in Three Selected Schools Using Lesson Study: A Pilot Study

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Abstract : The performance of students' involvement in science, teacher's performance and development of the professional health through Lesson Study in the Philippine secondary schools were studied. It made use of the process- lesson planning, classroom observations, post-lesson conferences and feedback mechanisms on the delivery of Science lessons. The findings as to students' performance, majority of the 240 students were able to explain and express their ideas critically and creatively about the lesson. There was a more active interaction among student to student and student to teacher. There was an 87.24% increase in the pre-post tests performance. As to teachers' performance, there was an improved art of questioning skills, lesson planning and delivery that motivated the students to participate in class recitation and activities. Teachers' evolution of feelings: hurt feelings at the start towards many suggestions and resistance to abide with the suggestions, partial acceptance and finally submission (acceptance) were manifested.

Keywords : Lesson study, students' performance, teachers' performance, professional health

1. Research Background and purpose as an introduction

The decline in science achievement of the Philippine secondary schools in various assessment tools have proven the continued downtrend on the performance of the students (TIMMS, 2003 & NAT, 2012). The school based management conducted is one of the initiatives by the Department of Education to reinforce teachers to develop their competencies and acquire strategies appropriate to the learners. This form part of the educational reforms on K-12 to effectively teach the least mastered learning competencies. Practicing effective teaching methods translate into greater student achievement (Public Information Network and the Finance Project, 2004). Teachers realized that developing lessons collaboratively will help them grow professionally (Amante, et. al, 2012). Therefore teachers need to use appropriate teaching strategies and lesson activities to ensure long lasting learning. The results of educational research suggest that students learn more if they are active

participants in the learning process. (Arends, 1994; Burden and Byrd, 1994; McBer, 2000).

The Science National Achievement Test-Year Four result in Camarines Sur, Philippines for school year 2011-2012 with a mean percentage score of of 36.91% was so alarming. This low performance necessitates refocusing educational reform efforts. This idea is supported by Stiglee, J. W. and Hiebert. (1999) in their study to refocus educational reform efforts such as restructuring schools as places where teachers can engage in career-long learning and teachers are given appropriate opportunities and support so as to improve teaching.

The introduction of Lesson study is looked up as a promising way to strengthen teaching and learning in schools, especially those that are low performing (Easton, 2009). The least mastered learning competencies in science can be effectively taught using the same approach.

Empowerment of teachers and students is highlighted in such intervention for it will build powerful instructional strategies, develop questioning techniques that stimulate student interest and learning, develop instructional materials, remediation lessons and student-centered activities for meaningful learning. In turn, the professional health of teachers is intensified.

The purpose of this study is to assess the effect of the “lesson study” as a new approach to the performance of students’ in science while strengthening the teachers’ performance in teaching science and developing professional health. This study is expected to give information on the new way of planning lessons through collaborative efforts, addressing the low performance of the students in Science and improving feedback mechanism in Philippine public schools.

2. Theoretical framework

Lesson study has started in the Philippines in 2006 through the University of the Philippines National Institute for Science and Mathematics Development (UPNISMED) participation in Lesson Study Project of the Asia Pacific Economic Cooperation (APEC) (Ulep S., Reyes R., 2013). The research grant award of the Department of Science and Technology (DOST) enabled the Central Bicol State University of Agriculture to conduct the research on

Lesson Study in the three secondary schools in the Division of Camarines Sur. These were Sagrada Familia High School, Dona Basilia S. Quilon Memorial High School and CBSUA-Computer Science High School of Bicolandia.

Individual planning a lesson was also practiced in university level in Denmark before lesson study was introduced (Christiansen et. al, 2007). The teachers agreed that it was a more fruitful learning to develop the lessons in group than individual planning. The individual experiences of the teachers were drawn into organizing the classroom activities and resulted to a more organized lessons. The lesson study does not only benefit the teachers but also the students. The students’ evaluations were improved and the lesson objectives were carried out. The dominant way of thinking of teachers about teaching was changed. The lesson study has also increased the knowledge base of teachers.

3. Research method

This qualitative research study underwent processes in accordance to the Lesson Study approach from Japan. However, some were modified to fit in the conditions of the secondary schools and the culture of the Filipinos. The process below was the innovations that were introduced in the conduct of this research.

The collaborators of the study were the teachers from

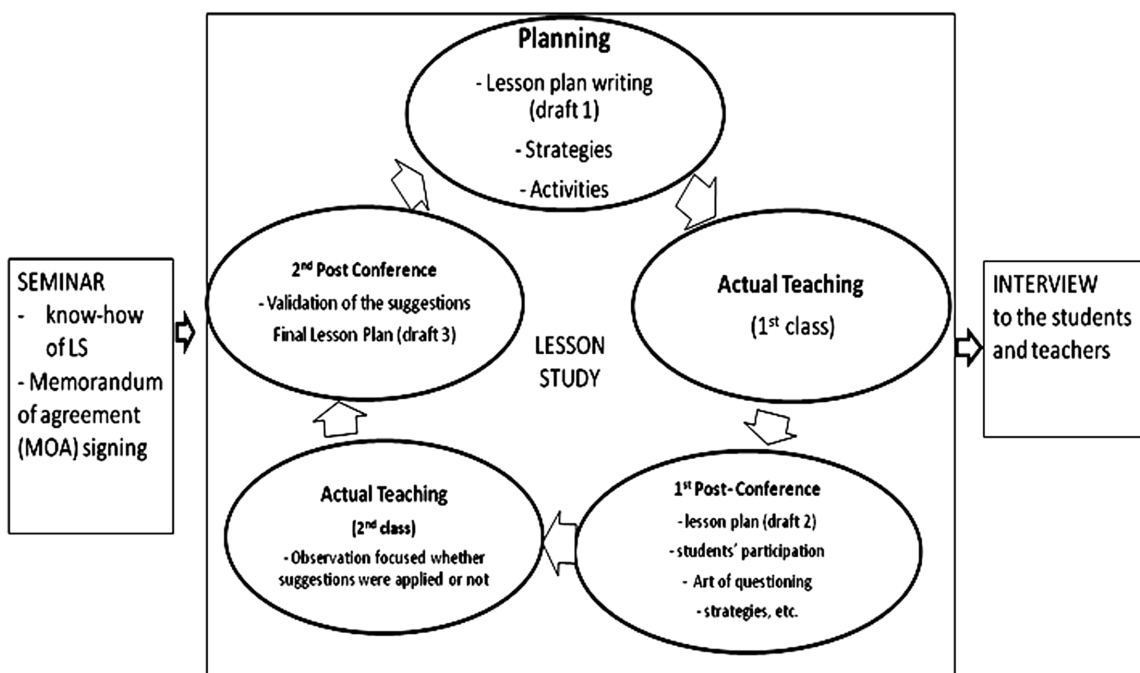


Figure 1. Process

Source: Authors made

three secondary schools in the Division of Camarines Sur, Philippines teaching Science in Grade 8, principals, division science supervisor in Secondary level and other Science teachers attended the Seminar on Lesson Study. Since the lesson study is new to teachers, the need to conduct training on the rudiments of lesson study was conducted. Memorandum of Agreement signing was put in place.

The lesson study was implemented after the preliminary activities to ensure the commitment of the people involved in the research. The process, as shown in the figure, was lesson planning, first class actual teaching, first post lesson conference, second class actual teaching, and second post lesson conference. In lesson planning, the teacher wrote the lesson plan which were reviewed by the research team and was revised according to the suggestions prior to the first class teaching. The second revision was made after the first class teaching post lesson conference session. The final draft was made after the second class teaching post lesson conference session. A pre and post tests were given prior to and after the lessons to gauge the students' performance before and after the lesson adopting the Lesson Study. The whole process was documented using video cameras and observation notes of the research team, other teachers, principals and supervisors. The observations were focused on the classroom interactions, quality of the questions asked by the teachers and students, strategies, classroom management, instructional materials used and assessment of learning.

In every school, the actual teaching was done to two sections of Grade 8 with the same teacher teaching the two classes. There were two post lesson conferences held: First post lesson conference. This was done after teaching the first group of students. The research team and knowledgeable others gave comments and suggestions of the class performance, teacher performance and delivery of the lesson. Second post lesson conference. This was conducted after teaching the second group of Grade 8 pupils. This conference is pointed out what transpired and what changes happened among the second group of students following the suggestions given in the second post lesson conference. The focus of the post lesson conference were art of questioning, pedagogy in teaching the lesson, management of the students, time management, delivery of

the lesson, behavior of children towards the subject/s and reception of the teacher in the suggestions given was observed.

The conclusion of the research lesson observation was the feedback session through interview and questionnaires of the teachers and students on their realization, experiences, impressions and feedback on the conduct of lesson study. The interview with the students validated the observations on the teacher's improvement in the delivery of the lesson. The interview with the teacher revealed the experiences and feelings on being given suggestions and the acceptability of the lesson study.

4. Findings and interpretation

The research focused on three domains. First was on the performance of students' involvement in science related endeavors, which showed an improvement in the pre and post test results and active classroom interactions. Second was on the teachers' performance, evident in the quality of questions asked, lesson plan developed and strategies employed. Third was on the development of professional health (attitude/openness for correction) of teachers wherein acceptance was observed.

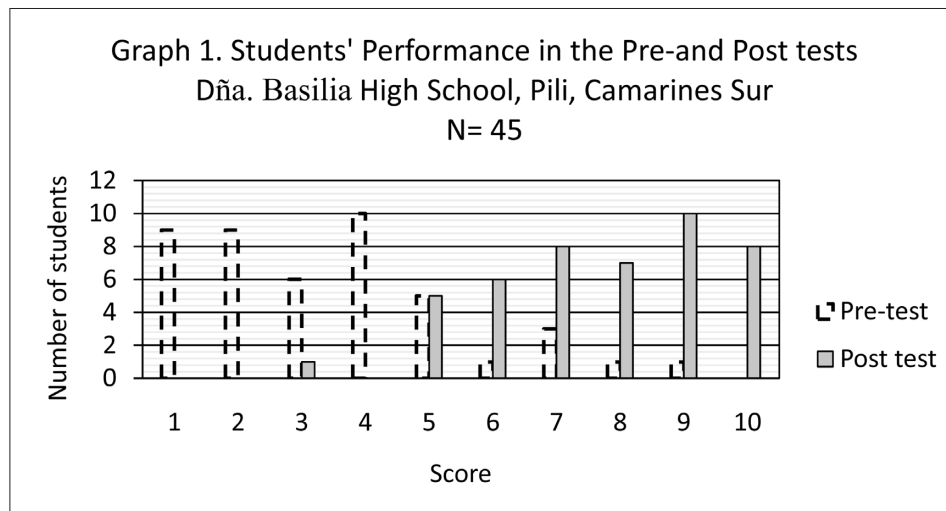
(1) Lesson study has improved the performance of students' involvement in science related endeavors.

The effectiveness of any approach is measured by an increased performance of the students in test scores and participation. The study assessed the performance of the students using the pre-post tests results and classroom interactions. Assessment is viewed as a trustworthy process aiding teaching and learning (Fletcher, R., Mey, L, Anderson H. Johnston, P., Rees, M., 2012)

The result was in the fourth day of lesson study in Dña. Basilia High School, Pili, Camarines Sur. Out of the 45 students who took the pre test (Annex 1) and post test (Annex 2), 39 students got a score ranges from 1-5 in the pre-test and 44 students got a score ranges from 5-10 in the post test. [hi1]

Students became very participative as observed. The objective of the lesson study is to maximize students'

[hi1] Ana san, these students who took pre and post tests are the same or different? I noticed that you applied the same test for pre and post. Therefore, if the students are the same, there would be a bias, since the students tried the same test twice. If you applied the tests for the 2 different students group. You needed to control the conditions of the students group...



Source: Authors made

participation. The change in the students' participation was evident. One observer said that :

During the first observation, students didn't ask question, they were just seated silently and doing nothing, some were not paying attention, and some were engaged in other activities. An educational noise was manifested. *No unnecessary noise was observed, students discussed among themselves about the lesson only.*

Lesson study increased the number of students who participated in the class. The students showed their best when allowed to express their ideas in the language that they were comfortable with. A science teacher shared that :

Majority of the students raised their hands for the answer on the questions that they themselves formulated. I saw their eagerness and enthusiasm.

The use of Mother Tongue Based Language (MTBL) helped. Before, slow learners do not talk but using MTBL they participated because they expressed their ideas freely without language barrier and fast learners became more active

Participation is valuable in learning. When the students formulated the generalization of the lesson in their own words, this is evident of higher order thinking. As observed by the research team and the Science supervisor :

Generalizations were formulated by the students. The students checked the correctness of the generalization with the teacher as facilitator. *Students were critic among themselves. Students developed self-confidence in asking questions which they didn't do before.*

Traditional classroom in the Philippines are teacher-centered (Rogan and Grayson, 2003). The traditional teacher is the one who can express clearly the lesson to the students without practically involving them and requiring them to ask questions. This view has been the practice which in turn resulted to a teacher to student interaction only. The lesson study has gradually shifted this view. The principals said that :

The interactions among student-student, student-teacher were evident.

During the first observation, teacher-student interactions only were observed.

Students overcome timidity and have shown high level of participation.

The students have shared the same view on the effects of lesson study on their participation. The feedback from the students :

It was my first time to experience asking questions.

When we ask questions, it broaden our knowledge.

Interview to the teachers, students and the observations of the research team and other knowledgeable others has shown that there was an improved students' performance using lesson study.

(2) Lesson Study has improved teacher's performance along art of questioning skills, lesson conceptualization and delivery.

The teachers who were observed were teaching Science for 1-5 years. They were in the early stage of the profession. They were seldom sent to trainings. One teacher was sent thrice and the other two teachers were

sent once in the division level trainings. They were young, aged 20- 27 years old. One of them has just finished the bachelor's degree and the other two teachers have not started yet their masteral course.

The K-12 curriculum is in the second year of implementation has brought changes on the learning competencies taught in Grade 8. This was the reason why it was their first time to teach the subject matter on Earthquake, Typhoon and Comets, Meteors and Asteroids. Lesson study is focus on the students' participation, however, teachers' performance was also improved. The teachers said that :

The experience was very rewarding. I was satisfied of the students' participation.

I elicited the questioning ability of the students. I motivated majority of students to participate in class recitation and activities. The suggestions helped a lot. The lesson study not only improved the students' performance but also transformed the way I delivered my lesson.

The lesson plan from 1st, 2nd and 3rd draft showed the quality questions asked by the teacher. A more improved teaching strategies and delivery elicited students' participation as observed by the research team. In the interview, one teacher said that :

The essence of lesson study for the students is to discover, the role of the teacher is to push and encourage and serve as facilitator. I am happy I was able to adjust to the level of the students and I understood that students need to be motivated to develop their reasoning ability and critical thinking for a meaningful learning.

The responses of the students during the feed backing mechanism were :

Mas lalong gumaling magturo si madam. (The teacher became skillful in teaching). *Dati hindi ako seryoso sa Science, ngayon curious na ako. Nag-enjoy na ako ngayon. Iyong damdamin po nag-iba-ngayon nasanay na ako. magtanong.* (Before I was not serious in learning Science, but this time I was curious and want to know more. I enjoyed learning and my other classmates changed. They participated now as compared before.)

(3) Lesson study has developed the professional health (attitude/openness for correction) of teachers.

Collaborative planning of the lesson, observations of a group of teachers, post lesson conference sessions and feed backing mechanism is not practiced in the school. The principal and supervisors were the only accepted higher authorities to observe the classes. The observation used a pre-made observation checklist. The attitude towards acceptance on the suggestions from other teachers especially colleagues and putting it into practice is difficult. The seminar held in the start of the lesson study has explained to the teachers that the feedback is purely constructive one. The interview said that :

During the first implementation, I was hurt of the suggestions given because I knew that I did my best but as if it wasn't enough. As time goes by, I processed the feelings and overcome it when my students performed well.

Teachers' evolution of feelings from disappointment, contentment and satisfaction towards the changes in behavior of students as the Lesson Study process was manifested. There was a partial acceptance and finally submission to the practices of Lesson Study which in turn aimed for more lesson study not only in Science but in other subjects for Excellence in Teaching.

5. Problems met during the project implementation.

Teachers teaching for more than three years in the secondary schools in the Philippines were exempted from preparing lesson plans and teachers who were teaching less than three years prepare a brief lesson plan. Lesson study required teachers to make detailed lesson plan which was a burden to them. In small schools, teachers were teaching other subjects aside from their major and have plenty of extra-assignments and limit their preparation time of the lesson. The teachers teaching the same discipline have different free time, thus, hinder in the mentoring and collaborative planning of the lesson. The limited instructional materials, insufficient learning module and physical facilities in the classroom also a hinder in the implementation.

The allotted one hour time slot for Science and the difficulty of students in expressing their ideas in English were also the problems met.

6. Conclusion

The study result shows that lesson study has improved the performance of the students' involvement in science related endeavors. The collaborative planning of the teachers has improved the strategies, approaches and art of questioning. The involvement of other teachers during classroom observation focusing on the students' participation, post-lesson discussion and feedback mechanism has contributed to the enhanced delivery of the lesson. The existing practices in the Department of Education high schools are far different from this. The planning of the lesson, learning process and feedback mechanism does not necessitate other teachers' participation. The idea of planning together and learning together is new. The pilot study in three schools is precedence to other schools to adopt the approach. It is but necessary to practice lesson study to address the long-time problem of the Department.

Lesson study has improved the lesson planning, art of questioning and delivery of the lesson of the teachers. The post-lesson discussion and feedback mechanism scheme involving more teachers widen the focus of the observation. Their teaching experiences and different views contribute to this improvement. Although observation of classes is being undertaken by the principal in the schools, their involvement does not start from conceptualization of the lesson. Lesson study involves many teachers from lesson conceptualization to the post-lesson discussion. The improved teacher performance is the work of many teachers not by a sole teacher. The sharing of ideas among them proves to be a contributor to this change. It is not widely practice in the Philippines, but this may be a start to integrate in the system.

The openness to corrections and suggestions among Filipino teachers has started to free with a proper orientation on the mechanics and purpose. The lesson study enable them accept that the purpose is only to increase students' performance which every teacher acknowledges this as the central focus for teaching. The negative feelings toward the suggestions are evident at first but soon were overcome and lead to acceptance. The positive response of the teachers under study signifies that the approach is possible in the Philippines. Eventually, teachers will regard the practice as a normal or ordinary occurrence. It would open the access for free exchange of ideas, peer tutoring that would overcome timidity, inferiority complex and build a

good relationship among teachers. The wide scope of lesson study implementation is good to research on the feelings of teachers on this practice.

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Annex 1. Pre-test

Name: _____ Grade level & Sec.: _____ Date: _____ Score: _____

1. What are the parts of a tropical cyclone? (2 points)

2. Compare the eye and the eye wall of a tropical cyclone in terms of their air pressure and wind speed? (4 points)

3. What is the importance of knowing the different parts of tropical cyclone? (4 points)

Annex 2. Post- test

Name: _____ Grade level & Sec.: _____ Date: _____ Score: _____

1. What are the parts of a tropical cyclone? (2 points)

2. Compare the eye and the eye wall of a tropical cyclone in terms of their air pressure and wind speed? (4 points)

3. What is the importance of knowing the different parts of tropical cyclone? (4 points)