

Lesson Study Approach as a teacher training Continuous Professional Development program in Mathematics and Science in two selected secondary schools in Serenje District, Zambia

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I. Summary

• English Summary

This is a study on improving quality of teaching staff through recognized approaches current applied, the Lesson Study Approach, in secondary schools in the district of Serenje in Zambia, conducted with data collected directly from the field.

The lesson study was introduced into Zambia by the Japanese government as its developmental technical support in 2005, and it has been conducted all over the country now at the school level. JICA, Japanese International Cooperation Agency has been complementing an educational project, namely, The Project for Improvement of Pedagogical Content Knowledge: Linking Pre-Service and In-Service Education supporting lesson studies in Zambia, however this year 2019 it will come to the end. Now it is necessary to conduct a study in order to assess the approach and take into consideration how it has been widely and deeply spread and practiced in the country.

In Zambia, despite the high enrolment rate of secondary school children at 70% (World Bank), quality education is still lacking. This links to low student performance and high drop-out rate, linking to social problems such as child labor. Since education is at the root of developing a society, investment into education also means investment into developing a society. Zambia has been remaining a position of neutrality in international issues and playing an important role of peace-building in Southern Africa thanks to sustained peace. Success in education programs in Zambia contributes to peace and development in other African countries and developing countries which have similar problems, and it also can be a good practice to them. For that reason, I conduct the research on educational development in Zambia.

This study will aim to look into the effectiveness of the Lesson Study Approach by measuring it with both qualitative and quantitative research methods on improving teacher training quality.

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By the end of the research period, this study should be able to:

- (1) Providing a clear picture as to whether the Lesson Study Approach generally improves teachers' knowledge, professional skills, and performance at local secondary schools in Serenje, Zambia. Specifically, it is expected to show whether the approach is effective in improving teachers' ability to teach, reflect on the contents of the lessons taught, discuss with colleagues on the approaches, activities in the lesson, and students' general attitude towards the lesson if applied in this local context through the reflection of the quantitative data and qualitative data in the study.
- (2) Identifying and estimating a better way of practices of the Lesson Study Approach applied in local settings for upscaling in other areas (provinces other than Serenje that still employs traditional institution-focused teacher training approach or employ the Lesson Study Approach but to a limited extent) and other education levels (middle and high school).
- (3) Contributing to the relevant field of studies as a case study of the Lesson Study Approach in Zambia by giving suggestions and new perspectives.

- 要約

本研究は、ザンビア共和国で現在行われている教師教育の一環である授業研究について、ザンビア北部に位置する中央州セレンジェ地区において授業研究アプローチが実際に教師教育の改善に繋がっているのかを調査明らかにする。

授業研究は、2005年に日本の国際協力機構の技術協力によりザンビアの教育の質向上を目的に導入されたものである。現在では、授業研究はザンビア全土に広がり、全国の学校で取り組まれている。2005年から教育の向上のための支援を継続しており、現在では、教員養成校と学校現場との連携による質改善プロジェクト (IPeCK) が施行されている。しかし、このプロジェクトも2019年に終了予定である。この研究では、長年ザンビアで行われてきた授業研究の手法が、ザンビアに広く、土着の教育文化や社会に根付いているものなのかを評価する。

ザンビアは中等教育の就学率が70%と途上国の中では比較的高い就学率を誇っているが、教育の質が問題視されがちである。教育の質の低さは様々な社会問題に繋がり、学習者の成績低迷やドロップアウトに直結する。教育は社会開発の根幹であり、教育に投資することはその国の社会を構築していくことでもある。紛争が絶えない東南部アフリカの中でもザンビアは中立政策により平和を維持しており、周辺諸国の規範的存在である。同国の教育分野の成功例はアフリカ及び他の途上国の開発・平和の一端に寄与することから、ザンビアの教育開発の研究には意義がある。

本調査では教師教育の質向上における授業研究の効率を質的・量的調査から考察する。この調査では以下のことが期待される。

- (1) 授業研究の手法が一般的にザンビアの中等教育教師の専門知識、スキル、パフォーマンスを向上させるのか明らかにする。この手法が効果的かどうか、授業の中身、教師との手法についての議論、授業研究における諸活動、生徒の授業研究に対する態度を考察することで明らかにする。

- (2) 土着の社会に根づいた授業研究の成功例を抽出し、この成功例が他の地域にも応用できるのかを考察・確認する。また、中等教育に限らず、授業研究が初等教育又は高等教育においても有効かを考察する。
- (3) ザンビアでの授業研究の事例として、同じように授業研究を行っている他の国々の事例に示唆を与えることで貢献する。

II. Research Activity

1. Introduction

As mentioned before, Zambia is a neutral country in African and has been stable without big conflicts or wars. However, the country has ranked the second worst results in the Southern and Eastern Africa Consortium for Monitoring Educational Quality in 2007 (The Ministry of General Education), and only 5 percent of learners in Zambia achieved the minimum level of proficiency in reading and 2 percent in mathematics in 2016 (OECD). It has been pointed out that the issue of education in Zambia is the quality of the lesson, so that JICA introduced the Lesson Study Approach in 2005 to improve teachers' pedagogical content knowledge to overcome the issue. Now, the Lesson Study is adopted as an educational policy and it has been spread and conducted all over Zambia.

The lesson study approach has been implemented in all over Zambia and supported by JICA as its technical support. The technical support started as SMASTE (School Based Continuing Professional Development Project) in 2005 and it has been still operating now as Project for Improvement of Pedagogical Content Knowledge: Linking Pre-Service and In-Service Education called IPeCK project in order to strengthen the linkage between college and school through Lesson Study to improve teachers' pedagogical content knowledge.

2. Study Area

I conducted this research in Serenje District, Zambia. I had already spent over 5 months in Serenje as part of a field research internship for IPeCK project JICA, working at Malcolm Moffat College of Education in Serenje, and researched lesson studies implemented in the district. I have established a good rapport with locals and teachers, as well as JICA staff in Zambia. This time I picked up two secondary schools for the research, Serenje Boma Secondary School and Serenje Technical Boys School, which are in Serenje District as shown by the below figure 1.

Both are the targeting schools of the IPeCK project and some of the most active and modeling schools in terms of implementation of the lesson study approach in Zambia. This research also acquires a few conditions like each school needs more than 3 classes in the targeting grade, each department of mathematics and science have more than 5 teachers and 100 students, and those schools meet all conditions. There are 208 students in Grade 9, 10 teachers in the department of mathematics, and 7 teachers in the department of science at Serenje Boma Secondary School. There are 98 students in Grade 9, 10 teachers in the department of mathematics, and 14 teachers in the department of science at Serenje Technical Boys School.

This research will give both academic and practical contributions to the academic literature in the cases of teacher training improvements, specifically at the Secondary Education level by:

- (1) Determining areas in which teachers and learners of mathematics and science have been benefited from the Lesson Study Approach.

- (2) Establishing the implementation of the Lesson Study Approach implemented by teachers of mathematics and science.
- (3) Establishing how learners embrace the Lesson Study Approach implemented by teachers of mathematics and science.
- (4) Determining perceptions of teachers and learners of mathematics and science on the Lesson Study Approach and challenges and opportunities of using the Lesson Study Approach.

This research will also give feedback to the theoretical literature applied in this study.

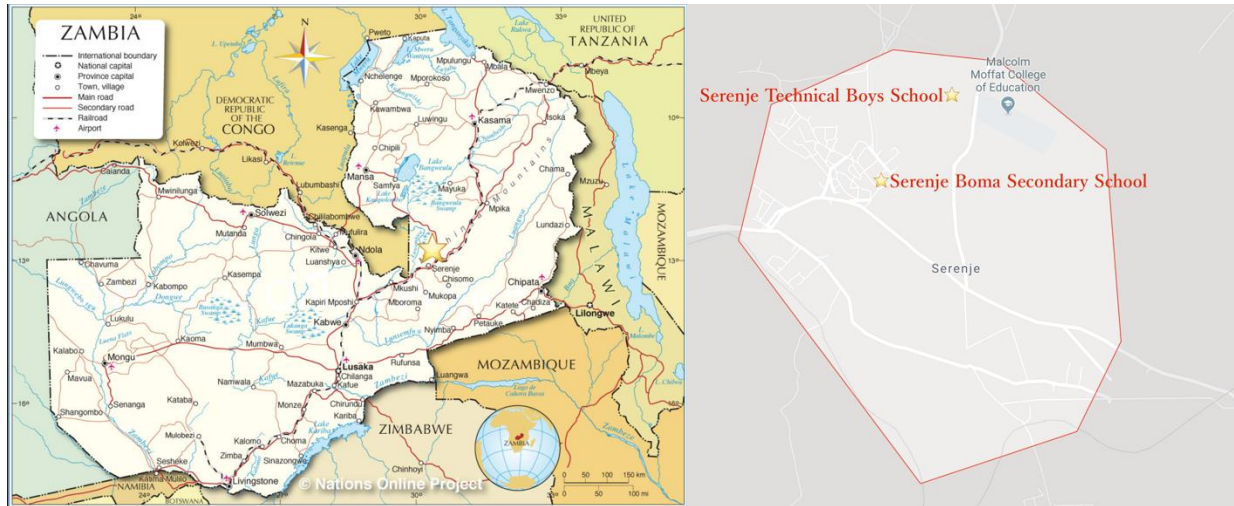


Figure 1. Map of Zambia

3. Methodology

This is a primary research employing both quantitative and qualitative research methods to collect and analyze data from the field. While the quantitative method makes possible the observation of whether there is an actual improvement in the quality of teaching staff in local secondary schools before and after the implementation of the Lesson Study Approach and how teachers and learners perceive and satisfy the approach. In complementation of such a deficiency, the qualitative method is employed to inquire in-depth the details and reasons for the success of the project (if any) and whether duplicating or up-scaling the project to other areas is possible.

(1) Quantitative Research Method

To observe whether there is an improvement in learner's' and teachers' performances/practices and their perception for the lesson study approach. Those are measured in two separate groups by the following rubrics:

Group 1: Learner	Group 2: Teacher
① Learners' academic achievement (tests)	③ Teachers' satisfaction (questionnaire)
② Learners' satisfaction (questionnaire)	

All items in the questionnaire (for ② and ③) aims at ranking teachers' and learners' satisfaction on the Likert Scale (5-point scale), thus detailed delineation will be provided for each point (interval) to ensure a clear understanding, or preventing any major misunderstanding of the question items, of every respondent. Tests and questionnaires will be distributed to selected 9 learners who are high, middle and low performers from each class, and moreover, tests should be pre-and post-tests which estimates learners' performance before and after the lesson

study approach. Questionnaires for teachers will be also distributed to all teachers who participate in the whole lesson study approach activities.

(2) Qualitative Research Method

(2-a) In-depth analysis and focus group discussions for teachers and learners

In-depth focus group discussion with both teachers and learners will be carried out to exhibit items ② and ③ above. The satisfaction of both groups will be justified with their reasons as to why the Lesson Study Approach makes teaching effective and enjoyable (for teachers) and learning effective and enjoyable (for learners). The targets for focus group discussion are learners in Grade 9 and its teachers in 2 schools, including 54 learners and 20 teachers from each school. Specifically, the teachers will participate in the Lesson Study approach activities in mathematics and science.

(2-b) Class Observation

All classes with Lesson Study Approach applied will be observed and filmed for in-depth study.

4. Research Findings

I conducted the lesson study approach to figure out my research questions at two local schools I mentioned above, Serenje Boma Secondary School and Serenje Technical Boys School. They were implemented during February and March in mathematics and science in Grade 9. The topic of Mathematics is Constructing Triangles given Three Angles and the topic of science is The Relationship between Voltage and Current. There is a table on learners' and teachers' perception from the interview and the questionnaires.

Table 1 is a part of my research results and it shows how learners and teachers have been benefited from the lesson study approach and their perception answering (1) and (4) as I mentioned in Study Area. This is not all my findings, however other research questions and its results are still being analyzed now. They will be showed and clear after my later continuing analyzation.

	Benefited	Unbenefited
Learners	<ul style="list-style-type: none"> -Improvements of skills and understandings of the topic in both mathematics and science. -The lesson study will help our future to become an engineer or a scientist. -The lesson motivated us to learn harder. -It was fun and interesting because there were experiments and group works. -There were opportunities to present our own ideas in the class which made us confident in mathematics and science. 	<ul style="list-style-type: none"> -There were many teachers in the class and the presence of them made us not focus on the lesson. -The presence of teachers made us nervous. -Lack of apparatus and materials, the lesson was not effective. -Not all learners had a chance to present and answer questions by themselves. -The content was too difficult to understand.
Teachers	<ul style="list-style-type: none"> -Building teamwork during preparation -Sharing knowledge and process skills and learning from other teachers 	<ul style="list-style-type: none"> -Affecting time schedule -Time-consuming -Making other classes miss lessons

	<ul style="list-style-type: none"> -Improvements of the lesson after the lesson study -Getting interactive skills with learners and teachers -Organizing and getting know about the usages of apparatus in science -Acquiring the content knowledge and how to deliver it in lessons in both mathematics and science -Getting questioning technic and skills of making worksheets -Making learners get interested in mathematics and science more 	<ul style="list-style-type: none"> -We should do the lesson study outside of the lesson like after school. -Making delay in covering the scheme -Problem of time-managing -Some teachers are not really involved and just wasting their time during the lesson study because topics of lesson study do not always fit their professional subjects.
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Table 1 The comments from learners and teachers about the lesson study (Author)

5. Discussion

As described in the section of Research Findings, the table 1 shows areas in which learners and teachers have benefited from the lesson study approach and what they have not benefited from the approach as well. From learners' perspective, the lesson study seems fun and interesting for them and lot of learners answered that they want to continue to participate in the lessons study more. There are some reasons why learners were eager in the lesson study. The first reason is that, compared to the usual lesson, experiments in science and activities in mathematics are often included in the lesson study approach. Usually, the lesson study approach is practiced once a term in a year which has 3 terms, and teachers have to demonstrate their lesson in front of other teachers, so that they prepared their lesson harder than usual lessons and tend to use teaching materials and worksheet. When it comes to the lesson study approach, most teachers understand it should be learner-centered which acquires activities. Those experiments and activities make learners fun and get interested in the lesson. Moreover, through those works, they learn how to use apparatus in science and mathematical instruments in mathematics. Of course, in the mathematics lesson study, some learners could not manage to prepare mathematical instruments which they were told to prepare before the lesson so that they could not fully participate but sometimes they borrowed the instruments from other learners. In the science lesson study, there were not full apparatus for all learners and some apparatus are too old to use or broken but teachers made improvised ones. The second reason is that the lesson study prompted learners to present their own ideas or opinions in the class and it gave them confidence and motivation in those two subjects. One of the problems in Zambian education is that the lesson is often teacher-centered, which means that learners just listen to their teacher and write on the book. It is a very passive and not effective study approach for learners. However, from learners' comments, the lesson study made them more confident and motivated by presenting their ideas and getting new ideas by sharing their ideas in the group

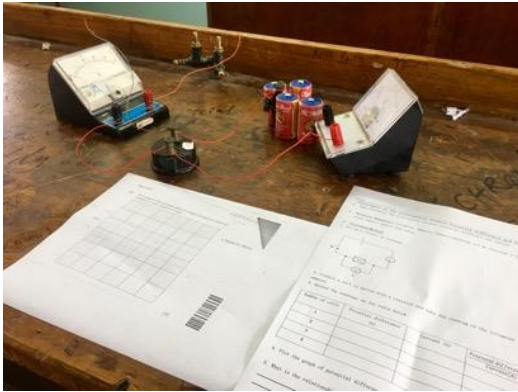


Picture 1: A student is demonstrating and presenting his answer on the board.



Picture 2: Learners are conducting the experiment measuring voltage and current.

discussion. There are also negative opinions towards the lesson study approach, but as far as I interviewed them most learners satisfied the lesson study approach.



Picture 3: Voltmeter, Ammeter and worksheets which were already prepared before the lesson.



Picture 4: A student is using mathematical instruments in the mathematic lesson.

There are more positive opinions from learners, on the other hand, the table 1 shows not all teachers have not benefited from the lesson study approach. Teachers have benefited in similar ways as learners have, like sharing and getting knowledge and skills among other teachers, which improved their content knowledge and process skills. However, a large number of teachers complained about the process of the lesson study approach because it takes time and it is demanding to prepare only one lesson. There are mostly 5 processes in the lesson study approach (Diagram 1). The diagram and table 2 shows a cycle of the lesson study approach and each process has tasks and works. As teachers pointed out that it is time consuming, the whole lesson study takes at least 3 days to complete the all processes since each demo lesson needs a day and the lesson study approach has 2 demo lessons and requires lots of preparation like making worksheets, original broad papers, checking apparatus and adjusting the lesson study in their normal work schedules. Some teachers told that the lesson study sacrificed other learners who did not take the lesson study in other classes because they were not benefited from the lesson study at all. However, some teachers understand the lesson study is a good teacher training and even if it sacrifices other learners and consumes time but teachers learn a lot from lesson study. Most teachers agree that the lesson study approach strengthens their pedagogical knowledge and skills which help making better lessons for learners. Now it is clear that there are positive opinions/benefits but also negative opinions of the lesson study approach.

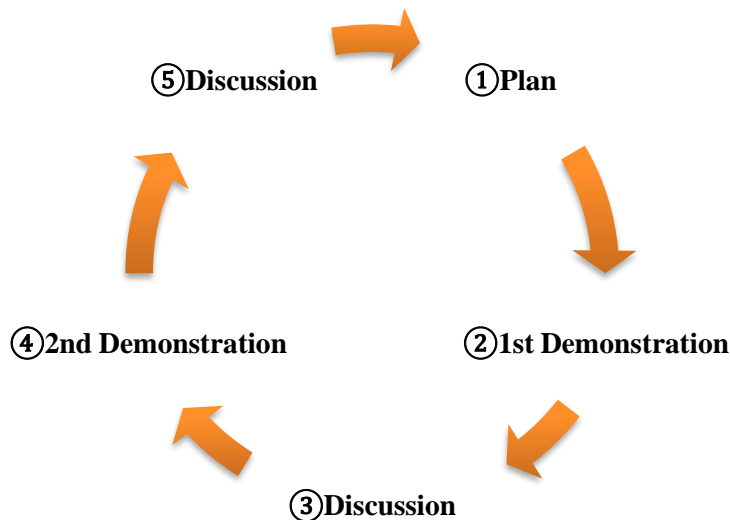


Diagram 1: The process cycle of the lesson study approach (Author)

① Meeting, Planning, Making the lesson referring to the syllabus, Preparing for the 1 st demo lesson
② Delivering the lesson (Demo-teacher), observing the lesson (Other teachers)
③ Discussing the lesson, sharing opinions and findings, re-planning the lesson, preparing for the 2 nd demo lesson
④ Delivering the lesson (Demo-teacher), observing the lesson (Other teachers)
⑤ Discussing the lesson, sharing opinions and findings, re-planning the lesson

Table 2: Details of each process (Author)



Picture 5: Teachers are discussing the lesson after the demo lesson at the department of science at Serenje Technical Boys School.



Picture 6: Mr. Chipiri, a mathematics teacher at Serenje Technical Boys school is making board papers for the lesson.

6. Conclusion

This paper is just a part of my research result and answering only 2 questions out of my 4 research questions: (1) determining areas in which teachers and learners of mathematics and science have been benefited from the Lesson Study Approach, and (4) determining perceptions of teachers and learners of mathematics and science on the Lesson Study Approach and challenges and opportunities of using the Lesson Study Approach.

To answer (1) question, for teachers have benefited in not only sharing ideas, skills and opinions but also learning new things from other teachers. However, they have not benefited from spearing their time on lesson study which put burdens to teachers and losing time from other learners who do not participate in lesson study. For students, they mostly enjoy lesson study because they can conduct experiments and activities in the lesson and it prompts their motivation and interest in mathematics and science. To answer (4) question, it can be said that most teachers

and learners satisfy the lesson study approach and have benefited from the approach. On the other hand, the approach is not perfect and needs more improvements especially in time management. To answer other questions and deepen this research, more analysis and examination is needed and this research will be continued.

This study aims to contribute to the Sustainable Development Goal 4 “*Ensure inclusive and equitable quality education and promote lifelong learning opportunity for all.*” Specifically, it contributes to Target 4.C “increase the supply of qualified teacher, including through international cooperation of teacher training in developing countries” with a focus on in-service teacher training.

(1) Acknowledgement

First and foremost, I would like to express my gratitude towards my supervisor, Dr. Simeone Mbewe at the University of Zambia for guiding me and patiently keeping give academic advice in conducting the research in Zambia. I would like to also give my gratitude to the director of the National Science Centre, Mr. Banda Benson, a chief advisor Mr. Nakai and all officers/staffs involved in IPeCK project for letting me to conduct this research and arrangement. I cannot express my deep gratitude to teachers and students in the schools I conducted my research for letting me in the schools and welcoming me. Especially, I am very grateful to my college and counterpart, Mr. Phiri at Malcolm Moffat College of Education for his tireless support in helping me trying to conduct this research and teach me lots of things about Zambia and education in Zambia. Finally, without the GLTP financial support, I could not make my research in Zambia possible. I really appreciate this opportunity and an honored to have participated in the program. Thank you very much.

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(3) Appendix



Picture 7: The author is interviewing learners in a group discussion after the lesson study



Picture 8: The author and students in Grade 9 at Serenje Technical Boys School

III. Reflection to the GLTP in Africa

May 2018 is my very first time to visit Zambia and Africa, but before that Africa was very far away from me and I never thought I would go there like many other people feel. I applied for JICA internship and worked as a research intern in a village, Serenje in Zambia for 5 months. I had been studying development studies at university but I felt that there was a limitation to know about the real world only on the desk, so that I got the chance and decided to go to the field. Honestly, I was utterly ignorant of Africa and the education system in Zambia (I am still learning and trying to get to know them), and at first I had difficulties in just settling down in the village. It was much harder than expected to live in a condition like frequent power and water supply failures. There were even no supermarkets with full products but a market under the beautiful blue sky. I struggled from the gap between my imagination of working for vulnerable children in the developing country and the reality in the village. However, one day I realized that I was not working and helping the people in Serenje but they were helping me. They taught me a lot of things about how to live in the village and even how to cook. My contribution to the village and JICA is very small during my internship, but the experience developed my attachment to Zambia and encouraged me to go there again for my research.

During the field research of the GLTP, I was attached to the University of Zambia in the capital city Lusaka and conducted my research in Serenje where I stayed before. I had connections with the people in the field of education and I expected it would be easier and smooth to conduct my research there. However, even though I was attached to the top university in Zambia and my supervisor Professor. Mbewe is quite a famous and influential person, once I went back to Serenje I faced lots of challenges. I easily got research permission from my research targeting schools because of the letter from the Ministry of General Education, but when I started my research in the field appointments were suddenly canceled or postponed so often and the research could not go as planned. Despite all various challenges, I could not conduct my fieldwork without helps from the people involved in my research. The research has not been completed yet, but I would like to continue to analyze and exam the collected data and publish a journal in the near future.

The GLTP program gave me not only further sights and thoughts on the education sector in Zambia but also motivation that I would like to go and work in Africa again. I have been dreaming of working for valuable children in Africa and contributing to them to give them better education and more opportunities to learn. I strongly believe this experience

and research will be a stepping stone to my future work in Africa. My gratitude goes to United Nation University to let me have this great opportunity. Thank you very much.



Picture 9: They are the Phiris. Mr. Phiri Cornelius is a lecture at Malcolm Moffat College of Education and He contributed to my research a lot.



Picture 10: The author is discussing with Professor. Mbewe at his office, the university of Zambia in Lusaka.