Collaborative Lesson Study between Nalikule College of Education and the Nalikule Demonstration Secondary School in the Republic of Malawi and University of Fukui in Japan

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I. Introduction

In the Republic of Malawi (hereinafter referred to as “Malawi”), the introduction of free primary education in 1994 has rapidly increased the number of students enrolled in primary and secondary education; this, consequently, resulted in a shortage of secondary school teachers. The government of Malawi responded to the shortage in terms of quantity by redeploying primary school teachers (i.e., teachers with lower qualifications) as secondary school teachers. Resultantly, whereas access to secondary education improved, there are still several issues that need to be addressed in terms of quality, such as qualification of teachers, and pass rate of the national examination.

In response to this situation, the Malawian government, with the cooperation of Japan International Cooperation Agency (JICA), has been working on the establishment and implementation of an In-service Teacher Training (INSET) system since 2004. The system consists of cascade training, that is complemented with cluster training (group training method). To further improve the quality of the training, action research is being conducted, with national trainers and university lecturers collaborating with teachers in the field.

Additionally, the University of Fukui has been accepting participants from African countries, including Malawi, in the JICA knowledge co-creation programs (KCCP) “Improvement of quality of education through lesson study” since 2016. A total of eight participants from Malawi have participated in the University of Fukui's program from 2016 to 2019. Based on Schön's (1983, 1987, 1991) education of reflective practitioners and Wenger, McDermott & Snyder's (2002) community of practice, the participants followed the reflective lesson study process, explored the long-term learning process, and examined the prospects for cultivating a professional learning community for teachers. After returning to their home countries, each participant began to cultivate a professional learning community for teachers.

In addition, relevant University of Fukui staff members visited Malawi to provide follow-up in 2017, 2018, and 2019. In 2017, these members participated in a lesson study at a school of a participant from previous year’s training. They also held a round table in collaboration with the schools. The participants discussed their own practices, where members from different types of schools and professions exchanged their practices, reflected on them, and developed a prospect for the future. The roundtable participants commented that it was a place that promoted collaborative learning among teachers and that the diverse participants allowed them to view their experiences from various perspectives, confirming that this approach was appropriate for the Malawian context. In addition, a roundtable session was incorporated into the 10th Strengthening of Mathematics and Science in. Secondary Education (SMASSE) National INSET, conducted by the Government of Malawi in 2018.

Based on the results of the study, the roundtable approach has

been adopted in some schools, and in 2019, the University of Fukui staff members participated in lesson studies and roundtables in the schools of previous years' participants. Thus, in the manner described above, a professional learning community of teachers is being cultivated in Malawi. Among these initiatives, this paper focuses on the collaboration with Nalikule College of Education (NCE) and describes the process of collaborative lesson study at NCE.

II. Collaboration between Nalikule College of Education (NCE) and the University of Fukui

1. Teacher Education in NCE

NCE, a college established in January 2017 with Japan's grant aid, aims to play a central role in teacher education and professional development of teachers to address the shortage of qualified science and language teachers in Malawi. As such, it has facilities such an assembly hall, lecture rooms, lecture theaters, library and laboratories and accommodation which are used during pre-service and In-service (INSET) trainings. In addition, NCE has a Demonstration Secondary School where pre-service trainee teachers do practice. The Demonstration secondary is also a cluster leader school of the five secondary schools within the cluster. Nalikule cluster plays a central role in the cluster activities.

NCE trains science and language teachers with an aim to address the critical shortage of qualified teachers in secondary schools. The college has three faculties, namely faculty of education, faculty of language and communication and faculty of sciences. These teachers are trained using face to face mode. These teachers are trained in the subject content as well as teaching methodologies. The faculties of science and languages and communication are responsible for teaching content of the subject and faculty of education is responsible for teaching trainees various teaching approaches and skills.

The following are the subjects taught at NCE: Biology, Agriculture, Chemistry, Human Ecology, Computer Studies, Mathematics, Physics, English and African languages. The pre-service training takes four years and the trainees after graduating are expected to teach two of the offered subjects in secondary school.

Apart from pre-service training, NCE engages in INSETs. These are short trainings aimed at capacity building in teachers and support.

Figure 1: NCE and demonstration school

2. Teacher Education in the University of Fukui

As one of the pioneering graduate schools of professional development of teachers, Fukui M.Ed. Program at the University of Fukui, is a school-practice-based collaborative inquiry action research model (Elliott, 1991) to enhance professional development of teachers. In designing the program, the paradigm that teachers learn by doing as reflective practitioners (Schon, 1983) brought in the importance of reflection in teachers' professional development, and requirement of designing teacher education programs to foster reflection in teachers. Therefore, an internship, different from the teaching practicum required to gain a teaching license, is considered as "learning by doing" for graduate students of both preservice and in-service teachers. This characteristic distinguishes the Fukui model from the other 53 programs all over Japan (Yamauchi, 2019). The other programs require in-service teachers to take a leave of absence from their teaching schools to enroll at the graduate school for the first year, for the purpose of receiving academic training by taking lectures. As for the internship, they are assigned to specific intern schools they are unfamiliar with, in which practice research is conducted in simulated context rather than their realistic context. Moreover, preservice teachers only go to schools for a few weeks or months to do an internship. In this way, it turns out to be research-based teacher education programs which orients to train teachers with academic research methods as the same as traditional academic master programs. In fact, this is distant from cultivating teachers' competencies as practitioners for which the M.Ed. program strives in the first place.

On the other hand, in the Fukui model, each teacher together with their schools is supported by a university faculty team

comprising members of researchers and scholarly practitioners. Preservice teachers, most of whom have gained teaching licenses in undergraduate programs, intern two or three days a week for two years in partner schools. During internships they learn school routines, observe, assist and teach at “school rhythm”, they also have reflection meetings at the university once a week. When they teach at partner schools, university faculty go to observe their classes as a team and have lesson study meetings with them afterwards. In-service teachers take part in on-the-job internships at their affiliated (partner) schools by conducting practice-based action research towards solving realistic school problems as school middle leaders or in school reform management roles. These practicing teachers come to the university to have reflection meetings with preservice teachers once a month. University faculty teams also visit their schools regularly to attend teachers’ research meetings and school-wide lesson study meetings, as well as share ideas on how to motivate and organize teacher-initiated communities of practice (Wenger, McDermott & Snyder, 2002). Through these internships, meetings and visits, preservice and in-service teachers collaborate with university faculty and school colleagues to solve realistic school problems. As a result, learning communities of teachers across ages, school levels, districts, subjects and administrative roles are cultivated in and beyond this program interweaving practice and research.

To be specific, the Fukui M.Ed. program features three aspects that make it unique and multi-layered (Figure 2). Firstly, it is school and practice-based, which is a fundamental measure for teachers to be able to conduct action research as case studies (Elliott, 1991). Partner schools for preservice teachers and affiliated schools (also called partner schools) of in-service teachers are places for teachers to practice and form inquiries at the same time as part of their fieldwork. In addition to the university faculty team, preservice teachers are assigned with school teachers as mentors to supervise their internships. Secondly, it is reflection-oriented which entails teachers to reflect-on and reflect-in actions (Schön, 1983, 1987, 1991). Practiced-based reflections are undertaken and shared regularly at meetings and public roundtables with peer teachers across schools and ages, university faculties, and other stakeholders in related contexts. To prompt teachers to reflect, reframe and reconstruct their practices, reading materials and presentations about certain topics are provided during summer and winter intensive courses. The whole process of multi-layered reflections is encouraged to be written as monthly practice reports which paves the way for them to write final longitudinal reflective practice reports. As a result of collaboration between partner schools and the graduate school, books of school-practice-based case studies and writings have been written by practicing teachers and published. In the meantime, the history and development of different phases of lesson study have been reviewed and examined to propose the necessity of paradigm shift from technical PDCA cycle to reflective inquiry spiral (Kimura & Kishino, 2019). Thirdly, the program consists of three typical professional life phases of Japanese teachers: the lesson study PD course (preservice teachers), the school middle leader course (in-service teachers) and the school management course (in-service teachers). Although these three courses are divided by different life stages, they share the same concepts and curriculum designs. Teachers of the three courses form a CoP and PLC within and beyond this program. Due to the annual teacher shift system in Japan, existing CoP and PLC are likely to be distributed and spread to a wider scale. It is worth noting that collaboration and long span perspective is interwoven through all three features.

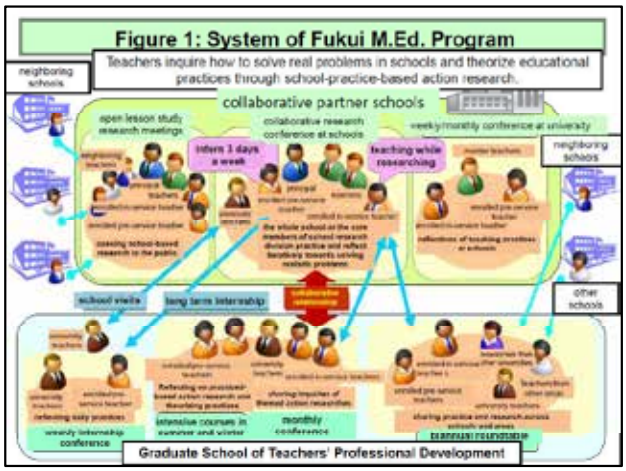

Figure 2: System of Fukui M.Ed. Program

3. Collaboration and Exchange Programs

The University of Fukui has been conducting exchange programs with NCE since 2017. In October 2017, five members from the University of Fukui visited NCE and exchanged opinions with the Principal and Deputy Principal of NCE and the Management of Nalikule Demonstration Secondary School. During this time, we also discussed the conclusion of an agreement to continue the lesson study. In November the same

year, one faculty member from NCE visited the University of Fukui for three weeks for a JICA KCCP. In October 2018, three members from the University of Fukui visited NCE, and the Roundtable was jointly held in the 10th SMASSE national INSET. In November 2019, one of the lecturers visited the University of Fukui for three weeks for JICA KCCP. Additionally, in February 2020, the Deputy Principal of NCE was invited to speak as a symposiast at the Practical Research Fukui Round Table, and an academic exchange agreement between the two universities was concluded.

Furthermore, in January 2021, a collaborative lesson study using information and communication technologies (ICT) was conducted, in response to the spread of the COVID-19 infection. With a quest of introducing and coordinating lesson study in Malawi by NCE, the participants observed a video of a mathematics lesson by a teacher from the Nalikule Demonstration Secondary School. After observing the video lesson, participants were divided into small groups to discuss the lesson. Next, they observed a video of a Japanese science lesson and were again, divided into small groups to discuss it. Later, the participants shared what they thought about the two classroom videos and group discussions. In the reflection session, held after the workshop on January 20, the following comments were made: the quality of the classes improved through the collaboration between NCE and the Nalikule Demonstration Secondary School; the participants were impressed by the quality of the teaching method developed by this collaboration, especially where students teach other students; they expressed a desire to work on the lesson study through a collaboration with the Ministry of Education, the Nalikule Demonstration Secondary School, and the University of Fukui.

Figure 3: Mathematics class at Nalikule Demonstration Secondary School

III. Collaborative implementation of lesson studies

1. First cycle

Based on the online meeting with NCE and the Nalikule Demonstration Secondary School on January 18, 2021, it was noted that there is an indication of good response for continuous collaboration. We deemed it important to first work together on the lesson study conducted at NCE and the Nalikule Demonstration Secondary School, and decided to participate in the lesson study using Zoom.

A meeting was held on Zoom on May 7, 2021, to understand the nature of the lesson study being conducted at NCE and the Nalikule Demonstration Secondary School. NCE formed a lesson study team, and its coordinator have participated in the third country training in Zambia in the past. Therefore, at NCE and the Nalikule Demonstration Secondary School, the lesson study was conducted in the following eight processes, by referring to the format of the lesson study conducted in Zambia with some few changes: (1) Defining Problems; (2) Planning a lesson(collaborative planning); (3) Conducting the lesson(first demo lesson); (4) Reviewing the lesson; (5) Planning a lesson again; (6) Conducting revised lesson(second demo lesson); (7) Reviewing the lesson again; and (8) Compiling learning.

We had expected to execute all eight processes of the lesson study via Zoom; however, due to network issues, we received the lesson plan reviewed by the relevant Nalikule members on May 14. Therefore, in the meetings held on May 14 and 21, we confirmed what discussions had taken place for (1) defining problems and (2) planning a lesson. In (1), one teacher opined that the unit on atmospheric pressure was difficult, to which the other teachers agreed. In (2), the content of the discussion was not recorded in camera. However, through the participants from NCE, it was observed that participating teachers were assigned some tasks such as identifying appropriate activities and experiments in addressing the concept for effective teaching and learning. Each participating teacher was asked to prepare something to present in the subsequent meeting for a collaborative lesson planning.

On May 28 and June 4, we participated in (2) planning a lesson through Zoom. The issue was determined to be the lack of appropriate teaching method for the unit on atmospheric pressure, causing difficulties for the students to understand the concept; some participating teachers designed some activities and experiments to be used but during collaborative planning the

experiment was changed from using a beaker to using a straw, such that students could learn the unit by connecting it with their existing knowledge. Later, after discussing whether one or two experiments should be conducted, it was decided that having two experiments would help students' understanding the concept of atmospheric pressure. An experiment involving heating a can was proposed as the second experiment. As a flowchart of subsequent classes, it was suggested that students write down their observations and findings from experiments on a worksheet and present them to each other. Initially, giving an assignment was proposed; however, summarizing the contents presented by the students was considered better because the students observed various things through the experiment and noticed the atmospheric pressure.

Figure 4: Planning the lesson (connected via Zoom)

On June 15, we tried to observe the class through Zoom. There were times when the camera angle and audio were difficult to see and hear respectively, but we followed the flow of the lesson through phone images. In the introduction, the definition of pressure that students learned in the previous lesson was confirmed, along with the relationship between pressure, force, and area. Then, the students conducted an experiment that involved drinking water from a glass using a straw. During discussion, the students presented their ideas on why it is possible to drink water with a straw and why it is difficult to lift a wet coin placed on a desk. Finally, as a summary, an explanation was given using diagrams.

In the subsequent (4) reviewing the lesson, the positive points of the class were revealed, that the introduction used appropriate existing knowledge, students actively participated in the experiments, and the worksheets encouraged students' activities. Regarding issues that could be improved, the following opinions were raised: the beaker and cardboard experiment could have been simpler and promoted students' understanding better, and the objectives of the lesson were not clearly stated.

Figure 5: Conducting the lesson (connected via Zoom)

Based on the reviewing the lesson, the flow of (5) Planning a lesson again → (6) Conducting revised lesson → (7) Reviewing the lesson again, and → (8) Compiling learning were conducted. However, we could not participate in the process. In the next cycle, we deemed it necessary to make adjustments such that everyone could participate in all the processes through Zoom.

As this was the first initiative, we aimed to participate in each process of the lesson study at NCE and the Nalikule Demonstration Secondary School. Although it was difficult to hear some of the voices due to network issues, and there were times when it was difficult to observe the class due to the camera angle, we were able to understand the discussion of the lesson plan and the flow of the class. In the previous annual follow-ups, we had heard only about the results of the lesson study initiatives, and had not been able to focus on the actual processes. However, by using online tools, we saw the potential of following the practice process.

2. Second cycle

On July 9, we held a forum to reflect on the practices of the first cycle and develop a vision for the second cycle. NCE and the Nalikule Demonstration Secondary School said that, through initiatives in the first cycle, they had learned a lot from the collaborative practice and felt confident in spreading the lesson study to other schools based on the results of the first cycle. They also revealed that the teachers at Nalikule Demonstration Secondary School began to have confidence in their classes, became more open, and had noticeably changing attitudes. Teachers could now ably critic and evaluate their own lesson.

Based on these efforts, in the next cycle (the second cycle), we received a proposal for a lesson study in the biology class. Since it was not possible to participate in all eight processes in the first cycle, it was agreed that they would be conducted collaboratively.

On July 16, NCE and the Nalikule Demonstration Secondary School teachers visited Malikha Community Day Secondary School (CDSS), one of the schools belonging to the Nalikule cluster. In collaboration, the Malikha CDSS teachers, NCE and the Nalikule Demonstration Secondary School teachers, and University of Fukui staff touched base in (1) defining a problem and (2) planning a lesson plan. The (1) problem identification and definition was facilitated by the lesson study coordinator of NCE. It was decided that a lesson study on the dichotomous key would be conducted by sharing the units that each teacher felt were problematic. The lesson study coordinator was able to elicit the opinions of the participating teachers in identifying the problems. teachers could mention some aspects making the topic challenging as: noticing best distinguishing features among organisms, use of necessary terminologies. Some teachers could mention that unfamiliarity of learners with some organisms being identified using a dichotomous key was a very big challenge.

During the (2) planning a lesson, the possible reason for this unit's difficulty was attributed to the unfamiliarity of the "organism" found in the textbook to the students, who found it difficult to clarify the organism's characteristics. Therefore, the subject matter was discussed considering which organism is familiar to students, such as whether a chicken was a better example instead of insects.

Figure 6: Planning the lesson at Malikha CDSS.
(Connected by Zoom)

The teachers at Malikha CDSS realized the benefits of working with other teachers, as the six teachers shared their opinions on how student understanding can be promoted, and how best a teacher can organize and plan for the lesson on this concept. Nevertheless, due to network issues, it was difficult to grasp what each teacher was thinking. However, through the notes shared from a round table discussion where a reflection on the lesson was done, some teachers openly acknowledged to have learnt some skills on distinguishing organisms using unique features among them and how best to address them within a dichotomous key. It was also observed that it does not necessarily mean that one has to be familiar with an organism for him/her to use a dichotomous key otherwise it will defeat the whole purpose of using a dichotomous key (for identifying organisms which may not necessarily need someone to be familiar with in first place). While some teachers learnt on how best to engage learners in an inquiry-based learning. Some thought engaging learners within the process of lesson delivery could be time wasting but upon participating in this lesson study they realized that it only requires thorough preparation for an effective concept conceptualization among learners.

On July 20, (3) conducting the lesson was held. As stated in the discussion of the lesson plan, there was an effort to connect the concept of the dichotomous key with the students' daily life and existing knowledge, and an awareness to draw out students' opinions. In the class, pictures of four organisms were pasted on the blackboard; the students discussed the differences between the organisms and classified them using the dichotomous key. Additionally, the students asked, "What is the importance of the dichotomous key?" one of the students also asked to say on which group of organisms could a dichotomous key be used? This question might have come due to the way how the introduction was delivered where learners were asked to state groups of organisms such as amphibians, reptiles, insects, birds etc. demonstrating that they were thinking about the subject.

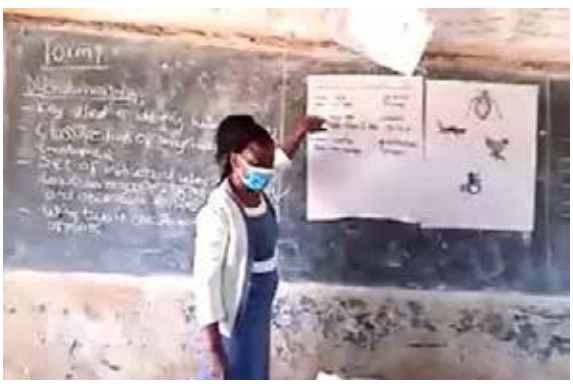

Figure 7: Conducting the lesson at Malikha CDSS
(Connected by Zoom)

In the subsequent (4) reviewing the lesson, a discussion was conducted, with each teacher talking about their impressions, positive points, and areas for improvement in introduction, development, and conclusion. The positive impression about the first demonstration lesson were: the teacher started from known to unknown content, had good interaction with the learners. However, the areas that needed improvement included shortening the introduction because it was too long, clearly state the rationale to the learners. The participants commented that it was good that the teacher encouraged students' participation through questions, and that the students' questions about the importance of the dichotomous key were “wonderful.” Further, because lesson study coordinator was typing up the main points of the discussion in the chat room, we could understand the situation, including those parts that were difficult to hear. In the meeting, we could see that the focus was on the students, and we believe that the teachers would be able to achieve their goal better by focusing on the students' thinking process in the future.

The (5) second planning of a lesson again was conducted after the first lesson. It was difficult to understand how the lesson plan for the second class was developed after the first class, because we were unable to connect via Zoom. However, the lesson study coordinator had some documentations. It was revealed that most teachers realized that they have to center much on designing activities that could engage the learners more and promote learning in them than teacher-centered activities. Questioning technique was also mentioned to improve making learners to ably understand what the teacher expected of them give as an indication that learning has occurred.

The (6) conducting revised lesson was conducted on July 23rd, and (7) reviewing the lesson again was then held. The general impression after the second demonstration lesson was that there were many improvements such as the lesson was learner centred, provided activities to learners and the teacher used the knowledge which was being generated by the learners. It proved that the second was a better lesson as compared to the first demonstration lesson. Additionally, the students' discussions and notes were shown on Zoom, making it easier for us to grasp the children's learning. Later, the (8) compiling learning was conducted by the teachers from the NCE and the Nalikule Demonstration Secondary School. The lesson study reflection report is attached at the end as appendix.

At the second cycle reflection on August 6, the following opinions were shared: the lesson study cycle was a good opportunity for Malikha CDSS teachers to learn about the lesson study, and that they would like to conduct more lesson studies in the future. Furthermore, although it was difficult for members from university of Fukui to participate in every process in the first cycle, in the second cycle, it was possible to participate in almost all the processes. However, in this lesson study initiative, all participants were required to make one record; consequently, it was unclear what each teacher felt and what everyone thought. Therefore, it was agreed that in the next cycle, each participant would write a reflective memo.

IV. Conclusion

Due to the impact of COVID-19, we were forced to change our approach to collaborative practice with NCE and the Nalikule Demonstration Secondary School. The change was made from visits and invitations that took place several times a year, to an online approach. Initially, there were concerns that the inability of both parties to travel would interrupt the collaboration and make it difficult to understand each other's situation. However, using the online system, we were able to collaborate on the practical process of the lesson study, which we had been able to tackle only in a fragmented manner.

As for the collaborative practice of online lesson study, the methodology had improved with each cycle. For example, the camera angle was modified, and the main points were noted in the chat. Additionally, the focus shifted from following the process of lesson study to the learning process of the children in the class and the learning of each participant during the process. In future, each participant should focus on their learning process by making a reflective memo. By continuing to work on the collaborative practice with the NCE and the Nalikule Demonstration Secondary School, we hope that the parties involved in the lesson study will be able to share our knowledge from our respective standpoints, and that it will become a place to explore the kind of education required in the future.

[references]

Elliott, J, (1991). *Action research for educational change.* Buckingham: Open University Press.

Kimura, Y. & Kishino, M. (Eds.). (2019). *Lesson study: Change the practice and innovate the theory*. Tokyo: Shinyosha.

Schön, D. A. (1983). *The Reflective Practitioner: How Professionals Think in Action*. New York: Basic Books.

Schön, D. A. (1987). *Educating the reflective practitioner*. San Francisco: Jossey‐Bass Publishers.

Schön, D. A., ed. (1991). *The reflective turn: case studies in and on educational practice*. New York: Teachers College Press.

Wenger, E., McDermott, R. and Snyder, W. M. (2002). *Cultivating Communities of Practice*. Boston, MA: Harvard Business School Press.

Yamauchi, T. (2019). A study of practice teaching methods at professional schools of education in Japan. *Bulletin of Professional School of Education Yamagata University*, 10, 34-42.

[appendix] Lesson Study Reflection Report

Nalikule College of Education, Nalikule Demonstration Secondary School and Malikha Community Day Secondary School (CDSS) organised a biology lesson study. This was part of the ongoing lesson study cycles being implemented in Nalikule. The biology lesson study was conducted at Malikha CDSS. Malikha CDSS was chosen as a way of introducing the model to the school. The first and second lessons were taught at Malikha CDSS by Mary Chiputu, a teacher from Nalikule Demonstration secondary school.

Malikha CDSS is a sister school to Nalikule Demonstration secondary belong to the same Nalikule cluster. (Cluster is a grouping of secondary schools within the same geographical location). Clusters are organised for the reason that schools coordinate and work together in areas of professional development. Nalikule cluster has five schools namely: Nalikule demonstration, Malikha CDSS, Chiwamba CDSS, Chimwa CDSS and Mseche secondary.

Nalikule college previously collaborated with Nalikule Demonstration secondary on lesson study. However, a decision was made to extend lesson study model to the whole cluster. Hence, working collaboratively with Malikha CDSS on the biology lesson. In the next lesson study, all schools in the cluster will be involved. This report reflects on the biology lesson.

Preparations for the biology lesson study were conducted at Malikha and the first and second lesson were taught at Malikha CDSS. A team of biology teachers from Nalikule and Malikha met on 16th July, 2021 to identify a topic and plan the lesson. Following this meeting, a topic: Dichotomous key, was identified as challenging to teach. This topic is from form four teaching syllabus. (Note: form four in the highest class in secondary education). A 120-minute lesson was planned the same day.

The first demonstration lesson was taught at Malikha CDSS on 20th July, 2021. The first demonstration lesson was taught to half of the class. (Form four at Malikha has many students in one class up to 90. So, the class was split into two, each group comprising of 45 students). The positive impression about the first demonstration lesson were: the teacher started from known to unknown content, had good interaction with the learners. However, the areas that needed improvement included shortening the introduction because it was too long, clearly state the rationale to the learners.

The second demonstration lesson was taught to the other half of the form four class on 23rd July, 2021. The second demonstration lesson had some improvements. The following were the improvements in the introduction: the introduction was brief but also engaging the learners through questions. This time around, the teacher asked learners to define classification. In this way, the learners were engaged and provided an opportunity for the teacher to assess prior knowledge of the learners and misconceptions brought to the lesson. Again, the teacher gave a situation where the teacher cited two animals (goat and chicken) for learners to identify the similarities and differences. In addition, the success criteria (objectives) for the lesson were clearly stated. In this case, direction of the lesson was given to the learners. They knew what they were supposed to learn.

Notable improvements were also noted in the lesson development. Among the improvement are: learners were engaged by asking them questions like, define dichotomous key, in pairs (involved learners). Teacher used the answers from learners to develop the definition of dichotomous key. In process, eliminated the misconceptions from learners. Afterwards, teacher hanged the chart showing different kinds of animals and asked learners to identify the differences among the animals (learners were engaged to build knowledge). Thereafter, the teacher displayed the prepared dichotomous key to identify the animals on the other chart. The teacher took learners through step by step how to use the prepared dichotomous key to identify the animals displayed on the chart.

In concluding the lesson, the teacher gave an activity for learners to identify the organisms with a prepared dichotomous key. This time learners were given opportunity to practice using the dichotomous key. In addition, learners were asked to summarise what they learnt in the lesson.

The general impression after the second demonstration lesson was that there were many improvements such as the lesson was learner centred, provided activities to learners and the teacher used the knowledge which was being generated by the learners. It proved that the second was a better lesson as compared to the first demonstration lesson.