

Lesson Study at Dhankaka Cluster Resource Center in Ethiopia

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Abstract : *The Japanese lesson study model is the major form of professional development and a teacher-led instructional improvement cycle. This paper describes collaboration between researcher and teachers/practitioners on lesson study at Dhankaka CRC. The purposes of the project were to introduce lesson study approach to teaching-learning of science and mathematics, and to clarify the effect of lesson study centered in-service training of teachers by the cluster resource center (CRC) system. Moreover, the pilot work aimed to see the effectiveness of lesson study in one of the school cluster centre.*

Data on the pilot work show that the lesson study was positive. The approach has created better opportunity for both teachers and student. It was noted from reflections that teachers' lesson study activities helped them to develop the kinds of instructional and subject matter knowledge that are goals of teacher professional development.

Five issues/concerns are suggested from this research: The need for guidelines/handbooks for lesson study to support discussion of lessons, observation of students, write-up of lessons; research on the design of professional development or lesson study experiences; model development and evaluation strategies; teaching-learning facilities/technological aids, and finally it is necessary to implement the lesson study in more sample schools with close follow-up and assessing the effectiveness to carry out workshops and training programs for teachers on lesson study.

Key Words : Lesson study, effectiveness, suggestion, Ethiopia

1. Background and the Context

Ethiopia is a multi-ethnic society with more than 80 different nationality languages that vary in population size. The total population of the country was estimated at 77.2 million in 2007, making it the second most populous country in Sub-Saharan Africa after Nigeria. The age composition is heavily concentrated in the young age cohorts; child and young people (0 to 14 year-olds) make-up about 42.8 percent of the total population.

The government system of the country is federal structure comprising of nine regional states (Afar, Amhara, Benishangul-Gumuz, Gambella, Harari, Oromia, SNNPR, Somali, and Tigray) and two city administrations (Addis Ababa and Dire Dawa) established on the basis of proclamation No 7/1992. The regions are divided into zones, woredas/city administrations and kebeles. The woredas are key local government units in each region and responsible for the provision of basic services. Inline with the decentralized

government arrangement, the managerial and administrative structure of the education system has five layers (school, woreda, zone, region and federal) whose functional responsibilities are defined by law (TGE, 1993; FDRE, 1995; MoE, 1995, 2002).

The Ethiopian education system is guided by Education and Training Policy issued in 1994, which focuses on major areas of reform such as expanding access to education equitably, restructuring the education system, increase the relevance of education to communities and improving the quality of education throughout the system (TGE, 1994; MoE, 2000). Within the framework of poverty reduction strategy, Education Sector Development Program (ESDP) has been adopted to ease educational problems and to facilitate implementations. Regarding the medium of instruction, the education and training policy allows nationality languages to be used at primary level. The other fundamental issue in the policy framework is the education tuition, where provision of education from grades 1-10 is free for all children. However, there is a provision of introducing cost sharing from second cycle of secondary education up to tertiary level. The structure of the education system encompasses formal and non-formal education. This formal system constitutes of basic, general, higher and specialized education and TVET programs. The components of the school education system are pre-primary for 4-6 years aged children, primary education of 8 years (grades 1-8) for 7-14 years aged children which is subdivided into basic education (1-4 grades) and general education (5-8 grades). The secondary education comprises of two cycles; general secondary education from grades 9-10 and preparatory senior secondary education of 2 years (11-12 grades).

The Education and Training Policy of 1994 stipulates that the teacher education and training components will emphasize basic knowledge, a professional code of ethics, methodology and practical training. A strategy of the policy is that teacher training programs and the curriculum will be made relevant to educational objectives and be responsive to the different curricula of education. The curriculum organization and instructional grouping for the first cycle primary education is self-contained classroom and subjects taught are English, Local language, Amahric, Mathematics, Environmental Science and Aesthetics. For upper primary education departmentalized approach is employed, where teachers trained to teach 2-3 subjects.

Regarding instructional methods, the policy strategy accentuates the teaching-learning process as learner-centered, active learning, and problem solving, activity-oriented, and life-related approaches in different contexts. Moreover, the schools in most cases are organized into a cluster system. The system of clustered school has been adapted with the objectives to: utilize scarce resources efficiently and share experiences among members of the school cluster, improve teaching and learning process, to enhance and sustain professional development of teachers, disseminate and localize curriculum and initiate creativity at local level and thereby improve quality of education (MoE, 2003). It is supposed that school cluster system serve to disseminate and familiarize teachers with research findings on approaches and methods of teaching and enhance professional competences of teachers, and consequently improve the teaching-learning process to impact on quality.

2. Rationale for Lesson Study

As literature indicates, many teachers have used the results of educational research to craft teaching methods that are innovative, interactive, learner-centered and responsive to a variety of learning styles. These approaches require active participation from both teachers and students, and suggested to be noteworthy particularly for teaching science and mathematics. In this regard, researchers have credited Japan's improvement in math and science instruction to teacher-led lesson study (Lewis, 2002). The goal of Japanese lesson study is to improve the instructional practice of teachers and thus, improve student learning and success.

The Japanese lesson study model involves teachers working in small collaborative groups. It is the major form of professional development and a teacher-led instructional improvement cycle. The teachers meet to discuss learning goals. Once a learning goal is agreed upon, teachers co-plan a classroom lesson. This planning involves the actual activities students will do and the teachers anticipate student responses. One teacher from the group teaches the actual lesson while the others from the group observe. The teachers then debrief the lesson and share observations. The lesson may then be revised and taught to another class by another teacher from the group (Fernandez et al., 2001; Lewis & Tsuchida, 1997; 1998; Yoshida, 1999).

Lesson study embodies many qualities of effective

professional development and has enabled Japanese classroom teachers to build an emphasis on problem-solving (Lewis & Tsuchida, 1998; Takahashi, 2000). In Japan, lesson study is a system for creating professional knowledge about teaching (Hiebert, Gallimore & Stigler, 2002). Murata and Takahashi (2002) noted that lesson study incorporates features associated with effective professional development and providing onsite support within a collegial environment. Lesson study is a form of practitioner research in which teachers investigate issues of teaching and learning in their own classrooms (Zeichner and Noffke, 2001). It can be a method for generating not only practitioner knowledge but also professional knowledge if it becomes a way to carry out the erudition of teaching and learning (Hutchings, 2000). The facts that lesson study creates multiple ways for learning that lead to instructional improvement. As Lewis (2005) suggested, teachers' thinking and practice may improve in multiple ways as a result of: increased knowledge of subject matter, increased knowledge of instruction, increased ability to observe students, stronger collegial networks, stronger connection of daily practice to long-term goals, stronger motivation and sense of efficacy, and improved quality of available lesson plans. Thus, it is believed that lesson study is a fertile context for teaching improvement and teachers' professional development.

3. The Problems

School clustering system was introduced to Ethiopia some years ago. In Oromia, majority of primary schools have been organized as cluster since 1995. The basis of clustering of schools was the local and needs and geographic convenience. Besides sharing of some experiences and resources among schools in cluster, the traditional way of teaching-learning process has persisted. In spite of similar pedagogical goals, approaches and experiences, teachers typically work alone when planning instructional activities. Such isolation limits efforts to improve teaching on a broader scale, both within and across disciplines. Although individual teachers may reflect on and improve their practice, there are few occasions to converse with colleagues about what they discover about teaching and learning. When they do share their ideas about teaching, it likely takes the form of knowledge they develop from their experiences in the classroom.

It is believed that teaching is a multidimensional process. Teaching may be identified as the active interactions between teacher and students in a classroom setting and embodies at least elements such as vision, design, interactions, outcomes, and analysis. Thus why, lesson study is highly valued by Japanese teachers and an effective way to promote long-term teaching improvement. As many researches identified, one of the factors that contribute to educational quality at the local level is quality of teaching, which is recognized as the key, the factor without which other quality inputs are unlikely to be successful. This was the idea behind that necessitates testing the lesson study in one of the cluster schools of Oromia Region.

4. Objectives

The purposes of the Lesson Study project were to introduce Lesson Study approach to teaching-learning of science and mathematics, and to clarify the effect of Lesson Study centered in-service training of teachers by the cluster resource center (CRC) system. The project was aimed at benefiting the students, teachers and CRC and the cluster member schools by providing:

- (i) Professional development for the teachers, i.e. enabling the teachers to use the child-centered and problem solving approach for lesson studying,
- (ii) Teachers of cluster member schools and CRC share good practices among each other.
- (iii) Improving teaching skills through reflective practice.

Moreover, the pilot work aimed to see the effectiveness of lesson study in one of the school cluster centre; documenting the implementation process, supports and challenges; and using this information to contribute constructively to further development in this regard.

5. Methodology

(1) Method and Sampling

The learning-teaching approach selected for implementation was the Lesson Study. Although, the approach employs child-centered and problem-solving methods, conceptually and practically in classroom application is new to Ethiopian context. Thus, an arrangement was made to discuss and share experiences on teaching in primary schools of Ethiopia, in particular in Oromia and that of the lesson study practices of

primary schools of Japan between the researchers. After a thorough discussion, a common understanding was reached to introduce the lesson study to one of the selected school cluster system in Oromia.

The idea of Lesson Study was communicated to Oromia Education Bureau, then, Dhankaka primary school cluster resource center recommended for the project work. Dhankaka school is a complete primary school (1-8 grades), a cluster resource center with four members of first cycle primary schools namely Daloo, Giche, Gubasaye, Dhankaka No. 2 in East Shewa Zone of Oromia Region. Afterward, a draft plan was prepared to introduce the Lesson Study method to Dhankaka CRC and member schools.

In order to introduce the Lesson Study to Dhankaka cluster center and member schools, it was necessary to retain essential features of the Japanese model, making necessary changes to adapt to the contexts and purposes to local situation, which are in no way uniform across regions, institutions or disciplines. However, it was learnt that lesson study involves a small team of teachers working together to design, teach, study, and refine a single class lesson.

(2) Study Subjects

For the purpose of the project work, grade four Environmental Science subject, teachers who teach the subject and their students at this grade were selected. Accordingly, four teachers from Dhankaka CRC, two teachers from each four cluster member schools and grade four students were identified and included in the study. In addition, head teachers of each school and one supervisor from the Dhankaka CRC were involved in the pilot work. The Lesson Study team for each cluster member schools and the CRC consists of two-three teachers, one head teacher and one supervisor.

(3) Procedures and Discussion

After Lesson Study teams' formation, the next step was to carry out brainstorming sessions and training on the implementation of Lesson Study. To facilitate the training sessions, training materials, formats/worksheets, other supportive aid and participatory/interactive methods were used. The following discussions present activities preformed.

① Brainstorming and training

The first session of the meeting with teams of lesson study at Dhankaka CRC was devoted to reflect on practical problems on instructional methodologies and the existing experiences. The participants shared

their views on: whether and how they can use the experience to improve their teachers in CRC and cluster member schools and whether they have other strategies to encourage teachers in meaningful team work. In the discussion, it was noted that teacher works alone. Teachers do not plan lessons together, and they don't even think about observing lessons conducted by their colleagues, except the head of the school or the supervisor who would observe lessons rarely, just once a semester for the requirements of teachers' performance appraisal. In most cases teachers were not reflective. No system in placed to assess what has been learnt and what needs to be changed. These were some of the teaching gaps realized and consensus reached among the teams/participants for the need to adopt 'lesson study' as a method for improving the learning-teaching (instruction) based on careful observation of students and their work. This was underlined as the purpose of the project.

The next point was clarification on Lesson Study/Research Lesson, the purposes, benefits and key features to familiarize the teams' members and to develop conviction in them. Then, the process of Lesson Study which involves planning the lesson, presentation of the lesson and reflecting on the lesson was discussed. The teams were able to differentiate that Lesson Study as a continuous cyclical process, Plan, Do and See, which is different from their experience of common teaching methods. Participants understood that working on Lesson Study involves planning, teaching, observing, and critiquing the lessons. To provide focus and direction to this work, the participants discussed on how to select an overarching goal and related research question that they want to explore which then serves to guide their work on all the study lessons.

Model of plan for Lesson Study for grade 3 Environmental Science was given to all school teachers to learn out of it (annex 2). With the help of the model plan, steps to be followed during planning phase, how to select learning goals were discussed. Finally, how to conduct the lesson and make observation (checklist annex 3), tasks to be accomplished during post lesson conferences and post lesson activities were discussed with the support of examples.

Regarding how long and how often teachers work on a given study lesson, the exact amount of time devoted per study lesson varies significantly from group to group. On average, a group may devote 2-4 weeks

period to working on a standard study lesson. Groups of 4 to 6 teachers will work on an average of 2-3 lessons a year. Often, each of these lessons will be taught twice in the process of being developed. In most schools, there will be at least a few subgroups that work on study lessons, which yield many opportunities for teachers to teach, observe, and discuss publicly taught lessons. For the purpose of this exercise, 2 weeks of time was suggested to work on the selected lesson study.

In general, the first day meeting has helped to clarify on the objectives of the project and to reach consensus to carry out the pilot study. For obvious reasons, the teachers need some time to internalize the method introduced and to visualize how to put it into practice in their own settings. Then, the teams of Lesson Study/participants agreed to go back to their respective schools, discuss among themselves on the workability of the method introduced, how and when they can implement, ways of assessing the impact of the method on students learning, and to come back with adequate preparation and arrangements needed for the next session.

② Reflections from the participants

The second training workshop was arranged after some weeks to discuss on any development and problems teachers faced in an effort to internalize the introduced method and its practicality. Accordingly, all schools including the CRC presented what they have done after the first training session. The following issues were reported:

- (i) The team of teachers for each school has identified the unit to be taught, the research lesson and the goals,
- (ii) Some teams questioned the role of observers in the classroom as when and how,
- (iii) All teams have scheduled to conduct lesson study in their respective schools,
- (iv) Some reported that the plan prepared overlaps with that of the usual lesson plan,
- (v) All teams have developed a draft lesson study plan, however they need more clarification and additional exercises to design,
- (vi) Lack of sufficient time to make detail discussion with a colleague to prepare and write the lesson plans,
- (vii) Practically, it was almost out of question to get the teachers together because of restrictions the long distances among the CRC members' schools and

teachers residence.

- (viii) There was a doubt whether each unit of environmental science content could be written by using lesson study approach.
- (ix) The schools have stated they concern regarding the inadequacy of the materials to carry out as intended.

As per participants reports presented from each schools, the units and lessons topic identified were different. The basis of topic selection would be those challenging and vertically linked to similar units in other grades. All groups presented their lesson study topic at plenary for discussion and review. The lesson study topics presented were not yet covered by the usual teaching-learning methods. It was noted that almost all teams have difficulties in designing their lesson study plan, thus much time was devoted to clarify all elements of the plan (annex 2) and its features which distinguish it from the ordinary lesson plan.

The next point focused was the role of observers; in this case when one teacher presents the lesson, the rest colleagues observe the lesson study in the classroom. During observation in classroom, observers note as per the checklist given (annex 3) and the results of observation will be presented on discussion during post lesson conference. Regarding inadequacy of materials for lesson study, all schools were advised to depend on locally available materials.

At the end of the session, the participants were asked to reflect on their opinion regarding lesson study. Teachers and head teachers opinion towards success of the workshop indicate that objectives of the project was clear, after some exercises review of the process made has helped them to understand the method and how to go about. Teachers reflected that they can make necessary effort and had a confidence in giving knowledge to others. Participants had a confidence in the improvement of lesson plans and in developing the quality of teachers with this approach being enhanced and influencing student learning.

The other important issue was how do we know whether the Lesson Study method is effective? Of course, this is a trial phase and it needs a preliminary assessment to check its usefulness. One way suggested was to carry out pre-test before intervention and post-test after intervention. Simple achievement test can be administered to assess the knowledge and skills. Finally, it was agreed that all teachers/teams to revise

their plan, carry out lesson study in their respective schools, conduct post lesson conference and submit report that includes the lesson study plan, pre-test and post-test results of the students, observation checklists and overall reports.

6. Limitations

One of the limitations was that the cluster member schools are located at 4-5 km far away from the Dhankaka CRC; thus, it was difficult to exercise the Lesson Study in one school. Further, the location/distance has limited the supervisor as external observer to some cluster member schools. Lack of educational technology materials to document classroom observation has reduced the quality of the lesson to learn out of it. An attempt was made to judge the effectiveness of the method based on test achievements, however, some other intervening variables were not adequately controlled that could interfere with the result. The large class size it-self in some schools have reduced the applicability of the method.

The problem solving approach as a teaching method was not so internalized by teachers. The teachers need more experience about how to present the problem and give students time to read, analyze, remember previous experiences related before thinking to expect and solve. Also they must finish the teaching plan on time. The other challenge was schools lack supportive materials like cameras/videos, computers, projectors and others teaching-learning aids. The method/technology was difficult to set up every day. Some of the sections of the same course remain idle during lesson study; they were no longer in synchronized. The time selected for the study was not convenient due to two reasons: overlaps of program with the schedule of national census and the time were almost end of the academic year, where teachers overburden by other school activities. Further, teachers demand some incentives due to the fact that preparation for lesson study and implementation requires more teachers time.

7. Major Findings

(i) The test results of the students before and after the implementation of lesson study is depicted in the following table. As can be seen from the table, the number of students who passed the test after

intervention was greater than before intervention. In all schools number of students who failed in the test was decreased after intervention. That is the number of students who passed the test increased and who failed in the test decreased after intervention. Similarly, the mean score achievements of the students have drastically improved for all schools after the implementation of the lesson study. This implies that the strategy employed/the lesson study makes students have good thought, high achievement and positive attitude.

Table1. Results of Pre-test and Post-test Conducted

Schools	Students	Pre-test	Post-test
Dhankaka CRC	No. of students sat for test	274	274
	Mean scores achieved	4.91	7.31
	No. of students passed	140	234
	No. of students failed	134	30
Dhankaka No.2	No. of students sat for test	100	100
	Mean scores achieved	5.02	6.59
	No. of students passed	64	91
	No. of students failed	36	9
Gubasaye	No. of students sat for test	46	46
	Mean scores achieved	5.38	6.62
	No. of students passed	32	42
	No. of students failed	14	4
Daloo	No. of students sat for test	48	48
	Mean scores achieved	5.4	6.8
	No. of students passed	32	44
	No. of students failed	16	4
Giche	No. of students sat for test	27	27
	Mean scores achieved	5.93	7.26
	No. of students passed	25	27
	No. of students failed	2	0

- (ii) Students in the same grade and taking the same subject in the school communicate to discuss problem, and express their thought in oral communication as well as interaction. They can explain the process and how to solve problems.
- (iii) Through working with the team of teachers, there were improvements in performance of teachers. It was reported that teachers use problem solving as a teaching method, depending on process of teaching. They give students chance to deduce new concept and build their knowledge (conceptual knowledge, procedural knowledge, problem solving). They encourage students to use previous experiences to expect answers. Teacher works as facilitator for students to think and

work themselves.

- (iv) The approach has created better opportunity for students to work in group and individually.
- (v) The teachers being observed by others have felt that this is very supportive.
- (vi) The teachers had positive feeling in using the lesson study plans in the class. The workshop was worth the time and it was the great activity. Teachers reflected that lesson study activities helped them to develop the kinds of instructional and subject matter knowledge that are goals of teacher professional development.
- (vii) Overall, the atmosphere of acceptance from the students and the teacher/practitioner was very inviting. The potential value of lesson study for teachers/practitioners willing to take the risks associated with an emerging innovation, and the importance of opportunities for practitioners to find ways to enhance their lesson study knowledge and practice over time needed.

8. Lesson Learned

Lesson study offers a different way of thinking about learning and teaching. Teachers get insight into how their students learn from the lesson, where they get stuck, what changes take place, and how they interpret ideas. Thus, how students learn is central at every step in the lesson study process. In the lesson planning phase teachers consider how their students are likely to interpret, construe and respond to the parts of the lesson. Observers attend to learning and thinking as the lesson unfolds. Data collection focuses on student learning and thinking throughout the lesson. After the lesson, the group analyzes the evidence of student learning as a basis for making changes to the lesson. It is believed that this piece of work indicated at least the following tangible products:

- (i) A detailed, usable lesson plan,
- (ii) An in-depth study of the lesson that investigates learning and teaching interactions, explaining how students responded to instruction, and how instruction might be further modified based on the evidence collected,
- (iii) Aspects of lesson study require a start-up training, consisting of a workshop or self guided tutorial designed to get teams of teachers started doing lesson study,

- (iv) Some topics/units can be selected for lesson study and carried out in 1-2 weeks in a semester, or 2-4 weeks in a year,
- (v) Carry out lesson study and participate in a review, receiving feedback and suggestions about how to improve the lesson study; then write a final lesson study that will eventually make a contribution to a knowledge base for other teachers in the same subject.

9. Recommendations

In lesson study a small group of teachers jointly designs, teaches, studies and refines a single class lesson. From this exercise and experiences of others the practice of lesson study creates multiple pathways for improving teaching and improved students' academic performance. In light of this study the following issues/concerns are suggested:

- (i) To implement lesson study in schools, resource development and key support is indispensable. Thus, four types of resource development seem especially important. These are:
 - a. Guidelines/handbooks for lesson study; resources on Japanese models of instruction (science and mathematics); and resources on student understanding of specific topics. One key observation of the pilot work on lesson study was the need for guidelines to support discussion of lessons, observation of students, write-up of lessons, etc. Descriptions of student thinking in various domains (misconceptions and strategies for building understanding) may also play an important role in supporting data collection on student understanding, which is a center of the lesson study process. The handbook illuminates both the key ideas underlying lesson study and the practical support needed to make it succeed in any subject area. It also provides practical resources including schedules, data collection examples, protocols for lesson discussion and observation, and instructional plans for subjects for which lesson study planned.
 - b. Research on the design of professional development; lesson study experiences, including those conducted with Japanese teachers could be as major source to learning. Careful study and sharing of methods for conducting lesson study work with Japanese practitioners might enable improvement of professional development methods.

- c. Model development, evaluation strategies are needed that contribute to continuous improvement of lesson study, by promoting reflection and feeding back information to lesson study leaders and participants so that they know in a timely fashion what is going well and what needs to be improved. How does lesson study improve instruction? What sequence of activities (e.g., collegial planning, observation of student learning, identification of key understandings, revision of lessons) ultimately results in instructional improvement? How is student learning best measured?
- d. In lesson study, teams document their lesson studies so that other instructors can review and learn from their work. Moreover, the schools need to be equipped with important teaching aids, for recording such as videos and audio materials, and other essential equipments some to be shared at CRCs.
- (ii) The exercise made was in a very limited area and it demands to observe the technology/method in more and reasonable number of schools to assess the strength and weaknesses. Thus, it seems necessary to implement the lesson study in some selected woredas of the region with close follow-up and monitoring in order to introduce to the system of education/large scale implementation. On top of this, it is necessary to make preparation and train some experts to expand and disseminate the application of lesson study in school contexts. Overall, workshops and training on lesson study for local educational authorities, teachers and school leadership is essential to facilitate implementation.

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要 約

日本の授業研究は、専門性を高め、教師自らが教育方法を改善する方法である。本論文は Dhankaka CRC において調査研究者と教員との共同研究のもとに行った研究である。このプロジェクトの目的は理科と数学の学習における授業研究の方法について紹介することや、クラスターリソースセンター（CRC）制度によって教員研修を中とした授業研究の効果を明らかにすることであった。さらに、この調査は一つのクラスターでの授業研究の有効性を確認することを目的とした。

本研究の調査データは授業研究に効果があったことを示している。また、このアプローチは教師と生徒の

両方に良い機会をもたらした。教師の授業研究活動が、教育力向上の到達点である教育方法と教科の知識の向上に役だったことが授業研究後の反省から読み取れた。

この研究から、次の5点の課題が示唆された。

1：授業の記録、児童生徒の観察、授業での議論のサポートや授業を議論するために授業研究のガイドライン／ハンドブックの必要性、2：授業研究の経験や専門性の高め方についての調査、3：向上と評価戦略のモデル、4：学習教材や技術への援助、5：より多くの学校で綿密な追跡や有効性の測定をともなった授業研究を行うことの必要性、授業研究を行う上での教師のためのトレーニングプログラムやワークショップを開くこと。

（訳：香西 武）

Annex 1: List of Participants Attended Training on Lesson Study

N	Name	School	Dates of Training		Responsibility
			Mar. 27/07	Apr.26/07	
1	Kedir Tura	Dalo	X	X	Teacher
2	Abadir Genna	“	X	X	Teacher
3	Mulugeta Mengistu	“	X	X	Head T.
4	Fekadu Takele	Giche	X	X	Head T.
5	Taye Gurmu	“	X	—	Teacher
6	Degefa Jango	Gubasaye	X	X	“
7	Bekelech Midhagsa	“	X	X	“
8	Tigist Zewdie	“	X	X	Head T.
9	Adugna Kebede	Dhankaa 2	X	X	Head T.
10	Damirew Tulu	“	X	X	Teacher
11	Nanno Bekele	“	X	X	Teacher
12	Werkitu Badhaso	Dhenkaka 1	X	X	“
13	Tilay Midhagsa	“	X	X	“
14	Kibitu Soori	“	X	X	“
15	Tsedala Legesse	“	X	X	“
16	Chaniyalew Asfaw	“	X	X	“
17	Fekadu G/Meskel	“	X	X	Head T.
18	Tigist Zewdie/ Getachew Kiflu	“	X	— X	— Supervisor

Annex 2: Grade 3 Environmental Science; Lesson Study Plan, Model Example

School: _____

Teachers: _____

1. Date and Time: Tuesday, March 27, 2007; 3rd Period (10:50-11:35 a.m.)

2. Name of the Unit: Let’s light up the miniature bulb.

3. Objectives of the Unit:

Students try to actively investigate objects around them to see if electricity can travel through them. [Interest/Desire]

Depending on an object a student chooses to connect in a circuit, the miniature bulb sometimes turns on. From this observation, the students are able to learn there are objects that electricity can travel through and objects that electricity cannot travel through. [Scientific thinking/decision making]

Students are able to categorize objects around them into the objects that electricity can travel through and the objects that electricity cannot travel through using the miniature bulb tester. [Skills/Expression]

Students are able to understand that there are objects that electricity can travel through and objects that electricity cannot travel through. They are also able to understand that those objects that electricity can travel through belong to a group called metals. [Knowledge/Understanding]

4. Instructional Plan:

How to light up the miniature bulb-1 lesson.

Let’s light up the miniature bulb-1 lesson.

Let’s make a tester-2 lessons.

Objects that do not pass through electricity and the object that pass through electricity-2 lessons.

Curriculum connections of topics related to electricity

Grade 3	Grade 4	Grade 5	Grade 6
Objective of the unit: Explained above	Objective of the unit: Investigate function of batteries by connecting them to a miniature bulb. Develop conscious thoughts about electricity. How to make a series circuit and a parallel circuit. Utilizing a solar battery.	No topics on electricity.	Objective of the unit: Investigate changes of the strength of electricity when electricity travels through an electromagnet, and understand the function of electric current Magnetization of iron core and nature of electromagnets. Constructing a miniature motor that utilizes electromagnets.

5. Objectives of this Lesson:

Students are able to categorize objects into those that electricity can travel through and objects that electricity cannot travel through by conducting an experiment.

Students are able to understand that those objects electricity can travel through are metals.

6. Lesson Process:

Steps	Learning process	Things to remember for instruction	Resources and preparation
7 minutes	(1) Talk about today's learning activity. Aim of this lesson <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px 0;">Let's investigate whether or not electricity can travel through objects by using tester.</div>	Describe/demonstrate how to conduct an experiment and confirm the process. • Provide opportunity for each individual student to conduct experiment in order for all students in the classroom to participate in the learning activity. • Support the students and check their methods by team teaching.	Worksheet • Tester (students made them prior to this lesson). • Objects for conducting experiment (students will bring them from home)
10 minutes	(2) conduct the experiment • Learning settings: Individual, group Talk about the problem that occurred or was found during the experiment. • By incorporating what they have learned from the discussion with the class, the students continue their experiment.	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px 0;">• Does the miniature bulb always turn on, even when other people try the experiment? • Does the miniature bulb always turn on no matter how many times you try the experiment?</div>	
8 minutes	(3) Carry out the discussion based on the results from the experiment.	• Conduct discussion with the whole class using the question indicated in the above box. If it is necessary ask the students to recall what they learned from the lesson entitled, let's light up the miniature bulb. If the students found different experimental results on the same object they investigated, the class will discuss the reasons why such differences occurred. • Walk around the classroom to observe how students are conducting the experiment and collect appropriate examples that are useful for carrying out a focused discussion, to resolve problems that students ran into or to highlight discoveries that the students made.	Worksheet
5 minutes	(4) Confirm what students are going to study in next lesson.	• Ask students to summarize new things they noticed/learned from this experiment by referring to the notes they took during the experiment. • Suggest to the students that based on the learning experiences gained from today's experiment, they can deepen the investigation by changing conditions in future experiments.	

7. Evaluation:

Students are able to categorize the objects that electricity can travel through and the objects that electricity cannot travel through.

Students can understand that the objects electricity can travel through are metals.

8. Notes for observers:

How actively are students engaged in the experiment, and how are they thinking on their own to solve the problems/tasks?

Annex 3: Observation Checklist

Name of the School: _____

Name of the Teacher: _____

Date of Observation _____

Subject and Grade: Environmental Science Grade 4

Unit and Lesson: _____

N.	Observation Question	Yes	No
1	Was the goal clear?		
2	Did the supporting activities contribute effectively to achieving the goal?		
3	Was the flow of the lesson coherent, and did it support students' learning of the concept?		
4	Were the problems and the materials helpful in achieving the goal of the lesson?		
5	Did the classroom discussions help promote student understanding?		
6	Was the content of the lesson appropriate for students' level of understanding?		
7	Did students apply their prior knowledge to understand the content of the lesson?		
8	Did the teacher's questions engage and facilitate student thinking?		
9	Were student ideas valued and incorporated into the lesson?		
10	Did the lesson summary refer to student theories or ideas?		
11	Was the lesson summary consistent with the lesson goal?		

12. How could the teacher reinforce what the students learned during the lesson?

Annex 4: Lesson Study Project Schedule

N.	Activities	Timeframe
1	Conduct training for teachers, supervisor and school heads.	March 20-30/2007
2	First observation at 4 Satellite Schools, conduct preliminary assessment using checklist.	April 1-10/2007
3	Second observation, Lesson centered in-service training at the CRC conduct training for satellite schools teachers.	April 20-30/2007
4	Reporting on performance, Analysis of Data.	May, June 2007
5	Write up report of the Research.	June
6	Discussion and conclusion of the research.	July, August 2007
7	Reflection to concerned bodies.	September 2007