

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Research

Bangladesh has a strong national commitment to education and it has one of the largest primary education organizations in the world. Despite many achievements during the past era such as hundred percent enrolment, recruitment of teachers, rebuilding of schools, long and short term management of teachers, different categories of training, major improvements are still needed in order for all children to obtain the benefits of quality education. In order to ensure quality primary education for all children it is important to change curriculum, re-write textbooks and enhance quality of teaching and learning in the classroom (UNICEF & JICA, 2009). Our primary curriculum is competence-based, but there are lots of gaps in curriculum, textbooks and its implementation system (JICA, 2009). According to the research findings, the impacts of competency-based curriculum in Bangladesh are far below from the level of expectation. So, there is a big gap among intended, implemented and attained objectives of the curriculum. In the process of rendering education, implemented curriculum (transferred by teacher) being situated in the middle position plays the vital role of materializing the intended curriculum and makes the students acquire the attained curriculum (Uddin, 2007).

Teachers are irreplaceable agents of the educational process at all levels of education system and in all types of educational provision (Svatopluk Petracek, 1989). Teachers play pivotal role in creating opportunities for social-emotional and academic learning (Hawkins, Doueck, & Lishner, 1998; Solomon, Kim, & Watson, 1997). Teachers' professional skill development is one of the important fundamentals of quality education. Learning is a process that occurs inside the children. Children need to be receptive, feel motivated and connected in order for a well facilitated classroom environment to contribute their learning. In order to ensure well facilitated classroom environment for the students' teachers have to be professionally skilled. But in Bangladesh, the traditional and dominant way of teaching in most schools tends to focus on memorizing facts. There is little emphasis on developing analytical, practical or vocational skills (UNICEF, 2009). Also teachers rely too heavily on the textbooks to present the content on teacher centered way without sufficient explanation using life-oriented examples and materials or problem solving strategies and diagnosis error patterns (Uddin, 2005). So, poor quality of teaching is recognized as one of the key variables contributing to the low level of learning achievement in primary schools (Bangladesh Education Sector Review, 2002).

Government started different initiatives for ensuring quality primary education in Bangladesh before starting Primary Education Development Program-II (PEDP-II). From 2004, PEDP-II started aiming at qualitative improvement of primary education. At that time, upon receiving an official request from GOB, JICA came forward with a project commonly known as JSP (JICA Support Program) with the goal of improving teacher training and the quality of lesson in primary science and mathematics which commenced in October 2004. For achieving the goals, JSP started for providing technical and physical support introducing different approaches of Lesson-Study (School-based with the participation of teachers within the school, cluster-based with the participation of subject-based teachers within piloting schools and different other stake-holders) named as SGA (Study Group Activity) and SW (Study Workshop) from 2004 under PEDP-II. Lesson Study is a Japanese model for teachers' professional learning that has been popularized mainly due to the work of American researchers such as Stigler and Hiebert (1998, 1999), Lewis and Tsuchida (1998) and Fernandez (2003). Lesson study process has been widely applied in different countries in Asia, Africa and North America for teachers' professional skill development. It is a highly structured process of teachers' collaboration, observation, reflection and practice and has spread rapidly around the globe across differing social, cultural and educational contexts. Many developed and developing countries are enabled to ensure quality teaching learning with teachers' professional development through lesson study. Lesson Study is popularized as an effective techniques for ensuring quality teaching learning in many countries around the world, on the other hand it does not take time and money like other CPD training. In Bangladesh, There are so many different CPD programmes for teachers' professional skills.

Many developed and developing countries have been able to attain desired goal by taking lesson study at school level for the insurances of the teaching learning in the class rooms with professional development of the teachers. The lesson study has become popular as a very effective technique all over the world, on the other side, it does not cost money and time like other trainings. For the participation of teachers in different trainings, the class teachings are interrupted.

Creditable progress in access and gender equality is the major achievements through different initiatives by the government of Bangladesh. However, in terms of quality education, student`s learning achievement and reduction of dropout in Bangladesh has not yet made similar breakthrough. With a view to improving the quality primary education, the Government of Bangladesh has undertaken an integrated sub-sector wide program known as PEDP since 2005 in association with the Development Partners (DPs). Now the

Forth Primary Education Development Program (PEDP4) for 2018-2023 running to improve the quality at all levels of the primary education sub sector (APSE, 2018). Out of 10 key objectives of the PEDP4 the following three objectives are most relevant of this study:

- To make primary education accessible for all children in Bangladesh;
- To increase enrollment, attendance and the rate of completion of the primary education cycle;
- To adopt a child-centered approach in the classroom;

In consideration of the importance of lesson study, it has included in the PEDP-3 with great importance and already it has included into DPED curriculum. According to TED plan TSN training for teachers and supervisors were conducted under the leading of DPE with technical support by JSP. Also during the period of PEDP 3, letters have been sent from the training division of DPE for the implementation of lesson study at the field levels. Besides these, NAPE organized training on LS for PTI personnel every year with the support of JSP since 2005.

From the time of foundation /establishment of NAPE, this institution has been managing the different periodic training and research activities for primary school teachers and related persons. JSP has been working for enhancing the quality of Mathematics and Science teaching learning in the primary level in collaboration with NAPE since 2004. Several members of the Mathematics and Science faculties of NAPE have achieved skills with experience on lesson study from home and abroad and already they have been performing duties as experts on piloting activities of lesson study under JICA support program. Some of the faculty members of NAPE received training on Lesson Study program from Japan with support of JSP. For this reason, NAPE has an opportunity to perform an important role to implement the lesson study and implementation of it after verification of its effectiveness against the background of Bangladesh. So under the consideration of the situation of Bangladesh the effectiveness of lesson study should be verified for the implementation of the quality education.

## **1.2 Main research objective:**

-To understand the impact of Lesson Study for improving teacher professional development.

### **1.2.1 Specific research objectives:**

- To identify the effective techniques of implementing Lesson Study;
- To identify the challenges in the implementation of school Lesson Study.
- To identify the changes of teaching learning in the classroom through Lesson Study.
- To determine the effect of Lesson Study in students learning.

## **1.3 Research Questions:**

R Q-1: What is the present status of mathematics teaching learning in the primary classroom regarding student's competencies?

R Q-2: What issues need to be considered in teacher CPD to enhance the quality of mathematics teaching learning in the classroom?

R Q-3: What issues need to be considered for the effective implementation of Lesson Study?

R Q-4: What sorts of difficulties do the teachers face for implementing Lesson Study?

R Q-5: What issues regarding administrative and academic support need to be considered for Implementing Lesson Study?

R Q-6: What changes have happened in the mathematics teaching learning through Lesson Study?

R.Q-7: What changes have happened in the student performance through Lesson Study?

R.Q-8: What kinds of initiative are required for teachers to implement Lesson Study effectively?

## **1.4 Educational Structure of Bangladesh**

Existing education in Bangladesh has four major stages: primary, secondary, higher Secondary and higher Education. Primary education is provided in two major streams: general and madrasha with 5 years schooling. Secondary education has 7 years schooling with three sub stages: junior secondary, secondary and higher secondary. Secondary education also has three major streams: general, technical-vocational and madrasha. Like secondary education higher education has also these three streams. According to National Educational Policy "preparatory education conducted together with other fellow-mates will create an enthusiasm for learning in the children. With this objective, a one-year pre-primary schooling must be introduced for 5+ children. Later, this will be extended up to 4+ children."

Table 1: Bangladesh educational structure is shown in a simple and easy way to understand the structure of education in Bangladesh.

Higher Education	General Education	Vocational Technical Education	Madrasha Education
Secondary Education	General Education	Vocational Technical	Fazil & Kamil
	Higher Secondary Education (XI-XII)	Vocational Technical	Alim
	Secondary Education (IX-X)	Vocational Technical	Dakhil
	Junior Secondary (VI-VIII)		
Primary Education	General (I-V)		Ebtadayee
Pre-primary Education	Pre-primary		

### 1.5 Primary Education in Bangladesh

Primary Education comprises 5 years of formal schooling from grade 1 to 5. The age group is 6+ to 10+ years. These five-year, primary education is compulsory for all children. In Bangladesh the Compulsory Primary Education act (CPE act) was enacted in 1990 in order to implement the constitutional provision for free, universal and compulsory education. The act empowered the government to undertake legal and administrative measures to implement the CPE act. The whole country was brought under CPE program in 1993. Bangladesh is committed to EFA and Dakar Framework and UN Millennium Development Goals for 2015. Its national development objectives and plans are guided by a strategy for poverty reduction and human development in which education, especially at the basic level, has a critical role. Primary education is generally imparted in the primary schools.

In order for all children to receive the benefits of quality education, recently Government has started one year pre-primary education (age 4+ to 5+) with all primary schools. At present there are 11 types of primary level institutions in Bangladesh namely Government Primary school (GPS), Experimental School (EXP) attached to PTI, Registered Non-Government Primary School (RNGPS), Community school (COM), Satellite School (SAT), High school attached Primary Section (H/A PS), Non-Registered Non-Government Primary School (NGPS), Kindergarten (KG), Ebtadayee Madrasha (EB), High Madrasha attached Ebtadayee Madrasha, and NGO run Full Primary School. Besides these, there are many private

schools around the country namely Pre-cadet Schools, Kindergarten Schools. These schools start from nursery. Many of these private schools are located in the urban area.

### **1.5.1 Organizational Structure of Primary Education in Bangladesh**

In Bangladesh, Management of primary education remains centralized. The Ministry of Primary and Mass Education (MOPME) is responsible for policy formulation, planning, evaluation and execution of plans and initiating legislative measures related to primary and non-formal education, headed by a Secretary of the Government. The Ministry is liable for administrative management and overall supervision of Primary education and non-formal education.

The Directorate of Primary education (DPE) was set up in 1981 and was created in order to stream line the universal primary education and strengthen the infrastructure. DPE has five divisions each headed by a Director. The divisions are Administrative division, Planning and Development division, Training division, Monitoring and Evaluation division, Policy and Operation division. There is a separate MIS cell in the Directorate of Primary Education for collection of data on selected primary education indicators. Under DPE, there are seven Offices of the Divisional Deputy Directors at each divisional headquarters. DPE has been decentralized administrative management, training, inspection and supervision among the division offices to ensure effective management of districts, upazilas, clusters and schools within the division. Also Divisional Deputy Director is responsible for the administrative management of PTIs and URCs within the division.

There are 64 District Primary Education Offices around the country headed by District Primary Education Officer. The DPEOs' main tasks and responsibilities are to take decisions related to administration and supervision of all primary schools in the district. DPEO is also responsible for recruitment, posting and transfer of teachers and other staff; arranging in-service training of teachers; distribution of free textbooks and supervision of schools within the district.

There are 481 Upazila Education Offices throughout the country. The UEO is in charge of general responsibilities for management and monitoring of primary education in the Upazila. Primary schools located within each upazila are divided into clusters. A cluster comprises 20-30 schools. One AUEO is in charge of each cluster. At present each cluster consists of 4-5 sub-clusters with 25-30 teachers in each sub-cluster. The AUEO's main duties are to supervise and monitor the teaching and learning in the

classroom within the cluster area schools. The AUEO is also responsible for the regular in-service training of all teachers of the sub-cluster. In fact, the AUEOs play the basic role in the development of the skills of teachers, in the implement of all kinds of innovative programs and in conducting of sub-cluster training programs for overall development of the quality primary education.

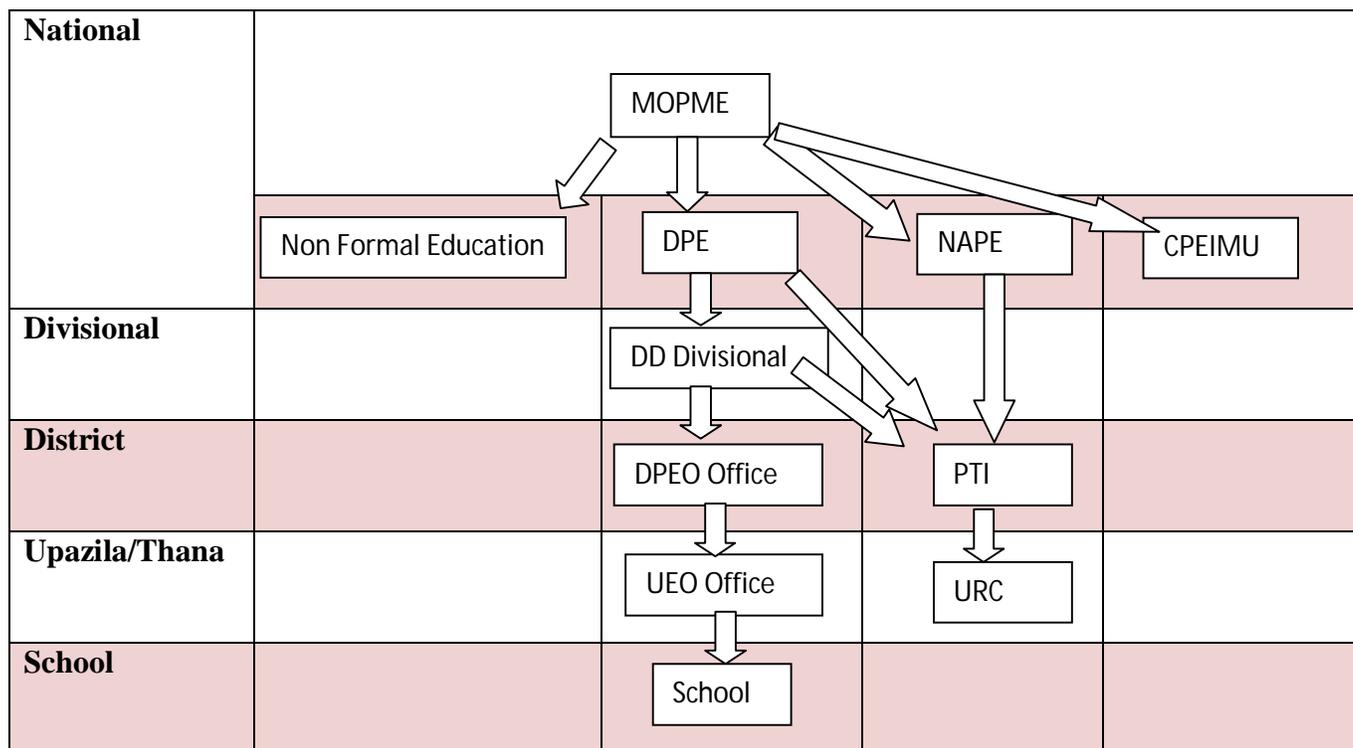


Figure 1: Organizational Structure of Primary Education in Bangladesh

The National Academy for Primary Education (NAPE) is the highest training institute for primary education. The responsibilities of the academy are development of C-in-Ed and DPED curriculum and the academic supervision of Primary Teachers Training Institutes, organizing officer’s training, research, workshops, seminars etc.

The Primary Teachers Training Institutes (PTI) offers one and half year formal course termed a Diploma in Primary Education (DPED) and one year Certificate in Education (C-in-Ed). Both of these courses are designed to train the teachers on pedagogical aspects and subject teaching methods. Upazila Resource Centre (URC) is an important institution at the upazila level for professional development of teachers in order to improve the quality of primary education.

## **1.5.2 Supportive Institutes of Primary Education**

### **1.5.2.1 National Curriculum and Textbook Board (NCTB)**

The National Curriculum Development Centre merged with the Textbook Board to reform the National Curriculum and Textbook Board (NCTB) in 1992. The NCTB currently serves as the national curriculum agency for the country as a whole and has been trusted with curriculum and instructional materials development activities from pre-primary to higher secondary level. The primary level related tasks of the National Curriculum and Textbook Board include: development of curriculum, completion of curriculum revision for all primary grades; field trials as well as the production of teaching-learning materials for pre-primary and classes I-V, including pupil assessment system; introduction of revised curriculum and materials for classes I-V in the school system throughout the country; development of supplementary/complementary teaching aids (i.e. charts, maps, reading-learning materials, kits, video films, etc.) organization of experimental and innovative activities in the context of primary education; development of training packages and participation in the training programmes for dissemination of revised primary curriculum; monitoring and evaluation of the training programme and development of reinforcement materials; development of motivational materials for media coverage.

### **1.5.2.2 National Academy for Primary Education (NAPE)**

National Academy for Primary Education is an apex institution for training, research, academic supervision and management in the field level of primary education in Bangladesh, which is headed by a director General (DG) and governed by a Board of Governors headed by the secretary of Ministry of Primary and Mass Education (MOPME). In NAPE, there is a board called DPED/C-In-Ed board which is responsible for managing the one and a half year DPED and one-year C-in-Ed program conducted by the PTIs. Under management of DPED and C-in-Ed training NAPE deliver necessary information, instruction for smooth running of DPED/C-in-Ed among the PTIs. NAPE also monitors and supervises DPED and C-in-Ed training program, prepare questionnaire for DPED and C-In-Ed examination, monitors examination, evaluate DPED and C-in-Ed training. NAPE jointly works with IER for ensuring quality of the DPED programme. NAPE also jointly work with different international organization to develop training manual, supplementary materials for teaching and learning and enhance the quality management of field level institutions of primary education and teaching-learning in the classroom, such as NAPE has been working with JICA support program since 2004. Besides this NAPE plays a vital role to develop and revise DPED and C-in-Ed curriculum and textbooks. In addition, NAPE is responsible for preparing questionnaire for Primary School Certificate Examination (PECE) which is started from 2008.

### **1.5.2.3 Primary Teachers Training Institute (PTI)**

In Bangladesh there are 65 government and two non-government Primary Teachers Training Institutes (PTIs). Most of the PTIs conduct one and half year DPED program and some of the PTIs conduct one year Certificate in Education Training for the untrained government primary schools teachers. The curriculum of DPED and C-in-Ed are provided by National Academy for Primary Education (NAPE). This course is designed to enrich teachers' subject matter knowledge and pedagogical content knowledge. In each PTI there are sixteen instructors who are involved in teaching, supervision of students teaching and related other activities of DPED program, an assistant superintendent who is responsible for academic management and a superintendent who is responsible for academic and administrative management. Besides one year DPED and C-in-Ed course PTIs also conducted different types of short course training for field level officers and teachers. PTI personnel conduct academic supervision in the catchment areas of primary schools in order to carry out the instruction of Directorate of Primary Education (DPE). Some times PTIs instructors work as trainer (facilitator) in different kinds of short course training in different places around the country according to the instruction and plan of training division of DPE and other government organizations.

### **1.5.2.4 Upazila/Thana Resource Centre (URC/TRC)**

The Upazila Resource Centre Training was introduced in 1998 under PEDP-I (Primary Education Development Program-1). In Bangladesh there are 491 upazilas (as of 9 January 2017) and every upazila has one Upazila Resource Centre. Each URC has an instructor, an assistant instructor, a data entry operator com cataloger and a night guard. The expectations from the URC professionals are to provide academic and technical support to the local level teachers for improving the quality of teaching-learning in the classroom. Thus establishment of URC at upazila level is a step towards decentralization of training and support services to local level for schools and teachers for improving quality of education which is a vital challenge in primary education of Bangladesh. In future URC may be an effective platform for teachers at the upazila level where they can get together in meetings, workshops or seminars in order to enhance quality of teaching-learning in the classroom. Under second primary education program URC conducted different kinds of short course training for the head teachers and assistant teachers, such as subject-based Mathematics, Science, Bangla, English, Social Science, Multiple Ways of Teaching and Learning, School Management Training etc.

## **1.6 Rationale**

The study team hopes that the present study will provide important suggestions and recommendations to ensure quality primary education. The research report will give a clear picture of the present situation of mathematics teaching learning in the primary classroom. On the other hand this report will give clear idea about how lesson study enhances quality of mathematics teaching learning in the primary classroom. Lesson study is one of the most favorite techniques around the world to ensure quality teaching learning in the classroom. Although the Government of Bangladesh has been taking different initiatives including implementation lesson study for ensuring quality education. In Bangladesh a big number of teachers and teacher educators received training on lesson study named as Teacher Support Network (TSN) through lesson study but real scenario of its implementation is not satisfactory.

Due to the importance of implementing lesson study in many countries many researchers conducted research related with lesson study. In Bangladesh with joint initiation and effort by JICA and NAPE (National Academy for Primary Education) experts, lesson study program conducted on experiment basis in 2 Government and 2 Registered Non-Government Primary Schools and Mymensingh PTI (Primary Teacher Training Institute) attached experimental school in Mymensingh district from 2004 to 2010.

Lesson study not only creates scope for a teacher but also a group of teachers and educators to gain knowledge about students, curriculum, pedagogy and subject matter. This lesson study process also enhances collaboration, cooperation, creative thinking skills of the members. It also builds up collegial relationship among the group members.

This research will help the researchers as well as the policy makers to make a future direction and also this research will help the policy makers to decide the ways of ensuring quality education through implementing lesson study. Related teachers' educators gain new insights in their role to ensure implementation of lesson study in order to ensure quality teaching learning in the classroom. Although this is not only research in this area but it will provide a real scenario about teaching learning status, implementation status of lesson study and concrete guide line for the policy makers and educators about how they can play role to make the teachers competent and committed to implement lesson study. So, this research is very important in order to ensure quality education.

## **1.7 Limitation of the Research**

Every sample-based survey research has some limitations. To conduct a research is a very intensive and complicated job. In this research there are several limitations that arose in this study.

The time frame for Implementing and collecting data of survey was a big limitation for this study. Within a very short time survey data were collected. In Bangladesh there are 509 URC/TRC. But in this study, 2 URC instructors and two Assistant Upazila Education Officers were included and data were collected. Data were also collected from 2 UEOs of two upazilas and 8 Head Teachers of 8 schools and 32 teachers of 8 schools (4 teachers in each school who teach mathematics) were included in implementing lesson study process and data and data also collected. So small sample size was one of the big limitation of this research. There are different types of primary schools. Including all types of primary schools there are about 76000 primary schools around the country. But only 8 schools were included in this process and data were collected. Thus the result of the research presents only the situation of the government primary schools. All other schools were excluded from the study.

The minimum standard of sample size in any research should be in between 5% to 10% as mentioned in Khurshid (1996). According to the formula, the sample size of this research would be much bigger, but the researchers could not cover it due to the limitations of time and budget. The researchers used purposive sampling considering different limitations. In this situation there might be some sampling errors which can affect the result of the research. In addition to that members of the research team was busy to carry out a lot of activities like preparation of competency-based text items and engaging training activities etc. This is why research team could not do all the activities of this research paying full attention.

# Chapter Two

## Literature Review

### 2.1 Lesson study

Lesson study is a continuous process of teachers' professional skill development where teachers work closely with their colleagues to assess the quality of teaching learning activity as well as for its development. This process develops teaching learning activity. Basically the lesson study is the continuous development of quality of lesson through Plan-Do-See structure.

Lesson study process is ongoing in different developed and developing countries in the world as a technique of teachers' professional development. Lesson study program helps a teacher in coordinating the three phases of curriculum – Intended curriculum, implemented curriculum and attained curriculum. Generally, due to different reasons, the topics described in the curriculum do not completely get reflected in the textbooks. The teacher cannot implement hundred percent that includes in the textbook in teaching learning activity simultaneously teaching learning activity cannot make students able to achieve entire competence. That means there remains some gap in-between intended and attained curriculum. The issue can be observed through the following flow-chart.

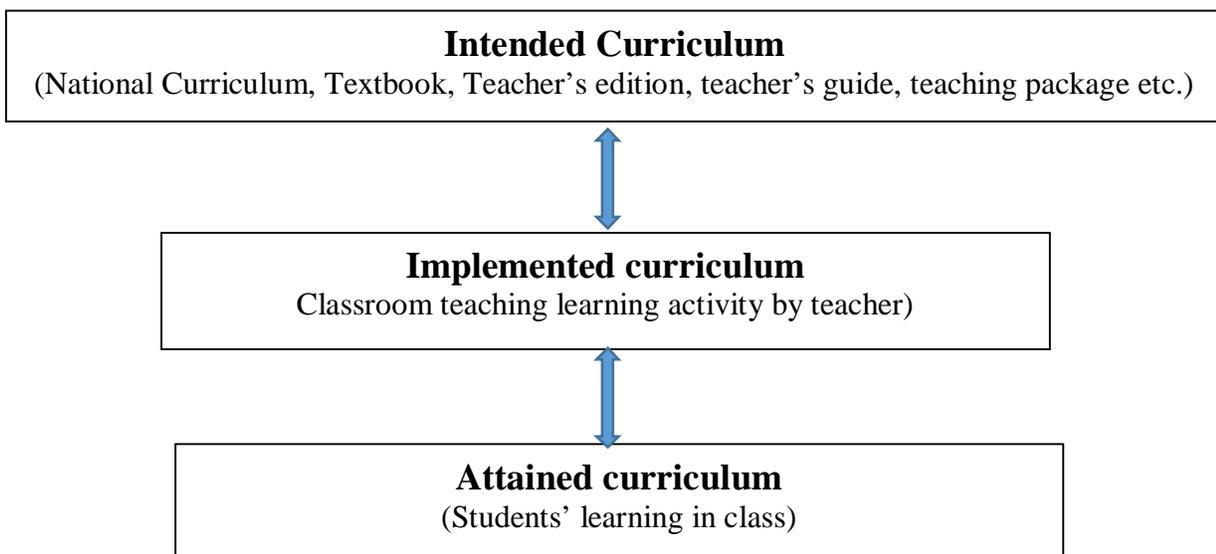


Figure 2 Gap in-between intended and implemented, intended and attained curriculum

Application of lesson study process in removing the gaps for implementation of curriculum and ensuring quality education plays a vital role indeed. Teachers become able to conduct lesson study program as per own needs by adjusting with the situation from own position at their schools. Lesson study process can be easily explained in Plan-Do-See cycle. The stages described in the lesson study process are called Quality Teaching Cycle (QTC) in one word (JSP-1). Quality Teaching Cycle creates wide scope for a teacher to decide how he/she will take help from colleagues for conducting teaching learning activity as well as reflect own effort. The following chart shows the lesson study implementation process in Plan-Do-See cycle.

## **2.2 Lesson study process**

According to the Lesson Study guide book was published by DPE with the support of JSP, It is mentioned that Lesson study program is an effective technique for teachers' continuous professional development process and Plan, do, see are the functional stages for proper implementation of this program. The needed tasks at every stage are like the following-

### **2.2.1 Stage 1: Plan**

The first step of lesson study is to introduce a lesson plan. Quality lesson plan is required in conducting quality teaching learning activity. It is required to maintain the following activities in introducing quality lesson plan.

#### **Work plan for lesson study:**

Based on discussion with colleagues the Head teacher will introduce a work plan adjusting with annual lesson plan and class routine. She/he will determine the teacher, class, subject, topic and date of completion of the lesson for this program. She/he will also determine by whom and how the lesson will be observed. It is essential to select the last period of a day of any Thursday for commencement of the lesson. She/he may complete this task two/three weeks before implementation of the lesson.

- **Introducing a lesson plan :**

The teacher responsible for implementing the lesson will introduce a lesson plan, collect and prepare the related materials. In this case the teacher may take help from teaching guide and teaching package. The teacher may complete this task in one/two weeks.

- **Discussion with colleagues about introduced lesson plan and materials:**

The head teacher will arrange meeting with lesson implementing teacher along with colleagues. In this meeting the lesson implementing teacher will explain the way to conduct the lesson plan introduced by the teacher, materials and ascertained activities of the lesson. She/he will revise the lesson plan wherever necessary according to the recommendations of colleagues. It is better to complete the task of this stage one week before implementation of the lesson.

**The issues need to be discussed at the lesson plan stage:**

- The teachers who are participants of lesson study process will be totally aware of lesson title, competence and learning outcomes, which will ease observation and analysis of important factors of the lesson.
- Colleagues will review the lesson plan so that the lesson may become suitable for implementation in classroom.
- Lesson implementing teachers will show the utility of the materials prepared for the lesson by applying the same in front of colleagues. They will rectify if any inconvenience arises so that these may be used easily and effectively during lesson implementation. At this stage they may discuss over the way of using board and technical materials (if there any).

Lesson implementing teachers will discuss how they would evaluate students. Evaluation strategy should be in such a manner so that it may measure the achievement as supposed to be attained by the students.

## **2.2.2 Stage 2: Lesson implementation and observation**

### **2.2.2.1 Lesson implementation**

Lesson implementing teacher will conduct teaching learning activity in class at this stage. Colleagues (as many as possible) will observe the lesson. It is better to include Head Teacher at this stage. Head teacher will take necessary measure for class management for certain grade ascertained in the routine for lesson observing teachers. At the end of lesson implementation and observation, the colleagues will provide constructive opinions for improvement of the lesson.

The teacher preparing the lesson plan will conduct teaching learning activity in the class. Teaching learning activity will be conducted according to the lesson plan prepared by the lesson implementing

teacher. The colleagues/members of the LS group will observe the teaching learning activity by using Lesson Observation Format during lesson implementation aiming for formative and pedagogical analysis. It is essential to look into the consideration of what and how students learn not just look what the teacher does in the classroom.

#### **2.2.2.2 Lesson observation**

Lesson study process is conducted through introducing a lesson plan, along with of teaching learning activity, lesson observation and exchange of feedback. Observation and feedback are a significant activity in case of lesson study. Lesson observation is unavoidable for improvement of a lesson. Effective lesson observation and feedback is the precondition of a lesson.

- Lesson implementing teacher can be benefitted through the following in the process of observation and feedback:
  - Opportunity to assess teaching learning activity conducted through observation by colleagues
  - Opportunity to assess own activity in the light of other's point of view
  - Recommendations by colleagues in pursuit of develop in professional skill
  - Increase of activities for professional groups in assessing students' demand and interest
  - Improvement and development of own profession
  
- The issues which are to be noticed during lesson observation:
  - Assessing the level of achievement of learning outcome from the lesson
  - Creating opportunity for students' thinking with the lesson
  - Application of effective teaching learning process and strategy
  - How students learn during teaching learning activity
  - Assessing the involvement of students in the learning process
  - Not to interrupt class activity during observation
  - Ensuring quality of observation task
  
- Instructions to be maintained during lesson observation:
  - To observe whether quality teaching learning activity is maintained
  - Not to talk much with students
  - Not to gossip with other observers
  - Do not consider only the extent that teacher followed from the lesson plan

- Write elaborately about students' statement, interaction, how students commit error and rectify the error by themselves etc. during observation

### **2.2.3 Stage 3: Evaluation/assessment**

At this stage, the lesson implementer and participant teachers decide the way to implement the lesson more effectively through discussion. The decision is made on how to develop the quality of teaching learning activity and to ensure students' learning through discussion. This step is post lesson implementation discussion session.

- **Post Lesson Discussion**

Lesson observation and post observation discussion should be effectively done. The discussion should take place in the classroom. This may be supportive for discussion on the entire class management including use of chalkboard. The post lesson implementation discussion will be for effective presentation of the lesson, not to criticize the lesson implementing teacher. It is expected that all participants (Implementing teacher and observers) will be benefitted from this discussion

#### **Conduction process for Post lesson implementation discussion-**

- Generally, the head teacher or the assigned group member of the formed group of LS will lead the discussion.
- One or two member(s) will be nominated to note down the discussion points
- At the very beginning, facilitator will deliver brief introductory speech about the observed lesson (it just positive comments about the observed lesson)
- Lesson implementing teacher will provide his/her opinion in favor of own teaching learning activity
- The observers will provide information obtained through observation as well as constructive opinions for improvement of the lesson
- The observers will mention the good points and later suggest improvement of the lesson.
- Finally, a teacher experienced on the subject will provide his/her opinion
- Should avoid criticizing/commenting at the personal level

## **2.4 According to the famous book of Teaching Gap by James W. Stigler and & James Hiebert, there are eight steps of Lesson Study**

**Step 1: Defining the Problem.** Lesson study is, fundamentally, a problem solving process. The first step, therefore, is to define the problem that will motivate and direct the work of the lesson study group. The problem can start out as a general one (for example, to awaken students' interest in mathematics) or it can be more specific (for example, to improve students understanding of how to add fraction with unlike denominators). The group will then shape and focus the problem until it can be addressed by a specific classroom lesson.

**Step 2: Planning the lesson.** Once a learning goal has been chosen, teachers begin meeting to plan the lesson. Although the teacher will ultimately teach the lesson as part of the process, the lesson itself is seen by all involved as a group product. Often the teacher will start their planning by looking at books and articles produced by other teachers who have studied similar problem. According to one Japanese book on how to prepare a research lesson, the useful research lesson should be designed with a hypothesis in mind; some idea to be tested and worked out within the context of the classroom practice, The goal is not only to produce an effective lesson but also to understand why and how the lesson works to promote understanding among students. The initial plan that the group produces is often presented at a school wide faculty meeting in order to solicit criticism. Based on such feedback, a revision is produced, ready for implementation. This initial planning process can take as long as several months.

**Step 3: Teaching the lesson.** A date is set to teach the lesson. One teacher will teach the lesson, but everyone in the group will participate fully in the preparation. The night before, the group might stay late at school, preparing materials and engaging in class rehearsal, complete the role-playing. On the day of the lesson, the other teachers in group leave their classrooms to observe lesson being taught (Two students, appointed to serve as class monitors, are left in charge of the lesson). The teacher stand or sit in the back as the lesson begins, but when students are asked to work at their desks, the teacher-observers walk around, observing and taking carefully notes on what students are doing as the lesson progresses. Sometimes the lesson is videotaped as well, for later analysis and discussion.

**Step 4: Evaluating the lesson and reflecting its effect.** The group generally stays after school to meet on the day the lesson has been taught. Usually the teacher who taught the lesson is allowed to speak first, outlining in his or her own view how the lesson worked and what the major problems were. Then other members of the group speak, usually critically, about the parts of the lesson they saw as problematic. The

focus is on the lesson, not on the teacher who taught the lesson; the lesson after all, is a group product, and all the members of the group feels responsible for the outcome of their plan. They are, in effect, critiquing themselves. This is important, because it shifts the focus from a personal evaluation to a self-improvement activity.

**Step 5: Revising the lesson.** Based on their observations and reflections, teachers on the lesson study group revise the lesson. They might change the materials, the activities, the problems posed, the questions asked, or all these things. They often will base their changes on specific misunderstandings evidenced by students as the lesson progressed.

**Step 6: Teaching the revised lesson.** Once the revised lesson is ready, the lesson is taught again to a different class. Sometimes it is taught by the same teacher who taught the first time, but often it is taught by another member of the group. One difference is that this time all members of the school faculty are invited to attend the research lesson. This is quite dramatic in a large school. Where there may be more faculty members crowded into the classroom than there are students in the class.

**Step 7: Evaluating and reflecting again.** This time, it is common for all members of the school faculty to participate in a long meeting. Sometimes an outside expert will be invited to attend as well. As before, the teacher who taught the lesson is allowed to speak first, discussing what the group was trying to accomplish, her or his own assessment of how successful the lesson was, and what part of the lesson still needs rethinking. Observers then critique the lesson and suggest changes. Not only is the lesson discussed with respect to what these students learned and understood, but also with respect to more general issues raised by the hypotheses that guided the design of the research lesson. What about teaching and learning, more generally, was learned from the lesson and its implementation?

**Step 8: Sharing the results.** All of this work has focused on a single lesson. But Japan is country with national education goals and curricular guidelines, what this group of teachers has learned will have immediate relevance for other Japanese teachers trying to teach the same concepts at the same grade level. Indeed, the teachers in one lesson study group see the sharing of their findings as a significant part of the lesson-study process. This sharing can be done in several ways. One is to write a report and the whole lesson-study group do produce a report that tells the story of their group work. Often these reports are published in a book fromm, even if only for the school's teachers' resource room. They are read by the faculty and the principal, and might be forwarded to educational authorities at prefectural level if judged

to be interesting enough. If a university professor happens to have collaborated with the group, the report might be written for a wider audience and published by a commercial publisher.

Another method of sharing the result of a research lesson is to invite teachers from other schools to observe the teaching of the final version of the lesson.

Nowadays, many research studies focus on different approach to teacher learning such as Lesson Study (Sims & Walsh, 2009; Parks, 2008; Akerson, Pongsanon, & Park-Rogers, 2015). Lesson study, which is a form of teacher's Professional development that originated in Japan, is closely tied to the idea of learning from teaching (Stigler & Hiebert, 1999). Through this professional development practice, teachers have an opportunity to systematically examine their teaching, with the goal of becoming more effective. Lesson study process typically includes: defining and researching a problem of practice; planning, teaching, and observing the lesson; evaluating the lesson; revising the lesson; teaching and observing the revised lesson; evaluating and reflecting again, and sharing the results (Lewis, Perry, & Murata, 2006). Through lesson study, teachers can explore real instructional challenges that are faced in their classrooms with their students.

According to the Huang & Shimizu, 2016, Lesson study is a collaborative model of professional development which supports teacher learning. Lesson study and research on lesson study have become particularly prevalent in the field of mathematics education and much research has detailed evidence of mathematics teacher learning through lesson study across the world (e.g. Doig, Groves, & Fujii, 2011; Dudley, 2013; Lewis et al., 2009; Lim, Kor, & Chia, 2016; Ni Shuilleabhain & Seery, 2017; Ono & Ferreira, 2010). Lesson study provides teachers with opportunity to contextualize representations of their classroom activities, while also making their implicit knowledge and practices explicit through collaborative conversations (Fujii, 2016). Participating in this model of professional development provides teachers with the opportunity to articulate, share and develop their knowledge, where student learning is at the core of their activities.

According to Murata, 2011, Teacher learning is best supported when teachers are active in their involvement, where there is a focus on content, and when teachers have opportunity to reflect on their own and students' learning. Also teacher professional development has greater potential to impact teacher learning when it involves the collective participation of a number of teachers and occurs over a period of time (i.e., not just one day) (Desimone, 2009). In lesson study, each cycle usually occurs over a number

of weeks and consists of several steps where teachers begin by studying the curriculum and deciding on a research theme. Teachers then collectively plan a research lesson according to that theme, conduct and observe a live research lesson, and reflect on student learning within the lesson (see Figure 1) (Lewis, Perry, & Murata, 2006).

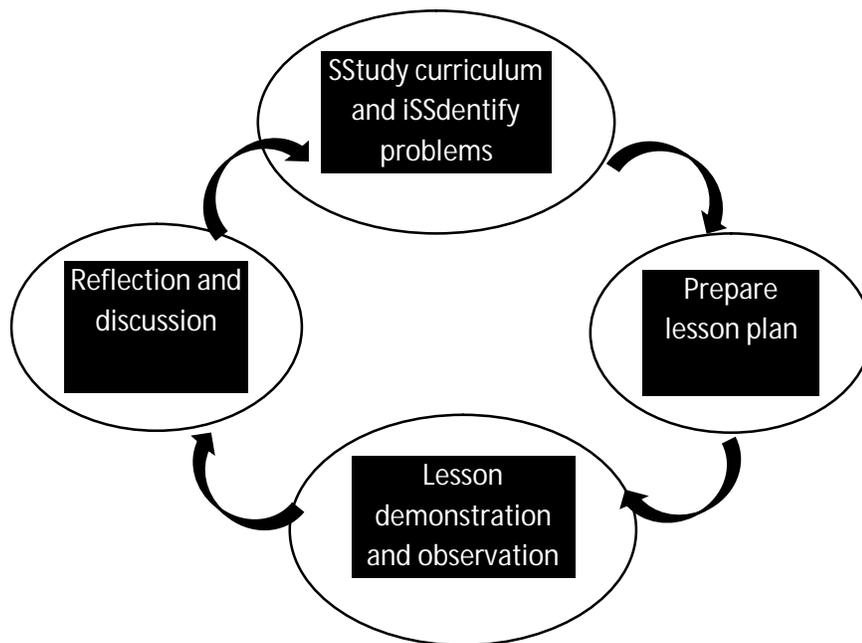


Figure 3. Lesson Study Cycle based on Lewis et al. (2006)

While the cycle, in itself, may seem simple and straightforward, the lesson study model provides a powerful means through which teachers can be supported in researching and developing their own practice, by focusing and reflecting on student thinking and on content-specific pedagogical activities (Fernandez, Cannon, & Chokshi, 2003; Meyer & Wilkerson, 2011; Takahashi & McDougal, 2016). Participants are provided with a window to critically review teaching and learning, at both a global and local level (Meyer & Wilkerson, 2011), and, through their collaboration with colleagues, have opportunity to build new knowledge, share learning, and introduce new practices related to teaching and learning (Dudley, 2013; Ni Shuilleabhain, 2016; Takahashi, 2014). While it is important to note that teaching and learning are cultural activities and that it may be difficult to transport lesson study across different cultures and education

systems (Robutti et al., 2016; Stigler & Hiebert, 2016), research has evidenced teacher learning in lesson study in many educational systems, with differing cultures and traditions of teaching and learning, and professional development.

Ball and her colleagues (2008) introduced a framework of Mathematical Knowledge for Teaching (MKT), developed as a practice-based theory of the knowledge required “to carry out the work of teaching mathematics” (p. 395). The model built on Shulman’s theoretical suggestion of PCK as a specific type of knowledge unique to teachers and distinguished it from subject matter or content knowledge. In this model, Ball and her colleagues highlighted particular categories of knowledge within the PCK and subject matter delineations (see Figure 2). For example, knowledge of content and students (KCS), a sub-domain of PCK, is presented in this model as the “knowledge that combines knowing about students and knowing about mathematics” (p. 401), while knowledge of content and teaching (KCT) refers to knowing how to sequence, represent or explain the mathematics being taught. Specialized content knowledge (SCK), categorized as a distinct category of subject matter knowledge, represents knowledge that allows teachers to engage in particular teaching tasks, including how to accurately represent mathematical ideas to learners.

Two existing frameworks of Mathematical Knowledge for Teaching (Ball et al., 2008) and Levels of Teacher Activity (Margolinas et al., 2005) as a tool were used to detail and analyze mathematics teachers’ knowledge in various phases of planning, conducting and reflecting on teaching in lesson study (see Figure 4). The conditions and the contributions of this combination of frameworks are discussed by Clivaz (2015a, 2017). Appreciating teacher knowledge as “vast, intricate and evolving” (Davis & Renert, 2013), Aoibhinn Ni Shuilleabhain (2017) proposed this combined framework in an attempt to deepen our insight into the knowledge incorporated by mathematics teachers during each phase of a lesson study cycle, in the broad and complex domain of teaching and learning.

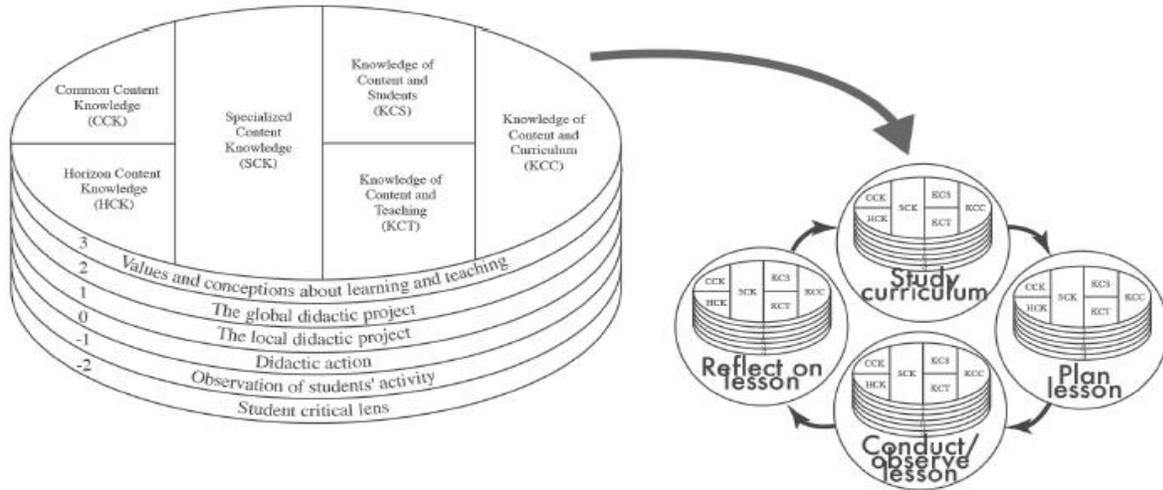


Figure 4. MKT and levels of teacher activity in a cycle of lesson study

## 2.5 Conceptual Framework

In order to meet the objectives of this research, a conceptual framework was developed based on the ideas of Ball et al. (2008) and Hill et al. (2007). This framework would enable to explore how much improvement happened in the mathematics teaching learning through implementing Lesson Study in the selected primary schools of Bangladesh. It will also enable teachers to analyze effective ways of implementing Lesson Study recognized as easy accessible by Bangladeshi primary School teachers. Therefore, four components: specialized knowledge, knowledge of content and students, knowledge of content and curriculum, and knowledge of content and teaching were considered from MKT framework for present study.

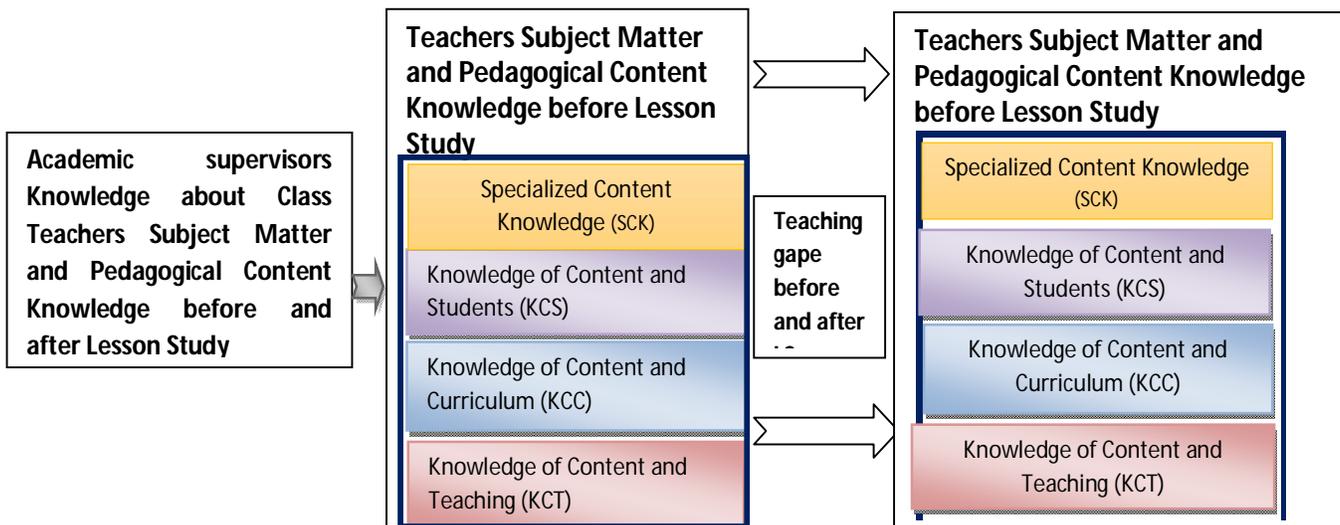


Figure 5: Conceptual Framework

Table 2: Modified framework for analyzing PCK (based on ideas of Chick, Baker, Pham & Cheng, 2006).

<b>PCK category for conducting Lesson Study (Plan-Do-See cycle)</b>		<b>Evidence</b>
<b>Specialized Content Knowledge (SCK)</b>	How much specialized subject knowledge teachers have in specific mathematics content?	To demonstrate distinct category of teacher's subject matter knowledge. -Represents knowledge that allows teachers to engage in particular teaching tasks, including how to accurately represent mathematical ideas to learners.
Knowledge of Content and Students (KCS)	-How much students know about a specific content? -Knowledge of Students ability -Knowledge of students thinking	-To consider students previous knowledge and students ability in order to prepare lesson plan -Incorporate students' thinking scope in the lesson plan
Knowledge of Content and Curriculum (KCC)	-Knowledge of curriculum and text	- Use competencies/outcomes from the intended curriculum and setting appropriate activities in the lesson before and after LS in order to meet them.
Knowledge of Content and Teaching (KCT)	-Knowledge of teaching strategies and approaches	Use appropriate strategies or approaches in the lesson before and after lesson study for teaching a specific content.

## CHAPTER THREE

### METHODOLOGY

This chapter addressed study area and participants, research instruments survey procedure and data analysis procedure of this study. A mixed method approach (Qualitative and quantitative) was adopted to conduct this study. Data were collected two times. At the first time data were collected to know current status of mathematics teaching in the Primary classroom and at the second time data were collected to identify the changes after the implementation of Lesson Study in the selected schools. Before the implementation an orientation work shop was conducted with related teachers and teachers' educators. According to the developed plan by school groups (8 school groups) implemented LS in their schools. NAPE faculty members provide necessary support during the implementation. But most of the data were collected for this study through open-ended questionnaires, lesson observations, document analysis. They are selected through purposive sampling technique from the Government Primary Schools of different districts of Bangladesh (which are mentioned in the 3.1).

#### 3.1 Research Locale, Respondents and Tools

**Table 3: Research Locale, Participants and Tools:**

Area			Participants and Tools										Tools				
District	Upazila	Schools	URC Instructors		Tools	AUEOs		Tools	HTs		Tools	ATs		Students	Tools	Lesson Observation	
			M	F		M	F		M	F		M	F				
Mymensingh	Muktagasa	4 schools	1		Questionnaire		1	Questionnaire	3	1	Questionnaire	4	12	10 students of grade 3 in each school	FGD Guide line	4math lessons in 4 schools	Observation checklist
	Fulbaria	4 schools		1	Questionnaire		1	Questionnaire	3	1	Questionnaire	2	14	10 grade 3 students in each school	FGD Guide	4math lessons in 4 schools	Observation checklist

### **3.1.1 Research Locale**

According to the above table the sample survey covered the selected 8 GPS from two upazilas of Mymensingh district in Bangladesh. It is decided that a form of purposive sampling has been used in selecting Upazilas and schools from Mymensingh district taking into consideration of limited number of expert in relevant area, availability and work-load of the faculty members of NAPE.

### **3.1.2: Tools for Data Collection**

According to the above table the following tools have been used two times (before and after implementation of LS) to collect data from different categories of respondents through field visits:

- i) Classroom observation checklist
- ii) Interview questionnaire for Assistant Teachers (4 teachers in each schools) of the selected school
- iii) Interview questionnaire for HT of the selected school
- iv) Interview questionnaire for AUEO of the related cluster of the two selected schools
- v) Interview questionnaire for URC Instructor of the selected Upazila
- vi) FGD with Grade 3 students

Besides these, NAPE faculty conducted the following activities for the implementation of lesson study in the selected schools

- i) A whole day orientation training about lesson study implementation process.
- ii) Provide support to prepare school based action plan for implementing lesson study cycle.
- iii) Provided necessary support for the effective implementation of lesson study cycle in every selected schools.

### **3.1.3: The Categories of Respondents**

The stakeholders are the right population who are very familiar with classroom teaching learning and can give reliable information about mathematics teaching learning qualities of classroom before and after implementation of LS. So for questionnaire survey, the following categories of respondents have been selected purposively as sources of data.

- a. 4 Assistant teachers in each school
- b. Head Teachers (HT) in each school.

- c. AUEO of the related cluster of the two selected Upazilas
- d. URC Instructors of the selected Upazilas
- e. FGD with grade 3 students ( 10 students in each school)

### **3.1.4 Validity of the tools and data collection procedures**

Before administering, the study teams drafted tools based on the objectives which were used in the study of “Effectiveness of Lesson Study: case of enhancing quality of mathematics teaching learning at primary level in Bangladesh”. The study team used the draft tools in two schools and with related stake-holders of Mymensingh sadar upazila. The study team checked how much effective the draft tools and finalized with some revision through intensive discussion.

All the primary and secondary data have been collected from the field through the use of interview questionnaires, observation checklist and document analysis. For this purpose, the NAPE faculty members visited all (eight) the samples located Schools and Uapzilas in accordance with the mentioned table (tabe-3).

After collecting and analyzing the first time data from the schools NAPE organized an orientation workshop on Lesson Study with the participation of ATs, HTs, AUEOs, URC Instructors and UEOs according to the mentioned participants (table-3) at Satrisia GPS, Muktagasa. The following activities had been discussed and practiced to ensure participants clear knowledge about Lesson Study.

- Video showing and open discussion
- Power point presentation about the concept and procedure of lesson study
- Sharing initiative by the government and experience of implementing lesson study in Bangladesh
- Sharing experience of lesson study in Japan
- Preparing school-based plan for the implementation of lesson study considering contents, yearly LP

NAPE faculty members collected a copy of lesson study implementation plan from every group.

The head of the research team assigned one of the members in each selected school. The head of the team and assigned member in each school visited and observed implemented activity and provided necessary support. In the implementation of every step of lesson study URC Instructor, AUEO and UEO also participated and provided support. An assigned member of NAPE played the role of a facilitator of the

discussion meeting for improving the lesson and noticed the head teacher to follow the facilitation techniques of NAPE faculty member. From the second cycle of lesson study the head teacher facilitated the lesson study and URC Instructor, AUEO, UEO and NAPE faculty members participated actively participated in every step.

After completing 2/3 cycles of lesson study NAPE faculty members again collected data using revised tools from related stake-holders according to the mentioned participants (table-3).

### **3.1.5 Data Analysis Procedure**

At first the researchers input the collected data in the micro soft excel templates. After cleaning the data researchers prepared tables and graphs by using micro soft excel software one by one according to the demands of the objectives of the research. The researchers also interpreted the tables and graphs and checked it very carefully. In some cases data also interpreted using SPSS due to the demands of meeting the objectives of the research. On the other hand, to find out the status of mathematics teaching learning, the degree of teachers and related stake-holders professional skills before and after implementing lesson study, were summarized based on cross case thematic analysis method developed by Miles and Huberman (1994) using the responses in the questionnaire of assistant teachers, head teachers, AUEs and URC Instructors. Students FGD data also interpreted based on cross case thematic analysis method.

This is a very thorough, explicit and systematic method for deciding on the ordering of cases, in which the analysis seeks to order the cases according to how much change had occurred in users. To order the cases the analyst began with a rough estimated ordering, entered the data in each case and re-arranged the rows (and sometimes columns) until the systematic ordered shown appeared. In order to develop the categories, the responses were summarized and checked, to develop profile of teachers' and related other stake-holders knowledge and experience regarding lesson study.

# CHAPTER FOUR

## DATA PRESENTATION AND ANALYSIS

### 4.1 Introduction:

Several types of tools were used in this study for collecting pertinent information. All the tools were brought under coding for analyzing the data properly and showing the relationship of information provided by different respondents. The data were analyzed through SPSS in the light of three objectives of the study. For this reason data are presented here according to the objectives of the study. The validity of the information was ensured through triangulation with all the relevant information from different tools. Different types of table and diagram were used to make the information clear to the readers of the study. The information under different headlines is presented below according to the sequence.

### 4.2 General Information about respondents

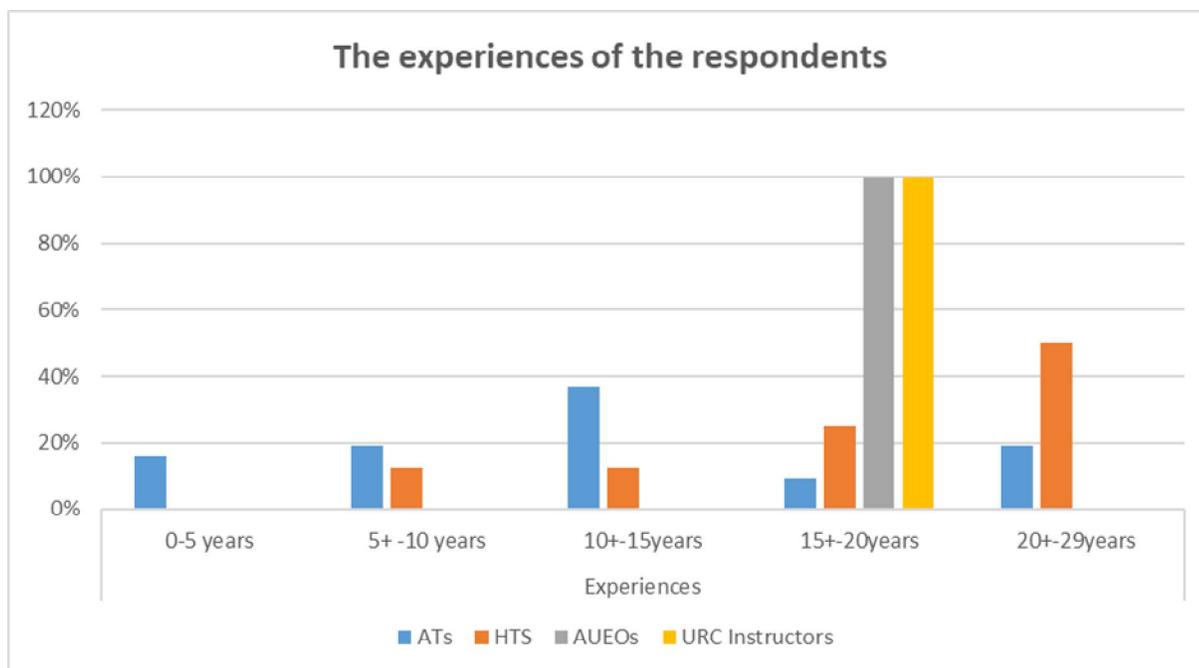
Table 4.1: Percentage of male and female Assistant Teachers, Head Teachers, AUEOs and URC Instructors under the study areas

Male (%)				Female (%)			
ATs	HTs	AUEOs	URC Instructors	ATs	HTs	AUEOs	URC Instructors
19	25	00	50	81	75	100	50

It is evident that 19% male and 81% female assistant teachers, 25% male and 75% female head teachers, 100% female AUEOs and 50% male and 50 % female URC instructors were the respondent of this study.

Table 4. 2: The experiences of the respondents:

Respondent	Experiences				
	0-5 years	5 <sup>+</sup> -10 years	10 <sup>+</sup> -15years	15 <sup>+</sup> -20years	20 <sup>+</sup> years
ATs	16%	19%	37%	9%	19%
HTS	0%	12.5%	12.5%	25%	50%
AUEOs	0%	0%	0%	100%	0%
URC Instructors	0%	0%	0%	100%	0%

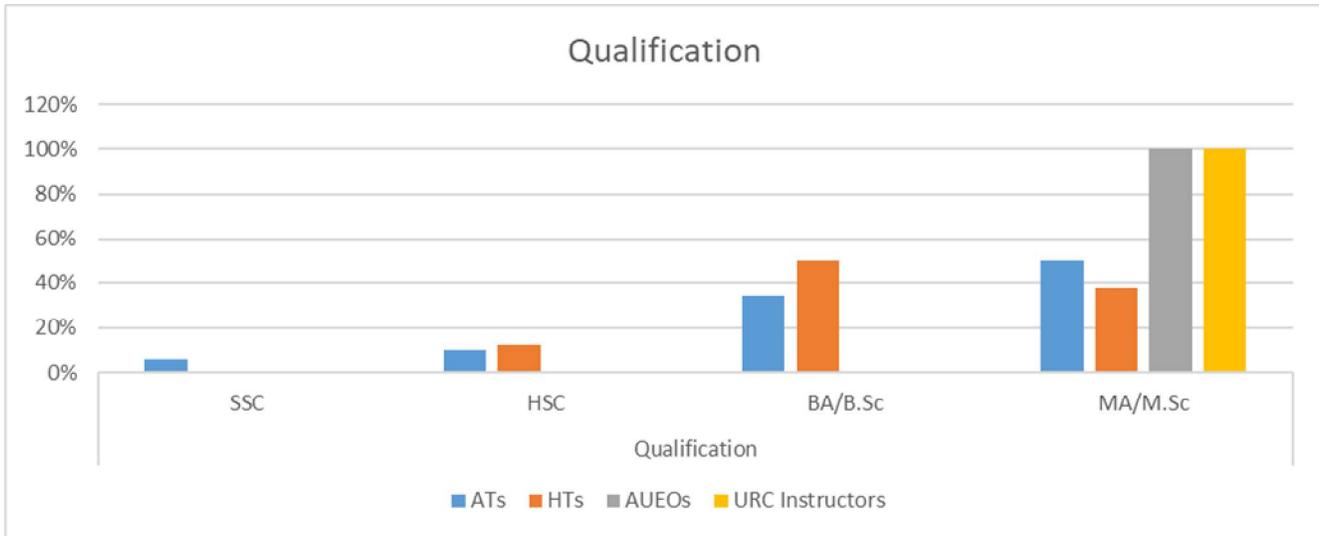


Graph 1: The experiences of the respondents

It is evident that 34% and 50% assistant teachers have BA/BSC and MA/MSC degree respectively. 10% teachers have HSC and only 6% teachers have SSC certificate. From the above table and graph it shows that most of the head teachers (50%) have graduation while 35% have master's degree and 12.5% have HSC certificate. It also shows that all of the AUEOs and URC Instructors have masters' or equivalent degree.

Table 4.3: **The highest educational degree that the respondents have achieved**

Respondents	Qualification			
	SSC	HSC	BA/B.Sc	MA/M.Sc
ATs	6%	10%	34%	50%
HTs	0%	12.5%	50%	37.5%
AUEOs	0%	0%	0%	100%
URC Instructors	0%	0%	0%	100%



Graph 2: The experiences of the respondents

It is evident that 34% and 50% assistant teachers have BA/BSC and MA/MSC degree respectively. 10% teachers have HSC and only 6% teachers have SSC certificate. From the above table and graph it shows that most of the head teachers (50%) have graduation while 35% have masters' degree and 12.5% have HSC certificate. It also shows that all of the AUEOs and URC Instructors have masters' or equivalent degree.

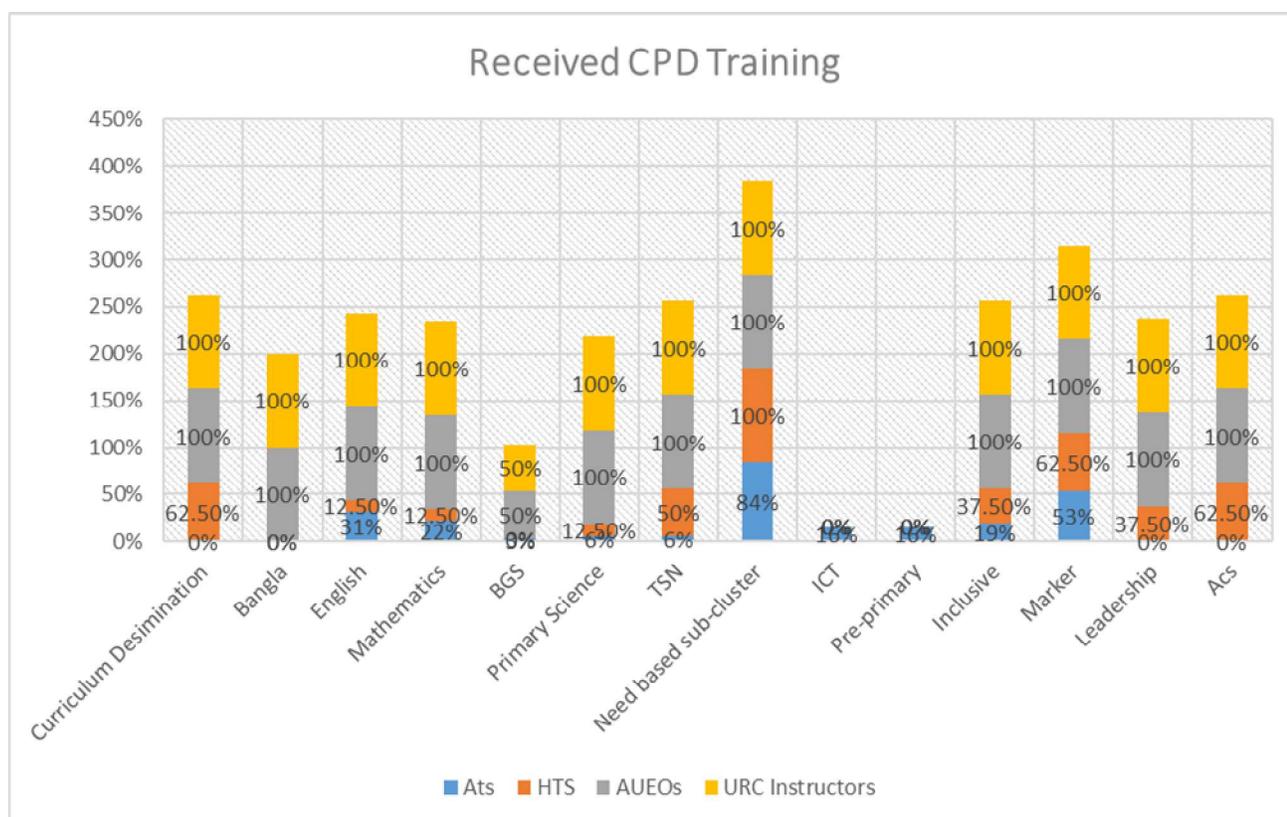
Table 4.4: Long term training of the respondents

Respondent	Long term training				
	C-in-Ed (%)	DPEd (%)	B.Ed (%)	M.Ed (%)	Not mentioned (%)
ATs	69%	22%	3%	0%	6%
HTs	50%	0%	25%	25%	0%
AUEOs	0%	0%	100%	0%	0%
URC Instructors	0%	0%	100%	0%	0%

It is revealed that 69% teachers have C-in-Ed, 22% have DPEd, 3% have B.Ed training and 6% teachers did not mention. It is found from the table that 50% Head Teachers have C-In-Ed, 25% have BEd and 25% have MED training. From the above table, it is shown that 100% AUEOs and 100% URC Instructors have B.Ed degree.

Table 4.5: Received CPD (Short course) training

	Curriculum Dissemination	Bangla	English	Mathematics	BGS	Primary Science	TSN	Need based sub-cluster	ICT	Pre-primary	Inclusive	Marker	Leadership	AcS
Ats	0%	0%	31%	22%	3%	6%	6%	84%	16%	16%	19%	53%	0%	0%
HTS	62.50%	0%	12.50%	12.50%	0%	12.50%	50%	100%	0%	0%	37.50%	62.50%	37.50%	62.50%
AUEOs	100%	100%	100%	100%	50%	100%	100%	100%	0%	0%	100%	100%	100%	100%
URC Instructors	100%	100%	100%	100%	50%	100%	100%	100%	0%	0%	100%	100%	100%	100%



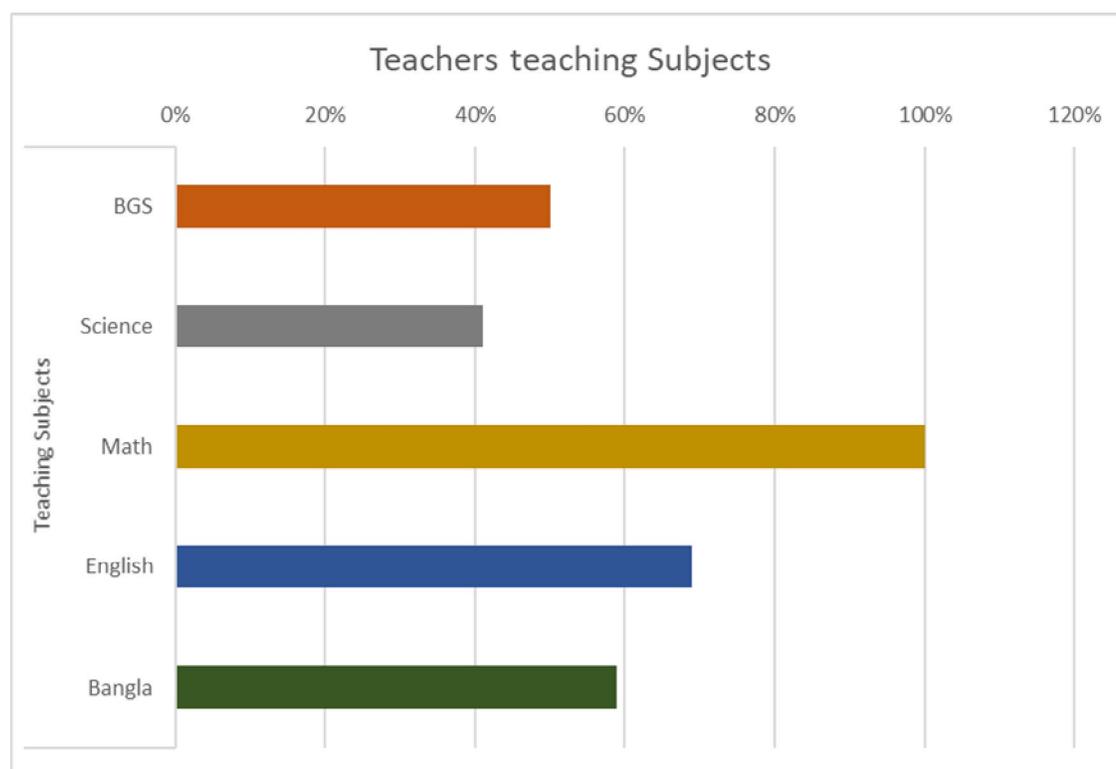
Graph3: Received CPD (Short term training) by ATs, HTs, AUEOs and URC Instructors

It is evident from above table and graph, all of the ATs have need-based sub-cluster training and all of the HTs have need-based sub-cluster and ACS training. While all of the respondent ATs have to teach

mathematics but only 22% have subject-based mathematics training. The table and the graph also show that all of the respondents AUEOs and URC instructors have subject-based mathematics training but only 12.5% HTs have subject-based mathematics training. It is also evident that all categories of respondents have competency based item development and marking training. Data also shows that all AUEOs and URC instructors and half of the respondent HTs have TSN training but on the other hand only 8% ATs have TSN training.

Table 4.6: Teaching subjects of respondent teachers

	Teaching Subjects				
	Bangla	English	Math	Science	BGS
Teacher	59%	69%	100%	41%	50%



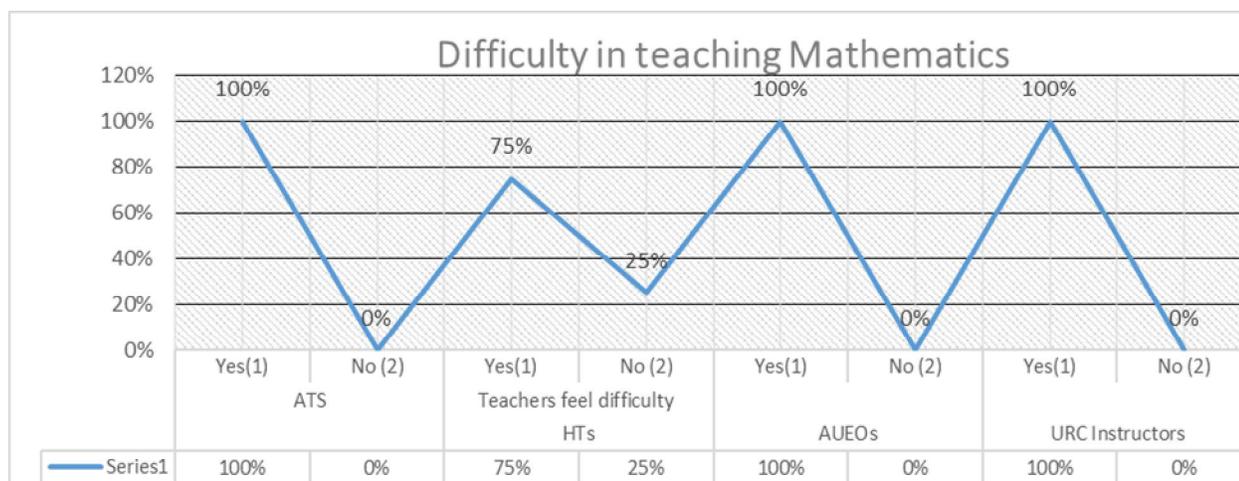
Graph 4: Respondent teachers teaching subjects

The above table and graph display that the ATs who teach mathematics also teach other subjects. Around 60%-65% respondent teachers teach Bangla and English and 40%-50% of them teach Bangladesh and Global Studies and Primary Science subject who teach mathematics. So it is evident that almost all of the respondent teachers who teach mathematics also teach other two or three more subjects.

### 4.3 Respondents feeling about Mathematics teaching learning in the schools.

Table 4.7: Respondents Feelings about teaching mathematics

ATS		HTs		AUEOs		URC Instructors	
		Teachers feel difficulty					
Yes(1)	No (2)	Yes(1)	No (2)	Yes(1)	No (2)	Yes(1)	No (2)
100%	0%	75%	25%	100%	0%	100%	0%

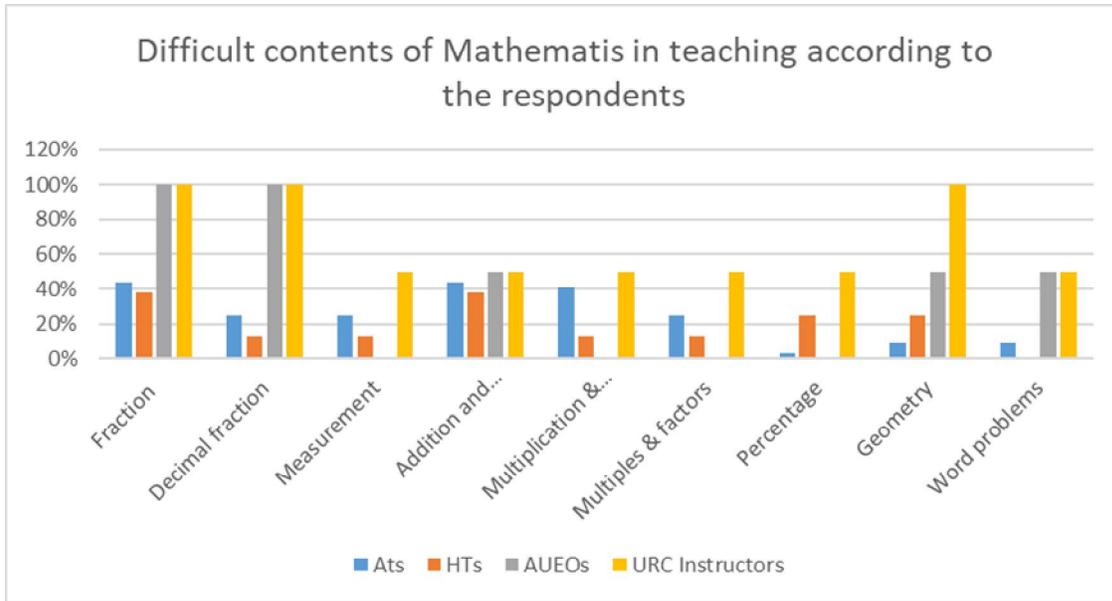


Graph- 5 Difficulty in teaching mathematics

It is evident from the above table and graph, 100% ATs mentioned that they feel difficulty in teaching mathematics. But 75% HTs opined that teachers feel difficulty in teaching mathematics. On the other hand 100% AUEOs and URC Instructors mentioned, teachers feel difficulty in teaching mathematics.

Table- 4.8 Difficult contents of mathematics

	Fraction	Decimal fraction	Measurement	Addition and subtraction with carry	Multiplication & division	Multiples & factors	Percentage	Geometry	Word problems
ATs	44%	25%	25%	44%	41%	25%	3%	9%	9%
HTs	38%	12.50%	12.50%	38%	12.50%	12.50%	25%	25%	0%
AUEOs	100%	100%	0%	50%	0%	0%	0%	50%	50%
URC Instructors	100%	100%	50%	50%	50%	50%	50%	100%	50%



Graph 6: Difficult contents of mathematics

According to the above table and graph, it is evident that around 50% respondents mentioned addition and subtraction with carry is difficult content and more than 40% ATs and HTs, 100% AUEOs and URC Instructors treated fraction as a difficult content. 25% ATs, 12.5% HTs, 100% AUEOs and URC Instructors treated decimal fraction as a difficult content. 9% ATs, 25% HTs, 50% AUEOs and 100% URC Instructors treated geometry as a difficult content.

Table 4.9: Attempts are taken by the respondents to make the difficult contents easy to the students

	Attempts which are taken to make the difficult contents easy to the students.								
	Discuss with colleagues	Use teachers' Addition	Use advance students	Use teaching aids	Help the students personally	Let the students work in mixed group	Let the students practice again and again	Help the students to memorize multiplication table.	Discuss with HT, AUEO and URC Instructor
ATS	25%	9%	37.50%	59%	6%	25%	47%	9%	0%
HTS	25%	12.50%	12.50%	37.50%	12.50%	2%	37.50%	0%	12.50%
AUEOs	0%	50%	0%	50%	0%	0%	0%	0%	100%
URC Instructors	0%	50%	0%	0%	0%	0%	0%	0%	100%

It is evident that around 60% ATs mentioned that they use teaching aids to make the content easy for the students. 25% of them discuss with their colleagues, 25% of them ask the students to work in mixed group, and 47% of them ask the students to practice again and again but none of them discuss with HT, AUEO or URC Instructors. According to the above table it is revealed that around 40% HTs mentioned, teachers ask the students to practice again and again to make mathematical contents easy. On the other hand 50% AUEO and URC Instructors mentioned Teachers use teaching aids to overcome the problem and 100% of them mentioned that they discussed with HTs, AUEO and URC Instructors to overcome the difficulty of teaching mathematical problems.

#### 4.4 Respondents concept about LS

Table 4.10: How did the respondents get the concept about LS?

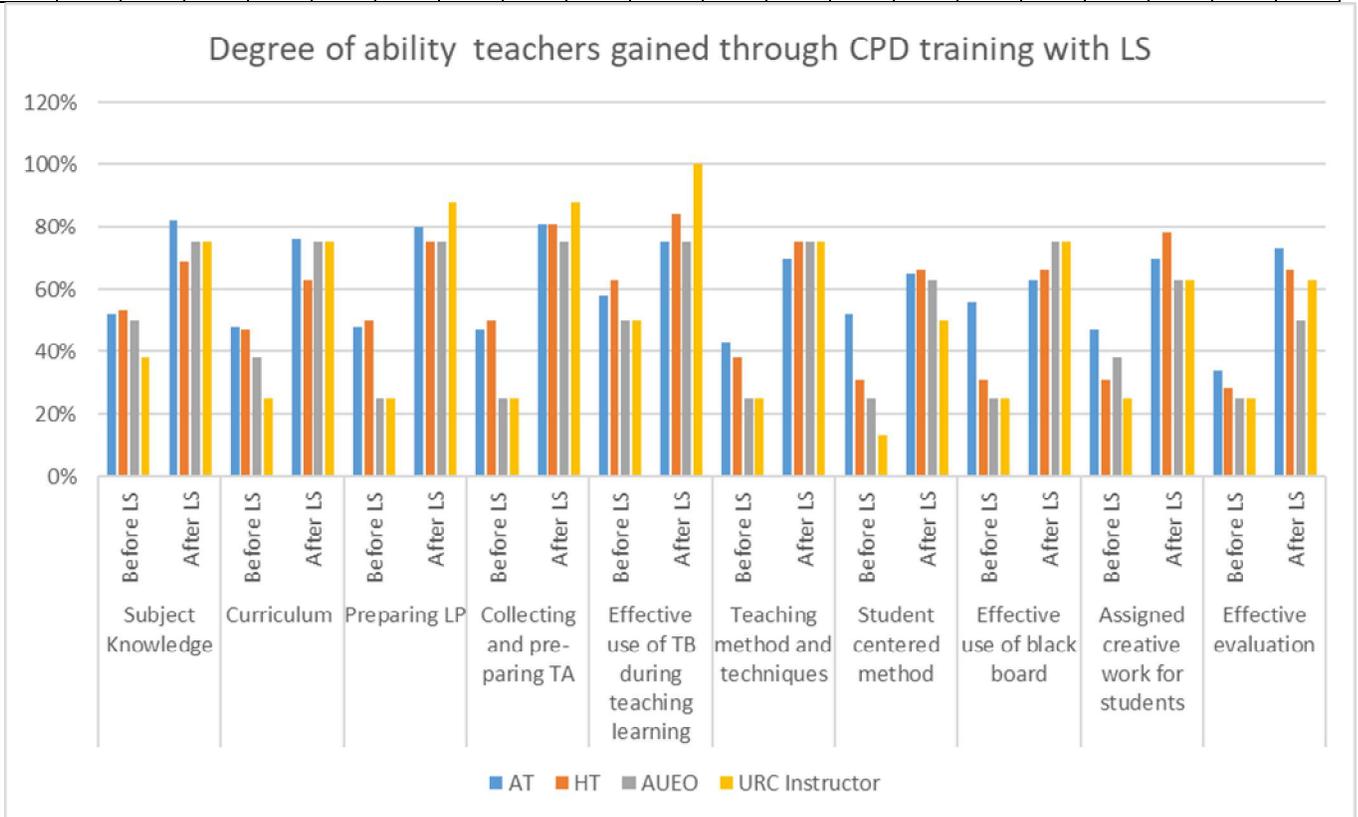
**How have you got the idea about Lesson Study?**

	Through TSN training from URC	Through attending DPEd training	Through reading lesson study leaflet	Through watching lesson study related video	Through attending orientation training organized by NAPE	Through actively participated in the lesson study process
AT	12.5	16	94	87.5	100	100
HT	37.5	0	75	75	100	100
AUEO	100	0	50	50	100	100
URC Instructor	100	0	50	100	100	100

According to the above table it is evident that 94% teachers got the idea of LS through reading lesson study leaflet, 87.5% got the idea by watching LS video and all of them got the idea through orientation training and actively participating in the LS cycles. it is evident that 37.5%, 75%, 75%, 100% and 100% HTs got the idea of LS through TSN training, reading LS leaf-let, watching LS video, attending LS orientation training and actively participating in the LS cycles respectively. On the other hand 100% AUEOs and URC Instructors have TSN training and also gained knowledge through reading LS leaf-let, watching LS video, attending LS orientation training and actively participating in the LS cycles.

Table: 4.11. Degree of ability teachers gained through attending CPD program and attending LS

Degree of ability teachers gained through attending CPD with lesson study																					
Respondent	Subject Knowledge		Curriculum		Preparing LP		Collecting and pre-paring TA		Effective use of TB during teaching learning		Teaching method and techniques		Student centered method		Effective use of black board		Assigned creative work for students		Effective evaluation		
	Before LS	After LS	Before LS	After LS	Before LS	After LS	Before LS	After LS	Before LS	After LS	Before LS	After LS	Before LS	After LS	Before LS	After LS	Before LS	After LS	Before LS	After LS	
AT	42%	82%	48%	76%	48%	80%	47%	81%	58%	75%	43%	70%	52%	65%	56%	63%	47%	70%	34%	73%	
HT	53%	69%	47%	63%	50%	75%	50%	81%	63%	84%	38%	75%	31%	66%	31%	66%	31%	78%	28%	66%	
AUEO	50%	75%	38%	75%	25%	75%	25%	75%	50%	75%	25%	75%	25%	63%	25%	75%	38%	63%	25%	50%	
URC Instructor	38%	75%	25%	75%	25%	88%	25%	88%	50%	100%	25%	75%	13%	50%	25%	75%	25%	63%	25%	63%	



Graph 7: Degree of ability teachers gained through attending CPD training with LS

The above table and graph show that before implementation of LS in the schools, according to the opinion of ATs, HTs, AUEOs, and URC Instructors, the mean scores of the teachers subject knowledge were 52%, 53%, 50% and 38% respectively, But after implementation of LS according to the opinion of ATs, HTs, AUEOs, and URC Instructors, the mean scores of the teachers' gained subject knowledge were 82% 69%, 75% and 75% respectively.

In the area of knowledge about curriculum before LS, it is evident from the opinion of ATs, HTs, AUEOs and URC Instructors that percentage of teachers gained ability through CPD training are 48%, 47%, 38% and 25% respectively, whereas after implementation of LS, ATs, HTs, AUEOs and URC Instructors opined that teachers gained knowledge about curriculum were 76%, 63%, 75% and 75% respectively.

In the area preparing LP, it is revealed from the responses of ATs, HTS, AUEOs and URC Instructors that degree of teachers' knowledge before LS were 48%, 50%, 25% and 25% respectively, whereas after implementation of LS, ATs, HTs, AUEOs and URC Instructors opined that the degree of teachers' preparing LP were 80%, 75%, 75% and 88% respectively.

In the area using TA, it is revealed from the responses of ATs, HTS, AUEOs and URC Instructors that degree of teachers' ability before implementation of LS were 47%, 50%, 25% and 25% respectively, whereas after implementation of LS, ATs, HTs, AUEOs and URC Instructors opined that the degree of teachers' ability were 81%, 81%, 75% and 88% respectively.

In the area of effective use of TB during teaching learning, it is evident from the responses of ATs, HTS, AUEOs and URC Instructors that degree of teachers' performance before implementation of LS were 58%, 63%, 50% and 50% respectively, whereas after implementation of LS, ATs, HTs, AUEOs and URC Instructors opined that the degree of teachers' performance were 75%, 84%, 75% and 100% respectively.

In the area of teaching method and techniques, it is evident from the responses of ATs, HTS, AUEOs and URC Instructors that degree of teachers' performance before implementation of LS were 43%, 38%, 25% and 25% respectively, whereas after implementation of LS, ATs, HTs, AUEOs and URC Instructors opined that the degree of teachers' performance were 70%, 75%, 75% and 75% respectively.

In the area of student-centered method and techniques, it is revealed from the responses of ATs, HTS, AUEOs and URC Instructors that degree of teachers' performance before implementation of LS were

52%, 31%, 25% and 13% respectively, whereas after implementation of LS, ATs, HTs, AUEOs and URC Instructors opined that the degree of teachers' performance were 65%, 66%, 63% and 50% respectively.

In the area of effective use of black board, it is revealed from the responses of ATs, HTS, AUEOs and URC Instructors that degree of teachers' performance before implementation of LS were 56%, 31%, 25% and 25% respectively, whereas after implementation of LS, ATs, HTs, AUEOs and URC Instructors opined that the degree of teachers' performance were 63%, 66%, 75% and 75% respectively.

In the area of assigned creative work for students in the lesson, it is evident from the responses of ATs, HTS, AUEOs and URC Instructors that degree of teachers' performance before implementation of LS were 47%, 31%, 38% and 25% respectively, whereas after implementation of LS, ATs, HTs, AUEOs and URC Instructors opined that the degree of teachers' performance were 70%, 78%, 63% and 63% respectively.

In the area of effective evaluation of students learning, it is evident from the responses of ATs, HTs, AUEOs and URC Instructors that degree of teachers' performance before implementation of LS were 34%, 28%, 25% and 25% respectively, whereas after implementation of LS, ATs, HTs, AUEOs and URC Instructors opined that the degree of teachers' performance were 73%, 66%, 50% and 63% respectively.

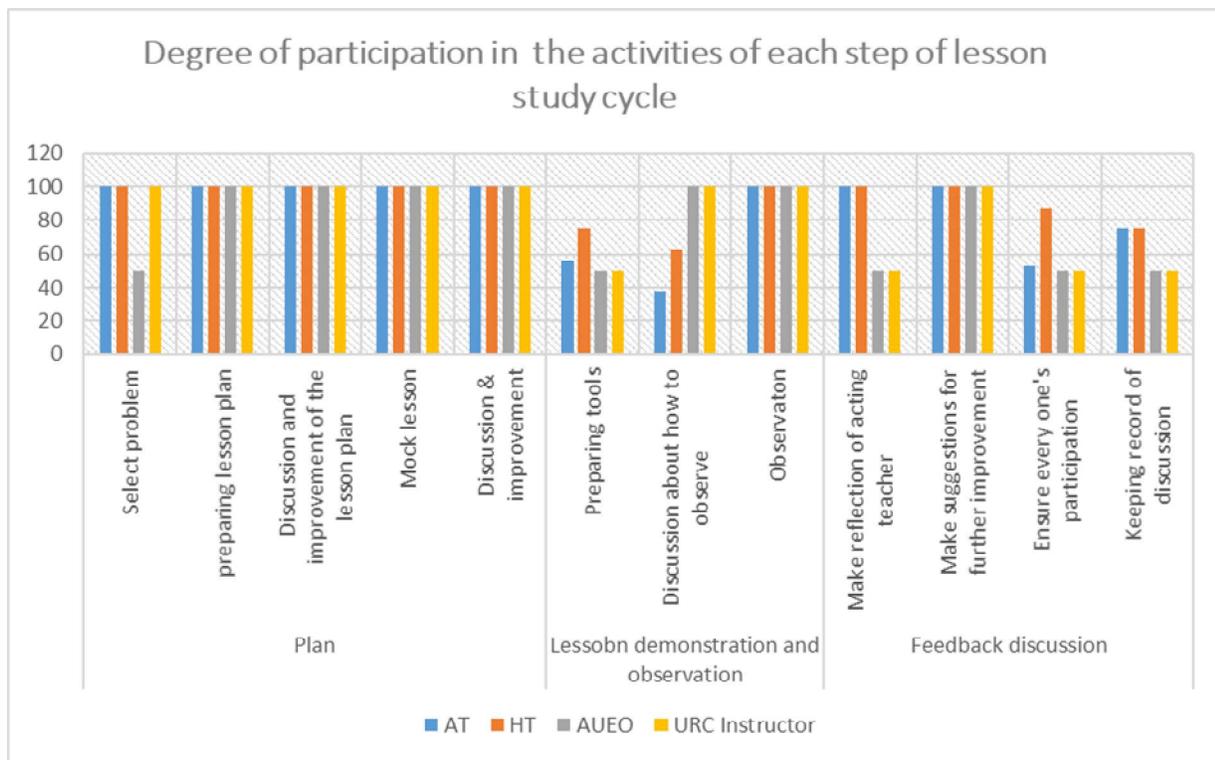
**Table 4.12:** Related stake-holders participation in the number of LS cycles in the schools.

<b>How many LS study cycle have you attended in the last 3 months?</b>			
<b>AT</b>	<b>HT</b>	<b>AUEO</b>	<b>URC instructor</b>
<b>2</b>	<b>3</b>	<b>6</b>	<b>7</b>

According to the above table it is evident that after the orientation training all of respondent ATs in every selected school attended 2 times in the lesson study cycles, HTs attended 3 times, AUEOs attended 6 times and URC instructors attended 7 times in lesson study cycle in the mathematics lessons of grade 3.

Table 4.13: Respondents' degree of participation in the activities of LS cycle.

Activities of each steps in a lesson study cycle												
Participants	Plan					Lesson demonstration and observation			Feedback discussion			
	Selection of problem	preparing lesson plan and improvement of the lesson	Mock lesson	Discussion & improvement		Preparing tools	Discussion about how to observe	Observation	Make reflection of acting teacher	Make suggestions for further improvement	Ensure every one's participation	Keeping record of discussion
AT	100	100	100	100	100	56.25	37.5	100	100	100	53.125	75
HT	100	100	100	100	100	75	62.5	100	100	100	87.5	75
AUEO	50	100	100	100	100	50	100	100	50	100	50	50
URC Instructor	100	100	100	100	100	50	100	100	50	100	50	50



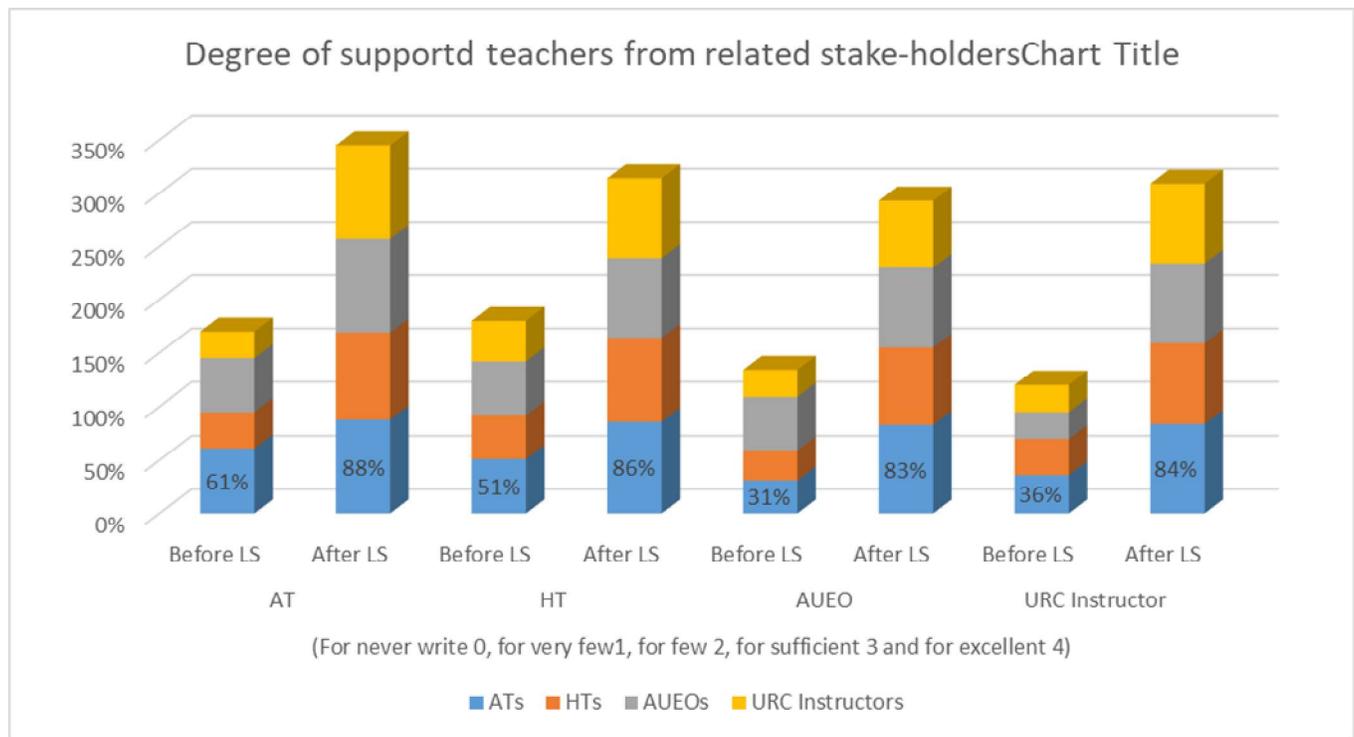
Graph 8: Respondents' degree of participation in the LS cycles

It is evident from the above table and graph, in the LS cycles except AUEO, all other respondents' degree of participation in all activities of Plan stage were 100%. In Do stage of LS cycles, ATs and HTs degree of participation in all activities were more than 50% but AUEOs and URC Instructors' degree of participation was 100%, except the area of preparing tools. It is also evident from the above table and

graph, in the See stage of LS cycle, acting teachers' reflection was 100% according to the opinion of ATs and HTs, but AUEOs and URC Instructors opined, acting teachers reflection were 50%. In the See stage, it was also found that all of the respondents' degree of participation in the feedback discussion meeting for further improvement was 100% but the activity of keeping record was around 60%.

Table 4.14 : Degree of support teachers are got from related stake-holders by class teachers.

Stake-holders	Degree of support teachers are got from related stake-holders (For never write 0, for very few1, for few 2, for sufficient 3 and for excellent 4)							
	AT		HT		AUEO		URC Instructor	
	Before LS	After LS	Before LS	After LS	Before LS	After LS	Before LS	After LS
ATs	61%	88%	51%	86%	31%	83%	36%	84%
HTs	34%	81%	41%	78%	28%	72%	34%	75%
AUEOs	50%	88%	50%	75%	50%	75%	25%	75%
URC Instructors	25%	88%	38%	75%	25%	63%	25%	75%



Graph 9: Degree of support provided by related stake-holders

It is evident from the above table and graph, before the implementation of LS, ATs opined that ATs, HTs, AUEOs, and URC Instructors' degree of provided support to teachers were 61%, 51%, 31%, and 36%,

whereas after implementation of LS, ATs opined that ATs, HTs, AUEOs, and URC Instructors degree of provided support were 88%, 86%, 83%, and 84% respectively to classroom teachers for quality teaching learning in the classroom. On the other hand, before the implementation of LS, HTs opined that ATs, HTs, AUEOs, and URC Instructors degree of provided support to teachers were 34%, 41%, 28%, and 34%, whereas after the implementation LS cycles, the mean scores of providing their support to classroom teachers were 81%, 78%, 72% and 75% respectively. The above table and graph show that before the implementation of LS, AUEOs opined that the degree of support of ATs, HTs, AUEOs, and URC Instructors were 50%, 50%, 50%, and 25%, whereas after implementation of LS, their degree of support were 88%, 75%, 75%, and 75%. It is also evident from the above table and graph, URC Instructors opined that before implementation of LS, ATs, HTs, AUEOs and URC Instructors provided support to teachers were 25%, 38%, 25% and 25% respectively whereas after implementation of LS their degree of support were 88%, 75%, 63% and 75% respectively.

	AT		HT		AUEO		URC Instructor	
	Before LS	After LS	Before LS	After LS	Before LS	After LS	Before LS	After LS
During the preparation of the lesson (before lesson)	37.50%	75.00%	25%	100%	0%	100%	0%	100%
After observing the lesson (after lesson).	19%	88%	37.50%	100%	0%	100%	50%	100%
At the time of preparing lesson plan and collecting teaching aids.	9%	100%	37.50%	100%	0%	100%	0%	100%
During free time according to the needs of class teachers.	22%	100%	0%	75%	0%	100%	0%	50%
During Sub-cluster training.	0%	40%	0%	50%	100%	100%	100%	50%
During the time of teacher facing problem.	12.50%	88.00%	25%	50%	0%	50%	0%	50%
During fortnight meeting.	0%	20%	0%	75%	0%	50%	0%	50%
During inspection(5)	0%	50%	0%	25%	100%	100%	100%	100%
During Subject-based training.	0%	40%	0%	25%	0%	50%	100%	100%

It is revealed from the above table, before implementation of LS in the school, 37.5% of the ATs and 25% HTs providing support classroom teachers during the preparation of the lesson (before lesson), whereas after implementation of LS, 75% ATs and 100% of HTs, AUEOs and URC Instructors support them during the preparation of the lesson (before lesson).

It is evident that before implementation of LS in the school, 19% ATs, 37.5% HTs and 50% URC Instructors support them after observing the lesson (after lesson), whereas after implementation of LS, 88% ATs and 100% of HTs, AUEOs and URC Instructors support teachers after observing the lesson (after lesson).

It is also revealed from the above table, before implementation of LS in the school, 9% of the assistant teachers and 37.5% HTs support classroom teachers at the time of preparing lesson plan and collecting teaching aids, whereas 100% ATs, HTs, AUEOs and URC Instructors support classroom teachers at the time of preparing lesson plan and collecting teaching aids.

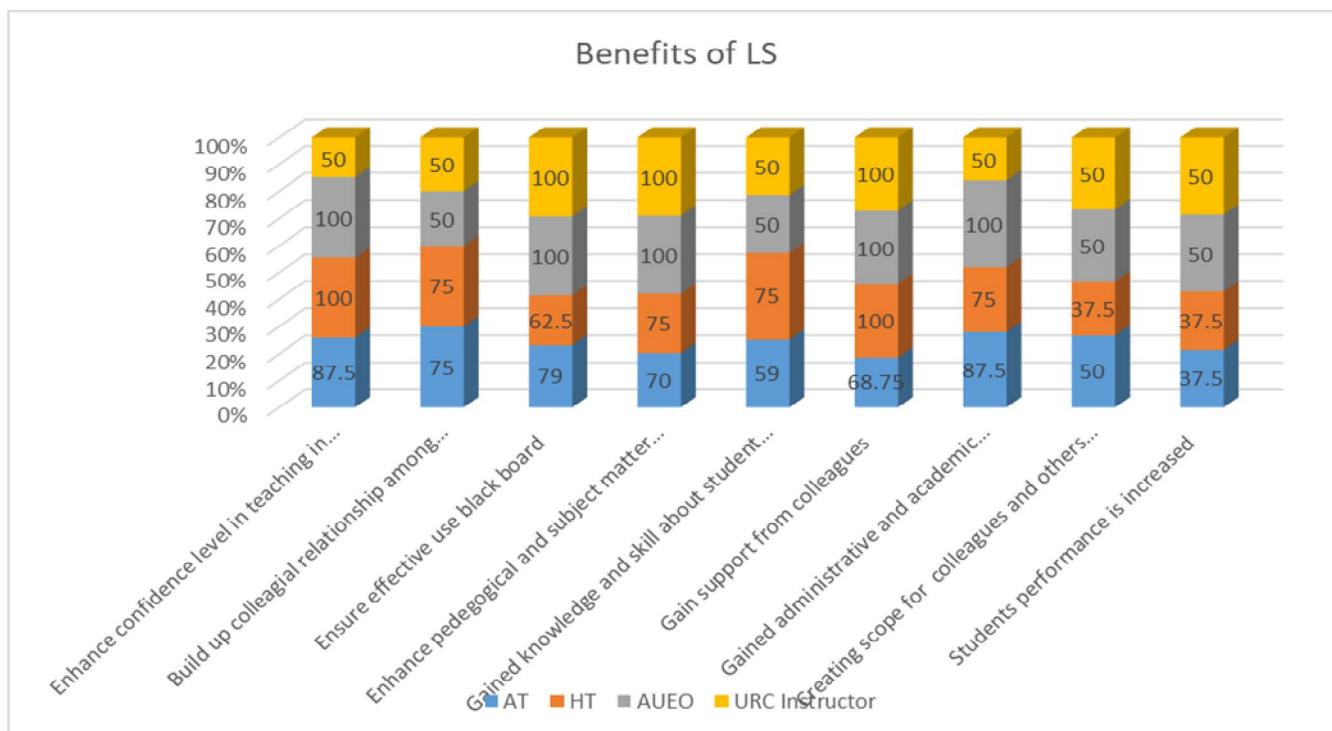
It is also evident from the above table, before implementation of LS in the school, only 22% of the assistant teachers support classroom teachers during the free time according to their needs, whereas 100% ATs, 75% HTs, 100% AUEOs and 50% URC Instructors support classroom teachers during the free time according to their needs.

From the above table, it is found that, before and after implementation of LS in the schools, 100% AUEOs and URC Instructors support the classroom teachers during need-based sub-cluster training and during inspection. It is also found that before implementation of LS, 12.5% ATs and 25% HTs support the classroom teachers when they face problems, whereas after implementation of LS 88% ATs and 50% of HTs, AUEOs and URC Instructors support the classroom teachers when they face problems.

Table 4.16: Benefits of LS

Benefits of LS

	AT	HT	AUEO	URC Instructor
Enhance confidence level in teaching in the classroom in presence of observer	87.5	100	100	50
Build up collegial relationship among teachers and teacher educators	75	75	50	50
Ensure effective use of black board	79	62.5	100	100
Enhance pedagogical and subject matter knowledge	70	75	100	100
Gain knowledge and skill about student centered approach	59	75	50	50
Gain support from colleagues	68.75	100	100	100
Gain academic support from supervisors	87.5	75	100	50
Create scope for colleagues and others in evaluating teaching learning activity from their viewpoint	50	37.5	50	50
Students performance is increased	37.5	37.5	50	50



Graph 10: Benefits of LS

It is evident from the above table and graph that 87.5% ATs, 100% HTs and AUEOs and 50% URC Instructors mentioned that LS enhance teachers' confidence level in teaching in the classroom in presence of observer. 75% ATs and HTs, 50% AUEOs and URC Instructors opined that LS build up collegial relationship among teachers and teacher educators. According to the table and graph it is revealed that maximum respondents (79%, 62.5% and 100% ATs, HTs and URC Instructors respectively) mentioned, teachers can ensure effective use of black board. Most of the respondents also mentioned, it is enhances teachers' pedagogical and subject matter knowledge, teachers knowledge and skill about student-centered approach, support from colleagues and academic supervisors through LS. Around half of the respondents mentioned, LS creates scope for colleagues and others in evaluating teaching learning activity from their viewpoint and some of them mentioned that students' performance is increased through LS.

Table 4.17: What kinds problems did you face in implementing LS?

	problems				
	Limitation of time	work-load	Lack of Interest	Lack of administrative support	Lack of academic support
AT	75%	56%	0%	37.50%	50%
HT	75%	62.50%	25%	50%	37.50%
AUEO	50%	50%	100%	50%	50%
URC Instructors	50%	50%	100%	100%	100%

According to the table 4.17, it is found that as problems of implementing LS 75% ATs mentioned limitations of time, 65% mentioned work load, 37.5% mentioned lack of administrative support and 50% mentioned lack of academic support. As problems of implementing LS. 75% HTs mentioned limitations of time, 62.5% mentioned work load, 25% mentioned lack of interest, 50% mentioned lack of administrative support and 37.5% mentioned lack of academic support. From the above table it is evident that as problems of implementing LS all of the respondent AUEOs mentioned lack of interest 50% of the them mentioned limitations of time, work load, lack of administrative support and lack of academic support. AS problems of implementing LS it is also evident that, all of the respondents URC Instructors mentioned lack of interest, lack of administrative support, lack of academic support and 50% of them mentioned limitations of time and work load.

Table 4.18: What attempts are taken to solve the problems?

Initiative for solving problems				
LS implementation plan considering Class routine	Ensure administrative support	Ensure academic support	Showing motivational video and give positive feedback	Use leaflet about LS implementation
62.50%	50%	65%	50%	37.50%
75%	50%	50%	37.50%	25%
100%	50%	50%	100%	0%
100%	50%	50%	100%	0%

According to the above table (4.18) it is found that 62.5% ATs mentioned that they prepared LS implementation plan considering yearly LP and class routine, 50% mentioned through administrative support, showing motivational video and giving positive feedback, 65% mentioned through academic support and 37.5% mentioned that they used leaflet about LS implementation to overcome the problems of implementing LS. It is evident that 75% HTs mentioned that they prepared LS implementation plan considering yearly LP and class routine, 50% of them mentioned through administrative and academic support, 37.5% of them mentioned through showing motivational video and giving positive feedback and 25% of them mentioned through using leaflet about LS implementation to overcome the problems of implementing LS. On the other hand all of the respondent AUEOs and URC Instructors mentioned, they prepared LS implementation plan considering yearly LP and class routine and showing motivational video and giving positive feedback and 50% of them mentioned they ensured administrative support and academic support to overcome the problems of implementing LS.

Table 4.19: Is LS necessary for ensuring quality teaching learning in the school? (Yes-1, no-2)

AT		HT		AUEO		URC Instructor	
Yes	No	Yes	No	Yes	No	Yes	No
100%	100%	100%	100%	100%	0%	100%	0%

It is evident from the above table, all of the respondent ATs, HTs, AUEOs and URC Instructors noted that implementation of LS is necessary for ensuring quality teaching learning in the school.

Table 4.20: Reasons for the continuation of LS

Reasons	Respondents			
	AT	HT	AUEO	URC Instructor
To ensure quality teaching learning in the school	75%	100%	100%	100%
To enhance subject matter knowledge	78%	87.50%	50%	50%
To build up collegial relationship with colleagues	62.50%	62.50%	50%	100%
To present the lesson easily in the classroom	62.50%	50%	50%	50%
To present the comparatively difficult lesson easily	53%	62.50%	0%	0%
To prepare the lesson plan effectively	53%	62.50%	100%	100%
To ensure students learning	44%	100%	0%	50%
To solve different type of problems easily with support of colleagues	50%	50%	50%	100%
Develop cooperative relationship among the colleagues	62.50%	100%	50%	50%
To get the idea of different teaching techniques	69%	50%	50%	50%
To ensure effective evaluation	50%	100%	50%	50%

According to the above table, 75% ATs and all other respondents opined that it is necessary to continue LS activities for ensuring quality teaching learning in the school. 78% ATs, 100% HTs, 50% AUEOs and 50% URC Instructors mentioned, LS activities enhance their subject matter knowledge. 62.5% ATs and HTs, 50% AUEOs and 100% URC Instructors opined LS activities build up collegial relationship with colleagues so it is necessary to continue in the schools. 62.5% ATs and half of other respondents mentioned, they can easily present the lesson in the classroom through participating LS activities. 53% ATs, and 62.5% HTs opined, they can easily present comparatively difficult lesson through attending LS activities. 40% ATs, 62.5% HTs, and all AUEOs and URC Instructors mentioned, LS activities help them to prepare LP effectively; so it is necessary to continue it in the schools. 44% ATs, 100% HTs and 50% URC instructors opined, they can ensure students learning through LS. According to the above table, it is found that more than half of the respondents mentioned that they can solve different types teaching learning related problems through LS. 62.5% ATs, 100% HTs and half of the other respondents opined, LS activities develop cooperative relationship among the colleagues. More than half of the

respondents mentioned through LS activities they can gain idea about different ways of teaching learning and can ensure effective evaluation of the performance of students in the classroom.

Table 4.21: Suggestions for effective implementation of LS

Suggestions for effective implementation of LS

Respondent	Need to get More training	Continuation of the implementation of LS	Need to conduct LS in each and every subject	Include LS activities in the early plan of school	Need to implement LS in every school	Need to include LS in the inspection form
AT	84.375	78.125	78.125	87.5	81.25	0%
HT	100%	50%	100%	62.50%	62.50%	25%
AUEO	50%	50%	50%	100%	100%	100%
URC Instructor	50%	50%	50%	100%	100%	100%

In response to the effective implementation of LS, from the above table it is revealed that 84% ATs mentioned, they need training on LS, 78% mentioned, continuation of the implementation of LS is important, 78% mentioned, they need to conduct LS in each and every subject, 87.5% mentioned, it is necessary to include LS activities in the yearly school plan and 81% mentioned, it is necessary to implement LS in every school. According to the above table, it is found that 100% HTs mentioned, they need training on LS, 50% mentioned, continuation of the implementation of LS is important, 100% mentioned, they need to conduct LS in each and every subject, 62.5% mentioned, it is necessary to include LS activities in the yearly school plan and 62.5% mentioned, it is necessary to implement LS in every school. From the above table, 50% AUEOs and URC Instructors mentioned, need training on LS, continuation of the implementation of LS in each and every subject is important. 100% AUEOs and Instructors also mentioned, it is necessary to include LS activities in the yearly school plan and implement it in every school. From the above table it is also found that 25% respondent HTs and all of the AUEO and URC Instructors mentioned, LS should be included in the inspection form as a school activity.

#### 4.5 Results of Students' FGD

Table 4.22: How many students like mathematics lesson?

How many students like mathematics lesson?					
Very good		Good		Not good	
Before LS	After LS	Before LS	After LS	Before LS	After LS
0	6	8	2	0	0

According to the above table it is found that before the implementation of LS, feelings of students of 8 schools' (8 FGDs) about mathematics lesson was good. On the other hand, after the implementation of LS students 6 schools (6 FGDs) feelings is very good and feelings students of 2 schools (2 FGDs) was good.

Table 4.23: Why do students Like mathematics?

Before LS	After LS
Teacher help them to understand. Teacher does not give punishment.	Teacher help them to understand with example. Teacher help them personally. Teacher use teaching aids. Teacher give them chance to use black board.

The above table shows that before implementation of LS students like mathematics because teacher help them to understand and teachers do not give punishment. On the other hand after implementation of LS students like mathematics because teachers help them to understand with example, teachers help them personally to understand, teachers use teaching aids and teachers give them chance to use black board.

Table 4.24: Teachers' activities using teaching aids

	Does the teacher use teaching aids in math lesson? (yes-1, sometimes-2, No-3)			What kind s of Teaching aids does the teacher use?		If Yes, how does the teacher use teaching aids in the lesson?			
	Yes	Sometimes	No	Real aids	Picture/chart	Teacher provide aids among all students	Teacher use few number of students to show teaching aids	Teacher demonstrate and asking question only	No answer
Before LS	5	1	2	0	6	0	0	6	2
After LS	8	0	0	8	8	4	4	0	0

According to the above table it is evident that before implementation of LS, students of 5 schools (5 FGDs) mentioned that teachers use teaching aids in the mathematics lesson. Students of 1 school mentioned that sometimes teacher use teaching aids and students of 2 schools mentioned that teachers do not use teaching aids in the mathematics lesson. On the other hand after implementation of LS students of 8 schools mentioned that teachers use teaching aids in the mathematics lesson. It is also evident that, before implementation of LS, students of 6 schools (6 FGDs) mentioned that teachers use only pictures or charts in the mathematics lesson and after implementation of LS students of 8 schools mentioned that teachers use real aids, pictures and charts in the mathematics lesson. According to the above table it is

also evident that before implementation of LS, students of 6 schools (6 FGDs) mentioned that teachers demonstrate the pictures or charts and ask question only. On the other hand it is evident that after implementation of LS students of 8 schools (8 FGDs) mentioned that teachers provide aids all students, students of 4 school (4 FGDs) mentioned, teachers show teaching aids to a few students in the mathematics lesson.

Table 4.25: What does students do if they don't understand any content of mathematics?

	What does students do if they don't understand any content of mathematics?		
	Ask question to teacher.	Talk with other students	Nothing to do
Before LS	5	2	1
After LS	7	5	0

The above table shows that, before implementation of LS in the school students of 5 schools (5 FGDs) mentioned they ask questions and students of 2 schools (2 FGDs) mentioned, they talk with other students if they don't understand any content of mathematics. On the other hand after implementation of LS in the schools, students of 7 schools (7 FGDs) mentioned they ask questions and students of 5 schools (5 FGDs) mentioned, they talk with other students if they don't understand any content of mathematics.

Table 4.26: Teacher's techniques of using textbook?

	Does the teacher use textbook?		How does the teacher use textbook?				
	yes-1	No-2	Ask them to read by opening specific page	Ask them to see the picture by opening specific page	Ask them to solve the problem from the book	Give home task from the book	Show picture from the book
Before LS	8	0	2	3	5	4	2
After LS	8	0	3	4	6	7	1

According to the above table, it is found that before and after LS grade 3 students of all schools (all FGDs) mentioned that teachers use textbook during the teaching learning in the classroom. In response to the question "How does teacher use textbook in the classroom?" before implementation of LS, students of 2 schools (2 FGDs) mentioned that the teacher ask them to read by opening specific page; students of 3 schools (3 FGDs) mentioned that the teacher asked them to see the picture by opening specific page; students of 5 schools (5 FGDs) mentioned that the teacher asked them to solve the problems the book; students of 4 schools (4 FGDs) mentioned that the teacher gave home task from the book; and students of 2 schools (2 FGDs) mentioned that the teacher showed picture from the book. On the other hand after

implementation of LS students of 3 schools (3 FGDs) mentioned that the teacher asked them to read by opening specific page; students of 4 schools (4 FGDs) mentioned that the teacher asked them to see the picture by opening specific page; students of 6 schools (6 FGDs) mentioned that the teacher asked them to solve the problem from the book; students of 7 schools (7 FGDs) mentioned that the teacher gave home task from the book and students of 2 schools (2 FGDs) mentioned that the teacher showed picture from the book.

Table 4.27: Students opinion about teacher’s teaching (before and after LS)

What does teacher do to present a mathematical content?					
	Present key question (problem) and try to solve with the participation of students	Present the problem, provide aids among all students or in groups to solve the problem	Declare the content, showing aids and solve the problem	Present the problem, explain the solution orally and write on the board	No Answer
Before LS	0	0	2	4	3
After LS	7	5	4	3	0

It is evident from the above table before LS, grade 3 students of 2 schools (2 FGDs) mentioned, in the mathematics lesson teacher declare the content (title), showing teaching aids and solving the problem on the board. Students of 4 schools (4 FGDs) mentioned teacher Present the problem, explain the solution of the problem orally and then on the board. According to the above table it also found that after LS students of 7 schools (7 FGDs) mentioned, in the mathematics lesson teacher present key question (problem) and try to solve with the participation of students, students of 5 schools (5 FGDs) mentioned, teacher present the problem, provide aids among all students or in groups to solve the problem, students of 4 schools (4 FGDs) mentioned, teacher declare the content (title), showing aids and solve the problem and students 3 schools (3 FGDs) mentioned teacher present the problem, explain the solution orally and write on the board.

Table 4.28: What does the teacher do if students have problems in understanding the content/problem?

What does the teacher do if students have problem in understanding the content/problem?					
	Explain with example to understand the problem	Solve again on the board	Use advance students to explain the content/solution	Give Punishment	Personally help to understand
Before LS	3	3	0	1	2
After LS	5	6	3	0	4

According to the above table it is found that, when students have problems in understanding any content, students of 3 schools (3 FGDs) mentioned that the teacher explained the problem with example, 3 schools (3 FGDs) mentioned that the teacher solved the problem again on the board, one school mentioned that the teachers gave punishment and two schools mentioned that the teachers personally helped to understand before implementation of LS whereas after implementation of LS, students of 5 schools (5FGDs) mentioned that the teachers explained the problem with example, 6 schools (6 FGDs) mentioned that the teachers solved the problem on the board, 3 schools (3 FGDs) mentioned that the teachers used advanced students to explain solution of the problem and 4 schools mentioned that the teachers personally helped the students to understand the problem.

Table 4.29: Do URC Instructor/AUEO/HT/ATs come to the class during lesson?

Does URC Instructor/AUEO/HT/ATs come to the class during lesson?							
Sometimes URC Instructor		Sometimes AUEO		Sometimes HT		Sometimes AT	
Before LS	After LS	Before LS	After LS	Before LS	After LS	Before LS	After LS
0	8	0	8	6	8	0	8

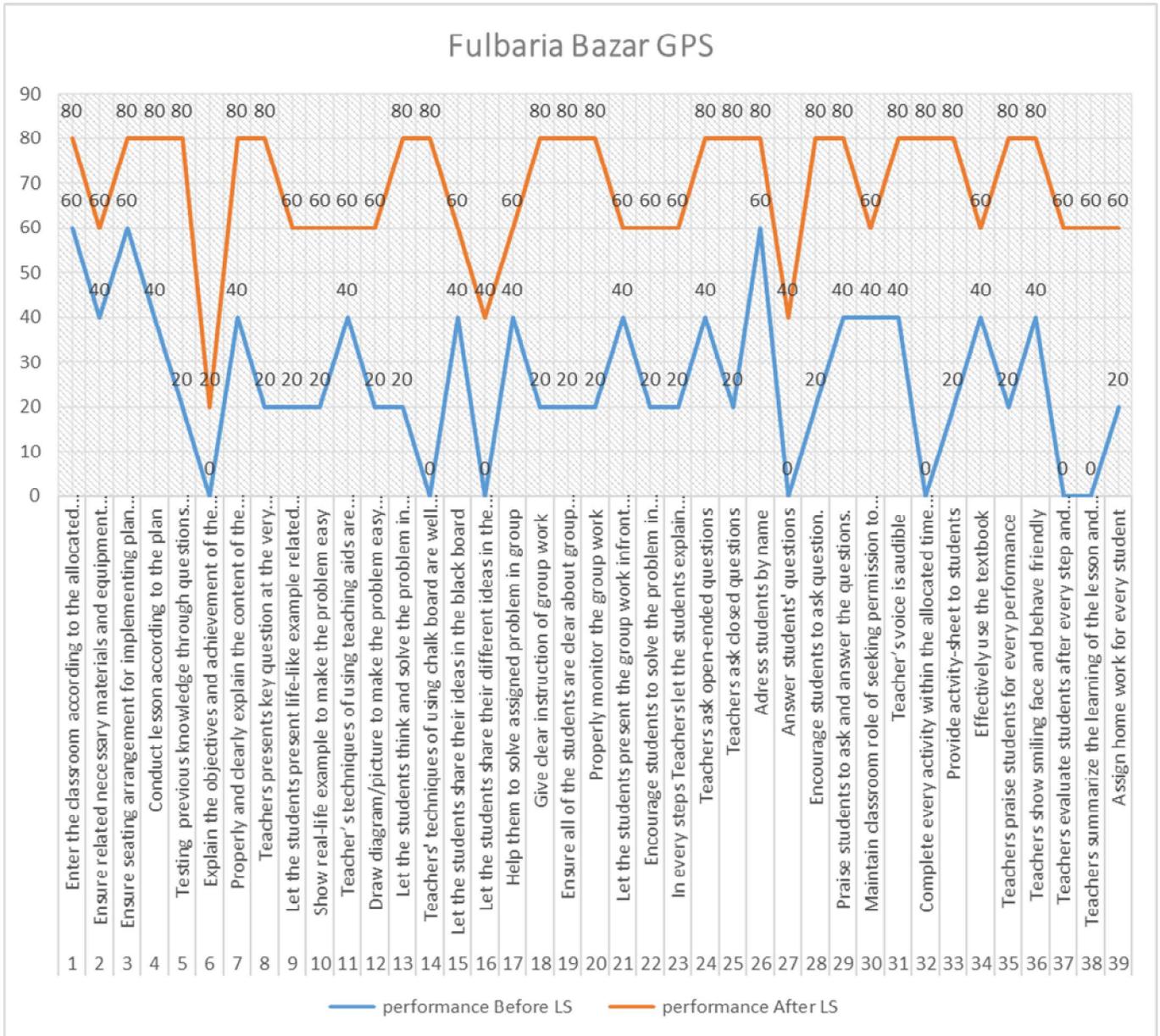
According to the above table, it is found that before LS, students of 6 FGDs mentioned that sometimes HTs entered into the classroom during the lesson. On the other hand students of all (8 schools) FGDs mentioned visitors (ATs, HTs, AUEOs and URC Instructors) entered the classroom during the lesson.

Table 4.30: Students opinion about lesson observation

If AUEO/HT/ATs come to the class during the lesson, how long do they stay?					
Full time of the lesson		Half time of the lesson		Few minutes	
Before LS	After LS	Before LS	After LS	Before LS	After LS
0	8	1	0	5	0

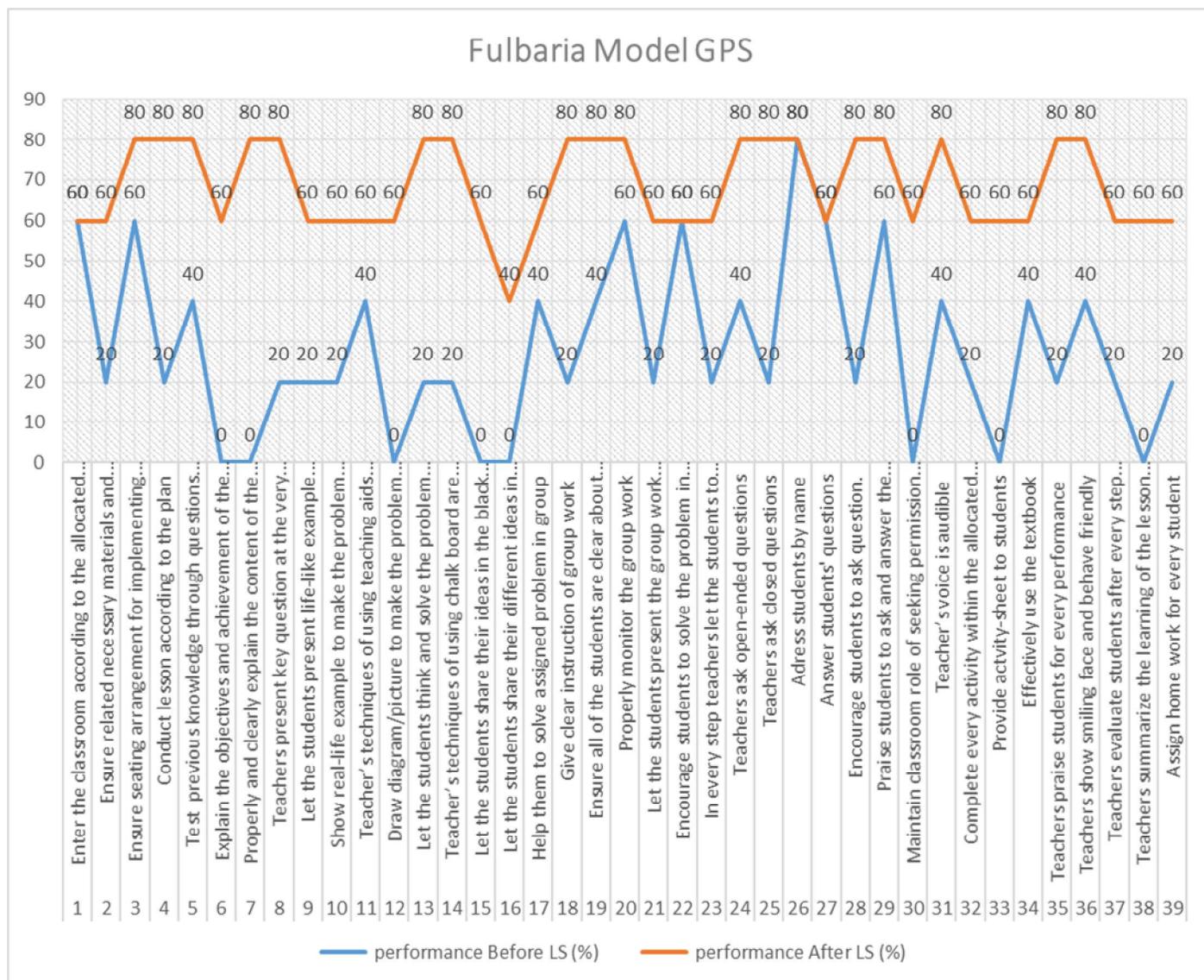
It is evident from the above table that one of the students FGD mentioned visitor entered the classroom during the lesson for a few minutes. On the other hand after LS cycles, students of 8 FGD (8 schools) mentioned that a visitor entered classroom and stayed full time during the lesson.

4.6 Results of **lesson observation (before and after implementation of LS).**



Graph 11 : Teaching performance of Fulbaria bazar GPS ( before and after implementation of LS in grade 3 mathematics)

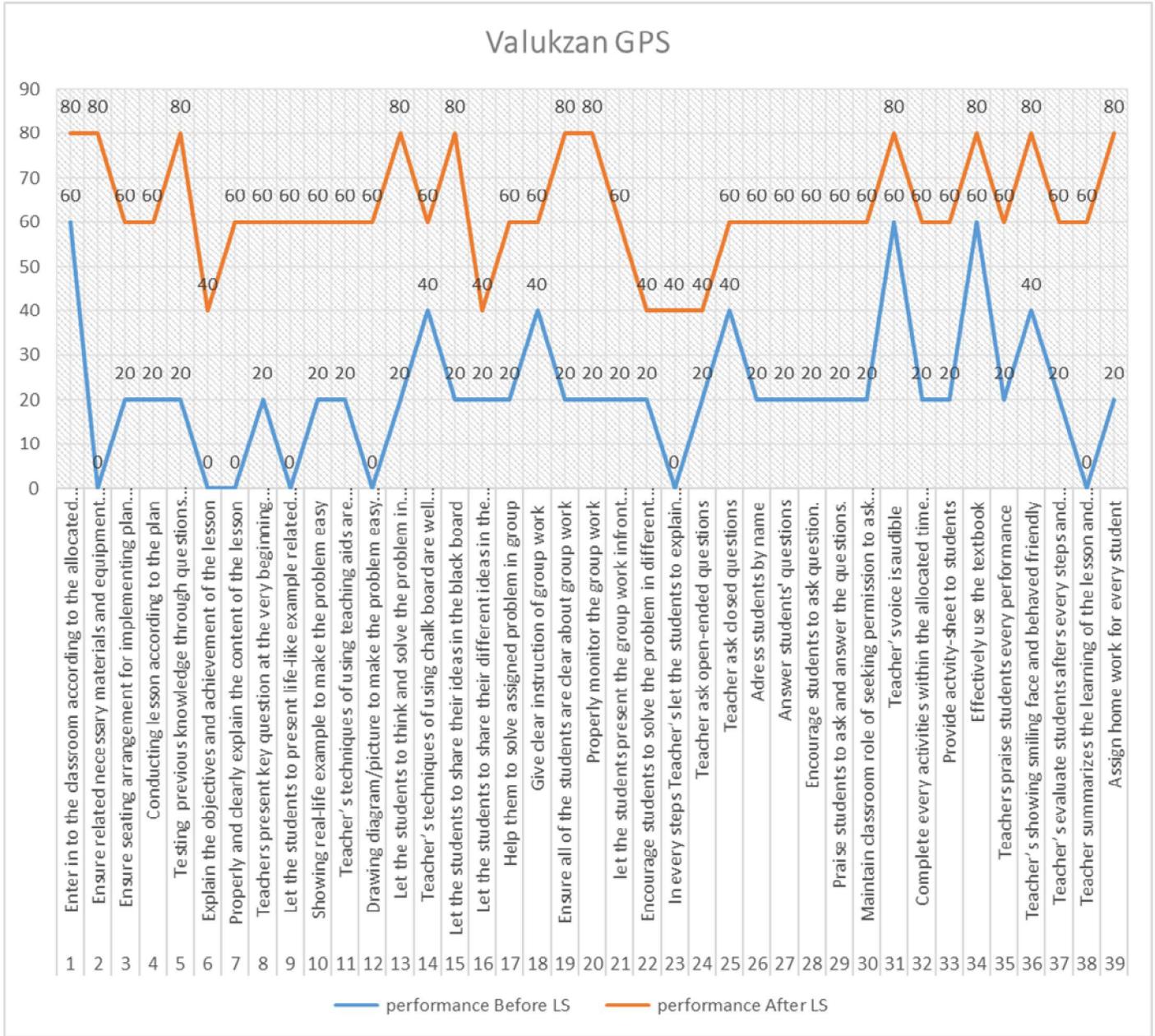
The above graph shows the grade 3 mathematics teacher’s performance before and after implementation of LS in the Fulbaria Bazar government primary school. It is evident from the graph that the teacher’s performance is increased in every activity of the observed lesson but in some of the important teaching learning activities teacher’s performance is increased to a satisfactory level, Such as using pictures/diagrams, using chalk board etc.



Graph 12 : Teaching performance of Fulbaria model GPS ( before and after implementation of LS in grade 3 mathematics)

The above graph shows the grade 3 mathematics teacher’s performance of before and after implementation of LS in the Fulbaria model government primary school. It is evident from the graph, teacher’s performance is increased in every activity of the observed lesson but some of the important

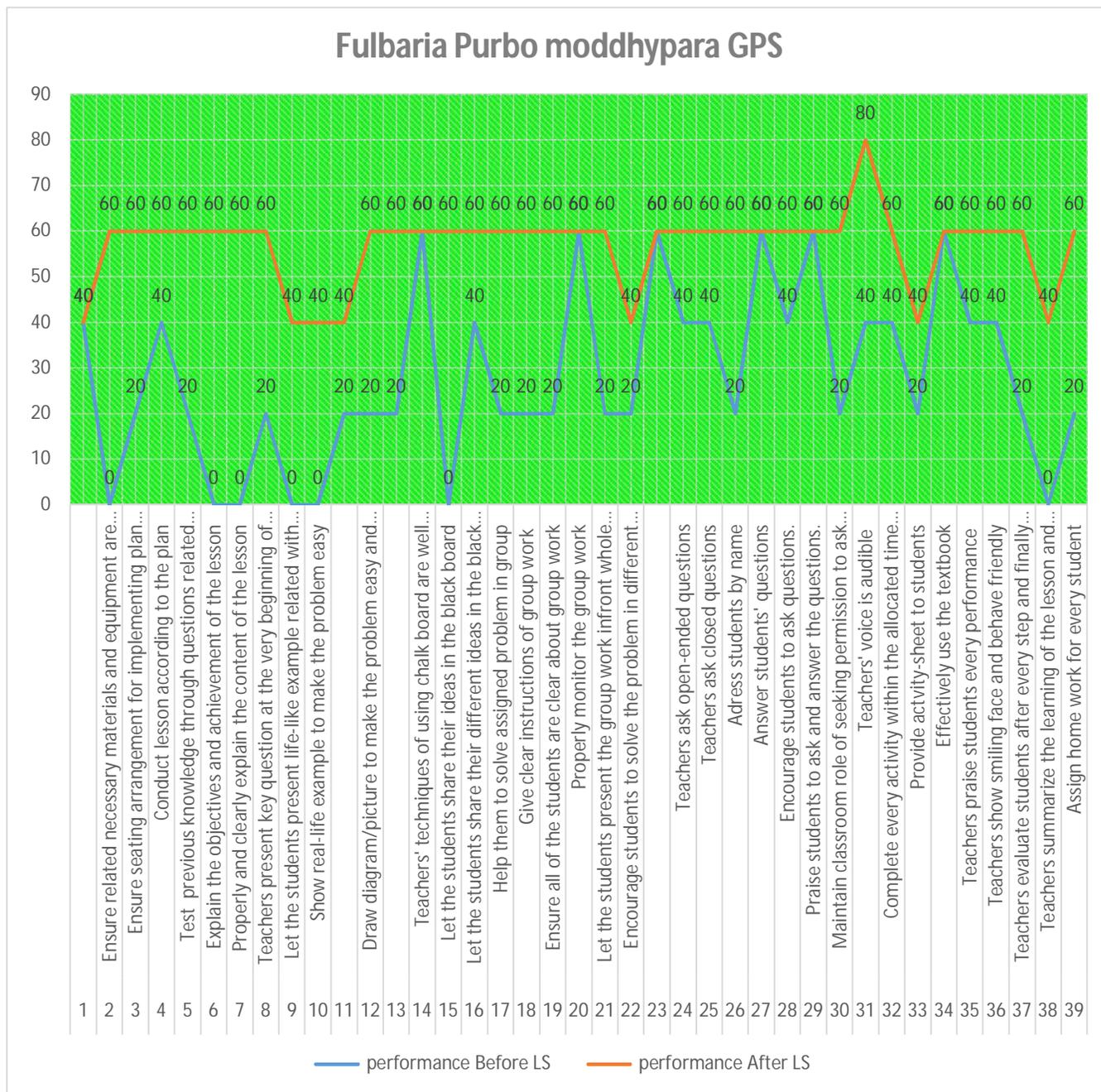
teaching learning activities teacher’s performance is increased in the satisfactory level, such as explaining the objective achievement of the lesson, properly and clearly explain the content of the lesson, using pictures/diagrams, using chalk board etc.



Graph 13: Teaching performance of Valukzan GPS, Fulbaria (before and after implementation of LS in grade 3 mathematics)

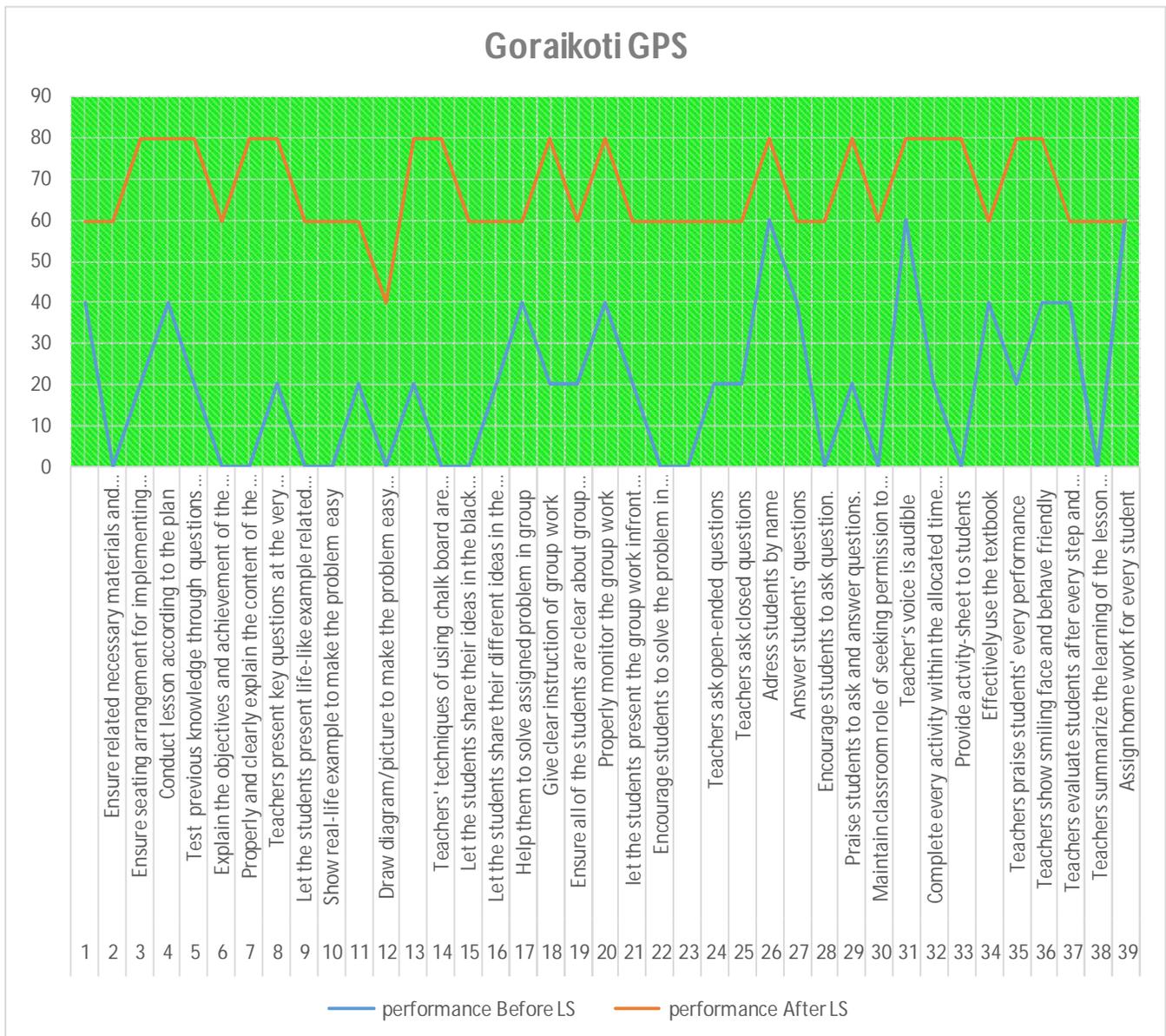
The above graph shows the grade 3 mathematics teacher’s performance before and after implementation of LS in Valukzan government primary school. It is evident from the graph, teacher’s performance is

increased in every activity of the observed lesson but some of the important teaching learning activities teacher's performance is increased to a satisfactory level, such as explaining the objectives of the lesson, using pictures/diagrams for making the problem easy, using chalk board etc.



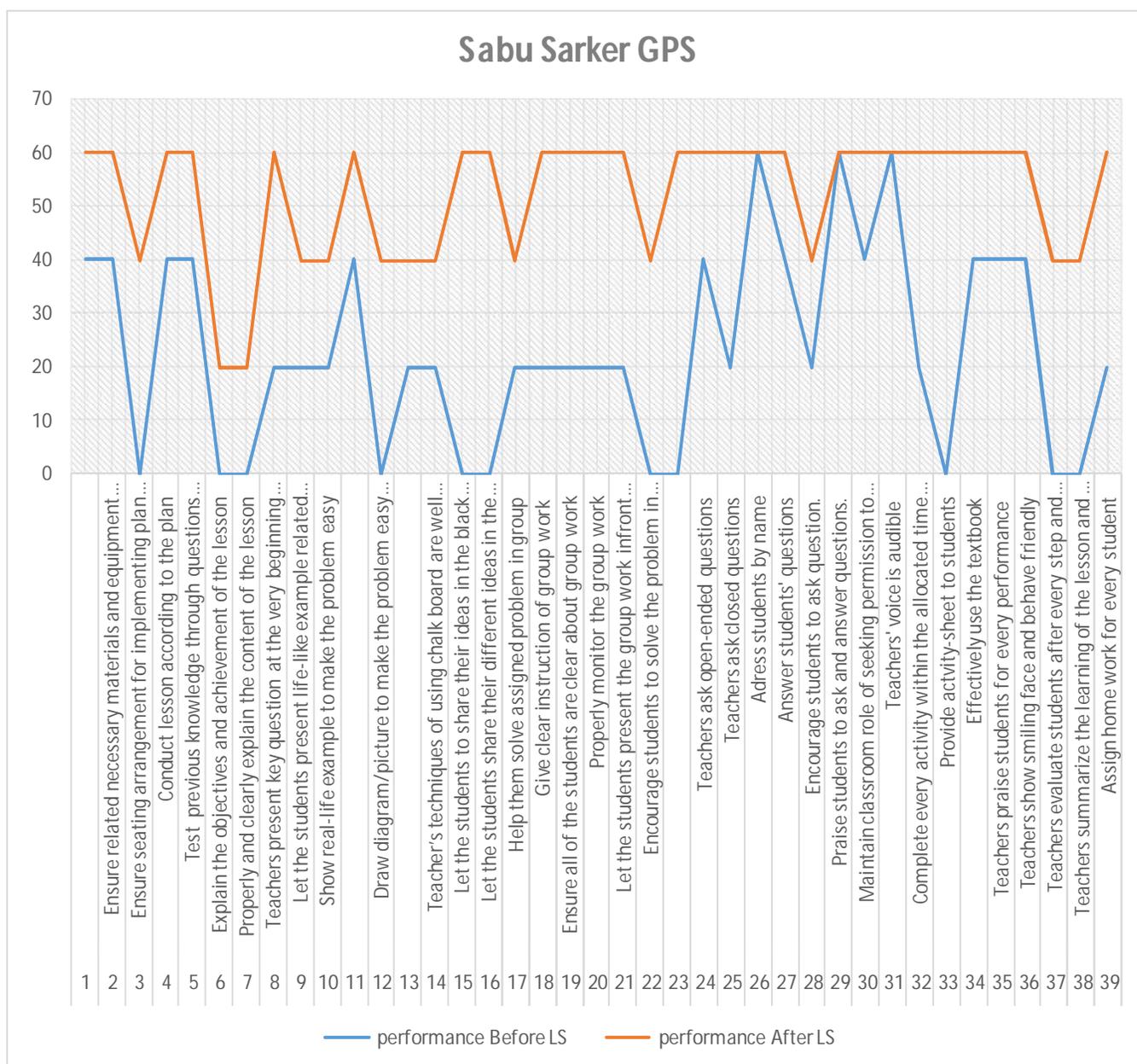
Graph 14 : Teaching performance of Fulbaria purbo moddhypara GPS ( before and after implementation of LS in grade 3 mathematics)

The above graph shows the grade 3 mathematics teacher's performance of before and after implementation of LS in Fulbaria purbo moddhypara government primary school. It is evident from the graph, teacher's performance is increased in every activity of the observed lesson but some of the important teaching learning activities teacher's performance is increased to a satisfactory level, such as explaining the objective achievement of the lesson, using pictures/diagrams for making the problem easy, and using chalk board. At every step teachers encourage students to explain ways of solution of the assigned problem etc.



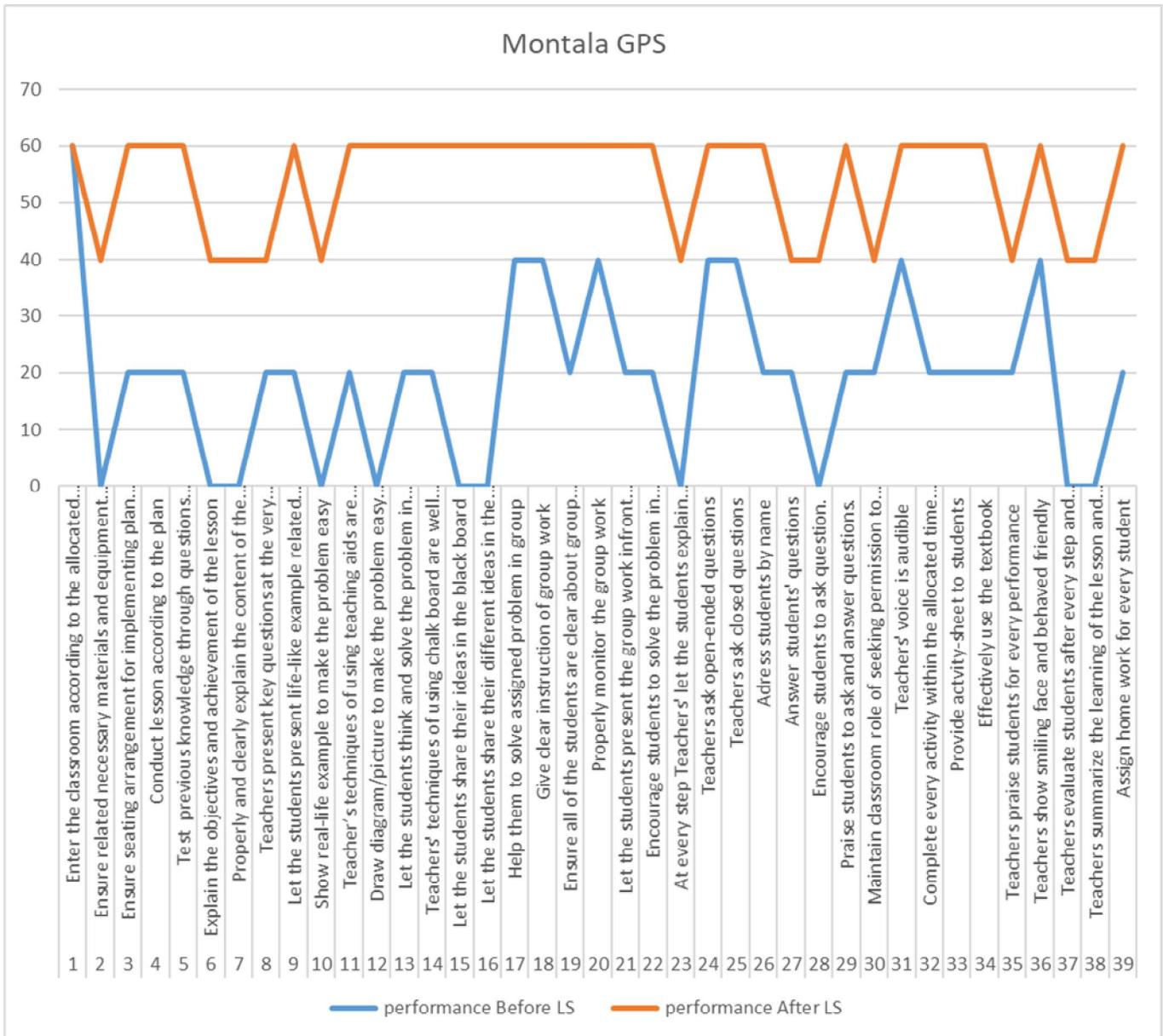
Graph 15 : Teaching performance of Goraikoti GPS, Muktagasa ( before and after implementation of LS in grade 3 mathematics)

The above graph shows the grade 3 mathematics teacher’s performance before and after implementation of LS in Goraikoti government primary school, Muktagsa, Mymensingh. It is evident from the graph, teacher’s performance is increased in every activity of the observed lesson but some of the important teaching learning activities teacher’s performance is increased to a satisfactory level, such as explaining the objective achievement of the lesson, using pictures/diagrams for making the problem easy, let the students share their ideas in the board, techniques of using chalk board, provide activity sheet among the students etc.



Graph 16: Teaching performance of Sabu Sarker GPS, Muktagasa (before and after implementation of LS in grade 3 mathematics)

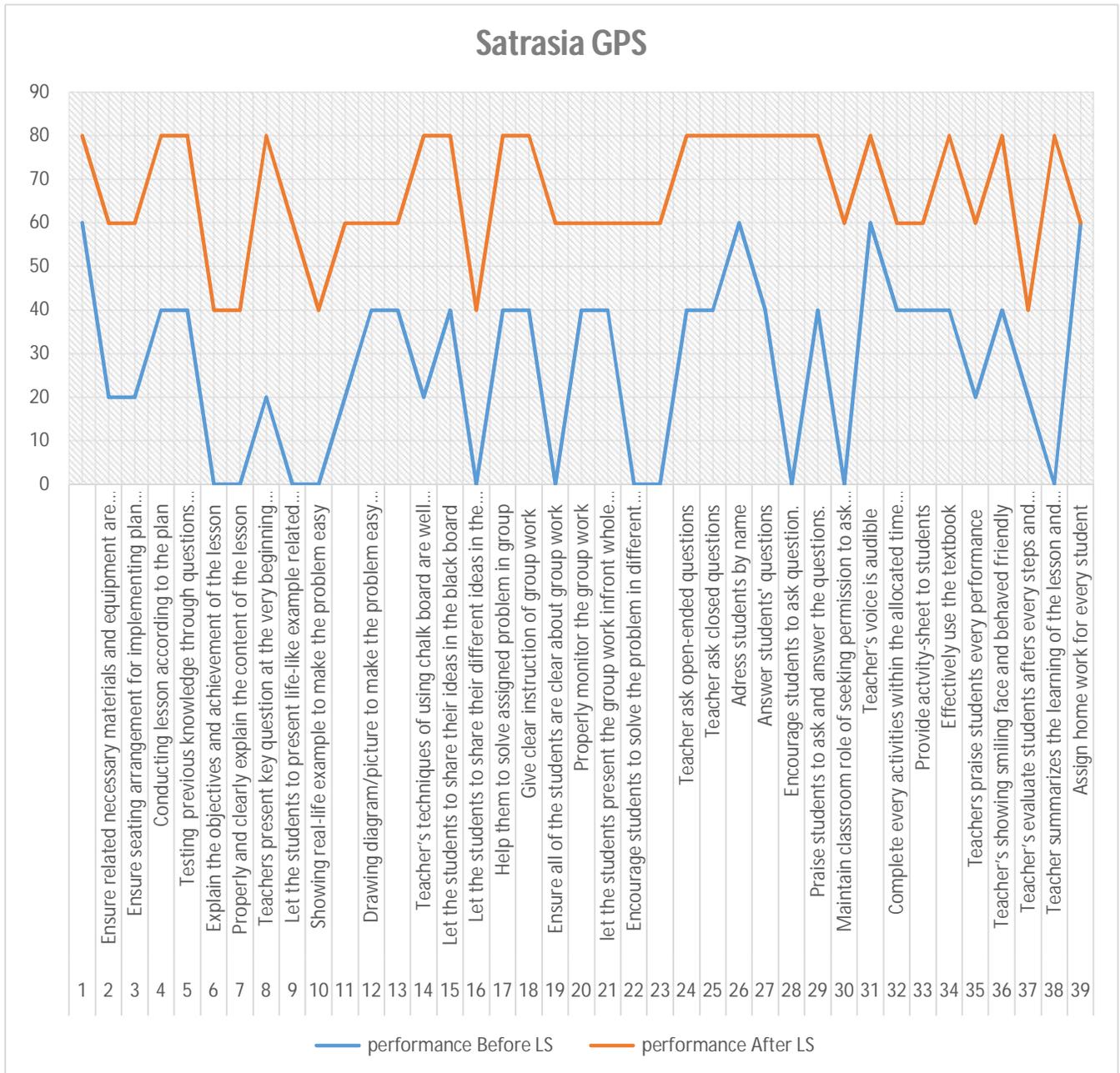
The above graph revealed the grade 3 mathematics teacher's performance before and after implementation of LS in Sabu Sarker government primary school, Muktagasa, Mymensingh. It is evident from the graph, teacher's performance increased in every activity of the observed lesson but some of the important teaching learning activities teacher's performance is increased to a satisfactory level, such as explaining the objective achievement of the lesson, using pictures/diagrams for making the problem easy, let the students share their ideas in the board, techniques of using chalk board, provide activity sheet among the students etc. On the other hand teachers performance in some of the activities was not at a satisfactory level, such as, explain the objectives and achievement of the lesson, properly and clearly explain the content of the lesson, encourage students to solve the problems in different ways etc.



Graph 17: Teaching performance of Montala GPS, Muktagasa (before and after implementation of LS in grade 3 mathematics)

The above graph revealed the grade 3 mathematics teacher's performance before and after implementation of LS in Montala government primary school, Muktagasa, Mymensingh. It is evident from the graph, teacher's performance increased in every activity of the observed lesson but some of the important teaching learning activities teacher's performance increased to a satisfactory level, such as explaining the objective achievement of the lesson, using pictures/diagrams for making the problem easy,

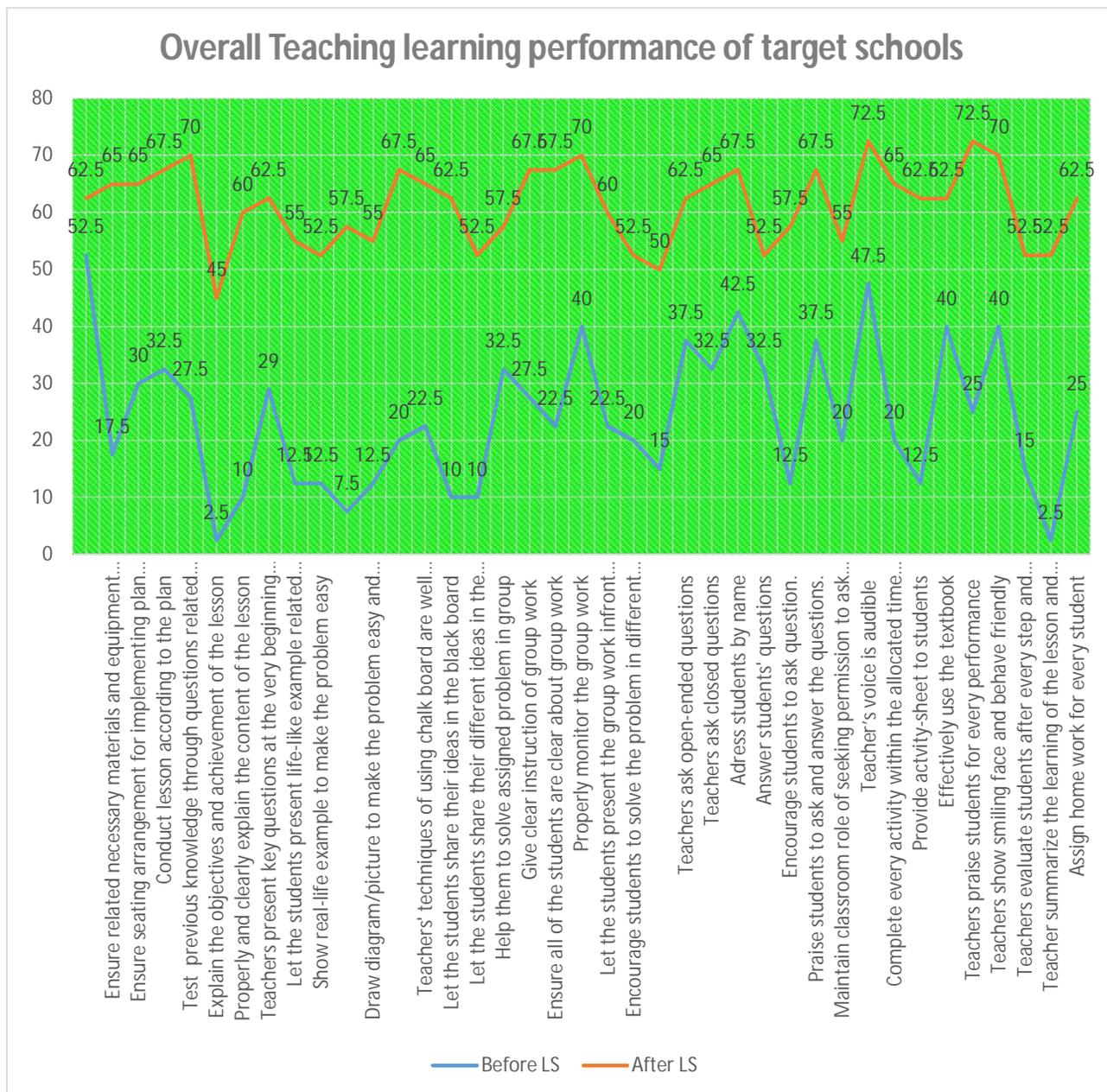
let the students share their ideas in the board, techniques of using chalk board and let the students to share their different ideas on the board etc.



Graph 18: Teaching performance Satrasia GPS, Muktagasa (before and after implementation of LS in grade 3 mathematics)

The above graph shows the grade 3 mathematics teacher’s performance before and after implementation of LS in the Satrasia government primary school, Muktagasa, Mymensingh. It is found from the graph, teacher’s performance increased in every activity of the observed lesson but some of the important

teaching learning activities teacher's performance is increased to a satisfactory level, such as teacher present the key questions at the beginning of the lesson, teacher's techniques of using chalk board is well-planned and encourage students to ask questions etc. On the other hand teacher's performance in some of the activities was not at a satisfactory level, such as, provide activity sheet among the students, explain the objectives and achievement of the lesson, properly and clearly explain the content of the lesson etc.



Graph 19: Overall teaching performance of the selected schools of Muktagasa and Fulbaria upazilas (before and after implementation of LS in grade 3 mathematics)

The above graph shows grade 3 mathematics teachers' teaching performance before and after implementation of LS in the selected 8 schools of Fulbaria and Muktagsa upazila, Mymensingh. It is found from the graph that teachers' performance in every activity of the observed lesson is increased. But some of the important teaching learning areas of their performance increased to a satisfactory level, such as properly and clearly explain the content of the lesson, let the students think and solve the problems, encourage students to ask questions, teachers' praise students for every performance, teachers summarize the learning of the lesson and concludes with praising students etc.

# CHAPTER FIVE

## FINDINGS AND RECOMMENDATIONS

### 5.1 Findings:

The findings of the study which have been identified through presentation and analyzing the data are presented below:

- 5.1 Most respondent of Assistant teachers and Head teachers are female. On the other hand two AUEOs and one URC Instructors are male.
- 5.2 Most ATs, HTs and AUEOs have more than 10 years experiences and most AUEO and URC instructors have 15 years experiences.
- 5.3 Most respondent (ATS, HTS) have graduation and post-graduation degree. All of the AUEO and URC instructors have post-graduation degree.
- 5.4 Most of the respondent ATs have C-in-Ed, 22% have DPED, 50% Head Teachers have C-In-Ed, 25% have BEd and 25% have MEd degree and 100% AUEOs and 100% URC Instructors have B.Ed degree.
- 5.5 All of the ATs have need based sub-cluster training and all of the HTs have need based sub-cluster and ACS training. While all of the respondent ATs have to teach mathematics but only 22% have subject-based mathematics training. All of the respondent AUEOs and URC instructors and half of the respondent HTs have TSN training but on the other hand a small number ATs have TSN training.
- 5.6 All of the respondent ATs who teach mathematics also teach other subjects. Such as around 60%-65% respondent teachers teach Bangla and English and 40%-50% of them teach Bangladesh and Global Studies.
- 5.7 All of the respondent ATs mentioned that they feel difficulty in teaching mathematics, whereas around 80% HTS and all of the AUEO and URC Instructors mentioned, teachers feel difficulty in teaching mathematics.
- 5.8 Around 50% respondents mentioned addition and subtraction with varying difficult content and more than 40% ATs and HTs, 100% AUEOs and URC Instructors treated fraction as a difficult content. 25% ATs, 12.5% HTs, 100% AUEOs and URC Instructors treated decimal fraction as a difficult content. 9% ATs, 25% HTs, 50% AUEOs and 100% URC Instructors treated geometry as a difficult content.

- 5.9.1 60% ATs mentioned that they use teaching aids, 25% of them discuss with their colleagues, 25% of them ask the students to work in mixed group and 47% of them ask the students practice again and again but none of them mentioned that they discuss with HT, AUEO or URC Instructors to make the content easy for the students.
- 5.9.2 40% HTs mentioned, teachers ask the students to practice again and again to overcome the difficulty of teaching mathematics.
- 5.9.3 50% AUEO and URC Instructors mentioned Teachers' use teaching aids to make contents easy and 100% of them mentioned, teachers discussed with HTs, AUEO and URC Instructors to overcome the difficulty of teaching mathematical problems.
- 5.10.1 Around 90% ATs got the idea of LS through reading LS leaflet and watching video and all of them got the idea about LS through orientation training and actively participating in the LS cycles.
- 5.10.2 More than seventy five percent HTs got the idea of LS through TSN training, reading LS leaf-let, watching LS video, attending LS orientation training and actively participating in the LS cycles respectively. On the other hand a small number of HTs got the idea about LS through TSN training.
- 5.10.3 All of the respondent AUEOs and URC Instructors have TSN training and also gain knowledge through reading LS leaf-let, watching LS video, attending LS orientation training and actively participating in the LS cycles.
- 5.11.1 Before implementation of LS in the schools, ATs, HTs, AUEOs, and URC Instructors opined, mean scores of the teachers' subject knowledge were 52%, 53%, 50% and 38% respectively. But after Implementation of LS in the schools, they opined that, mean scores of the teachers subject knowledge were 82% 69%, 75% and 75% respectively.
- 5.11.2 Before LS, according to the opinion of ATs, HTs, AUEOs and URC Instructors, percentage of teachers who gained knowledge about curriculum through CPD training were 48%, 47%, 38% and 25% respectively, whereas after implementation of LS, their gained knowledge about curriculum was 76%, 63%, 75% and 75% respectively.
- 5.11.3 ATs, HTS, AUEOs and URC Instructors opined, the degree of teachers' knowledge before LS were 48%, 50%, 25% and 25% respectively and after implementation of LS were 80%, 75%, 75% and 88% respectively in the area preparing LP.
- 5.11.4 ATs, HTS, AUEOs and URC Instructors opined, degrees of teachers' ability before implementation of LS were 47%, 50%, 25% and 25% respectively and after implementation of LS were 81%, 81%, 75% and 88% respectively In the area using TA.

- 5.11.5 In the area of Effective use of TB during teaching learning, respondents ATs, HTS, AUEOs and URC Instructors mentioned that degrees of teachers' performance before implementation of LS were 58%, 63%, 50% and 50% respectively and after implementation of LS, were 75%, 84%, 75% and 100% respectively.
- 5.11.6 In the area of teaching method and techniques, according to the responses of ATs, HTS, AUEOs and URC Instructors, the degrees of teachers' performance before implementation of LS were 43%, 38%, 25% and 25% respectively and after implementation of LS were 70%, 75%, 75% and 75% respectively.
- 5.11.7 In the area of student-centered method and techniques, according to the responses of ATs, HTS, AUEOs and URC Instructors, the degrees of teachers' performance before implementation of LS were 52%, 31%, 25% and 13% respectively and after implementation of LS were 65%, 66%, 63% and 50% respectively.
- 5.11.8 In the area of effective use of black board, according to the responses of ATs, HTS, AUEOs and URC Instructors, the degrees of teachers' performance before implementation of LS were 56%, 31%, 25% and 25% respectively and after implementation of LS were 63%, 66%, 75% and 75% respectively.
- 5.11.9 In the area of assigned creative work for students in the lesson, according to the responses of ATs, HTS, AUEOs and URC Instructors, the degrees of teachers' performance before implementation of LS were 47%, 31%, 38% and 25% respectively and after implementation of LS were 70%, 78%, 63% and 63% respectively.
- 5.11.10 In the area of effective evaluation of students learning, according to the responses of ATs, HTS, AUEOs and URC Instructors, the degrees of teachers' performance before implementation of LS were 34%, 28%, 25% and 25% respectively and after implementation of LS were 73%, 66%, 50% and 63% respectively.
- 5.12 All of respondent ATs in every selected school attended 2 times in the lesson study cycles, HTs attended 3 times, AUEOs attended 6 times and URC instructors attended 7 times in the lesson study cycle of mathematics lessons of grade 3.
- 5.13.1 In the LS cycles except AUEO, all other respondents' degree of participation in all activities of planning stage was 100%.
- 5.13.2 In the Do stage of LS cycles, ATs and HTs degree of participation in all activities was more than 50% but participation of AUEOs and URC Instructors was 100%.

- 5.13.3 In the Do stage of LS cycles, ATs and HTs degree of participation in all activities were more than 50% but AUEOs and URC Instructors degree of participation of were 100%, except the area of preparing tools.
- 5.13.4.1 In the See stage of LS cycle, according to the opinion of ATs and HTs, acting teachers' reflection was 100% but according to the opinion of AUEOs and URC, acting teachers' reflection was 50%.
- 5.13.4.2 Degree of participation in the feedback discussion meeting of see stage for further improvement was 100% but the activity of keeping record was around 60%.
- 5.14.1 ATs, HTs, AUEOs, and URC Instructors degrees of provided support to teachers were 61%, 51%, 31% and 36% respectively before the implementation of LS whereas after implementation of LS the provided support were 88%, 86%, 83%, and 84% respectively to classroom teachers according to the opinion of ATs.
- 5.14.2 Before the implementation of LS, ATs, HTs, AUEOs, and URC Instructors' degrees of provided support to teachers were 34%, 41%, 28%, and 34%, whereas after the implementation LS cycles, their support to classroom teachers were 81%. 78%, 72% and 75% respectively according to the respondent of HTs.
- 5.14.3 Before the implementation of LS, the degrees of support of ATs, HTs, AUEOs, and URC Instructors were 50%, 50%, 50%, and 25%, respectively whereas after implementation of LS, their degrees of support were 88%, 75%, 75%, and 75% according to the opinion of AUEOs.
- 5.14.4 According to the responses of URC Instructors, before implementation of LS, ATs, HTs, AUEOs and URC Instructors provided support to teachers were 25%, 38%, 25% and 25% respectively whereas after implementation of LS their degrees of support were 88%, 75%, 63% and 75% respectively.
- 5.15.1 Before implementation of LS in the school, 37.5% of the ATs and 25% HTs provided support to classroom teachers during the preparation of the lesson (before lesson), whereas after implementation of LS, 75% ATs and 100% of HTs, AUEOs and URC Instructors support them during the preparation of the lesson (before lesson).
- 5.15.2 Before implementation of LS in the school, 19% ATs, 37.5% HTs and 50% URC Instructors support classroom teachers after observing the lesson (after lesson), whereas 88% ATs and 100% HTs, AUEOs and URC Instructors support them after observing the lesson (after lesson).
- 5.15.3 Before implementation of LS in the school, 9% of the assistant teachers and 37.5% HTs support teachers at the time of preparing lesson plan and collecting teaching aids, whereas 100% ATs, HTs,

AUEOs and URC Instructors support them at the time of preparing lesson plan and collecting teaching aids.

- 5.15.4 Before implementation of LS in the school, only 22% of the assistant teachers support classroom teachers during free time according to their needs, whereas 100% ATs, 75% HTs, 100% AUEOs and 50% URC Instructors support classroom teachers during free time according to their needs.
- 5.15.5 Before and after implementation of LS in the schools, 100% AUEOs and URC Instructors support the classroom teachers during need-based sub-cluster training and during inspection.
- 5.15.6 Before implementation of LS in the schools, 12.5% ATs and 25% HTs support the classroom teachers when they face problems, whereas after implementation of LS, 88% ATs and 50% of HTs, AUEOs and URC Instructors support the classroom teachers when they face problems.
- 5.16.1 87.5% ATs, 100% HTs and AUEOs and 50% URC Instructors mentioned that LS enhance teachers' confidence level in teaching in the classroom with presence of observer.
- 5.16.2 75% ATs and HTs, 50% AUEOs and URC Instructors opined that LS build up collegial relationship among teachers and teacher educators.
- 5.16.3 Maximum number of respondents mentioned that teachers can ensure effective use of black board through LS. Most of the respondents also mentioned that it enhances teachers' pedagogical and subject matter knowledge, Gained knowledge and skill about student centered approach and gain support from colleagues and academic supervisors through LS.
- 5.16.4 Around half of the respondents mentioned that LS creates scope for colleagues and others in evaluating teaching learning activity from their viewpoint and some of them mentioned that LS increase students' performance.
- 5.17.1 75% ATs mentioned limitation of time, 65% mentioned work load, 37.5% mentioned lack of administrative support and 50% mentioned lack of academic support as problems of the implementation of LS.
- 5.17.2 75% HTs mentioned, limitation of time, 62.5% mentioned work load, 25% mentioned lack of interest, 50% mentioned lack of administrative support and 37.5% mentioned lack of academic support as problems of the implementation of LS.
- 5.17.3 All of the respondent AUEOs mentioned lack of interest and 50% of the them mentioned limitation of time, work load, lack of administrative support and lack of academic support as problems of the implementation of LS.

- 5.17.4 AS problems of the implementation of LS, all of the respondent URC Instructors mentioned lack of interest, lack of administrative support and 37.5% mentioned lack of academic support and 50% of them mentioned limitation of time and work load.
- 5.18.1 62.5% ATs mentioned that they prepared LS implementation plan considering yearly LP and class routine, 50% mentioned through administrative support, showing motivational video and giving positive feedback, 65% mentioned through academic support and 37.5% mentioned used leaflet about LS implementation to overcome the problems of implementing LS.
- 5.18.2 75% HTs mentioned, prepared LS implementation plan considering yearly LP and class routine, 50% of them mentioned through administrative and academic support, 37.5% of them mentioned showing motivational video and giving positive feedback and 25% of them mentioned through using leaflet about LS implementation to overcome the problems of implementing LS.
- 5.18.3 All of the respondent AUEOs and URC Instructors mentioned, for the effective implementation of LS, they prepared action plan considering yearly LP and class routine. They also stated, they motivated the teachers by showing motivational video and giving positive feedback. Half of the respondents ensured administrative and academic support to overcome the problems of implementing LS.
- 5.19.1 All of the respondent ATs, HTS, AUEOs and URC Instructors noted that LS implementation is necessary for ensuring quality teaching learning in the school.
- 5.20.1 All of the respondent ATs, HTS, AUEOs and URC Instructors noted that implementation of LS is very important for ensuring quality teaching learning in the school.
- 5.20.2 75% ATs and all other respondents opined, it is necessary to continue LS activities for ensuring quality teaching learning in the school.
- 5.20.3 78% ATs, 100% HTs, 50% AUEOs and 50% URC Instructors mentioned, LS activities enhance their subject matter knowledge. 62.5% ATs and HTs, 50% AUEOs and 100% URC Instructors opined LS activities build up deepen collegial relationship with colleagues so it is necessary to continue in the schools.
- 5.20.4 As reason of the continuation of LS in the schools, 62.5% ATs and half of the other respondent mentioned that they can easily present the lesson in the classroom through participating LS activities. 53% ATs, and 62.5% HTs opined, they can easily present comparatively difficult lesson through attending LS activities.
- 5.20.5 40% ATs, 62.5% HTs, and all AUEOs and URC Instructors mentioned, LS activities help them to prepare LP effectively, 44% ATs, 100% HTs and 50% URC instructors opined, they can ensure students learning through LS so it is necessary to continue in the schools.

- 5.20.6 As reason of the continuation of LS in the schools, more than half of the respondent mentioned that they can solve different types of teaching learning related problems through LS. 62.5% ATs, 100% HTs and half of the other respondent opined, LS activities develop cooperative relationship among the colleagues. More than half of the respondents mentioned through LS activities they can gain idea about different ways of teaching learning and can ensure effective evaluation in the classroom.
- 5.21.1 84% ATs, 100% HTs, 50% AUEOs and URC Instructors stated, for the effective implementation they are in need of training on LS.
- 5.21.2 78% ATs, 50% HTs, 50% AUEOs and URC Instructors stated, continuation of the implementation of LS is important.
- 5.21.3 78% ATs, 100% HTs, 50% AUEOs and URC Instructors stated, LS should be conducted in each and every subject.
- 5.21.4 87.5% ATs, 62.5% HTs, 100% AUEOs and URC Instructors mentioned, it is necessary to include LS activities in the yearly school activities plan.
- 5.21.5 According to 81% ATs, 62.5% HTs, 100% AUEOs and URC Instructors, it is necessary to implement LS in every school.
- 5.21.6 According to 25% respondent HTs and all of the AUEO and URC Instructors, LS should be included in the inspection form as a school activity.
- 5.22.1 Before the implementation of LS, feelings of students of 8 schools' (8 FGDs) about mathematics lesson were good whereas after the implementation of LS feelings of students of 6 schools (6 FGDs) were very good and feelings of students of 2 schools (2 FGDs) were good.
- 5.23.1 Before implementation of LS students like mathematics because teachers help them to understand and do not give punishment whereas after implementation of LS students like mathematics because teachers help them to understand with example, teachers help them personally to understand, teachers use teaching aids and give them chance to use black board.
- 5.24.1 Before implementation of LS, students of 5 schools (5 FGDs) mentioned that teachers use teaching aids in the mathematics lesson, students of one school mentioned that sometimes teachers use teaching aids and students of 2 schools mentioned that teachers do not use teaching aids in the mathematics lesson whereas after implementation of LS students of 8 schools mentioned that teachers use teaching aids in the mathematics lesson.

- 5.24.2 Before implementation of LS, students of 6 schools (6 FGDs) mentioned that teachers use only picture or chart in the mathematics lesson whereas after implementation of LS students of 8 schools mentioned teachers use real aids, picture and chart in the mathematics lesson.
- 5.24.3 Before implementation of LS, students of 6 schools (6 FGDs) mentioned that teachers demonstrate the picture or chart and ask question only whereas after implementation of LS students of 8 schools (8 FGDs) mentioned that teachers provide aids among all students, students of 4 schools (4 FGDs) mentioned that teachers use a few number students to show teaching aids in the mathematics lesson.
- 5.25.1 Before implementation of LS in the school students of 5 schools (5 FGDs) mentioned they ask questions and students of 2 schools (2 FGDs) mentioned, they talk with other students if they don't understand any content of mathematics whereas after implementation of LS in the schools, students of 7 schools (7 FGDs) mentioned they ask questions and students of 5 schools (5 FGDs) mentioned, they talk with other students if they don't understand any content of mathematics.
- 5.26.1 Before and after LS grade 3 students of all schools (all FGDs) mentioned, teachers use textbook during the teaching learning in the classroom.
- 5.27.1 Before LS, grade 3 students of 2 schools (2 FGDs) mentioned, in the mathematics lesson teachers declare the content (title), showing teaching aids and solving the problem on the board. Students of 4 schools (4 FGDs) mentioned teachers present the problem, explain the solution of the problem orally and then on the board.
- 5.27.2 After implementation of LS, students of 7 schools (7 FGDs) stated, in the mathematics lesson teachers present key questions (problem) and try to solve with the participation of students, students of 5 schools (5 FGDs) mentioned, teachers present the problem, provide aids among all students or in groups to solve the problem, students of 4 schools (4 FGDs) mentioned, teachers declare the content (title), showing aids and solve the problem and students of 3 schools (3 FGDs) mentioned teachers present the problem, explain the solution orally and write on the board.
- 5.28.1 It is found that when students have problems in understanding any content, students of 3 schools (3 FGDs) mentioned that teachers explain the problem with example, 3 schools (3 FGDs) mentioned that teachers solve the problem again on the board whereas after the implementation of LS, students of 5 schools (5FGDs) mentioned that teachers explain the problem with example, 6 schools (6 FGDs) mentioned, teachers solve the problem again on the board, 3 schools (3 FGDs) mentioned teachers use advanced students to explain solution of the problem and 4 schools (4 FGDS) mentioned teachers personally help the students to understand the problem.

5.29.1 After implementation of LS cycles in the selected schools of Muktagasa and Fulbaria uapazilas of Mymensingh district, the performance of grade 3 mathematics teacher increased in every area of the teaching learning in the classroom.(see graph-19)

## 5.2 Recommendations

1. An intensive training course on lesson study should be arranged for teachers and academic supervisors.
2. Academic Supervision, monitoring and mentoring of lesson study activities have to be ensured on a regular basis by the Head Teachers, URC instructors and AUEOs.
3. LS should be conducted in all subjects in order to ensure mastery learning of all students.
4. Lesson study implementation plan should be incorporated in the yearly school activities plan.
5. LS program should be implemented in every primary school.
6. Lesson study implementation status should be included in the school monitoring/inspection form
7. Ensure showing lesson study related motivational video and providing lesson study related leaflet in every school.
8. Academic and administrative support should be provided in order to ensure effective implementation of lesson study in every school.
9. Lesson study related resource book (lesson study guide book developed by DPE with the support of JSP), instructional materials and lesson study implementation video should be provided to all schools.
10. Ensure every teacher and related stake-holders to have the official order of DPE for taking necessary steps to implement lesson study in the school level.

The understanding of the issue about conducting lesson study at the school level depends on teachers' and supervisors' knowledge, skills and commitment. Many other issues are also related with effective implementation of lesson study at the school level. But according to responses from the different stakeholders and findings from different studies it is revealed that teachers have some limitation in implementing lesson study in the school level. It is also important to know how much quality the lesson study group can maintain in the every activity of lesson study cycles and how much qualitative support is given to teachers in order to effective implementation of lesson study. However, further research based on how much support is needed for the teachers and teachers' supervisors in order to ensure effective implementation of lesson study at the school level.

This study concludes that teachers of selected schools got necessary support from different sources in respect of implementing lesson study effectively at the school level. On the other hand teachers and teachers' supervisors faced some challenges for the implementation of LS. If necessary support is provided to teachers and related stake-holders according to the recommendations of the study LS can be implemented at the school level effectively and quality of teaching learning will be enriched.

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## Questionnaire 1: For the assistant teachers (before LS)

This questionnaire is not intended to evaluate you. It is intended for a research tool. The main objective of this research is to assess the effectiveness of Lesson Study by which it is hoped to take steps to develop the quality of education and the teachers' professional development in the classrooms. You will be thanked for your co-operation by giving necessary information as a part of this research. So, give your opinion without any hesitation. Your opinion and answer will be kept hidden.

1. School: \_\_\_\_\_ Type of School: \_\_\_\_\_  
Upozela: \_\_\_\_\_ District: \_\_\_\_\_ Division: \_\_\_\_\_
2. Teacher's Name: \_\_\_\_\_ Mobile \_\_\_\_\_  
No: \_\_\_\_\_
3. Academic Qualification(last): \_\_\_\_\_
4. Experience ( As a class teacher): \_\_\_\_\_
5. Subject and class of teaching: \_\_\_\_\_

Serial No	Subject	Class

6. Do you face any challenges to teach Math? Yes/No?

- 6.1 If yes, which contents do you face challenges to teach?

-  
-  
-  
-

- 6.2 What steps do you take to overcome the challenges?

-  
-  
-

7. Which contents do the students feel hard? Why do they feel them hard? What steps do you take here?

Class	Contents	Reasons of difficulty	Steps

8. What trainings have you taken to develop your professional development? (Tick  $\checkmark$  Mark where applicable)

Curriculum Dissemination	Subject-based (Names)	ICT	TSN	Pre-primary	Inclusive Education	Need based Sub cluster	Competency Based Test Item Writing and Marker's Training	Others (Names)
1	2	3	4	5	6	7	8	9

9. By participating in the trainings for professional development how much proficiency have you had to fulfil the following activities successfully? Give a Tick ( $\checkmark$ ) mark in each box beside the statements.

Serial No	Activities	Not at all	Very little	Ordinary	Good	Excellent
		1	2	3	4	5
1.	Curriculum					
2.	Subject Knowledge					
3.	Making Lesson Plan					
4.	Collecting and making materials					
5.	Proper Use of Textbooks					
6.	Process and techniques of Math Teaching Learning					
7.	Student-centered techniques					
8.	Proper use of Blackboard					
9.	Giving creative task					
10.	Evaluation					

10. To ensure quality teaching of math, who do you have assistance from? (Give  $\checkmark$  mark.)

Peer assistant teacher	Head Teacher	AUEO	URC Instructor	Others (Names)

11. To ensure quality teaching of math, how much assistance do you have from the personnel? Give ( $\checkmark$ ) mark beside the statements.

Serial No	Related People	Not at all	Very little	Ordinary	Good	Excellent
		1	2	3	4	5
1.	Peer Assistant Teacher					

2.	Head Teacher					
3.	AUEO					
4.	URC Instructor					
5.	Others					

12. To ensure quality teaching of math, in what areas do you have assistance from the personnel? Give (√) mark beside the statements.

Serial No	Activities	Not at all	Very little	Ordinary	Good	Excellent
		0	1	2	3	4
1.	Subject knowledge					
2.	Curriculum					
3.	Making Lesson Plan					
4.	Collecting and making materials					
5.	Proper Use of Textbooks					
6.	Process and techniques of math Teaching Learning					
7.	Student centered techniques					
8.	Proper use of Blackboard					
9.	Giving creative task					
10.	Evaluation					

13. When and how do the related people help you quality teaching of math?

Serial No	Related People	When	How
1.	Peer Assistant Teacher		
2.	Head Teacher		
3.	AUEO		
4.	URC Instructor		

14. What materials do you use in teaching?

15. Do you use Annual Lesson Plan? Yes/No  
(Match the Lesson with the Annual Lesson Plan)

16. What is your concept/opinion/ideas about Lesson Study?

Thanks for your co-operation

Name and Signature of data collector

## Questionnaire 1: For the assistant teachers (after LS)

This questionnaire is not intended to evaluate you. It is intended for a research tool. The main objective of this research is to assess the present condition and the effectiveness of Lesson Study by which it is hoped to take steps to develop the quality of education and the teachers' professional development in the classrooms. You are requested to give necessary information as a part of this research. So, give your opinion without any hesitation. Your opinion and answer will be kept hidden.

1. School: \_\_\_\_\_ Type of School: \_\_\_\_\_  
 Upozela: \_\_\_\_\_ District: \_\_\_\_\_ Division: \_\_\_\_\_
2. Head/Assistant Teacher's Name: \_\_\_\_\_ Mobile No: \_\_\_\_\_
3. Academic Qualification (last): \_\_\_\_\_
4. Professional Education/Training: \_\_\_\_\_
5. Experience ( As a teacher): \_\_\_\_\_
6. Subject and class of teaching:

Serial No	Subject	Class

7. How have you got ideas of Lesson Study?

Through TSN training at URC	Participating DPED Training Class	Reading leaflet about Lesson Study	Watching video on Lesson Study	Participating Orientation Workshop on Lesson Study	Participating Lesson Study activities

8. Activities of Lesson Study steps (Describe activities in blanks provided tables)

Steps	Activities
Preparing Lesson plan and its improvement.	

Demonstration Class and Observation	
Feedback	

9. How many cycles of Lesson Study have you participated in the last 3 months? 1/2/3/4/5

10. What was your role in the Lesson Study team? Tick (√) mark where applicable.

	Comments				
	Not at all (0)	Very little (1)	Ordinary (2)	Good (3)	Excellent (4)
As a facilitator					
As a demo teacher					
As an active member of the team to make a lesson plan					
As an active member of the team to advise to develop the lesson plan					
As an active member of the team to demonstrate the lesson according to the lesson plan					
As an active member of the team to observe the lesson using the lesson plan and tools					
As an active member of the team to feedback after the demo					

11. What was the role of URC to accomplish Lesson Study? Tick (√) mark where applicable.

Serial No	Activities	Degree of Assistance				
		Not at all	Very little	Ordinary	Good	Excellent
1.	Giving ideas of Lesson Study					
2.	Making Lesson Study group					

3	To assist in making action plan of Lesson Study					
4.	To ensure accomplishment of the action plan					
5.	To observe the activities of Lesson Study closely and feedback					
6.	To keep records and evaluate the activities of Lesson Study					

12. What was the role of AUEO to accomplish Lesson Study? Tick (√) mark where applicable.

Serial No	Activities	Level of Co-operation				
		Not at all	Very little	Ordinary	Good	Excellent
1.	Giving ideas of Lesson Study					
2.	Making Lesson Study group					
3	To assist in making action plan of Lesson Study					
4.	To ensure accomplishment of the action plan					
5.	To observe the activities of Lesson Study closely and feedback					
6.	To keep records and evaluate the activities of Lesson Study					

13. What professional developments have you got through the activities of Lesson Study?

Serial No	Activities	Not at all	Very little	Ordinary	Good	Excellent
		1	2	3	4	5
1	Curriculum					
2	Subject Knowledge					
3	Making Lesson Plan					
4	Collecting and making materials					
5	Proper Use of Textbooks					
6	Process and techniques of math Teaching Learning					
7	Student-centered techniques					
8	Proper use of Blackboard					
9	Giving creative task					
10	Evaluation					
11	Working collaborately with colleagues					
12	To develop teaching and learning techniques by mutual support					

14. Is there any problem to accomplish the activities of Lesson Study? Yes/No

14.1 If the answer is yes, what was the problem? What steps were taken to solve the problem?  
Tick mark (√) where applicable.

Problems to accomplish Lesson Study						Steps taken to solve the problems				
Limitation of Time	Work pressure	Eagerness	Lack of ideas of Lesson study	Lack of administrative assistance	Lack of academic assistance	To include in classroom activities and routine	To ensure academic assistance	To ensure administrative assistance	Showing motivational videos and positive feedback	Using leaflet of lesson study

15. What steps have you taken to accomplish Lesson Study?

Discussion with Head/assistant teachers on Lesson Study accomplishment	Plan to accomplish Lesson Study with Head/assistant teachers	To inform AUEO, URC Instructor, NAPE Faculty Member Lesson Study Accomplishment plan	To accomplish Lesson Study activities according to	To preserve all information about Lesson Study

16. What is the level of co-operation of the related people to accomplish Lesson Study in the school? Give tick (√) mark beside the statements.

Serial No	Related people	Not at all	Very little	Ordinary	Good	Excellent
		0	1	2	3	4
6.	Assistant Teacher					
7.	Head Teacher					
8.	AUEO					
9.	URC Instructor					
10.	NAPE Faculty Member					

17. Is it necessary to continue Lesson Study activities in the school to ensure quality teaching and learning? Yes/No.

17.1 If yes, write the reasons.

18. What is your advice to accomplish Lesson Study activities in the school successfully?

Thanks for your co-operation

Name and Signature of data collector

## Questionnaire 1: For the Head teacher (before LS)

This questionnaire is not intended to evaluate you. It is intended for a research tool. The main objective of this research is to assess the effectiveness of Lesson Study by which it is hoped to take steps to develop the quality of education and the teachers' professional development in the classrooms. You will be thanked for your co-operation by giving necessary information as a part of this research. So, give your opinion without any hesitation. Your opinion and answer will be kept hidden.

1. School: \_\_\_\_\_ Type of School: \_\_\_\_\_  
Upozela: \_\_\_\_\_ District: \_\_\_\_\_ Division: \_\_\_\_\_
2. Head Teacher's Name: \_\_\_\_\_ Mobile No: \_\_\_\_\_
3. Academic Qualification(last): \_\_\_\_\_
4. Experience ( As a Head Teacher): \_\_\_\_\_  
(As a class teacher): \_\_\_\_\_
5. Do you teach math? Yes/No  
If yes, which classes do you teach math?
6. 1. Do your colleague assistant teachers face any difficulties? Yes/No  
6.2 Do you face any challenges to teach math? Yes/No?  
6.3 If yes, which contents do you face challenges to teach?  
6.4 What steps do you take to overcome the challenges?
7. Which contents do the students feel hard? Why do they feel them hard? What steps do you take here?

Class	Contents	Reasons of difficulty	Steps

8. What trainings have you taken to develop your professional development? (Tick  $\checkmark$  Mark where applicable)

Curriculum Dissemination	Subject-based (Names)	ICT	TSN	Pre-primary	Inclusive Education	Need based Sub cluster	Competency Based Test Item Writing Marker's Training	Others (Names)
1	2	3	4	5	6	7	8	9

9. By participating in the trainings for professional development how much proficiency have you had to ensure the co-operation with your colleagues successfully? Give a Tick (√) mark in each box beside the statements.

Serial No	Activities	Not at all	Very little	Ordinary	Good	Excellent
		0	1	2	3	4
1.	Curriculum					
2.	Subject Knowledge					
3.	Making Lesson Plan					
4.	Collecting and making materials					
5.	Proper Use of Textbooks					
6.	Process and techniques of math Teaching Learning					
7.	Student-centered techniques					
8.	Proper use of Blackboard					
9.	Giving creative task					
10.	Evaluation					

10. To ensure quality teaching of math, how much assistance do you have from the related people? Give (√) mark beside the statements.

Serial No	Related People	Not at all	Very little	Ordinary	Good	Excellent
		0	1	2	3	4
11.	Peer Assistant Teacher					
12.	Head Teacher					
13.	AUEO					
14.	URC Instructor					

11. When and how do the related people help you quality teaching of Math?

Serial No	Related People	When	How
5.	Peer Assistant Teacher		
6.	Head Teacher		
7.	AUEO		
8.	URC Instructor		

12. What materials do you use in teaching?

13. Do your colleagues use Annual Lesson Plan? Yes/No  
(Match the Lesson with the Annual Lesson Plan)

14. What is your concept/opinion/ideas about Lesson Study?

Thanks for your co-operation

Name and Signature of data collector

## Questionnaire 1: For the Head teacher (after LS)

This questionnaire is not intended to evaluate you. It is intended for a research tool. The main objective of this research is to assess the present condition and the effectiveness of Lesson Study by which it is hoped to take steps to develop the quality of education and the teachers' professional development in the classrooms. You are requested to give necessary information as a part of this research. So, give your opinion without any hesitation. Your opinion and answer will be kept hidden.

1. School: \_\_\_\_\_ Type of School: \_\_\_\_\_  
Upozela: \_\_\_\_\_ District: \_\_\_\_\_ Division: \_\_\_\_\_
2. Head Teacher's Name: \_\_\_\_\_ Mobile No: \_\_\_\_\_
3. Academic Qualification (last): \_\_\_\_\_
4. Professional Education/Training: \_\_\_\_\_
5. Experience ( As a teacher): \_\_\_\_\_
6. Subject and class of teaching:

Serial No	Subject	Class

7. How have you got ideas of Lesson Study?

Through TSN training at URC	Participating DPED Training Class	Reading leaflet about Lesson Study	Watching video on Lesson Study	Participating Orientation Workshop on Lesson Study	Participating Lesson Study activities

8. Activities of Lesson Study steps (Describe activities in blank in the space provided)

Steps	Activities
Lesson Plan making and developing	
Demonstration Class and Observation	
Feedback	

9. . What steps have you taken to accomplish Lesson Study? Tick (√) mark where applicable.

Discussion with Head/assistant teachers on Lesson Study accomplishment	Plan to accomplish Lesson Study with Head/assistant teachers	To inform AUEO, URC Instructor, NAPE Faculty Member Lesson Study Accomplishment plan	To accomplish Lesson Study activities according to	To preserve all information about Lesson Study

10. How many cycles of Lesson Study have you participated in the last 3 months? 1/2/3/4/5

11. What was your role in the Lesson Study team? Tick (√) mark where applicable.

	Comments				
	Not at all (0)	Very little (1)	Ordinary (2)	Good (3)	Excellent (4)
As a facilitator					
As a demo teacher					
As an active member of the team to make a lesson plan					
As an active member of the team to advise to develop the lesson plan					
As an active member of the team to demonstrate the lesson according to the lesson plan					
As an active member of the team to observe the lesson using the lesson plan and tools					
As an active member of the team to feedback after the demo					

12. What was the role of URC to accomplish Lesson Study? Tick (√) mark where applicable.

Serial No	Activities	Level of Co-operation				
		Not at all	Very little	Ordinary	Good	Excellent
1.	Giving ideas of Lesson Study					
2.	Making Lesson Study group					

3	To assist in making action plan of Lesson Study					
4.	To ensure accomplishment of the action plan					
5.	To observe the activities of Lesson Study closely and feedback					
6.	To keep records and evaluate the activities of Lesson Study					

13. What was the role of AUEO to accomplish Lesson Study? Tick (√) mark where applicable.

Serial No	Activities	Level of Co-operation				
		Not at all	Very little	Ordinary	Good	Excellent
1.	Giving ideas of Lesson Study					
2.	Making Lesson Study group					
3	To assist in making action plan of Lesson Study					
4.	To ensure accomplishment of the action plan					
5.	To observe the activities of Lesson Study closely and feedback					
6.	To keep records and evaluate the activities of Lesson Study					

14. What was the role of NAPE faculty member to accomplish Lesson Study? Tick (√) mark where applicable.

Serial No	Activities	Level of Co-operation				
		Not at all	Very little	Ordinary	Good	Excellent
1.	Giving ideas of Lesson Study					
2.	Making Lesson Study group					
3	To assist in making action plan of Lesson Study					
4.	To ensure accomplishment of the action plan					
5.	To observe the activities of Lesson Study closely and feedback					
6.	To keep records and evaluate the activities of Lesson Study					

15. What professional developments have you got through the activities of Lesson Study?

Serial No	Activities	Not at all	Very little	Ordinary	Good	Excellent
		1	2	3	4	5
1	Curriculum					
2	Subject Knowledge					
3	Making Lesson Plan					
4	Collecting and making materials					
5	Proper Use of Textbooks					
6	Process and techniques of math Teaching Learning					
7	Student-centered techniques					
8	Proper use of Blackboard					
9	Giving creative task					
10	Evaluation					
11	Working collaborately with colleagues					
12	To develop teaching and learning techniques by mutual support					

16. What professional developments have your teachers got through the activities of Lesson Study?

Serial No	Activities	Not at all	Very little	Ordinary	Good	Excellent
		1	2	3	4	5
1	Curriculum					
2	Subject Knowledge					
3	Making Lesson Plan					
4	Collecting and making materials					
5	Proper Use of Textbooks					
6	Process and techniques of math teaching learning					
7	Student centered techniques					
8	Proper use of Blackboard					
9	Giving creative task					
10	Evaluation					
11	Working collaborate with colleagues					
12	To develop teaching and learning techniques by mutual support					

17. Is there any problem to accomplish the activities of Lesson Study? Yes/No

17.1 If the answer is yes, what was the problem? What steps were taken to solve the problem? Tick mark (✓) where applicable.

Problems to accomplish Lesson Study						Steps taken to solve the problems				
Limitation of Time	Work pressure	Eagerness	Lack of ideas of Lesson study	Lack of administrative assistance	Lack of academic assistance	To include in classroom activities and routine	To ensure academic assistance	To ensure administrative assistance	Showing motivational videos and positive feedback	Using leaflet of lesson study

18. What is the level of co-operation of the related people to accomplish Lesson Study in the school?  
Give tick (✓) mark beside the statements.

Serial No	Related people	Not at all	Very little	Ordinary	Good	Excellent
		0	1	2	3	4
1.	Assistant Teacher					
2.	Head Teacher					
3.	AUEO					
4.	URC Instructor					
5.	NAPE Faculty Member					

19. Is it necessary to continue Lesson Study activities in the school to ensure quality teaching and learning? Yes/No.

19.1 If yes, write the reasons.

20. What is your advice to accomplish Lesson Study activities in the school successfully?

Thanks for your co-operation

Name and Signature of data collector

**School:**  
**Upazela:**  
**Date:**

**FGD (Students)**

Serial	Name	Class	Roll No
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

1. How do you feel about Math Classes? Good/Medium/Not Good
2. Does the teacher of math use materials? Yes/No
3. If yes, how do the teachers use materials?
4. What do you do if you can't understand any topic of math?
5. Is the textbook used in the math class? Yes/No
6. If yes, how is the book used?
7. What does a teacher do to present a mathematical concept (write any content) or to solve a problem?
8. What does a teacher do if they can't understand any problem?
9. Does Head/assistant teacher come to the class while conducting any lesson?
10. If yes, how long do they stay there?

## Questionnaire 1: For AUEO/URC Instructor (before LS)

This questionnaire is not intended to evaluate you. It is intended for a research tool. The main objective of this research is to assess the effectiveness of Lesson Study by which it is hoped to take steps to develop the quality of education and the teachers' professional development in the classrooms. You are thanked for your co-operation by giving necessary information as a part of this research. So, give your opinion without any hesitation. Your opinion and answer will be kept hidden.

1. Cluster: \_\_\_\_\_ Upozela: \_\_\_\_\_  
District: \_\_\_\_\_ Division: \_\_\_\_\_
2. Name of AUEO/URC Instructor: \_\_\_\_\_  
Mobile No: \_\_\_\_\_
3. Academic Qualification (last): \_\_\_\_\_
4. Experience : \_\_\_\_\_
5. Tick mark if you visited the schools below in the last 3 months.

Serial	School's name	Upozela	Visited School	How often?
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

6. If you visited, did you observe math class? Yes/No  
If Yes, which classes and what contents did you observe?
7. What type of difficulties did teachers face?
- 7.1 What steps did you take to overcome the challenges?
8. Which contents do the students feel hard? Why do they feel them hard? What steps do the teachers take here?

Class	Contents	Reasons of difficulty	Steps

9. What trainings have you taken/given to develop your professional development? (Tick  Mark where applicable)

Curriculum Dissemination	Subject-based	ICT	TSN	Pre-primary	Inclusive Education	Need based	Competency Based Test	Others (Names)
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	(Names)					Sub cluster	Item Writing and Marker's Training	
1	2	3	4	5	6	7	8	9

10. What trainings have the teachers taken to develop professional development? (Tick  $\checkmark$  Mark where applicable)

Curriculum Dissemination	Subject-based (Names)	ICT	TSN	Pre-primary	Inclusive Education	Need based Sub cluster	Competency Based Test Item Writing and Marker's Training	Others (Names)
1	2	3	4	5	6	7	8	9

11. What steps have you taken to use their knowledge earned from trainings?

12. By participating in the trainings for professional development how much proficiency have you had to ensure the co-operation with the teachers of your cluster successfully? Give a Tick ( $\checkmark$ ) mark in each box beside the statements.

Serial No	Activities	Not at all	Very little	Ordinary	Good	Excellent
		0	1	2	3	4
1.	Subject Knowledge					
2.	Curriculum					
3.	Making Lesson Plan					
4.	Collecting and making materials					
5.	Proper Use of Textbooks					
6.	Process and techniques of math Teaching Learning					
7.	Student centered techniques					
8.	Proper use of Blackboard					
9.	Giving creative task					
10.	Evaluation					

13. To ensure quality teaching of math, how much assistance do the teachers have from the related people? Give ( $\checkmark$ ) mark beside the statements.

Serial No	Related People	Not at all	Very little	Ordinary	Good	Excellent
		0	1	2	3	4
1.	Peer Assistant Teacher					
2.	Head Teacher					
3.	AUEO					
4.	URC Instructor					

14. Do teachers use Annual Lesson Plan? Yes/No  
If yes, how and when?

15. What materials do the teachers use in teaching?

16. What is your concept/opinion/ideas about Lesson Study?

Thanks for your co-operation

Name and Signature of data collector

## Questionnaire 1: AUEO/URC Instructors (After LS)

This questionnaire is not intended to evaluate you. It is intended for a research tool. The main objective of this research is to assess the present condition and the effectiveness of Lesson Study by which it is hoped to take steps to develop the quality of education and the teachers' professional development in the classrooms. You are requested to give necessary information as a part of this research. So, give your opinion without any hesitation. Your opinion and answer will be kept hidden.

1. Upazila/Cluster:  
Upazela: \_\_\_\_\_ District: \_\_\_\_\_ Division: \_\_\_\_\_
2. Name: \_\_\_\_\_ Mobile No: \_\_\_\_\_
3. Academic Qualification (last): \_\_\_\_\_
4. Professional Education/Training: \_\_\_\_\_
5. Experience: \_\_\_\_\_
6. Short-term training:

Serial No	Name of the trainings

7. Tick mark if you visited the schools below in the last 3 months.

Serial	School's name	Upazila	Visited School	How often?
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

8. If you visited, did you observe math class? Yes/No  
If yes, which classes and what contents did you observe?
9. How have you got ideas of Lesson Study?

Through TSN training at URC	Participating at DPED Training Class	Reading leaflet about Lesson Study	Watching video on Lesson Study	Participating Orientation Workshop on Lesson Study	Participating Lesson Study activities

10. Activities of Lesson Study steps (Describe activities in blank space provided)

Steps	Activities
Lesson Plan making and developing	
Demonstration Class and Observation	
Feedback	

11. How many cycles of Lesson Study have you participated in the last 3 months? 1/2/3/4/5

12. What was your role as an AUEO/URC Instructors in the Lesson Study team? Tick (✓) mark where applicable.

	Comments				
	Not at all (1)	Very little (2)	Ordinary (3)	Good (4)	Excellent (5)
As a facilitator					
As a demo teacher					
As an active member of the team to make a lesson plan					
As an active member of the team to advise to develop the lesson plan					
As an active member of the team to demonstrate the lesson according to the lesson plan					
As an active member of the team to observe the lesson using the lesson plan and tools					
As an active member of the team to feedback after the demo					

13. What was the role of URC Instructor to accomplish Lesson Study? Tick (✓) mark where applicable.

Serial No	Activities	Level of Co-operation				
		Not at all	Very little	Ordinary	Good	Excellent
1.	Giving ideas of Lesson Study					
2.	Making Lesson Study group					
3	To assist to make action plan of Lesson Study					

4.	To ensure accomplishment of the action plan					
5.	To observe the activities of Lesson Study closely and feedback					
6.	To keep records and evaluate the activities of Lesson Study					

14. What was the role of NAPE Faculty Member to accomplish Lesson Study? Tick (√) mark where applicable.

Serial No	Activities	Level of Co-operation				
		Not at all	Very little	Ordinary	Good	Excellent
1.	Giving ideas of Lesson Study					
2.	Making Lesson Study group					
3.	To assist to make action plan of Lesson Study					
4.	To ensure accomplishment of the action plan					
5.	To observe the activities of Lesson Study closely and feedback					
6.	To keep records and evaluate the activities of Lesson Study					

15. What professional developments have the teachers of the Lesson Study team in your cluster got through the activities of Lesson Study?

Serial No	Activities	Not at all	Very little	Ordinary	Good	Excellent
		0	1	2	3	4
1	Curriculum					
2	Subject Knowledge					
3	Making Lesson Plan					
4	Collecting and making materials					
5	Proper Use of Textbooks					
6	Process and techniques of Math Teaching Learning					
7	Student centered techniques					
8	Proper use of Blackboard					
9	Giving creative task					
10	Evaluation					
11	Working collaboratively with colleagues					
12	To develop teaching and learning techniques by mutual support					

16. Is there any problem to accomplish the activities of Lesson Study? Yes/No

16.1 If the answer is yes, what was the problem? What steps were taken to solve the problem? Tick mark (√) where applicable.

Problems to accomplish Lesson Study						Steps taken to solve the problems				
Limitation of Time	Work pressure	Eagerness	Lack of ideas of Lesson study	Lack of administrative assistance	Lack of academic assistance	To include in classroom activities and routine	To ensure academic assistance	To ensure administrative assistance	Showing motivational videos and positive feedback	Using leaflet of lesson study

17. . What steps have you taken to accomplish Lesson Study? Tick (√) mark where applicable.

Discussion with Head/assistant teachers on Lesson Study accomplishment	Plan to accomplish Lesson Study with Head/assistant teachers	To inform AUEO, URC Instructor, NAPE Faculty Member Lesson Study Accomplishment plan	To accomplish Lesson Study activities according to	To preserve all information about Lesson Study

18. What is the level of co-operation of the related people to accomplish Lesson Study in the school? Give tick (√) mark beside the statements.

Serial No	Related people	Not at all	Very little	Ordinary	Good	Excellent
		0	1	2	3	4
6.	Assistant Teacher					
7.	Head Teacher					
8.	AUEO					
9.	URC Instructor					
10.	NAPE Faculty Member					

19. Is it necessary to continue Lesson Study activities in the school to ensure quality teaching and learning? Yes/No.

19.1 If yes, write the reasons.

20. What is your advice to accomplish Lesson Study activities in the school successfully?

Thanks for your co-operation

Name and Signature of data collector

### Observation Check list

Name of the School:

Name of the teacher:

Class:

Number of present students:

Date:

Starting time:

Ending time:

Content of the lesson:

Objectives/Learning outcomes:

Make tick (✓) marks considering the performance of the activities below and write evidence in the space of remarks [0- Doing nothing, 1- Showing little performance, 2- Showing good performance, 3- Showing excellent performance]

Sl. no	Activities	performance					
		0	1	2	3	4	
1	Enter the classroom according to the allocated time in the routine and creating safety environment	0	1	2	3	4	
2	Ensure related necessary materials and equipment are available in the classroom	0	1	2	3	4	
3	Ensure seating arrangement for implementing plan-wise activities	0	1	2	3	4	
4	Conduct lesson according to the plan	0	1	2	3	4	
5	Test previous knowledge through questions related with today's lesson	0	1	2	3	4	
6	Explain the objectives and achievement of the lesson	0	1	2	3	4	
7	Properly and clearly explain the content of the lesson	0	1	2	3	4	
8	Teachers present key question at the very beginning of the lesson	0	1	2	3	4	
9	Let the students present life-like example related with the present content	0	1	2	3	4	
10	Show real-life example to make the problem easy	0	1	2	3	4	
11	Teachers' techniques of using teaching aids are effective, attractive and visible.	0	1	2	3	4	
12	Draw diagram/picture to make the problem easy and understandable	0	1	2	3	4	
13	Let the students think and solve the problem in their note book.	0	1	2	3	4	

14	Teachers' techniques of using chalk board are well planned and student centered	0	1	2	3	4
15	Let the students share their ideas in the black board	0	1	2	3	4
16	Let the students share their different ideas in the black board	0	1	2	3	4
17	Help them to solve assigned problem in group	0	1	2	3	4
18	Give clear instruction of group work	0	1	2	3	4
19	Ensure all of the students are clear about group work	0	1	2	3	4
20	Properly monitor the group work	0	1	2	3	4
21	Let the students present the group work in front whole class	0	1	2	3	4
22	Encourage students to solve the problem in different ways	0	1	2	3	4
23	At every step teachers let the students explain ways of solution.	0	1	2	3	4
24	Teachers ask open-ended questions	0	1	2	3	4
25	Teachers ask closed questions	0	1	2	3	4
26	Address students by name	0	1	2	3	4
27	Answer students' questions	0	1	2	3	4
28	Encourage students to ask question.	0	1	2	3	4
29	Praise students to ask and answer the questions.	0	1	2	3	4
30	Maintain classroom role of seeking permission to ask and answer.	0	1	2	3	4
31	Teachers' voice is audible	0	1	2	3	4
32	Complete every activity within the allocated time logically	0	1	2	3	4
33	Provide activity-sheet to students	0	1	2	3	4
34	Effectively use the textbook	0	1	2	3	4
35	Teachers praise students every performance	0	1	2	3	4
36	Teachers show smiling face and behave friendly	0	1	2	3	4
37	Teachers evaluate students after every step and finally at the end of the lesson.	0	1	2	3	4
38	Teachers summarize the learning of the lesson and conclude with praising students.	0	1	2	3	4
39	Assign home work for every student	0	1	2	3	4

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার  
প্রাথমিক শিক্ষা অধিদপ্তর  
সেসকশন-২, মিরপুর, ঢাকা- ১২১৬

শীঘ্র  
০৬ অক্টোবর ১৪২৪  
তারিখ :-  
২০ ডিসেম্বর ২০১৭

স্মারক নং- প্রাশিঅ/প্রশি/জ্যাটিপ্যা/২৭০/২০০৯/(পার্ট-৩)/২০১৩/৯) ৬

বিষয় : উপজেলা পর্যায়ে প্রাথমিক বিদ্যালয়ে Lesson Study Technique বাস্তবায়ন

সূত্র : ১। JICA Support Program (Phase 2) থেকে প্রাপ্ত ৩ ডিসেম্বর ২০১৭ তারিখের পত্র।

উল্লিখিত বিষয় ও সূত্রের পরিপ্রেক্ষিতে জানানো যাচ্ছে যে, প্রাথমিক শিক্ষা অধিদপ্তর জাইকা সাপোর্ট প্রোগ্রামের সহযোগিতায় শিক্ষকদের পেশাগত দক্ষতা উন্নয়নের লক্ষ্যে মনোনীত বিদ্যালয়সমূহে Lesson Study Technique এর পরীক্ষামূলক বাস্তবায়ন ফেব্রুয়ারি ২০১৭ থেকে শুরু হয়। দেশের ১০ জেলার ১০টি সদর উপজেলায় উক্ত পরীক্ষামূলক কার্যক্রমের সার্বিক সফলতা Lesson Study Technique উপজেলার প্রতিটি প্রাথমিক বিদ্যালয়ে বাস্তবায়নের লক্ষ্যে সংশ্লিষ্ট কর্মকর্তাগণকে নির্দেশনা প্রদান করা হল।

জেলা প্রাথমিক শিক্ষা অফিসার :

- রুটিন পরিদর্শনকালে উপজেলা পর্যায়ে Lesson Study Technique বাস্তবায়ন লক্ষ্য করবেন
- জেলা পর্যায়ের মাসিক সমন্বয় সভায় উপজেলা পর্যায়ে Lesson Study কার্যক্রম বাস্তবায়ন লক্ষ্য করবেন।

উপজেলা/থানা শিক্ষা অফিসার :

- উপজেলার সকল প্রাথমিক বিদ্যালয়ে Lesson Study Technique বাস্তবায়ন কার্যক্রম মনিটরিং-এর লক্ষ্যে বিদ্যমান মাসিক মনিটরিং সভার আয়োজন করতে হবে
- প্রধান শিক্ষকদের রুটিন মাসিক সমন্বয় সভায় কার্যক্রমটির অগ্রগতির পর্যালোচনা করতে হবে
- সকল প্রাথমিক বিদ্যালয়ে এই কৌশল অনুশীলনের ক্রমাগত সম্প্রসারণের উদ্যোগ গ্রহণ করতে হবে
- এই বিষয়ে প্রয়োজনীয় পরামর্শ ও সহযোগিতা গ্রহণের জন্য অধিদপ্তরের প্রশিক্ষণ শাখা ও ইমেইলের মাধ্যমে জাইকা প্রোগ্রাম টিমের সহায়তা নেয়া যাবে
- জাইকা প্রোগ্রাম টিম অধিদপ্তরের সহযোগিতায় উপজেলা শিক্ষা অফিসারদের সাথে সময় সময় যোগাযোগ করবেন।

ইন্সট্রাক্টর, উপজেলা/থানা রিসোর্স সেন্টার :

- বিদ্যালয়ের রুটিন পরিদর্শনকালে Lesson Study Technique বাস্তবায়ন নিশ্চিত করবেন
- ইউআরসি-তে পরিচালিত Teacher Support Network through Lesson Study (TSN) প্রশিক্ষণ ফলোআপের মাধ্যমে এর যথাযথ বাস্তবায়ন নিশ্চিত করবেন।

সহকারী উপজেলা/থানা শিক্ষা অফিসার :

- Lesson Study Technique বাস্তবায়ন ও মনিটরিং-এর লক্ষ্যে উপজেলা/থানা শিক্ষা কর্মকর্তাকে সার্বিক সহযোগিতা করবেন
- রুটিন পরিদর্শন প্রতিটি বিদ্যালয়ে Lesson Study কার্যক্রম বাস্তবায়নের জন্য সংশ্লিষ্ট প্রধান শিক্ষকদের সাথে রুটিন যোগাযোগ অব্যাহত রাখবেন
- বিদ্যালয় পর্যায়ে প্রচলিত বার্ষিক কর্ম পরিকল্পনায় (জানুয়ারী-ডিসেম্বর ২০১৮) কৌশলটির বাস্তবায়ন অন্তর্ভুক্তি নিশ্চিত করবেন
- বিদ্যালয়ের রুটিন পরিদর্শনে এই কার্যক্রমটির বাস্তবায়নে যথাযথ গুরুত্বারোপ করবেন।

২০/১২/১৭  
মোঃ আব্দুর রউফ  
পরিচালক (প্রশিক্ষণ)  
ফোন: ০২-৫৫০৭-৪৯৪৬

জনাব .....

জেলা প্রাথমিক শিক্ষা অফিসার

গাজীপুর/বরিশাল/চট্টগ্রাম/যশোর/ময়মনসিংহ/রংপুর/বগুড়া/রাজশাহী/সিলেট/কুমিল্লা

উপজেলা/থানা শিক্ষা অফিসার

সদর, গাজীপুর/সদর, বরিশাল/কতোয়ালী, চট্টগ্রাম/সদর, যশোর/সদর, ময়মনসিংহ/

সদর, রংপুর/সদর, বগুড়া/বোয়ালিয়া, রাজশাহী/সদর, সিলেট/আদর্শ সদর, কুমিল্লা

ইন্সট্রাক্টর, উপজেলা/থানা রিসোর্স সেন্টার

সদর, গাজীপুর/সদর, বরিশাল/কতোয়ালী, চট্টগ্রাম/সদর, যশোর/সদর, ময়মনসিংহ/

সদর, রংপুর/সদর, বগুড়া/বোয়ালিয়া, রাজশাহী/সদর, সিলেট/আদর্শ সদর, কুমিল্লা

অনুলিপি : সদয় অবগতি ও প্রয়োজনীয় কার্যার্থে :

- ১। মহাপরিচালক, জাতীয় প্রাথমিক শিক্ষা একাডেমী (নেপ), ময়মনসিংহ  
(রুটিন মনিটরিং কার্যক্রমের আওতায় বিদ্যালয় পর্যায়ে Lesson Study অনুশীলনে বিশেষজ্ঞ সহায়তা প্রদানের অনুরোধ)
- ২। উপপরিচালক, প্রাথমিক শিক্ষা, ঢাকা/বরিশাল/চট্টগ্রাম/খুলনা/ময়মনসিংহ/রংপুর/রাজশাহী/সিলেট
- ৩। Adviser, Primary Education, JICA Bangladesh
- ৪। মহাপরিচালক মহোদয়ের ব্যক্তিগত সহকারী, প্রাথমিক শিক্ষা অধিদপ্তর (মহাপরিচালক মহোদয়ের সদয় অবগতির জন্য)।
- ৫। অতি: মহাপরিচালক মহোদয়ের ব্যক্তিগত সহকারী, প্রাথমিক শিক্ষা অধিদপ্তর (অতি: মহাপরিচালক মহোদয়ের সদয় অবগতির জন্য)।