

**EFFECTIVENESS OF LESSON STUDY MODEL IN
IMPROVING PROSPECTIVE TEACHERS' PROFESSIONAL
DEVELOPMENT AND STUDENTS' ACHIEVEMENT: A
MIXED METHODS "MULTIPLE CASE STUDY"**



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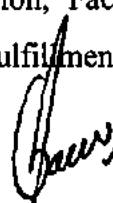
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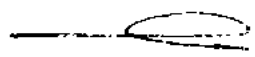
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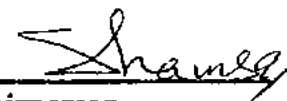
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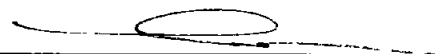
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Dedication

*I Humbly Dedicate this Piece of Work to
Fourteen Shining Stars and especially to My
Beloved Prophet Mohammad (S.A.W.W) Who
are the Light House of Islamic Teachings,
Source of Salvation, Ethical Role Models, and
Symbol of Love, Patience, Tolerance, Courage,
& Perseverance for the Whole World*

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Fatima Batool

ABSTRACT

Worldwide educational experts and policymakers are focusing to explore and improve methods that may enable teachers to practice innovative and sophisticated approaches to teaching. These methods can play an important role in empowering teachers with basic teaching skills and challenging subject content as well as supporting them to engage students having diverse backgrounds effectively. Various countries are adopting diverse strategies for teachers' professional development. One of the most important, highly successful, and well-studied forms of teacher professional development is lesson study. As lesson study model involves the recursive, reflexive, and collaborative process for improving the quality of the teaching-learning process. The present research study was conducted to reconnaissance the perception and experience of prospective teachers about the role played by lesson study in their professional development. Furthermore, this study also compared the performance of prospective teachers using traditional ways of teaching and the teachers involved in the practice of the lesson study model. For exploring the wide-ranging impact of the lesson study model, the performance of students was also compared (taught with traditional teaching strategies and taught by practicing the lesson study model). For addressing these objectives model of lesson study was practiced and the researcher facilitated prospective teachers throughout the process. This study employed mixed methods multiple case study approach, as in this approach each participating group is conceptualized as a case. Prospective teachers (19) of the 4-Year undergraduate program in the education department of International Islamic University Islamabad, supervisors of prospective teachers (at schools: 8 & university: 5), cooperative teachers (16) at schools, and students (1288) of Islamabad Model Schools/Colleges constituted the population of this study. Convenient, purposive, random, and census sampling techniques were applied to select prospective teachers (10), supervisors (3), and cooperative teachers (6) at schools, students (114), and university supervisors (5) respectively as a sample for this study. For practicing the lesson study model and collecting relevant data both qualitative and quantitative tools were utilized by the researcher. Prior permissions were taken from the heads of the institutions where the practice of the lesson study model has to be conducted. The researcher personally visited

supervisors for interviews. Thematic analysis and inductive content analysis were used to analyze qualitative data, while percentages, mean scores, t-test, and Hedges, g formula were applied for the analysis of quantitative data. Cumulative findings of the data collected from the researcher's notes, prospective teachers, cooperative teachers, teacher educators, and school principals indicated that the practice of the lesson study model has proved very effective for improving the professional development of prospective teachers and academic achievement of students. Findings clearly indicated the dissimilarities in the instructional practices of prospective teachers practicing traditional methods of teaching and lesson study model. As the mean scores of data collected (regarding to planning, lesson presentation skills, use of multiple teaching methods, interaction with students, the use of audiovisual aids, and assessment-related competencies) by the observation of teachers practicing traditional methods of teaching was low (Mean scores=1.25, 1.71, 2.17, 1.67, 1.00, 2.00) as compared to the mean scores of those teachers' observation who were practicing lesson study model (Mean scores= 2.25, 3.00, 3.00, 2.83, 2.00, 3.00). Keeping in view the findings of the study, for ensuring the effective professional development of prospective teachers, a framework of university-school partnerships has been proposed. This framework may be implemented with close coordination of teacher educators, school principals, and training directors of FDE on a priority basis as it can prove helpful not only for teachers' professional development but also for upgrading the academic achievement of students. Furthermore, it is recommended that the teacher education department of colleges and universities may include the lesson study model in their course outlines for familiarizing all prospective teachers with its real essence. Researchers (who intend to practice this model with prospective teachers) and cooperative teachers may be necessarily guided by teacher educators for providing support and constructive feedback to prospective teachers to raise their motivation and confidence level.

Keywords: Lesson Study, Prospective Teachers, Professional Development, and Students' Achievement

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LIST OF ABBREVIATIONS AND ACRONYMS

ADE	Associate Degree in Education
AV	Audio Visual
BB	Black Board
BS	Bachelor of Science
CTs	Cooperative Teachers
EFL	English as a Foreign Language
FDE	Federal Directorate of Education
ICT	Islamabad Capital Territory
IIUI	International Islamic University Islamabad
IMCG	Islamabad Model College for Girls
IMSG	Islamabad Model School for Girls
LASW	Looking at Students' Work
LS	Lesson Study
MOU	Memorandum of Understanding
NEP	National Education Policy
PKT	Previous Knowledge Testing
PTs	Prospective Teachers
RR	Researcher's Reflection

SPs	Schools Principals
STEM	Science, Technology, Engineering, and Mathematics
TEs	Teacher Educators
TIMSS	Trends in International Mathematics and Science Study
UAE	United Arab Emirates
UK	United Kingdoms
USA	United States of America

CHAPTER 1

INTRODUCTION

Worldwide educational experts and policymakers are focusing to explore and improve methods that may enable teachers to practice innovative and sophisticated approaches to teaching. These innovative methods can play an important role in empowering teachers with basic teaching skills and challenging subject content as well as supporting them to engage students having diverse backgrounds effectively. Many countries are adopting diverse strategies for teachers' professional development. Burns (2014) indicated that there are five famous models for the professional development of teachers which are: i) observation/assessment, ii) open classrooms, iii) Lesson Study (LS), iv) study groups, and v) Looking at Students Work (LASW). A brief description of each model is as follows:

The model of observation/assessment focuses on the active role of an experienced/ master teacher, their colleagues, or a specialist, whose major responsibility is to observe teachers' classroom practices, and their way of teaching and evaluating students. This model is like peer coaching as it may be practiced throughout the school year as a support measure for following workshops and other professional development activities (Sparks & Horsley, 1989). The open classroom model motivates teachers to invite their colleagues for observing the lesson and providing feedback for improvement in a post-observation session.

A well-studied, highly successful, and most important model for the professional development of teachers is lesson study (Burns, 2014). According to Gaible and Burns (2007) this model creates an environment that tends to provide adequate support, time, resources, and required skilled facilitation to teachers, so that they may ensure the success of their lesson. From its orientation, it has been proved

very effective to improve teachers' pedagogical and content-related competencies (Stigler & Hiebert, 1999). The study groups model of teachers' professional development stimulates teachers to collaborate as smaller teams or single large groups for creating and implementing lessons as well as solving problems that are creating hurdles in common goals achievement. In LASW (Looking at Student Work) model, collaborative self-study and formative assessment enable teachers to assess the ways of reviewing particular activities for examining students' work.

It has been reported by Lucenario et al. (2016) that for enhancing the competencies of teachers, the lesson study model may be considered a timely effort as its main focus is to ensure experience sharing and collaborative interaction among teachers (Lucenario et al., 2016). Furthermore, this idea has been asserted by Dudley (2013) by stating that the lesson study model involves the recursive, reflexive, and collaborative processes to improve the value and quality of the teaching as well as the learning process. The idea of lesson study was initiated in 1872 by the Meiji government in normal schools in Japan. This idea was based on Pestalozzian theory, as it stated that students recognize the concepts through their intuition when the teaching-learning process gets start from the observation of objects.

With the emergence of the lesson study model, a significant change has been introduced in teaching. Makinae (2010) stated that in this method, students of the normal school were instructed to present a lesson to the class and it was the duty of other students to observe that lesson and after observation conduct discussion for its further improvement. As lesson study informed teachers about the benefits and value of collaborative work by motivating them to share experiences and observe each other's work, it may be connoted as the culture of professional development activity (Richardson, 2004). In Japan, teachers who practiced the lesson study model have

identified seven pathways of improvement (Rebecca & Lewis, 2003), which are as follows:

- i. Improved subject matter knowledge
- ii. Upgraded knowledge of instructional strategies
- iii. Elevated observational skills
- iv. Stronger collegiate coordination
- v. Ability to build a connection between daily practices and long-term goals
- vi. Improved sense of efficacy and stronger motivation
- vii. Amplified quality of newly developed lesson plans

In Japan, the lesson study model is being utilized as a systematic approach since the mid of nineteenth century for the professional development of teachers (Fernandez, 2002). It came to the attention of educators in the west in the 1990s when researchers investigated what lay behind Japan's success in the 1998 TIMSS (Trends in International Mathematics and Science Study) Survey. Based on shreds of evidence that emerged from research studies, this question has become a point of great importance in other parts of the world as well as how effectively lesson study may contribute to school improvement. Lesson study has been proved very effective in many western countries such as the USA (United States of America), the UK (United Kingdoms), Sweden, and Canada.

Now besides Japan, it is being practiced in many East Asian countries such as China, Singapore, etc. Originally, the focus of research studies was to explore the practices of the lesson study model (e.g., Dudley, 2013; Norwich & Ylonen, 2013). But now its effect is being investigated in the area of teacher education as well and various research studies have been conducted by renowned educationists and researchers (such as Intaros & Inprasith, 2019; Coenders & Verhoef, 2019; Akiba et

al., 2019; Jumani et al., 2018; Arslan, 2018; Kanellopoulou & Darra, 2018; McSweeney & Gardner, 2018; Aimah et al., 2017; Saye et al., 2017, Kohlmeier & Saye, 2017; Mynott, 2017; Lucenario, et al., 2016; Regan et al., 2016; Leavy & Hourigan, 2016; Warwick et al., 2016; Akiba & Wilkinson, 2015; Verhoef & Goei, 2016; Cajkler et al., 2015; Bjuland & Mosvold, 2015; Nauerth, 2015; Thompson, 2015; Lucas, 2014; Hamzeh, 2014; Matanluka et al., 2013; McDowell, 2010; Meyer, 2005; Rock & Wilson, 2005; Rebecca & Lewis, 2003; Fernandez et al., 2003).

1.1 Rationale of the Study

For ensuring reforms in the teaching and learning process, though parents, educational administrators, curriculum developers, and students all are required to play their roles, teachers are considered key actors in this regard. It has been highlighted by researchers (Hanley & Torrance, 2011; Charalambous & Philippou, 2010; Remillard & Bryans, 2004) that teaching is already a complex profession, and reforms demand a lot of expertise from teachers. Therefore, it is the responsibility of educational administrators that they must provide continuous support and meaningful opportunities for professional development to prospective teachers; so that they can appreciably implement educational reforms. Various research studies have provided the rationale for practicing collaborative and inquiry-based approaches in the programs of teacher education for ensuring their success.

It has been asserted by Greene et al. (1989) that in pre-service education programs, it is very important to ensure the alignment between theoretical knowledge and practical skills that are being offered to prospective teachers. Wallace et al. (2001) stated that that as teachers are neither encouraged nor provided opportunities to work collaboratively, share ideas, strategies, and techniques, therefore limited changes occur in the classrooms. Lee (2008) also encouraged the practice of

innovative teaching strategies by declaring that until professional development is not grounded in actual classroom practice, the effectiveness of teacher education programs cannot be ensured.

If we talk about the Pakistani teacher education system, from its emergence, various challenges have been faced by experts/ educationists in this area, such as lack of quality teachers, low resources, lack of consistent policies and standards, low quality of the teaching-learning process, inconsistency of curriculum, etc. Since its establishment in 1947, keeping in view these challenges, to improve the condition of teacher education different reforms have been brought into the country's policies and practices. As many national and international projects have been launched, one great achievement in this area is the revised curriculum for B.Ed. (Hons) and ADE (Associate Degree in Education) which has been introduced in 2012. But, the majority of the faculty members are unaware of innovative teaching strategies which are very crucial for the successful implementation of revised ADE and B.Ed. program curriculum ("Report Teacher Training", 2013). It is clear fact that the revitalization of the present education system is not possible without preparing, developing, and inducting properly trained teachers.

Therefore, keeping in view these considerations, Pakistan's National Education Policy (2017) prompted that for the training of less qualified and untrained teachers, face-to-face models may be used via evening, weekend, and summer programs. It has been promised in National Education Policy (2017) that adequate arrangements are decided to initiate for standardizing and institutionalizing teacher education programs. In the same scenario; for teacher education programs, recommendations have been made to upgrade the curriculum and system keeping in view the requirements of a learner-centered curriculum and technological era. It has

been also realized that while making revisions in the curriculum of teacher education programs, the concept of promoting Islamic and moral values among teachers shall not be overlooked as it is mandatory for character building and personality development of both teachers and students.

Teachers are required to be trained for teaching keeping in view the learning needs of students and contextual requirements (NEP, 2017). It has been documented in the policy draft that teachers teaching at the primary level are not familiar with the ways to practice innovative teaching-learning strategies, therefore such training programs need to be initiated that may offer ample opportunities for teachers to practice innovative instructional trends in the classroom for making them attractive and joyful for all types of learners. It has been also described in National Education Policy (2017) that there is a need to develop a diligent relationship between professional development programs for prospective and in-service teachers. There is a need to ensure purposeful coordination among concerned officials (school administrators and officials of the teacher education department) for improving the status of pre and in-service teachers' professional development.

For strengthening assessment-related competencies of both in-service teachers there is a need to expand the content related to this competency in the curriculum and practices of teachers' professional development must surely focus on that idea. It has been also asserted that for exploring the possibilities of initiating prospective teachers professional development programs, researchers and educationists are expected to conduct detailed research studies (NEP, 2017). And besides it, teacher educators at universities are also anticipated motivated to acquire up-to-date knowledge and practice innovative teaching-learning strategies in classrooms for strengthening the professional development of both prospective and in-service teachers.

For dealing with similar concerns, the Japanese have found a way through the lesson study model for addressing the call to ensure collaboration among teacher education institutions, strengthening pedagogical and assessment-related competencies of both prospective and in-service teachers, ensuring the professional development of both teachers and students, preparing teachers to teach keeping in view the students' needs and learning context, and for strengthening professional development opportunities of prospective teachers. The question then becomes whether the practice of the lesson study model in Pakistan may serve as an effective source for improving the teachers' professional development and academic achievement of students. Though, in Pakistani universities, models of teacher professional development (including the lesson study model) are being taught to prospective teachers for familiarizing them with innovative models of teachers' professional development.

By exploring the view of prospective teachers and teacher educators; it was argued by Jumani et al. (2018) that lesson study may serve as a stimulus to improve the pedagogical skills of pre-service teachers. But for checking the practicality of these models, there is a scarcity of research studies in Pakistan. Certainly, all these models are of great importance and have their implications. The present research is based on the practice of the lesson study model as several research studies that have been internationally conducted to check the effectiveness of the lesson study model identified that it has been proved very operative in increasing prospective teachers' instructional and content knowledge as well as students' achievement. Previous studies also provide insight for developing a framework to ensure university-school partnership. This study is significant regarding the research setting as the researcher

checked the practicality of the lesson study model in the actual context and proposed a framework to ensure university-school partnership accordingly.

1.2 Statement of the Problem

In teacher education institutions of Pakistan, the dilemma is that opportunities for teachers' professional development are not aligned with revisions in the teacher education curriculum. Jumani et al. (2018) based on their research study explored that the process of teacher preparation is not properly aligned with the real needs of students and a large gap exists between theory and practice. For the success and effective implementation of this new curriculum, the practice of collaborative, inquiry, and activity-based teaching approaches is the need of the hour. Internationally, lesson study is considered one of the most effective models for professional development of prospective teachers keeping in view students' needs at schools (Thompson, 2015). But, in Pakistan, very limited research studies have been conducted in this scenario.

Therefore, exploring the use of the lesson study model for improving the practices of prospective teachers with the ultimate aim of improving the academic performance of students in the Pakistani context was a necessary and timely initiative. This study reconnoitered the perceptions and experiences of prospective teachers about the role of the lesson study model in their professional development. Furthermore, this study also compared the performance of prospective teachers using traditional ways of teaching and the teachers involved in the practice of the lesson study model. For exploring the wide-ranging impact of lesson study; the performance of students (taught with traditional methods and taught by practicing the lesson study model) was also compared. Besides it, views of teacher educators, schools principals, and cooperative teachers were also explored about the practicality of lesson study

model to set a baseline for proposing university school partnership. This mixed-methods multiple case study research integrated variety of data collection and analysis procedures to examine the effectiveness of the “lesson study model” in improving prospective teachers’ professional development and students’ academic achievement.

1.3 Objectives of the Study

Based on the application of the lesson study model, the following objectives were formulated to:

1. determine the effectiveness of the lesson study model as a collaborative approach to teacher professional development
2. compare the instructional practices of prospective teachers’ using traditional ways of teaching and the prospective teachers involved in the practice of the lesson study model
3. evaluate academic performance of students who were taught by applying the lesson study model to those who were taught by traditional methods
4. explore the views of cooperative teachers and supervisors (at schools and university) regarding the instructional activities and meetings that take place during the practice of lesson study
5. propose a framework to ensure the collaboration of supervisors (at schools and universities) for introducing the lesson study model as a mandatory part of teaching practice (If found effective)

1.4 Research Questions

Keeping in view the objectives, the study addressed the following question:

1. How did prospective teachers reflect on their experiences and skills in the various phases of the lesson study model?

2. How lesson study made the learning processes and instructional practices of prospective teachers (involved in the lesson study process) different than prospective teachers using traditional ways of teachers?
3. To what extent the lesson study process improve the academic performance of students (who were taught by applying the lesson study model) as compared to those who were taught by traditional methods?
4. What are the views of cooperative teachers and supervisors (at schools and university) regarding the instructional activities and meetings that take place during the practice of lesson study?
5. To what extent are findings supportive for developing a framework to ensure university-school partnership for improving the teaching practice of prospective teachers?

1.5 Research Hypotheses

In order to address research question three, following hypotheses were formulated:

H_{A1} There is a significant difference in the marks of geography' students taught by traditional methods and taught by practicing the lesson study model

H_{A2} There is a significant difference in the marks of computer education' students taught by traditional methods and taught by practicing the lesson study model

1.6 Significance of the Study

As National Education Policy (NEP, 2017) endorsed to offer continuous support and meaningful opportunities for professional development to prospective teachers, ensure the alignment between theoretical knowledge and practical skills that are being offered to prospective teachers, promote the habit of collaborative work among teachers, enable teachers for practicing innovative teaching and assessment

related strategies/techniques, promote Islamic and moral values for character building and personality development of both teachers and students, train teachers for teaching keeping view the learning needs of students and contextual requirement, ensure purposeful coordination among concerned officials, and explore ways for strengthening prospective teachers' professional development.

The practice of the lesson study model also played a pivotal role in strengthening the professional development of prospective teachers, ensuring the alignment between theoretical knowledge and practical skills, promoting the moral values and habit of collaborative work among prospective teachers, enabling teachers to practice innovative teaching and assessment related strategies/techniques, training teachers to teach keeping view the learning needs of students and contextual requirement, and ensuring purposeful coordination among concerned officials.

Therefore, it can be stated that this study can serve as a landmark for addressing national aspirations concerning teachers' (specifically prospective) professional development. During the practice of the lesson study model, prospective teachers were engaged in the process of identifying the challenging content areas, planning, implementing, observing, and evaluating lessons, and these practices have improved pedagogical content knowledge of prospective teachers, developed research-related competencies, and make them effective reflective practitioners.

Therefore, the findings of this study can support prospective teachers not only to enhance their learning but they can also prove supportive to improve their instructional abilities to teach effectively. As throughout the whole process of practicing the lesson study model, the researcher provided the required support and guidance to prospective teachers; it has raised the motivation, confidence, and interest level of prospective teachers. As prospective teachers actively performed in the whole

process of lesson study, the results of this study may serve as groundwork to make prospective teachers realize that re-conceptualizing knowledge and experiences are important elements of effective professional development.

As this research has highlighted the role of the lesson study model in the professional development of prospective teachers; therefore it is expected that the present research study can play a contributive role to strengthen the prevailing context of teacher training programs as well as strategies of teachers' professional development in teacher education institutions. This study also motivated supervisors in schools and teacher educators in universities to envisage the use of innovative methods for prospective teachers' effective learning and professional development. In this study, the researcher has proposed a framework for ensuring university-school partnership.

Therefore, the findings of the study can serve as a baseline for that teacher education department that intends to develop a partnership with schools with the consent of concerning authorities to offer ample opportunities for professional development for prospective as well as in-service teachers. This study also motivated school principals for playing their contributing role in ensuring university-school partnership as the practice of lesson study can not only ensure effective professional development of prospective teachers but prove helpful in the professional development of cooperative teachers (at schools) as well.

As training and coordination director of FDE (Federal Directorate of Education, Islamabad) holds the responsibility of ensuring the effective professional development of teachers, therefore findings of the present study may serve as a baseline for them in the selection of the appropriate model of teachers professional development and ensuring a strong bond between teacher training institutions and

their affiliated schools/colleges. As a limited number of research studies is available in Pakistan regarding the practice of teachers' professional development models, while internationally multiple research studies have been conducted in this scenario, therefore this study was initiated as a foundational research base for those scholars who intend to conduct studies with same motive in future.

1.7 Context of the Study

The setting for the study was secondary schools/colleges in the urban area of Islamabad Capital Territory. The schools/colleges were selected based on prospective teachers' placement by university supervisors. Those schools were selected whose administrators were willing to take the initiative of university-school partnership for effective teachers' education and improvement in classroom teaching. For the implementation of the lesson study cycle, students were engaged for one semester (i.e. from February-June, 2021). The main objectives of this period were to ensure students' participation and collaboration in the development of lesson plans as well as to explore their ways of presentation and evaluation. Keeping in view the characteristics of social constructivism theory, this study explored how social interaction, active participation in experiments as well as knowledge and expertise of colleagues influence teachers' learning during teaching practice sessions.

1.8 Delimitations of the Study

This study was delimited to:

- i. Prospective teachers of BS Education program (Session 2017-21) and teacher educators of International Islamic University, Islamabad (IIUI)
- ii. Principals, cooperative teachers and students of those Islamabad based colleges and schools, where prospective teachers of IIUI were placed for long term teaching practice.

- iii. Only those Islamabad based model schools and college (4 schools and 4 colleges) where the prospective teachers were teaching to students of middle level classes (6-8).

1.9 Operational Definitions of Terms

1.9.1 Lesson Study

It is a form of classroom inquiry in which a group of teachers (4 to 6 or 4 to 8) works collaboratively under the guidance of a university supervisor and school instructor for planning, teaching, observing, and revising a single lesson. All the teachers show a responsible attitude to improve their professional and teaching capabilities as well as the academic performance of students.

1.9.2 Prospective teachers

Prospective teachers for this study were students of BS Education (4 years degree programs). After completing and qualifying for their mandatory courses, they were sent to various schools for practicing their learned teaching skills that seem quite supportive for their career. For developing the habits of collaborative and reflective practices as well as group work, they were engaged in the process of practicing the lesson study model.

1.9.3 Professional Development

It may be described as an informal, systematic, and an ongoing process in which teachers work individually as well as collaboratively for improving their planning, implementation, and evaluation skills. It includes all the processes and activities that are designed by educational administrators to enhance the professional knowledge, skills, and attitudes of teachers with the broader aim of improving the teaching-learning process of their educational institution.

1.9.4 Student Achievement

It is students' competency or skill to carry out their academic tasks accurately, efficiently, and appropriately. These skills play an important role in achieving learning outcomes and improving the academic results of students. It may be also defined as a degree, to which a student learns academic content in a determined amount of time.

1.10 Theoretical Framework of Study

As the purpose of the theoretical framework is to explore the already developed theories or models that support the research objectives (Vinz, 2020) and explain how these theories/models support the objectives of present research studies. Therefore, the researcher explored two theories that may serve as a baseline for her study and provided the description of an updated lesson study model as well that has been selected to practice during prospective teachers' internship (teaching practice) at school/college with the help of the teacher educators and cooperative teachers. According to Rock and Wilson (2005) as well as Gergen (2009) it is the uniqueness of the lesson study model that it adheres to the general principles of many theories and basic principles of predominantly two theories. The first baseline theory associated with the practice of the lesson study model is the theory of social constructivism.

It has been stated by researchers (Cobb & Yackel, 1996; Prawat, 1996) that the active cognitive involvement of a person in socially structured activities is one of the key principles of social construction theory. And throughout its process lesson study model also encourage teachers to get involved in the active reflection writing process to improve their pedagogical and content-related competencies as well as the academic performance of their students. Therefore, it can be deduced that the lesson study model has great support for social construction theory as it is being used as a

potential method to increase the professional competencies of all teachers generally and prospective teachers especially.

Another basic principle of social construction theory is that it stresses social interaction among teachers for knowledge creation and delivery. Social interaction not only raises the motivation level of teachers but also fosters a positive attitude among them by improving their practices and the learning experience of students (Gergen, 2009). It has been explored by reviewing literature that the lesson study model also focuses on effective coordination among group members for planning lessons, negotiations, comparing views, and providing feedback. And collaborative nature of the lesson study model tends to ensure active social interaction among teachers for the successful implementation of all basic steps i.e. identification of goals, planning, implementation, and evaluation.

Some other key aspects of social constructivism theory are fostering the use of learner-centered instructional strategies, promoting the habit of teamwork among students, exploring previous knowledge of students before starting the presentation of a new lesson, motivating students to share the innovative learning-related idea, and ensuring the practice of emerging educational trends (Enonbun, 2010; Churchill et al., 2011) and it has been also identified by Darling-Hammond (2010) that lesson study is a collaborative approach that requires participants to practice innovative pedagogical and learning-related skills, get involved collaboratively in the process of drafting a lesson, observing the lesson of other teachers for identifying strengths and weaknesses as well as assessing students' learning before starting and after completion of the lesson to refine their lessons. A pictorial description of social constructivism theory is as follows:

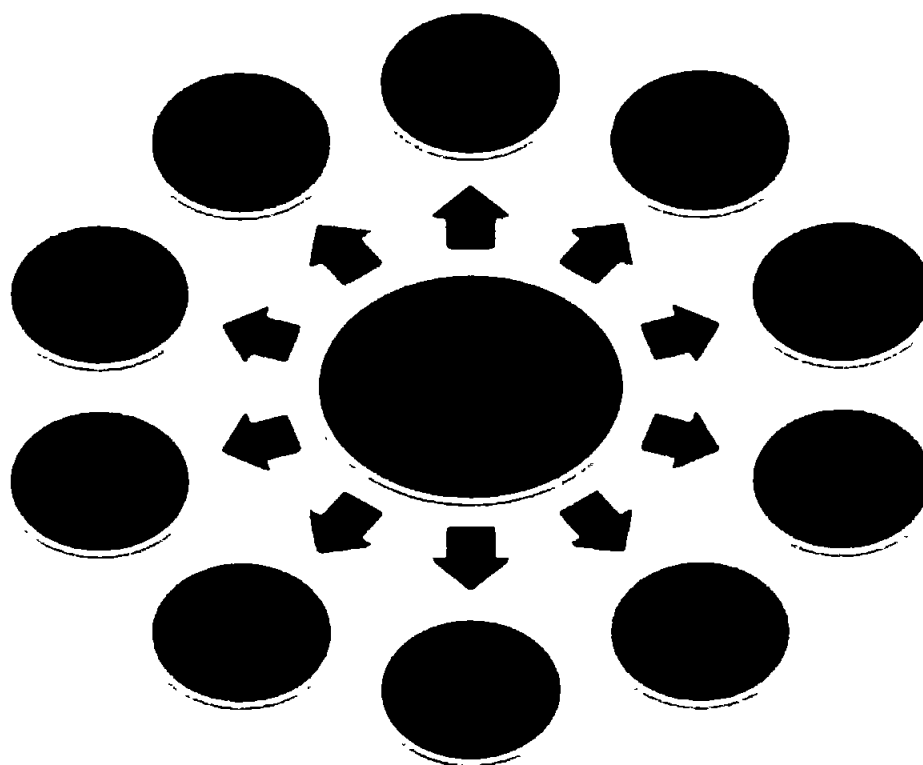


Figure 1.1: Social Constructivism Theory (Churchill et al., 2011; Enonbun, 2010)

The second baseline theory of the lesson model is self-determination and according to Deci and Ryan (2000) it asserted that if high-quality performance and motivation for the task are being expected from a group then it is very necessary to satisfy psychological needs, and relatedness and autonomy. As in the lesson study model, teachers advance their competence by improving their instructional practices, gain autonomy by deciding learning goals as well as ways to achieve these goals, and satisfy the needs of relatedness by sharing ideas/experiences for constructing knowledge. Therefore, following this theory, the lesson study model has the potential to produce a high-quality performance for both teachers and students as it satisfies the psychological needs of teachers by providing an actual learning environment.

As self-determination theory focuses on expanding the competencies of both teachers and students by increasing their motivation level and satisfying basic needs. Therefore, another strong point to ensure that the lesson study model is following the

basic principles of self-determination theory is that it not only emphasizes improving the instructional practices of teachers but side by side it also stresses expanding learning experiences of students. A pictorial description of self-determination theory is as follows:

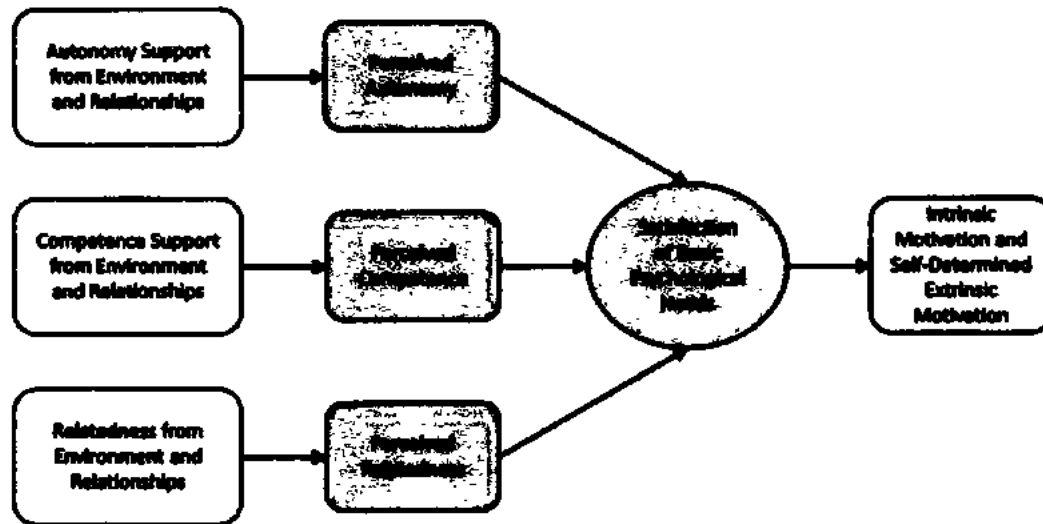


Figure 1.2: Self-Determination Theory (Legault, 2017)

Therefore keeping in view the above-mentioned arguments it can be stated that the practice of the lesson study model for improving teachers' professional development and students' learning is aligned with the key assumption of multiple learning theories. This practice can effectively develop the habit of teamwork, sharing experiences, and practicing innovative educational trends to great extent. If we look at the history of the lesson study model, then it has been described in the literature that in the early 1900s, a study meeting on innovative teaching methods was held in Japan with the collaboration of Japanese normal schools and private schools. Nakatome (1984) stated that as the major findings of this meeting, the model of lesson study was introduced. According to Fernandez and Yoshida (2004) since the middle of the 1960s, the lesson study model is being considered an effective strategy for the professional development of teachers. A unique characteristic that distinguishes the

lesson study model from other models of professional development is the collaboration and group work that is being ensured by teachers to plan research lessons and solve problems that occur in the learning process. Over time, many modifications have been made in the lesson study cycle. The following lesson study cycle (McSweeney & Gardner, 2018) served as a baseline for the present study:

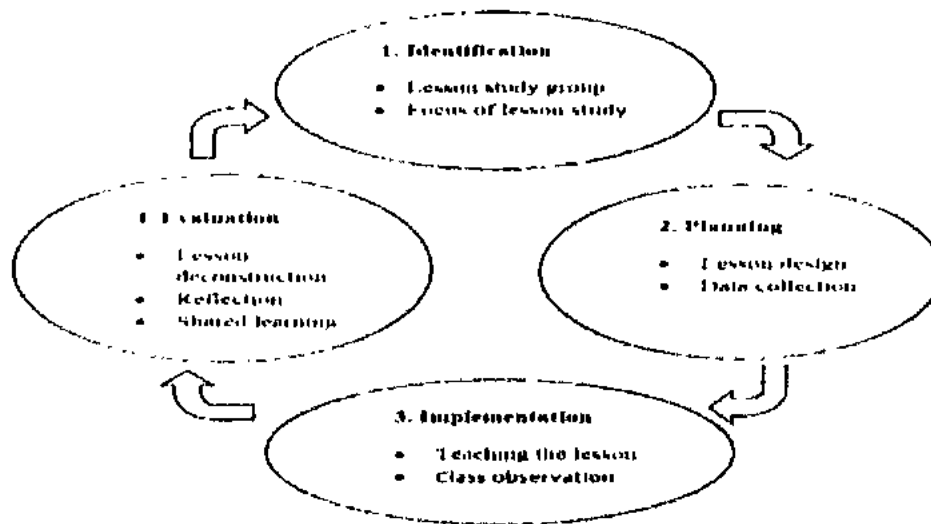


Figure 1.3 Model of Lesson Study (McSweeney & Gardner, 2018)

The lesson study model starts with identification and during this stage; a group of teachers identifies and examines the most challenging area of teaching. At this stage, it is identified and communicated that what type of knowledge, role, and expertise are being expected from participating teachers. Ground rules for practicing the whole model are also declared and most important efforts are made to establish an environment of respect, trust, constructive criticism, freedom to take risks, and confidentiality. At the second stage of this process, which is termed planning, a group of prospective teachers collaboratively plan and design the lesson based on content that they identified as most challenging and in which students are facing problems related to concept clarification.

Teaching strategies and activities are also decided in the planning stage. During the third stage of the lesson study model; that is implementation, the designed lesson is presented by one teacher of the participating group. While one teacher present and deliver the lesson, other teachers take the reasonability of observing the whole process (including student-teacher interaction) and collecting data for further improvement. The fourth stage which is termed as “evaluation” is the most important, as during this stage discussion takes place about the success of the whole process. Results are being compared with objectives that were designed and formulated during the planning session.

Based on the above explanations, it may be concluded that the practice of the lesson study model is a form of the action research cycle. Based on findings, efforts are made to minimize the risks that take place during the delivery of the lesson and ensure further improvement in presenting the lesson again. When the process of lesson study is repeated, next time another teacher from participating group takes the role of delivering the lesson and other members perform the role of observers and reflective practitioners. During both cycles of practicing the lesson study model, the researcher and Cooperative Teachers (CTs) are expected to remain present for note-taking and providing guidance and instructions whenever and wherever prospective teachers require. The role of the researcher and cooperative teachers is active in all four stages more specifically in the identification and evaluation process, as these stages provide a baseline for the whole process and decision-making about the success of the lesson. During the evaluation stage, the researcher helps the participating group in decision making and ensuring alignment between objectives and outcomes.

1.11 Conceptual Framework of the Study

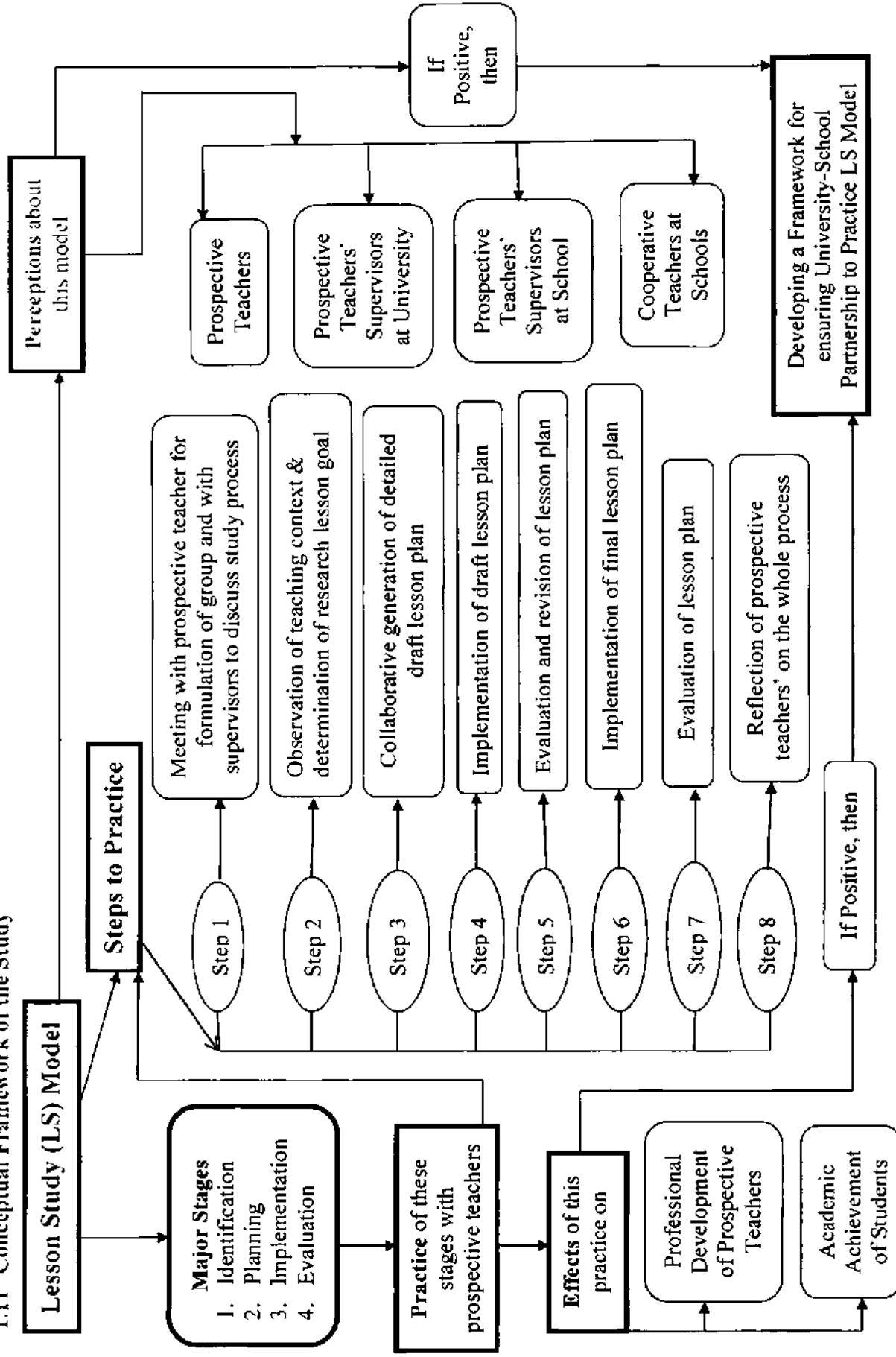


Figure 1.4: Conceptual Framework of Study

CHAPTER 2

LITERATURE REVIEW

Effective professional development of prospective teachers may be ensured by providing them ample opportunities to practice learned knowledge in the actual classroom environment and it has been indicated by Stigler and Hiebert (1999) that it is the responsibility of administrative staff at higher education institutions to offer adequate opportunities as well as support for prospective teachers to gain maximum experience of school learning. As such type of training and experience can play a pivotal role in strengthening their instructional and management-related skills.

Many teachers believe that the main support for improving their instructional skills comes from other teachers but ironically, they have few opportunities to collaborate with their peers. Prospective teachers cannot be expected to undergo profound changes in their instructional strategies based on the professional development programs that are being offered by school districts (Smith, 2001). And extensive efforts are required on the part of administrators, educators, and researchers to ensure enriched the provision of professional development activities for prospective teachers. For ensuring drastic changes in professional development programs for prospective teachers; these programs may be made more collaborative and inquiry-based.

As teaching is also considered a cultural and social activity, therefore the time of professional development programs also matters a lot. And prospective teachers are required to get involved informally in the teaching-learning process for a longer period to become effective teachers in their careers. The involvement of prospective teachers in the actual teaching-learning process has also become a prerequisite as collaborative learning

has proved a key for acquainting oneself with the art of effective teaching as compared to individual efforts/activities. Keeping in view that calls for improvements in professional development have strengthened over the last few years, and offering opportunities for prospective teachers to get engaged in a follow-up discussion with their colleagues for finding the solution to instructional and students engagement related problems have become one of the most important growing consensus (Wilson & Berne, 1999). Initiatives have been also taken by National Research Council (established in the USA for providing counseling to academicians) to improve the environment of schools for the development of productive individuals/teachers (National Research Council, 2002) school environment is considered a baseline component

Literature indicated that the lesson study model (initiated by Japanese teacher educators) is being practiced by many countries as an effective model for improving the professional development of prospective teachers as it focused on conducting professional development activities in the actual school environment and promoting a collaborative attitude among teachers. As the present study is based on the idea of practicing the lesson study model; therefore detailed literature based on key variables related to that model is as follows:

2.1 Overview of Lesson Study Model

At the start of 1873, an elementary school was founded by the Japanese government, and in the same year, 78 pupils got enrolled in that institution, which was taught by applying the lesson study model. The purpose of establishing that elementary school was to provide a practical learning environment for the professional development of teachers and students of Normal school (Tokyo) so that they can observe classrooms.

plan lessons, practice innovative teaching strategies and support each other in getting expertise to handle classroom management related issues (Arani et al., 2010). Afterward, graduates of that elementary school were invited by the prefectural government (Japan) and they were hired as teacher trainers in various teacher education institutions. In 1902, the role of Tokyo Normal school was later changed to Tokyo Secondary School Teacher College. Over time, lesson study has become an essential component of teaching for Japanese teachers and is playing a fundamental role in assisting teachers to implement the new curriculum in an effective way across the country.

The professional development model that was developed by researchers (i.e. Stigler & Hiebert, 1999; Fernandez, 2002) for Japanese teachers' better performance in mathematics was Jugyo kenkyu (study of instruction). As the English translation of the word "Jugyo" is lesson or instruction and the meaning of kenkyu is research or study, therefore its anglicized version is known as lesson study. Though the term lesson study is being used instead of jugyo kenkyu, it has been argued by Lewis et al. (2009) that the word lesson focuses on a discrete and single block of teaching that may be drafted on paper but the jugyo (Japanese word) is a comprehensive term that focuses on live interaction between teachers and students for a longer period.

Initially, the process of lesson study was outlined by Stigler and Hiebert (1999) which contains a set of concrete steps that may be followed by teachers from time to time to improve their teaching. An important aspect of the lesson study model that has been highlighted by Stigler and Hiebert (2009) is the process of enabling teachers to strengthen their teaching skills and to get familiar with the techniques that may prove helpful for enhancing students learning. Furthermore, it has been identified by Darling-Hammond

(2010) that a lesson study is a collaborative approach that requires at a time both skills: inquiry and practice. In this process teachers get involved collaboratively in the process of drafting a lesson, observing the lesson of other teachers for identifying strengths and weaknesses as well as assessing students' learning evidence and responses to refine their lessons.

Wood (2018) described that now lesson study is not limited to Japanese but it has been adopted across the world. Keeping in view the basic assumption of the Japanese lesson study model, various versions of the lesson study model have been developed by Japanese and international experts. It has been highlighted by Mynott (2017) that the work of English researchers pays less attention to context and duration of lesson study as compared to the work of Japanese researchers (i.e. Fernandez, 2002; Fernandez & Yoshida, 2004) as their studies provide a deeper understanding regarding the way lesson study was implemented in Japan. Among these models, descriptions of the most applicable models and experts' views regarding these models are as follows:

2.1.1 Various Versions of Lesson Study Model

Ontologically, it has been proved that the currently used model of lesson study is different from Japanese roots and the work of English writers/researchers (i.e. Lewis, 2002; Stepanek et al., 2007; Dudley, 2012) is being followed in this regard. The model of lesson study developed by Lewis (2002) keeping in view the basic considerations of Japanese lesson study showed that the lesson study cycle is based on four major phases. The graphical representation of the lesson study cycle developed by Lewis (2002) is as follows:

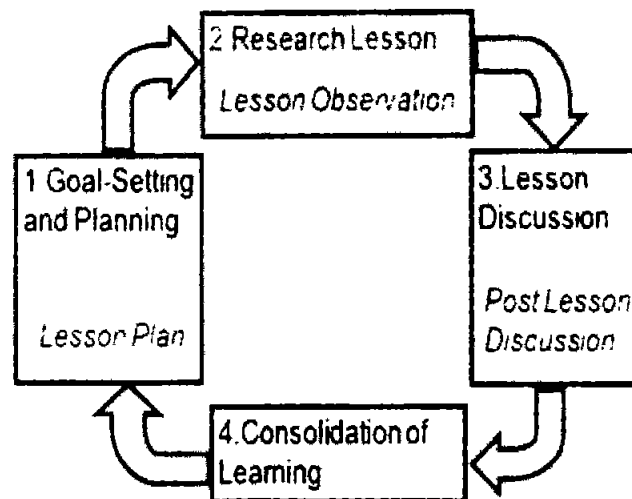


Figure 2.1: The Lesson Study cycle (Lewis, 2002)

During the first phase of that model prospective teachers are trained to plan their lesson after carefully identifying the goals/objectives of the topic/lesson. In the second phase, prospective teachers learn to observe the teaching lessons of senior and experienced teachers. In the third phase of that cycle, prospective teachers are involved in the discussions related to the practice of the lesson study model. And at the final phase, it is expected from concerning authorities (teacher educators and school principals) that they may arrange the practice of the lesson study model for strengthening prospective teachers' professional development.

The real essence of the lesson study model has been discussed by Fernandez and Chokshi (2002) and they indicated that for practicing the lesson study model in an effective way, it is essential for teachers to work collaboratively on at least two to three lessons per year. Each lesson must be followed by four weeks of planning, two observations, two instructions, and two reflections. As an extension of the Japanese lesson study model, a lesson study process has been described by Fernandez and Yoshida

(2004) and they expressed that the previously adopted model was more comprehensive in terms of teachers' teamwork, time, and duration of work. Graphical illustration of lesson study model presented by:

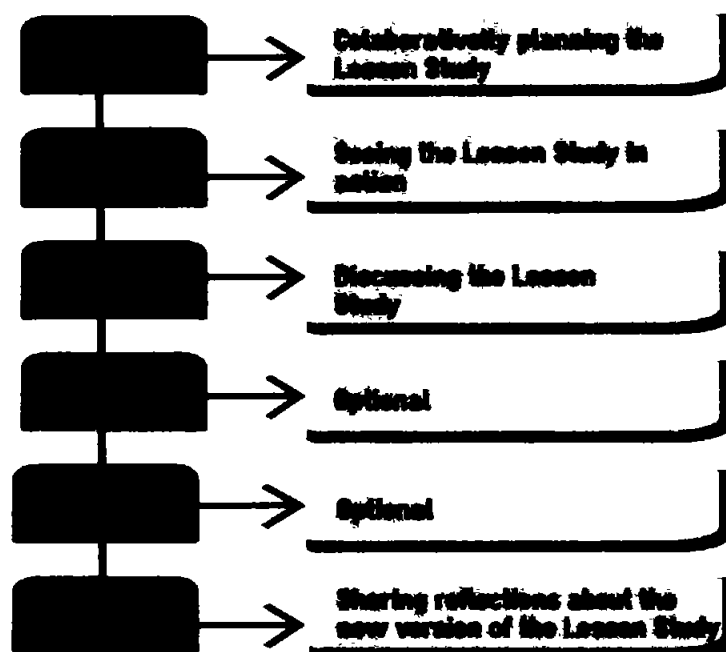


Figure 2.2: Lesson Study Process (Fernandez & Yoshida, 2004)

This process has been based on six major phases, and it is anticipated that in the first phase of this process, teachers can be directed to plan a lesson collaboratively and in the second phase prospective teachers observe the presentation of lessons given in the actual school environment. After the presentation phase, the discussion session take place about the effectiveness of the presented lesson, and reflection/comments are provided about the implementation of the developed lesson plan and improvement of the lesson. It has been stated by Fernandez and Yoshida (2004) that revision of lesson and re-teaching or observation of lesson is optional but the discussion for integrating the points of reflections and discussion for improving the lesson plan is considered mandatory.

Like, Fernandez and Yoshida's (2004) process of lesson study model has been also elaborated by Dudley (2004) and the basic distinction of that process is that it is based on the idea of presenting three lessons. Keeping in view the basic requirements of that model, these lessons can be planned through the collaborative efforts of teachers. After the presentation of each lesson, a review of the whole instructional process and re-planning of the lesson can be carried out accordingly. As a result of the whole process, a model lesson is prepared and it can be shared with concerned authorities to highlight the effectiveness of the lesson study model. The graphical representation of the model developed by Dudley (2004) is as follows:

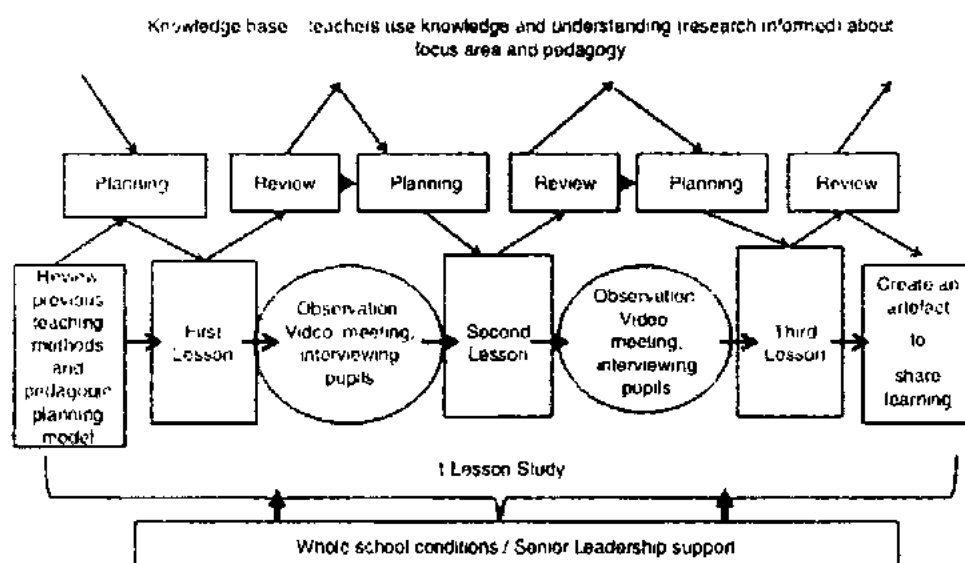


Figure 2.3: Lesson Study Process Model (Dudley, 2004)

In Japan, since the early 70s lesson study model is being practiced for the teachers' professional development. But according to researchers (Lewis et al., 2006; Lewis et al., 2006) in the K-12 educational system of the United States, it is in practice since 1999. And researchers (Lewis & Tsuchida, 1999; Lewis, 2000; Lewis et al., 2006) who have conducted an in-depth analysis of the Japanese education system have explored

that lesson study is working as a key tool for ensuring the success of Japanese teachers and students. Key features of the lesson study model declared by Lewis, Perry, and Murata (2006) are as follows:

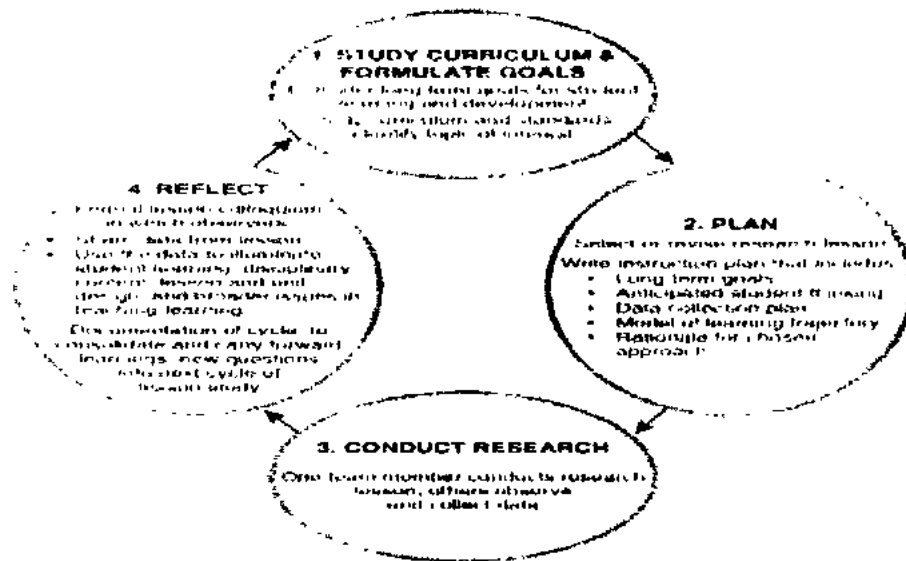


Figure 2.4: Lesson Study Cycle (Lewis et al., 2006)

This cyclic process of lesson study is based on four major phases. In the first phase, teachers are expected to study curriculum/course content in detail to identify the topic of interest and formulate goals for the lesson. It is also mandatory for teachers to develop such goals for the lesson that may have long-term effects on students learning. During the second phase of that cycle, formal planning is made for developing a detailed lesson plan and such instructional plans/activities are selected that may address developed learning outcomes, ensure the development of student's creative and critical thinking abilities, structure a complete plan of data collection, provide a rationale for selecting those specific topics, and outline required learning material.

During the third phase of the model presented by Lewis et al. (2006) developed lesson plan is presented by one teacher of the lesson study team and other

teachers/fellows observe that lesson presentation to identify points for improvement of the lesson. In the final phase, multiple activities are carried out by members of the lesson study team; they can share the results of conducted observations with one another, use the observation data to determine the level of learning outcomes attainment, and improve the lesson plan for the next cycle of lesson study.

It was highlighted by Fernandez (2002) that the successful practice of the lesson study model required a group of teachers to work consecutively for the duration of three to four weeks. And in each week at least 10-15 hours must be spent solely on planning, designing, implementing, and evaluating activities associated with its practice. Therefore, keeping in view this unique characteristic of the lesson study model that differentiates it from other models of professional development, a model of lesson study based on five phases was introduced by Stepanek et al. (2007) and the graphical representation of that model is as follows:

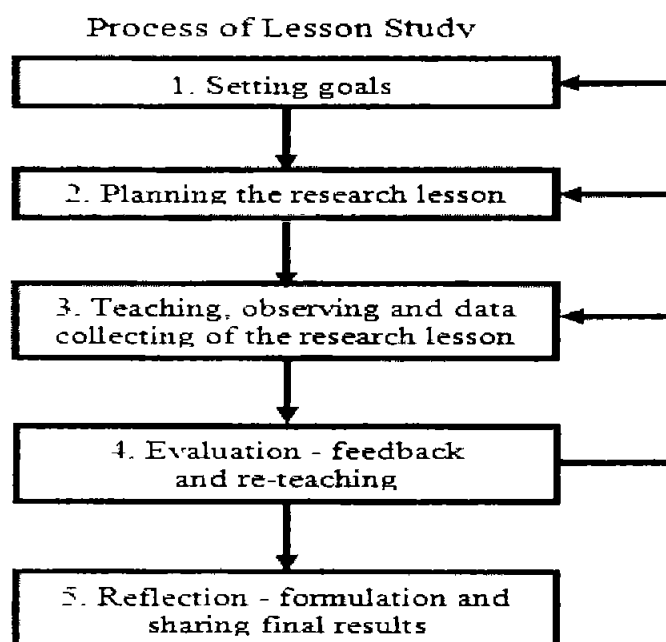


Figure 2.5: Phases of the lesson study (Stepanek et al., 2007)

During the first phase of that lesson study model, a group of teachers starts to determine the goals and objectives of the lesson. And it has been suggested by Cerbin and Kopp (2011) that the minimum number of teachers required for the lesson study group is three and the maximum number is six. Teachers who get involved in the implementation of the lesson study model prefer to select that topic and learning objectives for a lesson plan in which students have a keen interest or facing some learning-related challenges. As it has been argued by researchers (Lewis & Hurd, 2011; Rekalidou, 2012) that setting clear and realistic objectives for a lesson is the key indicator of successful implementation of the lesson, therefore at that phase teachers are expected to work collaboratively and diligently. The second phase of that lesson study cycle is to plan the research lesson comprehensively. Teachers can design various learning activities to make their lessons interesting and effective collaboratively.

A significant point according to Verhoef and Tall (2011) for that phase is to predict the questions that students may ask the teacher during the delivery of the lesson. The third phase is considered the core of that lesson study cycle as in that phase one teacher from the lesson study group gave a presentation of the lesson and other teachers collect the data (Shaun, 2014) related to students understanding and points for improving that lesson presentation. During the fourth phase which has been termed as evaluation feedback and re-teaching, a group of teachers get involved in the evaluation of the lesson model and improve the lesson keeping in view the comments of fellow teachers and reteaching of the lesson carried out. It has been decried by Easton (2009) that the application of suggested points and redesigning of the lesson may be also considered as an endpoint of that cycle as the final lesson may be shared with other teachers to teach in

class. But according to Hiebert et al. (2002) the lesson study groups must compose detailed reflections and conclusions for publication purposes, and these steps are also considered as the application of the fifth phase of that model in an appropriate way.

Likewise, Inprasitha (2010) conducted a pilot study regarding the practice of the lesson study model at Khon Kaen university in Thailand, and keeping in view the astonishing findings of his study and studies conducted by other researchers in the same scenario, lesson study practice as an approach is being implemented in various provinces of Thailand by government support for professional development of prospective as well as in-service teachers. Besides, these initiatives a comprehensive model for practicing the lesson study approach has been developed by Inprasitha (2010) and a pictorial description of that model is as follows:

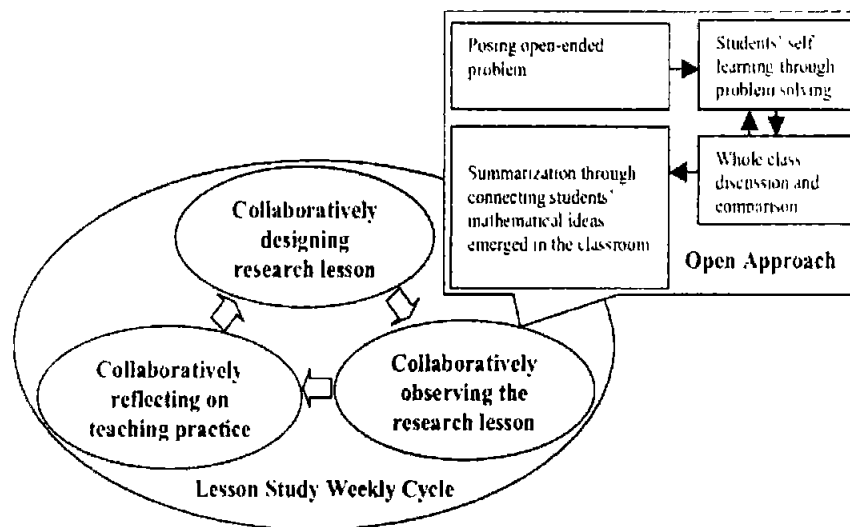


Figure 2 6: Lesson Study Model Developed by Inprasitha (2010)

The basic purpose of that model is to ensure the practice of an open approach during the instruction process for ensuring collaboration between prospective and in-service teachers. The key characteristic of that model is that teachers collaboratively plan, practice, and observe lessons keeping in view the idea of creating open-ended problems.

Teachers are expected to compose a variety of content-related questions and responses that may come from students' side during lesson presentations and following the practice of that model they discuss these questions at the end of the week for ensuring further improvements in their instructional practices. Besides the previously discussed model; for better illustration of the lesson study model, the graphical representation of Murata (2011) can prove very supportive. As, it provides in-depth information about activities that are an essential part of the lesson study model, the role of the lesson study model in the learning of teachers, and its outcome in an effective way. A pictorial description of the LS model is as follows:

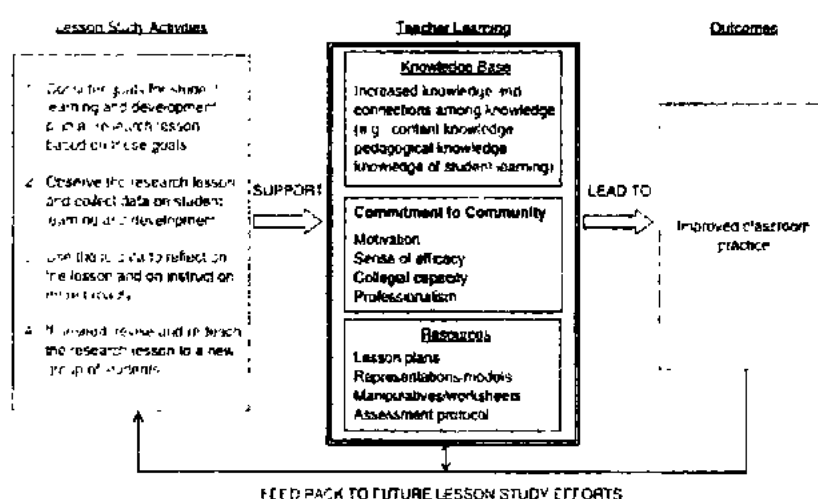


Figure 2.7: Lesson Study Activities, Teaching Learning, & Outcomes (Murata, 2011)

It has been argued by Murata (2011) that activities that take place during the practice of lesson study can play a contributive role in improving the learning of teachers, and that is a key indicator of ensuing improved classroom practices. Various activities that are conducted in the context of lesson study are: stating clear and specific learning outcomes/goals for students and developing a detailed lesson plan keeping in mind these goals/outcomes; observing the presentation of the research lesson and collecting data for

improving that lesson, using collected for reflecting on and improving the lesson, and finally using the updated draft of lesson plan for teaching to another group of students.

These activities positively contribute to improving pedagogical content knowledge of teachers, the level of teachers' commitment to teachers' community such as motivation, self-efficacy, teamwork, and professionalism, as well as their ability to develop effective lesson plans, teaching-learning material, and assessment protocol. Alike, the process of lesson study has been also described by Mee and Oyao (2013) and it is based on five major phases that are: planning a detailed lesson, teaching the lesson effectively, observing the lesson, writing a reflection about the lesson presentation, and refining that lesson keeping in view the recorded observations. A pictorial description of their model is as follows:

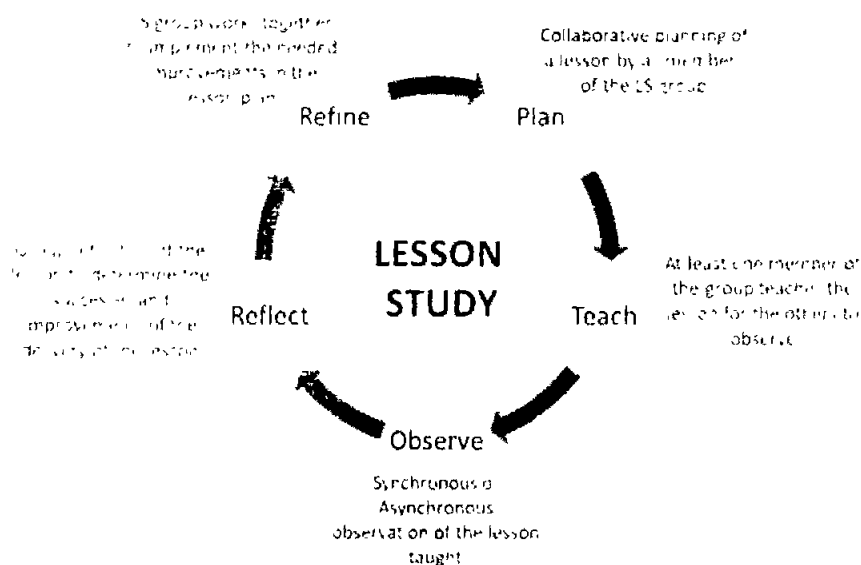


Figure 2.8: Process of Lesson Study (Mee & Oyao, 2013)

About that model, it has been commented by researchers (Ndongfack, 2015; Xiaofeng et al., 2015) that collaborative meetings of teachers play an important role in ensuring effective planning of research lessons and ensuring the relevancy of

instructional material with the selected topic of the lesson. During the second phase, one teacher from the lesson study group presents the topic and the other notes the points for the lesson presentation next time (Chong et al., 2017). It has been also suggested by Lewis and Perry (2017) that video recording of research lessons may be also carried out for ensuring effective improvement in lesson drafts.

After that phase etchers conduct a detailed discussion session for reflecting on the teaching (Naresh, 2013) and as a result of that discussion, the lesson is refined for the next time presentation (Kadroon & Inprasitha, 2013). The phrase breathtakingly that was used by Japanese researchers in the context of lesson study has been translated by Dudley (2013) as professional development, and he proclaimed that the lesson study model is not too complicated but it can produce exemplary results to raise the standard of educational institutions. The graphical representation of his model is as follows:

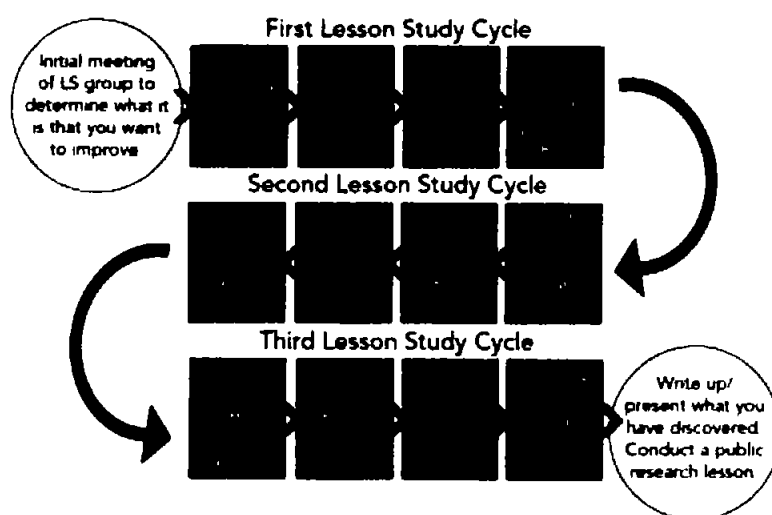


Figure 2.9: Lesson Study Process (Dudley, 2013)

The unique point of Dudley's (2013) lesson study process that makes it distinct from other models of lesson study is that it emphasizes the thrice presentation of a

research lesson. During the practice of that model, initial meetings with teachers engaged in lesson study group take place, and in that meeting after close coordination and arguments of teacher that topic is selected for teaching through lesson study model which needs due attention of teachers for effective presentation. During all three phases of the lesson study cycle collaborative planning, teaching, observation, and discussion of teachers as well as an activity for exploration of students 'remarks take place.

In the end, teachers collaboratively work to compile the report of the whole process, and results are disseminated to the teachers' community for getting desired benefits. In the scenarios of the lesson study model, after conducting multiple research studies in this area, a model of lesson study was also developed by Fujii (2014). Key aspects of that model are defining and deciding research lesson goals, planning a detailed lesson, presenting the lesson and conducting observations of improvement, sharing observation data for lesson improvement, and the fifth (last) step is writing a reflection for consolidation of professional learning as well as improvement of the presented lesson. A pictorial description of that lesson is as follows:

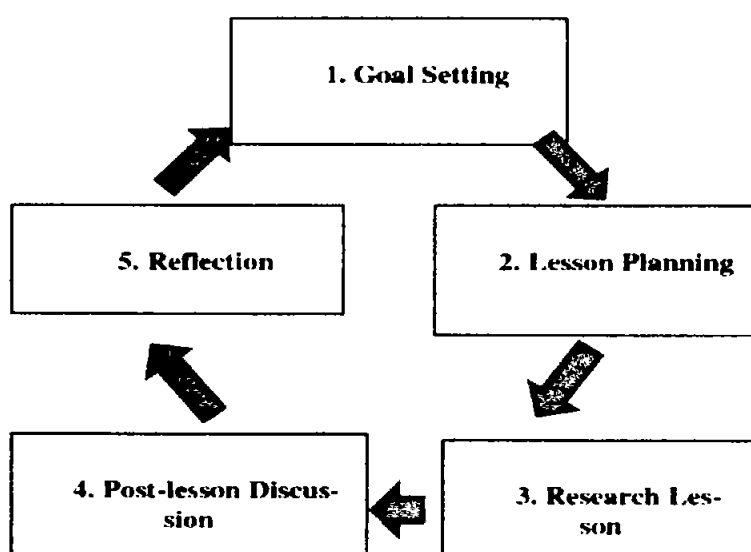


Figure 2.10: The Process of Lesson Study (Fujii, 2014)

For presenting a true picture of Japanese lesson study visits were made by researchers namely Archer (2016) and Simmons (2016) and by viewing the work of prominent Japanese scholars (Takahashi, 2014; Takahashi & McDougal, 2016; Fujii, 2014, Fujii, 2016) they found that through a phylogenetic mutation many countries have stray from the real nuance of Japanese lesson study model that was termed as “jugyo kenkyu”. But the type of variations and their effects on the outcomes of the lesson study model has not been highlighted. The cultural difference between jugyo kenkyu and the lesson study model developed by Stepanek et al. (2007) and Dudley (2014) has been also neglected by Archer (2016) and Simmons (2016) while they were stating the difference between jugyo kenkyu and various updated models of lesson study. The basic stages of the lesson study model that are aligned with jugyo kenkyu model involved the process of teachers', and professionals' engagement in the planning, teaching, and reviewing cycle.

2.1.2 Key Features of Lesson Study Model

Though there are various iterations associated with lesson study, some basic features of the lesson study model are agreed upon by the majority of concerned researchers (i.e. Audette, 2004; Cerbin, 2011; Fernandez, 2002; Fernandez & Chokshi, 2002; Puchner & Taylor, 2006; Lewis & Tsuchida, 1999) are as follows:

- i. Involvement of three to six teachers
- ii. Process of identifying a learning goal for drafting a lesson
- iii. Keeping in view students' experiences and their learning levels for devising detailed lesson
- iv. Delivering the lesson by one teacher and its evaluation by fellow teachers

- v. Analyzing the complete lesson keeping in view the data collected from observation and students' performance
- vi. Revision of lesson keeping in view all comments and suggestions
- vii. Repeating the complete cycle of the lesson study model to improve instructional practices and the effectiveness of this model

2.2 Benefits of Lesson Study Model

In a true sense, lesson study is a time-intensive model and this characteristic makes it a sustainable model of teachers' professional development (Fernandez & Chokshi, 2002). Lesson study is associated with the professional and instructional development of teachers as well as improved academic performance of students. Though the lesson study model empowers teachers to reflect on their instructional practices to identify their weak areas and practice innovative teaching-learning strategies (Audette, 2004) but its main focus is to improve student's learning; as this model motivates teachers to anticipate the learning difficulties of students and to observe students' learning on regular basis. There are many positive features and beneficial outcomes that have been attributed to the lesson study model; detailed description of these elements is as follows:

2.2.1 Improved Collaboration and Self-Efficacy

It has been endorsed by various researchers (Lee et al., 1991; Gersten et al., 1995; Clement & Vandenberghe, 2000; Huffman & Kalnin, 2003) that collaboration among teachers in the teaching-learning process plays an important role in enhancing students' achievement, as well as teachers' effectiveness, their satisfaction, and professional development. Another important underlying feature of this collaboration is that teachers

learn a lot of new things from their team members due to their diverse cognitive impact and socio-emotional background. Moreover, it has been highlighted by Rock and Wilson (2005) that during the process of peer collaboration, besides learning new approaches related to teaching and learning, teachers get a very prestigious chance to get a better understanding of the level and interest of their students.

It has been highlighted by Taylor et al. (2005) that the involvement of teachers in the lesson study model is a positive sign of improving their collegiality. Increased collaboration among teachers is an important element of the lesson study model (Rock & Wilson, 2005; Puchner & Taylor, 2006). Furthermore, it has been explored by Puchner and Taylor (2006) that teachers seem highly interested to get engaged in the process of active discussion and collaboration (to improve their teaching-learning strategies) while they work by following the lesson study cycle.

Collaboration of teachers during the development and delivery of lessons is the surface feature of the lesson study model (Lewis et al., 2006). According to Cerbin and Kopp (2006) one of the most significant elements of this professional development model is that teachers collaboratively get engaged in the process of examining teaching-learning issues. Furthermore, this model also encourages the idea of collaborative leadership among teachers (Sibbald, 2009) which is a key indicator to upsurge the professional development of prospective teachers. As, this model expects teachers to work jointly for developing students' activities and strengthening their teaching skills (Lewis & Tsuchida, 1999; Audette, 2004; Chokshi & Fernandez, 2004; Cerbin & Kopp, 2006; Lewis et al., 2011) therefore, it can be stated that this model is intrinsically collaborative.

After increased collaboration among teachers, improved self-efficacy of teachers is considered a major benefit of the lesson study model. From the perspective of improved self-efficacy, Rock and Wilson (2005) explored that during the practice of the lesson study model, participants' experienced increased confidence in their roles as teachers and instructional designers. It has been revealed by Puchner and Taylor (2006) that during the practice of the lesson study model, teachers not only received detailed feedback about their instructional practices but they also experienced amazing engagement of students in the learning process and expressed that such type of experience they never got before. As students' better academic achievement is closely associated with teachers' performance; therefore, it can be stated that a reliable predictor of students' achievement is the teacher's improved efficacy (Ross et al., 2006; Palardy & Rumberger, 2008). It has been explored by various researchers (Rock & Wilson, 2005; Puchner & Taylor, 2006; Sibbald, 2009) that increased self-efficacy of teachers is positively associated with the practice of the lesson study model in the instructional process. Furthermore, Sibbald (2009) also stated that the collaborative nature of the lesson study model widens the pedagogical and content-related competencies of teachers and it is a robust sign of teachers' improved self-efficacy.

2.2.2 Promoting Culture of Practical Activities

According to various renowned researchers (such as Fernandez, 2002; Audette, 2004) that another imperative benefit of the lesson study model is promoting a culture of learning from practical activities, as it offers opportunities for prospective teachers to learn by working in the real context. It has been denoted by Fernandez (2002) that this model presents a well-articulated and systematic process for observing the performance

of other teachers with the aim of self-improvement. As the activities of the lesson study model take place in actual classrooms that's why it has been endorsed by Chokshi and Fernandez (2004) that concrete learning is ensured in this model.

Furthermore, Sibbald (2009) believed that the success of the lesson study model is sure as it offers opportunities to teachers for addressing their content as well as pedagogy-related challenges in actual context and is authentically contextual. Likewise, Stigler and Hiebert (2009) also highlighted the benefits of lesson study's contextual nature by stating that the lesson study model offer opportunities to teachers for improving their teaching. As they can examine which types of activities can contribute to the success of the teaching-learning process and which type of activities needs to be exempted from instructional practices.

2.2.3 Detailed Reflections and Teachers' Active Personal Involvement

Another significant benefit of the lesson model is that it is promoting the habit of writing reflection and ensures active personal involvement of teachers in the professional development process. In the lesson study model, teachers develop learning outcomes, decide the nature of audiovisual aids that can be used for ensuring effective delivery of the lesson, choose suitable teaching methods and students activities regarding a particular topic/lesson and select the ways to evaluate students' performance. Additionally, the lesson study model has been proved very effective in the perspective of "reflective practices". According to Chokshi and Fernandez (2004) lesson study is serving as a driving force to enable teachers to think about their teaching. It has been argued by Rock and Wilson (2005) that lesson study is serving as a catalyst of change by enabling teachers to become reflective practitioners, as it demands from them to learn from their

previous lessons for ensuring improvements in their future lessons and enriching students' experiences.

Cerbin and Kopp (2006) stated that lesson study itself is a reflective practice as it motivates teachers to get involved in the discussion for findings the solution to sensitive issues related to the teaching and learning process. It has been declared by researchers (Lewis et al., 2006) that the success of lesson study mode is dependent on teachers' style of discussion, observation, and thinking for improving students learning as well as critical thinking skills. It has been indicated by various researchers (Lewis & Tsuchida, 1999; Audette, 2004; Rock & Wilson, 2005; Lewis et al., 2006; Stigler & Hiebert, 2009) that the lesson study model stimulates teachers to write a reflection on their instructional practices. And these reflections play a contributive role in changing their mindset about instructional patterns and students' learning. Furthermore, Lewis et al. (2011) stated that the process of reflective practices that take place in the context of lesson study is equally beneficial for prospective as well as expert teachers as on its basis they can improve their instructional practices.

2.2.4 Environment of Sharing Professional Knowledge

Fernandez (2002) stated that the lesson study model offer opportunities for group members/prospective teacher to write reports of their experiences for sharing as well as to conduct activities like an open house to learn from each other experiences. During the practice of this model, teachers collaboratively learn and practice innovative instructional strategies on regular basis for improving the learning of students (Chokshi & Fernandez, 2004). And this model does not enable teachers to improve only one model lesson, rather it emphasizes strengthening their overall skills and abilities for improving their

instructional practices. Creating an environment of sharing professional knowledge as well as expertise during teaching practice (Fernandez & Chokshi, 2002; Chokshi & Fernandez, 2004; Lewis et al., 2006) is another key advantage of lesson study model. As all the prospective teachers utilize their best experience in planning, implementing, and revising the model lessons (Cerbin & Kopp, 2006) that's why instructors can also use the same lesson without making too many modifications for their classes.

Results of various research studies conducted by renowned researchers (Audette, 2004; Rock & Wilson, 2005; Stewart & Brendefur, 2005; Puchner & Taylor, 2006) indicated that lesson study can significantly contribute to the professional development of prospective teachers as the majority of the teachers involved in the practice of this model responded that this model has proved very imperious in upgrading instructional practices as well as their confidence level. It is obvious fact that the quality/performance of teachers and students plays an important role in upgrading the reputation of the school. It has been reconnoitered by Lewis et al. (2006) that there is a close connection between lesson study, upgraded professional development of teachers, and improved academic performance of students. It has been proved by Cerbin and Kopp (2006) that the Japanese LS model is a teacher-led broad-based model that is playing a significant role in improving the teaching-learning environment of educational institutions.

2.2.5 Alignment with Best Practices of Teachers' Professional Development

Last but not least, another significant benefit of the lesson study model is ensuring alignment among best practices of teachers' professional development. Lesson study can be regarded as an effective model of teachers' professional development as it ensures the alignment between prospective teachers' activities and the goals of the school's curricula

(Puchner & Taylor, 2006; Stigler & Hiebert, 2009). Effective professional development programs need to be faculty-driven and it has been explored by researchers (Murray, 2002; Audette, 2004; Chokshi & Fernandez, 2004; Lewis et al., 2006; Puchner & Taylor, 2006; Lewis et al., 2011) that lesson study model has been also attributed as a faculty-driven model as it involves teachers throughout the process i.e. from initiating the idea to evaluation.

Ensuring collaboration among teachers is another important element of an effective professional development program (Darling-Hammond & McLaughlin, 1995; Desimone, 2011; Garet et al., 2001) and the lesson study model effectively incorporates that element in its cycle (Audette, 2004; Stewart & Brendefur, 2005; Lewis et al., 2011). A key characteristic of an effective professional development program is that it must ensure teacher command of content knowledge (Garet et al., 2001; Desimone, 2011). And it is a unique characteristic of the lesson study model to provide a natural context for all teachers so that they can update their content knowledge keeping in view emerging trends and can practice innovative content-related ideas in their classrooms. In order to create beneficial learning experiences for teachers, the lesson study model satisfies and adheres to the principles of many other professional development models. For instance, according to researchers (Darling-Hammond & McLaughlin, 1995; Garet et al, 2001; Desimone, 2011) intensive, sustained, and long-term professional learning experiences are considered the key criteria of an effective professional development program and lesson study model undoubtedly satisfies these conditions.

Correspondingly, lesson study focuses not only on deepening the content knowledge of teachers but also strengthen their instructional capabilities for effective

delivery of that content. It has been explored by researchers (Darling-Hammond & McLaughlin, 1995; Garet et al., 2001; Desimone, 2011) that another key characteristic of the effective professional development program is that; it offers hands-on and active involvement-based learning opportunities for its participants. And in the lesson study model, the active involvement of teachers is ensured during the planning, teaching, observation, discussion, and reflection writing sessions of a lesson (Lewis & Tsuchida, 1999; Fernandez, 2002; Fernandez & Chokshi, 2002; Lewis et al., 2011). One of the unique features of effective professional development is to provide coherent and daily life-related experience to its participants (Darling-Hammond & McLaughlin, 1995; Garet et al., 2001; Desimone, 2011) and the lesson study model is also practicing this assumption successfully

In short, we can say that it is the unique characteristic of the lesson study model that it incorporates all the elements in its process that have been denoted mandatory to ensure the success of a professional development program. Activities of the lesson study model are hands-on and embedded within the teaching practice of prospective teachers.

2.3 Professional Development of Teachers

It is a growing concept worldwide that there is a close connection between teaching, cultural and political interests of a nation and besides the national interests of a nation; trends of globalization are affecting it to great extent. Ensuring development in the teaching profession has become a global theme in the shared and open world of knowledge and innovative ideas related to teaching and learning are frequently gaining popularity everywhere. Therefore, in each state, each region, and each educational

institution, there is a dire need to take initiatives for strengthening the teaching profession to maximize students' achievement (Ellis et al., 2010).

Keeping in view these considerations, it has been argued by researchers such as Oanh (2012) and Trippstad (2013) that though globalization can alter systems, mindsets, and ideas of nations through global trends; these new trends must be adopted per contextual requirements. And this process of ensuring connections between global and national contextual ideas can be termed the concept of glocalization. In the field of teacher education, meaningful integration of global trends in the local context can contribute effectively to enhancing the instructional practices of teachers. Therefore, keeping in view the global trends, best practices, and challenges associated with teachers' professional development have been discussed in the upcoming paragraphs.

2.3.1 Best Practices of Teachers' Professional Development

Keeping in view the practices of other professions, it is need of the hour that teachers must be also engaged in professional development practices that are collaborative, on-the-job, continual, and effective to meet emerging challenges. It has been explored by Garet et al. (2001) that professional development opportunities not only enhance the skills and knowledge of teachers but also have a great impact on their teaching practice. Therefore, these programs must be integrated into the daily life activities of educational institutions and offered hands-on and collaboration-based learning opportunities for teachers. For ensuring the effective professional development of teachers, the standard for professional learning has been revised by the national staff development council (2001). In these standards, it has been declared that the development

of new knowledge and skills among teachers is closely associated with the quality of the professional learning environment that is being provided to them.

It has been elaborated by Murray (2002) that for ensuring the effectiveness of professional development programs, it is necessary to ensure maximum participation of faculty members in planning and implementation-related activities. Literature indicated that throughout professional development programs, teachers must be motivated to participate in planning learning activities as this practice can develop a sense of voice and choice among them. In the field of education, all teachers are capable to play leadership roles if they have been provided with ample opportunities for continuous development opportunities. As Lambert (2003) advocated that effective professional development practices demands from all participants perform leadership responsibilities (such as planning activities, sharing knowledge, observing others' work, and providing feedback) and these roles may positively strengthen their professional capabilities.

Besides it, observation of colleagues' work and practice of sharing are two key characteristics of an effective professional development program and it is the firm belief of the teachers' community that long-term professional development activities are positively contributing to change their instructional practices (Boyle et al., 2004). Braun and Clark (2006) stated that teachers must be trained to build a connection between innovative research and classroom instruction as well as to translate the data of tests conducted at the international, national, district, and district levels for ensuring the desired academic performance of students. These skills may serve as a key to improving the teaching-learning environment and for developing those skills among teachers which are incumbent to involve them in collaborative models of continuing professional

development. And according to Brownell et al. (2006) for promoting the habit of effective/active collaboration among teachers, producing an environment of support and mutual respect is a prerequisite.

As a result of their research study, Gerstein and Ragey (2008) identified that cooperative teaching-learning strategies have been proved very supportive and beneficial to effective professional development. It has been also endorsed by Darling- Hammond, and Richardson (2009) that job-embedded, sustained, and collaboration-based activities can offer opportunities for faculty members to take ownership of their learning as well as to improve their instructional practices continuously. It is the unique characteristic of an effective teacher that he/she always learns from his/her teaching.

Therefore, teachers are expected to get involved in the continual reflection process to improve their content and pedagogy-related skills. It is a dilemma that regular professional development of teachers is being less centered as compared to other professions such as medical and military (Darling-Hammond et al., 2009). Teachers must be involved in such opportunities that may enable them to learn from their instructional environment (Darling-Hammond et al., 2009). Continuous professional development of teachers is also imperative for fostering a rich learning environment as it emphasizes the equal participation of both (teachers and learners) in the learning process.

It has been highlighted by Reeves (2010) that there is a need to initiate programs of continuous professional development of teachers as students' achievement is closely associated with the professional development of teachers. There is a dire need to shift practices of teachers' professional development from fragmented in-service days toward a sustained model of professional development which includes all activities related to the

teaching-learning process. Accordingly, it has been suggested by Joyce and Calhoun (2010) that such types of opportunities must be offered to teachers that may enable them to strengthen their pedagogical content knowledge through a productive discussion with their colleagues. Likewise, it has been suggested by Hull et al. (2010) that sufficient time must be provided to teachers so that they can collaborate as well as can reflect on teaching-learning strategies for improving their instructional practices.

According to Desimone (2011) focus on content, activities based on the active involvement of teachers, coherence with instructional policies, continuation, enough time for practice, and effective participation of all members are common characteristics of a successful professional development program. According to Kampen (2019) professional development programs may be made effective/attractive by personalizing teacher learning with the professional plan of professional development and by making these plans specific, ongoing, and embedded in teaching practice. Though, it has been overviewed that collaborative and faculty-owned activities are considered basic components of effective professional development programs. But it is not easy to carry on such types of activities at educational institutions, because teachers at educational institutions are facing the problems of increased responsibilities and heavy workload. Therefore, besides discussing the characteristics of effective professional development, various challenges to teachers' effective professional development have been also discussed in this section.

2.3.2 Challenges Associated with Teachers' Professional Development

Researchers (Cerbin & Kopp, 2006; Darling-Hammond & Richardson, 2009) revealed that school structure/culture and sense of isolation limit teachers' participation in

professional learning activities. It has been explored by Gerstein (2009) that due to the burden of classes and the management of co-curricular classes, teachers working at the college level cannot find sufficient time to get engaged in professional development activities. Whereas, due to the heavy pressure of research publications, teachers working at the university level also cannot participate actively in professional development activities. Traditionally teaching was considered an isolated profession (Fernandez, 2002; Hindin et al., 2007; Gerstein, 2009) that's why finding a conducive learning environment for professional development was a challenge for university and college teachers.

Likewise, another challenge to the active participation of teachers in professional development programs is the value of incentives that are being provided to those teachers who have completed professional development training despite time scarcity (Goldrick-Rab, 2010). Many teachers cannot get engaged in such professional development activities because their home institutions do not provide them attractive incentives for the completion of such programs. It has been also highlighted by Huffman and Kalnin (2003) as well as Darling-Hammond (2010) that a competitive and isolation-based environment exists in schools in the United States as well, and teachers find very little time to engage in the collaborative process of designing, implementing, and evaluating lesson. It has been highlighted by (Darling-Hammond, 2013) that another challenge to the effective professional development of teachers is that teachers' evaluation process does not capture the collegial and collaborative dimensions of their work. It has been explored by Gomba (2019) that ineffective participation of teachers and lack of poor information communication technology-related skills are also great challenges to teachers' effective professional development.

2.4 Theories of Effective Professional Development

For ensuring the effectiveness of teachers' professional development programs, it has been suggested by Heijne-Penninga et al. (2018) that these programs must be based on literature as well as the latest research work. Each program must be based on theoretical stances as intense theoretical search can serve as a baseline for successful professional development programs. For instance, if teachers are required to adopt a conceptual approach to teaching than traditional teaching, then their teaching process must undergo profound changes. Over time, many changes occur in the nature and duration of teachers' professional development programs and the brief description of these amendments is as follows:

2.4.1 Collaboration-Based Teachers' Professional Development

There is a variety of teachers' professional development models which have originated and implemented in one country and afterward have been practiced in various countries with prolific results. A successful example of this trend is the lesson study model which originated in Japan by focusing on development phases and central issues of teaching (Lewis, 2002). This model contributed a lot to improving teachers' instructional practices and students' academic achievement by educating teachers to learn from problems that they have experienced during classroom teaching and helping students to ensure concept clarification (Lewis, 2002). In the United States, it was explored by National Research Council (2002) that professional development programs focus on disseminating knowledge related to curriculum, performance standards, integration of technology in instructional practices, and innovative method of teaching. According to

Smith (2001) and other researchers such as Wang et al. (2003) these programs were sponsored by district committees and based on one-day training workshops.

It has been explored by Hill and Ball (2004) as a result of their research study conducted with 2300 elementary teachers that those professional development programs contribute a lot to improving classroom environment/teaching which focuses on improving teachers' pedagogical content knowledge and instructional practices. It has been endorsed by Absolum (2006) that motivating teachers to get engage in reflective practices can enable them to identify and resolve problems collaboratively as well as to get familiar with emerging trends to adapt them in their instructional practices. For ensuring retention of teachers, improved quality of the teaching-learning process, better achievement of students; and effective management of student's behavior; it is necessary to provide effective mentoring and a supportive environment to beginning teachers (Lind, Franks, & Prebble, 2005; Hobson et al., 2009; Hobson et al., 2009) so that they can deal intelligibly with their teaching, learning, and classroom-related problems. As Cameron (2009) stated that at the beginning of a career, teachers need to learn the modes of professional conversation for developing their own opinions and conversational habits.

2.4.2 Observation-Based Teachers' Professional Development

The observational model can be also utilized in teachers' professional development programs as observation is considered a powerful tool for monitoring and assessing teachers' performance (Bubb, 2007). Furthermore, it has been also declared by Totterdell et al. (2008) that observation may be used as an imperative tool for providing constructive feedback to colleagues in a professional way. Besides this, it has become crucial to develop the abilities of creative and critical thinking among teachers during

professional development programs so that they can develop the same skills among students (Gilbert, 2007). Fraser (2008) stated that for ensuring the success of the teaching profession, it is necessary to conduct teachers' training workshops and in-service teachers' professional programs on regular basis. For enhancing their competencies, teachers are required to review daily what works best for students (Timperley, 2008) and which areas need improvement for effective teaching.

It has been reported by OECD (2009) that effective teachers' professional development programs include training and practice-related activities, adequate time duration, timely feedback, and follow-up support. And professional development programs can take many forms i.e. workshops, refresher courses, seminars, conferences, observation visits to other institutions, qualification programs, individual or collective research work, participation in professional learning communities, coaching, peer observation, mentoring, etc. (OECD, 2009). Furthermore, the idea of incorporating technological tools, blogs cloud, online forums, and networks into instructional processes has been also endorsed for ensuring the success of the teaching-learning process. Quality learning circles can also play an important role in ensuring the effective professional development of teachers (Hill & Sewell, 2010) as these circles offer opportunities for teachers to observe each other' instructional practices on regular basis to improve their teaching-learning practices as well as to discuss and share their views, thoughts, and emotions to build a reciprocal and responsive relationship with students.

According to Castro et al. (2010) it is the responsibility of experienced teachers to provide mentoring facilities and demonstrate strategies for creating work-life balance to ensure effective professional development of prospective teachers; so that they may get

engaged in the completion of academic tasks without having the feeling of overworked. Such type of assistance can also help them to improve their instructional and reflective practices (Devos, 2010). As a result of effective mentoring, prospective teachers can learn soft skills i.e. self-realization, change in attitude, effective communication as well as management skills, and strategies to deal effectively with students.

It has been also explored by researchers (Keogh et al., 2010; Hudson, 2012) that key issues that are normally faced by prospective teachers are to manage students' behaviour and create work-life balance and for it, they need sustainable guidance and support from experienced teachers containing problem-solving techniques and strategies to deal with diverse students behaviours. Moir (2012) declared that by playing the role of mentoring, experienced teachers cannot only fulfil the responsibility of training prospective teachers but this practice can also help them to upgrade their knowledge and skills related to the teaching profession.

2.4.3 Effective Context-Based Professional Development of Teachers

Imants and Van Veen (2010) introduced a workplace-situated approach for the professional development of teachers as it can train teachers to deal with work-related issues effectively. Byrne et al. (2010) stated that writing reflection on colleagues' work in the actual classroom settings is a valuable part of successful professional development programs. Likewise, Avalos (2011) focused on the idea of creating such an environment for teacher professional development that may promote the habit of collaborative learning among them. Rekha and Ganesh (2012) stated that professional development programs must reinforce the habit of upgrading/updating their subject matter knowledge and instructional skills among prospective teachers.

The importance of an effective school environment has been also highlighted by researchers for prospective teachers' professional development. It has been highlighted by Pillen et al. (2012) that it has become an international trend to ensure actual school environment/practice-cum learning culture for prospective teachers to familiarize them with pedagogy and management-related affairs, ensuring their effective professional development and developing their professionals' identities. The present study is also important: as based on findings, the researcher intends to develop a framework for encouraging university school collaboration to ensure effective learning culture at school for prospective teachers' professional development.

During the teacher training session, there may be some sort unexpected queries from participants, therefore it is suggested by Lunenberg et al. (2013) that teacher educators must have solid general knowledge and skills in addition to the knowledge of their respective profession. There are various challenges i.e. lack of effective communication among teachers, revising programs, lack of leadership, improper familiarity with key objectives of training sessions, etc. (Patterson & Thornton, 2014) that teacher educators may face in mentoring. It has been highlighted by Wolfensberger (2015) that such professional development programs are very rare that may produce gifted and talented teachers.

According to researchers (Van Veen et al., 2012; Merchie et al., 2016) for ensuring the success of professional development programs, teacher educators are required to translate the findings of current research studies into their practices/activities that have been designed for training teachers, utilize research findings in developing course contents and to evaluate the impact of designed courses on participants. For

promoting the personal and professional well beings of teachers as well as transmitting teaching culture, teacher educators are required to develop coping strategies among prospective teachers (Avalos, 2016). While discussing characteristics of effective teachers' professional development programs; Hummond et al. (2017) stated that these programs are intensive, create ample learning opportunities for participants, enable them to identify their own learning needs and of their fellows, develop observation related and peer review skills among participants, enable participants to evaluate their performance by engaging in reflection process, develop the habit of conducting effective professional dialogues, and build strong collegial relationship among teachers.

Likewise, Gerber (2017) highlighted the importance of applying the observation method in professional development programs by stating that strong observational skills can enable educators to draw actual meaning from what they hear and see as well as to provide professional and timely feedback to their subordinates for improving/upgrading their professional practices, experience, knowledge, and skills. As the practice of the lesson study model is supporting the idea of context-based professional development, therefore, it has been argued by Abd Rahim and Abd Rahim (2020) that the practice of lesson study in real context can contribute a lot to supporting teachers to diversify their instructional practices, upgrade their subject matter knowledge, observe the instructional practices of senior and fellow teachers, and to become more confident for classroom teaching.

2.5 Factors Affecting Students' Academic Achievement

It has been found Karemera (2003) as a result of a research study that there is a significant correlation between students' achievement and their satisfaction with the

learning environment as well as the instructional strategies of teachers. Diaz (2003) has explored factors lying behind the poor academic achievement of students and resulted that there are major factors that significantly become the reason for poor students' academic achievement and these are family-related (associated with parents), academic factors (associated with teachers), and personal factors (that are associated with students themselves). Diverse learning needs of students has also a significant impact on their academic achievement, therefore it has been suggested that performance data of students may be utilized during the professional development of teachers as it permits teachers to practice limited and valuable resources of professional development for addressing explicit learning need of students (Holloway, 2003). Professional development programs (which utilize students' data for training) enable teachers to make their instructional decisions keeping in view the diverse learning needs of students.

Besides it, Darling-Hammond (2006) also claimed that improved quality of teachers' instructional practices is a positive indicator of improved students' academic achievement, therefore it can be established that dream of improved students' academic achievement can be only realized by ensuring the effective professional development of teachers. It has been also argued by Hamilton et al. (2009) that during professional development programs teachers must be trained to utilize students' data/scores to improve their instructional abilities and meet the learning needs of students. For obtaining reliable data regarding students' performance, teachers may be trained to use multiple assessment tools, encounter the factors contributing to the academic performance of students, apply a variety of instructional strategies to teach students, and evaluate students' data to improve their instructional strategies.

In the area of teachers' professional development, it has been argued by Ingersoll and Strong (2011) that effective induction programs and refresher training facilities can ensure teachers' retention and empower them to implement innovative ideas during their instructional practices for improving the academic performance of their students. Marzano et al. (2011) have highlighted an important point in the scenario of teachers' professional development by stating that there is a dire need to educate educational administrators about the importance of offering professional development programs for their teachers as their initiatives can positively influence school reputation along with students learning. It has been reported by Mushtaq and Khan (2012) that the provision of high-quality learning facilities is one of the most influencing factors that affect students' academic achievement and only a teacher who has received high-quality training/professional development can ensure the provision of appealing learning environment for students.

Likewise, results of TALIS (Teaching and Learning International Survey, 2013) declared that improved learning performance is positively associated with the effectiveness of classroom instructional practices (Rutkowski et al., 2013) therefore, it is the responsibility of effective teachers that they must upgrade their instructional strategies keeping in view global trends and diversified students learning needs. As students' academic performance is closely associated with the nature of professional development programs that are being offered to teachers, therefore it has been suggested by researchers (Baumert et al., 2010; Neubrand et al., 2013; Fullan & Langworthy, 2014) that focus of professional development activities must be on polishing prospective teachers cognitive as well as psychomotor skills so that they can not only construct new

knowledge based on collegial experiences but also practice new knowledge during their instruction.

Likewise, it has been suggested by Briede (2016) that for improving the academic performance of students, it has become imperative for teachers to modernize their instructional strategies. Undoubtedly, teachers may face some complexities and unexpected challenges during the practice of innovative teaching strategies; therefore, it is the responsibility of educational administrators to take initiatives for training teachers in this regard. It has been argued by Solheim (2017) that in the field of education, effective learning and professional development of teachers is of great importance as it can enable teachers to master new knowledge, skills, and expertise, and develop novel proficiencies regarding teaching and learning environment. These changes in teachers' behavior can surely lead to improved academic achievement of students.

2.6 Effect of Teachers' Professional Development on Students' Achievement

It has been pronounced by researchers (Fishman et al., 2000) that undoubtedly professional development programs familiarize teachers with new ideas, knowledge, and skills for improving their instructional practices. However, it is a general notion that effective professional development opportunities can be translated into improved learning and academic achievement of students only when teachers apply the new knowledge and skills during instructional practices. A detailed study has been conducted by Guskey (2005) to explore the effect of teachers' professional development on the academic performance of students and found that persuasive professional development of teachers can enable them to advance their instructional strategies and procedures for supporting students to accomplish learning outcomes appreciably.

The importance of teachers' professional development has been also highlighted by Murphy (2005) stating that it can positively influence teachers' pedagogical content knowledge and their instructional skills. Furthermore, it can also familiarize teachers with ways to ensure the understanding of all students regarding challenging content areas. In the same area, researchers (Miller & Davidson, 2006) have underlined that teachers who have received training to upgrade their pedagogical skills and content knowledge can contribute a lot towards ensuring the better academic performance of students. Likewise, it has been stated by Lasley et al. (2006) that well-trained teachers can create a conducive learning environment and arrange eloquent learning activities in the classroom which are substantiated indicators of improved students' academic achievement.

Educational administrators who conduct training workshops for their teachers, despite limited time and financial resources expect that these investments in teachers can result in the form of improved academic performance of students and school effectiveness. It has been argued by Holloway (2006) that if the focus of professional development programs is maintained on effective research-based activities then these programs can surely produce expected results. It has been debated by Cerbin and Kopp (2006) that lesson study-based professional development programs can make teachers plan such types of activities which can ensure the accomplishment of learning objectives and students' understanding regarding subject matter as in the lesson study model teachers intentionally plan such lessons which can make students' thinking and learn open to analysis and observation.

Correspondingly, it has been indicated by researchers (Yoon et al., 2007) that time duration of a professional development program matters a lot as it has been found

that a professional development program that lasted for more than 14 hours is significantly correlated with improved students' performance as compared to those professional development activities that take place for a very little number of hours. Similarly, it has been explored by Jalongo et al. (2007) that professional development programs which focus on developing the skills of effective lesson planning among students are considered more consistent to satisfy the learning needs of students as it has been viewed that during lesson planning teachers integrate research, theory, and practice to make students' experiences meaningful and intelligible. Besides these benefits of practicing lesson planning during professional development programs, it has been established by researchers (Vui, 2007; Sukirman, 2007) that effective lesson planning is a great tool to improve learning motivation, enthusiasm, knowledge management, cooperation, and communication skills of students.

In the same scenario, an analysis of professional development programs conducted by the National Staff Development Council (2009) exposed that there is a significant correlation between students' academic performance and those professional development programs which lasts for six to twelve months and researchers (Darling-Hammond et al., 2009) explored that such professional development programs have no significant influence on students achievement which take place for a limited amount of time. Hill et al. (2013) argued that research studies are being conducted at a rapid pace to collect evidence about the fact that which type of professional development programs have a significant influence on the academic performance of students (Kennedy, 2019). In the same area, a study has been conducted by Gore et al. (2021) to explore the effect of teachers' professional development on the improved academic performance of students.

The findings of this study (Gore et al., 2021) indicated that effective professional development opportunities that are provided to teachers have a significant effect on students' academic achievement.

2.7 Role of Lesson Study in Improving Performance of Teachers and Students

Lewis and Tsuchida (1997) described that in the era of the late 1990s, the lesson study approach was introduced profoundly in the United States and has proved as an efficient way of enhancing the professional competencies of teachers and examining their instructional practices. By publishing their scholarly work entitled “the teaching gap” Stigler and Hiebert (1999) introduced the idea of lesson study to the international education community. For the promotion of collaborative teaching, the lesson study model may be effectively utilized as it contains the logic of continuous improvement, maintains a constant focus on the learning of prospective teachers, and focuses on the improvement of the teaching context (Stigler & Hiebert, 1999). Participation in the lesson study cycle can contribute not only to prospective teachers' knowledge development but may also ensure their professional development. Japan has the most skillful and purposeful teaching system in the world.

It has been attributed by researchers (Lewis & Tsuchida, 1999) that in the Japanese context lesson study model is playing a significant role in improving the performance of teachers as well as students. Now, lesson study is being practiced successfully in the fields of science education and mathematics in North American contexts. Beyond this, in various regions of Japan and North America, it is being utilized as an effective tool for the professional development of teachers. Researchers (Panasuk & Todd, 2005) explored that in the teaching-learning process, lesson planning which

ensures organized development of the learning environment, instructional materials, and learning activities and evaluation tools is considered an important element of the lesson study model. Therefore, it can be argued that the lesson study model is a purposeful and timely effort for enabling teachers to analyze the learning needs of students and design instructional activities accordingly to ensure their purposeful learning.

In the process of the lesson study model, teachers can push each other to think about improving their command of the subject matter with the aim of improved students' performance. That's why, it has been indicated by various researchers (Audette, 2004; Chokshi & Fernandez, 2004; Lewis et al., 2006; Puchner & Taylor, 2006) that it the teacher-directed model of professional development for ensuring improved instructional practices of teacher and academic performance of students. Furthermore, researchers have explored that the lesson study model not only improved the practices of teachers but also ensure the academic performance of students (Leung & Yuen, 2007). For highlighting the importance of practicing the lesson study model during professional development programs, it has been advocated by Lenski et al. (2009) that participation in lesson study groups enables teachers to discuss pedagogical interventions, share knowledge about differentiated students' behaviors, and receive feedback on their teaching from their colleague. In this way, they become able to draft their daily lesson plans based on collective wisdom which can positively influence students' engagement and performance in classroom activities.

It has been reported by Koo (2010) that in Brunei at the WALIS (World Association of Lesson Studies) conference a local researcher presented that by practicing two cycles of lesson study model teachers have become able to improve the academic

performance of their students from 30% to 80%. In the same context, it has been reported by Suhaili (2010) as well that in Brunei, lesson study is serving as a progressive, elegant, and refined model for teachers to improve the academic performance of their students. Results of a study conducted by Ahmad (2011) in Brunei with students of Year nine concluded that lesson study is positively contributing to increase academic achievement and content-related learning of students. As Yoong (2011) indicated that lesson study model motivates teachers to practice emerging trends in the fields of teaching and learning.

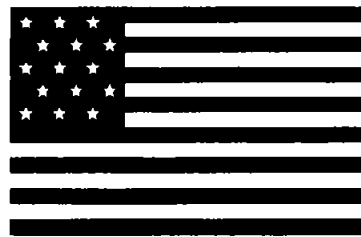
Therefore, keeping in view these arguments, it has been declared by Brunei, Darussalam's Ministry of Education (2013) that for ensuring technological, scientific, and environmental developments in the field of education, there is a need for a paradigm shift toward the establishment of students centered classroom from teachers centered classroom and to train teachers accordingly for ensuring schools good reputation generally and students' better academic performance specifically. Takahashi (2014) also endorsed that the lesson study model may be conceptualized as a teacher-initiated, career-long, and collaborative professional development model, which enables teachers to design effective lessons and to develop higher-order skills among students such as problem-solving and independent thinking. It is a well-designed and comprehensive model that offers opportunities for ongoing professional development for teachers. This model is considered a powerful tool for the professional development of both prospective teachers and in-service teachers, as it encourages teachers to consider the implications of learning theories in designing lessons for students.

2.8 Practices Related to LS Model in Developed and Developing Countries

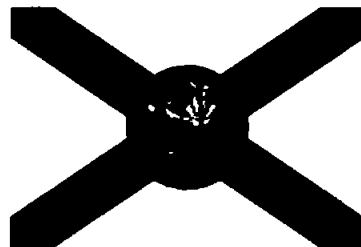
Various studies have been conducted in several countries to highlight and prove the effectiveness of the lesson study model in the improved professional development of teachers and students' achievement, detail of these studies is as follows:

2.8.1 Practice of Lesson Study Model in the USA

In various states of the USA, extensive studies have been conducted in the area of lesson study. These studies have been conducted by the researcher of the University of Florida, Gainesville and Florida State University, universities of Alabama, Mississippi, Georgia, and Indiana, George Mason University, Florida State University, University of Central Florida, Kansas State University, University of Windsor, Arizona State University, Georgia State University, and Baylor University. A detailed description of these studies along with major findings have been given in upcoming lines:



Akiba et al. (2019) who belong to the University of Florida, Gainesville, and Florida State University, Tallahassee collaboratively conducted a study to explore the key features of the lesson study model and the effects of teachers' participation in the inquiry process of this model on students' learning. This study was a part of a four-year project; in this study, 87 teachers were engaged in 24 mathematics lesson study groups as a sample, and a survey method was used to collect data from them. Results of this study indicated that key features of the lesson study model are time duration, instructor's focus on students thinking, and quality of material that is

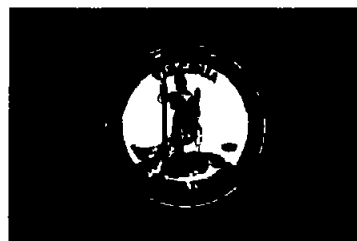


being used during training activities. Researchers further explored that teachers' participation in the inquiry process of the lesson study model is highly associated with these key features.

During a research project, Saye et al. (2017) who belong to the universities of various USA states (Alabama, Mississippi, Georgia, and Indiana) coordinated with historians, teachers, and teacher educators for practicing a framework entitled Problem Based Historical Inquiry (PBHI). Keeping in view the assumptions of this framework, researchers designed lesson plans and tested these lesson plans in classrooms with the assistance of teachers. Findings of their research project revealed that as a result of participation in that research project, teachers acquired an in-depth understanding of historical phenomena; they gained expertise in techniques to engage students in challenging learning areas, and reconsider what is required to facilitate students in understanding complex content areas. The lesson study model has proved very effective for teachers as it motivates teachers to ensure active engagement of students in the teaching-learning process and adopt broader cultural principles which are necessary to promote independent and inquiry-oriented teaching practices.

In the Virginian context, a study was conducted by a research team at George Mason University, Virginia to illustrate the use of microteaching lessons study by a team of researchers to teach students having learning disabilities

(Regan et al., 2016). Based on findings, it was concluded that teachers can improve their teaching practice by integrating pedagogical, content, and technological knowledge effectively if they have participated in a practice session of lesson study. It was also



declared that involvement in the lesson study cycle can improve teachers' planning, implementation, and evaluation-related skills.

Similarly, Akiba and Wilkinson (2015) from Florida State University, Tallahassee conducted a study to analyze state and district level policies/documents that have been drafted to promote the lesson study model. This study adopted a mixed-method strategy; primary sources (state and district level policy documents) and interviews with concerned administrators were utilized to collect the relevant data. As a result of the study, it was denoted that if school administrators want to practice the lesson study model, then they are required to provide adequate funding for teacher payment and substitutes. Furthermore, they are required to develop sustainable plans for ensuring the effective implementation of the lesson study model. In the sphere of the lesson study model, four doctoral dissertations have been conducted in different states of the USA (i.e. Florida, Kansas, Arizona, and Texas). Their brief description is as follows:

In Florida State, the impact of the lesson study model on the effectiveness of secondary school teachers was explored during the research work of a doctoral dissertation by Thompson (2015) from the University of Central Florida. It was qualitative research and 37 resident teachers of three school districts were interviewed in this study along with document analysis of models/ projects/reports and constant comparison of participants' reflections. As a result of the study, the researcher indicated that resident teachers perceived the lesson study model as very beneficial for their professional development and school district designees of two districts (from three sampled districts) also perceived positively the effects of lesson study in enhancing their professional competencies.

In Kansas State, the impact of the lesson study model on the self-efficacy of teachers as well as on outcome expectancy was explored during doctoral dissertation research by Nauerth (2015) who belongs to Kansas State University. This study employed an intrinsic mixed-methods case study methodology and both qualitative and quantitative instruments were utilized to collect in-depth data to get a deeper understanding of the impact of the lesson study model. 14 teachers of a kindergarten school were selected as a sample and a lesson study cycle adapted from Stepanek et al. (2007) was practiced in this study. Findings of the research indicated that both the variables self-efficacy and beliefs related to outcome expectancy are positively influenced by the lesson study model of professional development. The researcher further explored that throughout the whole process of practicing the lesson study cycle, teachers' attitudes remained very positive and they were so much motivated to improve their instructional practices via collegial experiences.



In the Canadian context, a doctoral dissertation has been completed by Hamzeh (2014) from the University of Windsor in the area of lesson study. The purpose of this research study was to explore the effects of the lesson study approach on the teaching skills of prospective teachers in the area of science (inquiry-based approaches) and the self-efficacy beliefs of teachers who practiced the lesson study model. It was a correlational case study and the researcher collected both types of data; qualitative as well as quantitative. 48 prospective teachers enrolled in methodology courses constituted the population of this study, from which 36 were considered as the control group. 12



prospective teachers were selected as part of an experimental group and they were placed in three groups for practice lesson study. The findings of the study indicated an increase in self-efficacy among the experimental group of pre-service teachers. Furthermore, this study added valuable data to teaching-learning communities, professional development, and teacher empowerment programs.

Likewise, Lucas (2014) from Arizona State University implemented the lesson study model to explore its impact on collaboration among counselors and the instructional practices of teachers. It was action research; the researcher utilized mixed methods concurrent triangulation design in this research study and employed both qualitative and quantitative means for getting detailed data from participants. Based on findings, the researcher demonstrated that lessons created through lesson study produced a higher quality learning experience for students than lessons that were not created through the lesson study model. Moreover, the analysis of the data showed an increase in instructors' efficacy in teaching.

In the same scenario, a doctoral dissertation was completed with prospective teachers by McDowell (2010) a research scholar of Georgia State University to explore the use of the lesson study model in their practices. This study adopted a single case study design of qualitative research methodology and three lesson study teams consisting of six prospective teachers were selected for this study after the formal consent of prospective teachers. Findings revealed that the lesson study model is playing an

important role in enabling teachers to transfer theoretical concepts of course into classroom practice.

Meyer (2005) from Baylor University (Texas) during his doctoral dissertation examined the effect of the lesson study model on mathematics teachers and students.

This study adopted a multiple case study design and three lesson study groups consisting of 13 teachers constituted the sample for this study. Based on findings, it was explored that lesson study plays an important role in strengthening pedagogical and content-related competencies of teachers by promoting the habits of self-reflection, cooperative learning, and getting involved in problem-based activities.

Similarly, Rock and Wilson (2005) conducted a study at Shady Brook Elementary School in North Carolina to explore the role of the lesson study model in

improving classroom teaching. This study adopted a qualitative research design and six intermediate-level elementary teachers were engaged in the pilot implementation and evaluation process of the lesson study model. Findings of the study revealed that peer collaboration, meditation, and peer coaching; which are important elements of the lesson study process play an important role in teachers' professional development.

Rebecca and Lewis (2003) explored the effectiveness of teacher-initiated lesson study in a Northern California District. This study described that the lesson study model which is being practiced by school

teachers contains three important components which are: i) coherent and balanced lesson



study' cycle, ii) provision of knowledge related to valuable content and innovative pedagogical strategies, and iii) collegial support to ensure collaborative learning. The potential of lesson study has been explored in U.S schools as well with the collaboration of Japanese teachers and resident teachers. Results indicated that during the practice of the lesson study model; teachers develop some sort of critical lenses to learn from concrete samples of teaching practice that play an important role in supporting them for effective implementation and evaluation of lessons.

2.8.2 Practice of Lesson Study Model in Europe

Likewise USA in the European context, researchers from the University of Lisbon, University of Twente, University of Aegean, St. Angela's College, University of Stirling, University of Hertfordshire, University of Limerick, University of Cambridge, University of Utrecht, School of Education, University of Leicester, and the University of Stavanger. A detailed description of these studies along with major findings has been given in upcoming lines:

In the Portuguese context, a study has been conducted by researchers belonging to the University of Lisbon (Conceicao et al., 2021) to highlight the role of the lesson study model in changing the instructional practices

of prospective teachers. This study was qualitative in nature and a lesson study model based on three cycles was implemented in this study. The model of the lesson study was practiced by involving three prospective teachers, three cooperative teachers, three researchers, and one teacher educator. All these experts (teacher educators, cooperative

teachers, and researchers) encouraged the prospective teachers throughout the process to deepen their knowledge and utilize multiple representations for improving their instructional practices. Results of that study specified that the lesson study model has served as an effective tool for improving the practice of prospective teachers regarding the utilization of multiple representations and audiovisual aids during teaching.

In the Netherlands context, a study has been [REDACTED] conducted by Coenders and Verhoef (2019) who belong [REDACTED] to the University of Twente, Enschede, Netherlands. This [REDACTED] study adopted a qualitative multiple case study approach [REDACTED] and the purpose of this study was to explore the effect of the lesson study model on the professional development of novice and experienced teachers. In this study, researchers divided the participants into two teams, in the first team a teacher educator from university, a mentor from school, and one novice, and one experienced teacher was placed while in the second team teachers of different subjects were involved. Results showed that the lesson study model contributed to pedagogical content knowledge development of both beginning and experienced teachers. And after practicing this model; teachers learned that for ensuring meaningful learning in classrooms, they are required to engage students in a variety of learning activities according to their learning needs instead of focusing on content explanation.

Furthermore, a previously conducted research study by Verhoef and Goei (2016) in which their purpose was to explore the effects of the lesson study model on the professional learning of mathematics teachers revealed that lesson study has been proved as a flexible approach that is based on innovative, complex, and diverse classroom

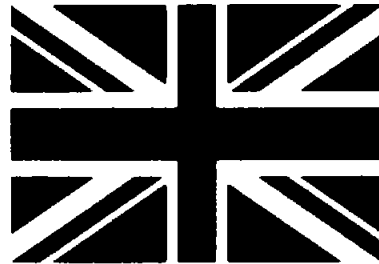
practices. It focused not only on the dominance of learning material or teaching methods but also emphasized promoting students' lifelong learning and thinking abilities.

In the context of Greece, Kanellopoulou and Darra (2018) from the University of Aegean (Greece) conducted a study to explore the perceptions, experiences, and attitudes of teachers who have utilized the lesson study model in the planning phase of their instructional process. It was a survey research, 31 students, a director, and four teachers of a school were selected as a sample for this study. Results of their study showed that key elements of the lesson study model such as detailed planning, collaborative process of lesson development, sharing or experiences, observation, and reflection by fellow teachers have a positive influence on teachers' professional development. Participating teachers also showed positive attitudes and perceptions about the effectiveness of meetings and workshops that take place in the context of practicing the lesson study model.

In the Irish context, the role of the lesson study model in improving classroom instructions has been explored by McSweeney and Gardner (2018) who belong to St. Angela's College, Ireland, and the University of Stirling, United Kingdom respectively. It was qualitative research and a lesson study cycle was practiced to examine improvements in the instructional capabilities of teachers. Results of their study indicated that improving pedagogical skills of teachers and academic achievement of students' lesson study approach contribute a lot, as it plays an important role in ensuring various practices for enhancing teachers' learning and subject-related understanding

through collaborative professional learning, meaningful dialogue, and deeper levels of reflections.

In the British context, Mynott (2017) from the University of Hertfordshire completed a doctoral dissertation in the area of lesson study by adopting an exploratory layered method to explore the effectiveness of the lesson study model in a primary school. Based on findings it was revealed that for ensuring the success of the lesson study model, there is a dire need to overcome the challenges that teachers face due to inadequate collaboration and professional conflicts. The researcher indicated that effective opportunities for learning may be created for teachers by ensuring the practice of the lesson study model in an environment of support, trust, and collaboration.



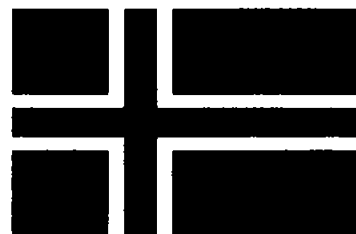
Leavy and Hourigan (2016) from the University of Limerick conducted a study to use a lesson study model for ensuring knowledge development among teachers during initial teacher education programs. 25 prospective teachers constituted the sample of this study and arguments were made qualitatively to narrate the usefulness of the lesson study model. Findings showed that teachers showed highly integrated and robust pedagogical understanding after participating in the practice of the lesson study model. Engagement in this model not only improved the pedagogical content knowledge of teachers but has also supported them to enhance their knowledge about the diverse learning needs of students.

In the same context (British) to explore the effect of the lesson study model on the learning of teachers and students, a study has been conducted by Warwick et al. (2016) who belongs to the University of Cambridge and University of Utrecht. Researchers

adopted a mixed-method strategy and data for this study was derived from a large project that takes place in Camden (London) in the area of lesson study. Findings suggested that teachers are required to focus on students' outcomes as this practice can enable them to select pedagogical strategies as well as learning activities while keeping in view the needs and interests of students. When teachers value the ideas based on their shared understanding and learning needs of students, they become able to accept the idea of pedagogic change according to the nature of the content.

Likewise, teacher perspectives about lesson study have been examined by a group of researchers (Cajkler et al., 2015) who belongs to the School of Education, University of Leicester, UK. This study was qualitative and seven teachers from two departments of an England secondary school constituted the sample of this study. Results of their study indicated that for developing creative solutions to problems that teachers face in classrooms and for collaborative identification of teaching as well as learning-related challenges, the lesson study model offers a practical framework. Moreover, the lesson study process has been reported practice-oriented clear and rewarding process by teachers.

In the Norwegian context, a study has been initiated by Bjuland and Mosvold (2015) who belong to the University of Stavanger, Norway. This study was a part of a Norwegian teacher education project entitled “teachers as students” and the purpose of their study was to explore the challenges associated with lesson study in teacher education. Two groups of teachers teaching the subjects of science, sports, mathematics, and English as a foreign language were selected as samples for this study,



and data collected from them were analyzed qualitatively. Researchers concluded that the lesson study model is not being implemented in the true sense as mentoring sessions, group interviews; collaborative discussions for finalizing research lesson goals which are important elements of lesson study were missing. Furthermore, researchers claimed that there was no proper mechanism for students' observation and ensuring alignment between learning activities and interests. Based on their findings; it was reported that lesson study cannot prove beneficial till that time; until it is practiced with true spirit.

2.8.3 Practice of Lesson Study Model in Asia

Likewise the USA and Europe, in the Asian context researchers of Khon Kaen University, Centre of Excellence in Mathematics (Bangkok), Suratthani Rajabhat University, Cantho University, International Islamic University, Universitas Islam Malang, University of Muhammadiyah Semarang, State University of Semarang, San Jose National High School, State University of Jakarta, Leyte Normal University, University of the Philippines, Philippine Normal University, and the University of Malaysia also conducted various research studies in the area of lesson study model. A detailed description of these studies along with major findings has been given in upcoming lines:

In the Thais context, a research study has been [REDACTED]
conducted by Intaros and Inprasith (2019) who were [REDACTED]
research scholars at Khon Kaen University, Khonkaen, [REDACTED]
Thailand. The purpose of this study was to analyze students' performance in mathematics as a result of using an open and lesson study approach. This study employed a participatory research design, in which researchers themselves, two in-service teachers of

a school and two prospective teachers (who were enrolled in the bachelor program of their respective universities) were engaged. Findings of this study revealed that when the collaborative lesson study approach was practiced in the mathematics classroom, it produced very effective results. Researchers experienced that mathematical ideas of students were extended as well as generalized through representations of real-world and semi-concrete aids.

In the same context, a study has been conducted by scholars (Boonsena et al., 2019) of Khon Kaen University, Centre of Excellence in Mathematics, and Surattani Rajabhat University. The purpose of this study was to explore the role of prospective teachers as a part of the lesson study process. This study was qualitative and one cooperative teacher, two graduate students, two teacher educators, and two prospective teachers constituted the sample of the study. Major data collection tools were observation and reflection and the findings of the study indicated that participation in the practice of the lesson study model matters a lot in promoting the skills of teamwork, collaboration, problem-solving, and experience sharing among not only the prospective teachers but among in-service teachers as well.

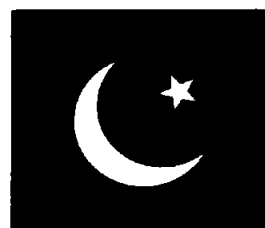
Likewise, researchers (Diem & Thathong, 2019) from Cantho University, Vietnam, and Khon Kaen University, Thailand conducted a study to explore the prospective teachers' understanding of the lesson study



model and the role of this model in enhancing their lesson planning ability for biology subject. This study was qualitative and the case study method was applied for research. Six prospective teachers who voluntarily agreed to participate in the practice of the lesson

study model were selected by researchers as a sample of the study. Initially, these teachers were unaware of the nature of the lesson study model but after training their understanding level concerning the lesson study model was 85.7%. Prospective teachers also indicated that participation in the practice of this model has played an important role in improving their skill of effective lesson planning.

In the Pakistani context, for investigating the gap between theory and practice in teacher education programs (four-year B. Ed / ADE) regarding pedagogical approaches and teacher preparation, a study has been conducted by Jumani et al. (2018) who belong to International Islamic University, Islamabad (Pakistan). Their main focus was to explore the role of the lesson study model as a stimulus for improving the instructional abilities of prospective teachers. Researchers adopted a concurrent triangulation strategy for their study and data were collected through various research instruments such as questionnaires, interviews, direct observations, and focus group discussions. Findings of the study specified that the lesson study model positively affected teachers' pedagogical strategies, content knowledge, and skills as well as improved students' academic achievement through enriched delivery of content knowledge, subject matter, and reflection.



In the Indonesian context, researchers (Prasetyoningsih & Laksono, 2021) from Universitas Islam Malang conducted a study to explore the effect of a scenario card lesson study on the instructional practices of a disabled prospective teacher. This study was qualitative and the case study method was



applied for research. The findings of the study indicated that participation in the practice of the lesson study model has contributed a lot in improving the prospective teacher's skills of lesson planning, classroom teaching, maintaining effective interactions with students, and designing adequate teaching-learning plans.

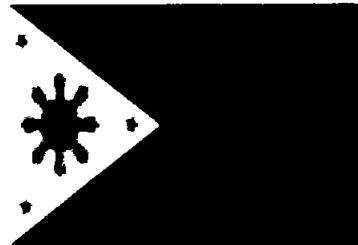
Likewise, a study has been conducted by Aimah et al. (2017) who belong to the University of Muhammadiyah Semarang and State University of Semarang, Central Java Indonesia. The purpose of this study was to observe teachers and give evidence of using lesson study to get benefit from others' experiences especially in the process of teaching to strengthen their strategies and classroom management. It was action research and the researcher selected 11 students of the fourth semester as a sample of study for practicing the lesson study model. Based on findings, it was concluded that lesson study is an important part of teaching improvement as it has made improvements in teachers' pedagogical competencies and ability to increase students' attention, confidence, and motivation in the teaching-learning process, perceptions, experiences, and attitudes of teachers

Similarly, in the Indonesian context, a study has been conducted by Meiliasari (2013) who belongs to the State University of Jakarta for exploring the effect of the lesson study model on prospective teachers' learning during a teaching practice course. This study was quantitative and the researcher utilized multiple data collection tools such as filed notes, videotaped lessons, student's work, prospective teachers working documents, etc. four prospective teachers, four practicing teachers and three teacher educators constituted the population of the study. Findings of the study revealed that the lesson study model has served as an important tool for upgrading prospective teachers'

learning by giving them opportunities to develop effective lesson plans keeping in view the demands of students-centered methods, forecast students' responses and queries before going for classroom teaching, develop effective audio-visual aids, get involve in teamwork and reflect professional attitude during teaching

In the Filipino context, a study has been conducted by Danday (2019) who belongs to Leyte Normal University for exploring the effect of active versus passive microteaching lesson study on prospective teachers' technological pedagogical content knowledge. In this study, the researcher employed a pretest-posttest quasi-experimental design and 18 prospective teachers were selected as a sample of the study. Findings revealed that active microteaching lesson study (which allows prospective teachers to work under a controlled environment for learning essential instructional strategies and rehearsing instructional practice) played an important role in upgrading technological pedagogical content knowledge of prospective teachers as compared to passive microteaching lesson study (in which, there is no teaching through lesson study model and prospective teachers only act as a student throughout the course period).

Likewise in the same context, a study has been conducted by researchers (Lucenario et al., 2016) of San Jose National High School, University of the Philippines, and Philippine Normal University. The main purpose of this study was to explore the effectiveness of the lesson study model in developing Pedagogical Content Knowledge (PCK) competencies of teachers and the academic achievement of students. This study utilized a quasi-experimental research design; four regular chemistry teachers of a high school and their respective students were taken as samples for this study. Based on



findings, it was concluded that the Pedagogical Content Knowledge guided Lesson Study (PCKLS) model played an important role in teachers' professional development (by enhancing their content and pedagogy-related competencies) and students' achievement (by improving their abilities of problems solving and conceptual understanding). It has been further argued by researchers that this model is equally important in the areas of natural and environmental sciences.

In the Malaysian context, the perception of students and teachers was explored about the effectiveness of lesson study implementation by Matanluka et al. (2013) who were research scholars at the University of Malaysia, Sabah. It was a quantitative study and data were collected through questionnaires from 10 teachers and 60 students. Findings revealed that among school teachers lesson study implementation has proved very effective as it offers new perspectives of pedagogy for them and tends teachers to ensure active involvement of students in the teaching-learning process.

2.8.4 Practice of Lesson Study Model in the Middle East

Like American, European and Asian researchers, in the area of lesson study research have been conducted by researchers from Abu Dhabi School of Management, Ajman University, Mus Alparslan University, Tokat Gaziosmanpasa University, Amasya University, TED University, Ankara University, Ministry of Education (Turkey), Duzce University, and the University of Gaziantep as well in the Middle East. A brief description of these studies (that have been conducted by researchers in the United Arab Emirates (UAE) and Turkey) along with major findings is as follows:

In the Emiratis context, a study has been conducted by researchers (Al Masaeid et al., 2021) of Abu Dhabi School of Management and Ajman University to explore the effect of lesson study strategy on classroom practices of university students. Researchers employed a semi-experimental approach for their study and 45 students of Al Khalidiya School of Sharjah constituted the sample of the study. Findings of the study revealed that the lesson study strategy has proved very effective in improving the classroom practices of those teachers who adopted that strategy in their classrooms. It has proved as the best professional development practice for improving lesson planning, lesson implementation, and developing effective action plans related skills of teachers.



In the Turkish context, a study has been conducted by researchers (Aykan & Dursun, 2021) of Mus Alparslan University and Tokat Gaziosmanpasa University to explore the role of the lesson study model in the professional development of prospective teachers. This study was qualitative and the single case study method was applied for investigation. Four female and four male prospective teachers (that were selected by using the criterion sampling technique) constituted the sample of the study. The curriculum consisted of a lesson study model that was developed to practice with prospective teachers and major data collection tools were interviews and teacher diaries. Findings of the study revealed that the practice of the lesson study model has played an important role in improving lesson planning, utilization of innovative teaching methods, and course evaluation-related skills of prospective teachers.



Researchers (Aykan & Yildirim, 2021) of Mus Alparslan University also researched to explore teachers' views and practices about the integration of the lesson study model into distance STEM (science, technology, engineering, and mathematics) education programs. This study was qualitative and the case study method was applied in this research. Data were collected from 24 science teachers (who were selected as a sample of study by using criterion sampling techniques. Findings of the study revealed that according to teachers' views; integration of the lesson study model in distance education programs has proved very effective in developing professional skills among teachers as well as in ensuring high-quality lesson planning and implementation.

In the area of lesson study, a research study has been also conducted by researchers (Ayra & Kosterelioglu, 2021) of Amasya University (Turkey) to explore the effect of this model on academic achievement of students. This study was quantitative and a quasi-experimental design namely a pretest-posttest control group design was utilized by researchers. Six primary school teachers and 167 students of the 3rd-year batch (that were selected through purposive sampling technique) constituted the sample of the study. The findings of the study revealed that the practice of the lesson study model has resulted in significant improvement in the academic performance of students, particularly at those schools where the achievement level of students was very low.

Similarly, researchers (Bayram & Bikmaz, 2021) of Turkish universities: TED and Ankara University respectively; also conducted a research study to explore the implications of the lesson study model for the professional development of EFL (English as a foreign language) teachers. This study was qualitative and a case study was utilized by the researchers. For EFL teachers were purposefully engaged in this research study by

seven volunteers. The findings of this research study revealed that the practice of the lesson study model has the potential to improve the professional development of teachers as it has contributed to increasing their pedagogical content knowledge, reflectivity, research-related, collaboration, and collegiality-related skills.

From the perspective of prospective teachers' professional development, researchers (Okmen & Kilic, 2021) from the Ministry of Education and Duzce University (Turkey) conducted a research study to explore the effect of lesson study practice on the professional development of prospective teachers. This study was qualitative and the action research method was applied in this study. For practicing the lesson study model, researchers engaged two prospective teachers who voluntarily agreed to participate in this practice. Major data collection tools were interviews, observations, reflective diaries, students' evaluation forms, and letters from prospective teachers. Based on findings, researchers concluded that the practice of the lesson study model is a great source of improving instructional practice and skills of prospective teachers. Furthermore, the practice of this model has motivated prospective teachers to emphasize on utilization of student-centred methods and strengthen their beliefs about being successful in the teaching profession.

Likewise, at the University of Gaziantep Arslan (2018) conducted a study to explore the contributions of the lesson study process to the professional growth of teachers. In this study, the researcher employed an intrinsic case study approach, and eight prospective teachers of EFL courses were selected as the sample of the study. Based on data collected from a variety of qualitative tools (i.e. lessons videos, researchers' notes of group meetings, reflections of prospective teachers, drafts of lesson plans, and

observations of lessons), it was concluded that for the training of pre-service teachers in the field EFL, lesson study model has proved very effective. It is effective not only for improving the pedagogical skills of teachers but also played an important role in advancing their professional learning. In a nutshell, it can be stated that in the perspective of practices related to the LS model in developed and developing countries; the researcher has discussed the results of 12 studies conducted in the USA, 10 in Europe, 10 in Asia, and seven research studies conducted in the Middle East.

Though in these research studies, the effectiveness of the lesson study model has been explored regarding diverse variables such as teachers' professional development, classroom practices, the academic achievement of students, collaboration amongst counselors, and instructional practices of teachers, the practice of this model with prospective teachers, ensuring knowledge development among teachers during initial teacher education programs, subject-based improved performances of teachers as a result of participation in the practice of this model and so on. Cumulative analysis of these research studies' findings indicated that the practice of the lesson study model has been found very supportive for effective professional development of prospective teachers, improved classroom practices, and upgraded academic achievement of students.

2.9 Summary

As the main variables of this study were the lesson study model, professional development of prospective teachers, and academic achievement of students, therefore, in this chapter researcher has conducted a detailed literature review regarding these variables. There are eight major headings in this chapter; the first three headings are related to the introduction of the lesson study model, baseline theories, and benefits of

this model. The fourth and fifth headings are based on literature related to the professional development of teachers and theories of effective professional development. In the sixth heading, evidence related to the direct effects of teachers' professional development on students' achievement has been described. The seventh heading highlighted the role of lesson study in improving teachers' professional development and students' achievement; and in heading eighth, practices related to lesson study models in developed and developing countries have been drafted. Based on the literature review, it can be concluded that the quality and good repute of educational institutions are closely linked with professional development opportunities that are offered by educational administrators for their teachers. Only well-educated and purposefully trained teachers can ensure the desired achievement of students which is an affirmative indicator of excellent school repute.

Though there are various models of teachers' professional development that is being practiced by educational administrators worldwide one of the most effective is the lesson study model. The eighth heading of this chapter described in detail the researchers' evidence regarding the effectiveness of this model concerning prospective teachers' professional development and improved students' academic achievement. In Pakistan, very limited research has been conducted to explore the effectiveness of innovative teachers' professional development models generally and lesson study model specifically, therefore, it was realized to bridge this gap. Next Chapter (3) presents the data related to philosophical assumptions, research design, population, sample, instrument, data collection, and data analysis regarding the practice of the lesson study model.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Philosophical Assumptions

For accomplishing the purpose of this study, the theory of social constructivism was practiced as a philosophical foundation. Wilen et al. (2004) stated that this theory implies the assumption of active learning, as it emphasized involving learners in the collaborative investigation, social interaction, authentic experiences, extensive discussions, and reflective practices. The lesson study model is fulfilling that assumption very evidently as it has been indicated in literature (Stigler & Hiebert, 1999; Lewis, 2002; Chokshi & Fernandez, 2004; Lewis et al., 2011; Lucenario et al., 2016) that for professional development of prospective as well as in-service teachers lesson study model is being used effectively for developing the spirit of collaborative teaching, active social interaction, experiences sharing, conducting comprehensive discussion session, getting engaged in reflective practices; as these skills are considered the prerequisites of an effective instructional process.

Social constructivism has been considered effective since the late 18th and early 19th century as Dewey (1859-1952) who has remained a prolific educationist, stated that its focus on encouraging teamwork among students, establishing a learner-centered and interactive classroom environment keeping in view the routines, abilities, and interest of students that are main elements of the constructivist approach. The lesson study model is also supporting Dewey's point of view regarding an effective instructional model as it has been argued by researchers (Fernandez & Yoshida, 2004; Stepanek et al, 2007;

Murata, 2011; Rutkowski et al., 2013; Thompson, 2015) that practice of lesson study model is a timely effort for promoting the abilities of teamwork, practicing learner-centered instructional strategies, making classroom interactive by improving instructional practices, teaching students keeping in view their interest and cognitive level.

Vygotsky (1896-1934) also highlighted the importance of socialization in educational institutions as it can assist students in knowledge construction. According to him, an interactive classroom environment which is a key assumption of constructivism can prove very supportive in developing new cognitive structures among students (Gabler & Schroeder, 2003). And in these scenarios, it has been also highlighted by Murata (2011) that activities that take place in the context of the lesson study model play an imperative role in strengthening the socialization-related competency of teachers, as it demands from teachers to get involved in the collegial discussion for improving their instructional practices and classroom environment effective and attractive for students. Besides it, it has been also explored by Intaros and Inprasith (2019) that by practicing the lesson study model in a real sense during instruction, students' ideas can be extended as well as generalized for concepts clarification of students this model emphasized representations of the real world and semi-concrete aids.

From a philosophical perspective, Darling-Hammond and Sykes (1999) stated that the success of a nation is dependent on quality teachers, and for ensuring the professional development of teachers, teacher trainers are expected to shift their practices from repetition, memorization, and recitation of correct answers to problems based, activity-based and discussion-oriented activities. And it has been expressed by Inprasitha (2010) that the key characteristic of the lesson study model is that teachers collaboratively plan,

practice, and observe lessons keeping in view the idea of creating open-ended problems to ensure maximum participation of students in the teaching-learning process. Furthermore, Darling-Hammond (2010) herself argued that a lesson study is a collaborative approach that requires at a time both skills inquiry and practice.

3.2 Research Design

A mixed-method multiple case study approach was employed in this research and keeping in view the assumptions of this approach, each group of sampled respondents was conceptualized as a “case” (Stake, 2005; Yin, 2009). In multiple case study one case is selected (it may be an individual, a model, an institution, or an organization) and for illustrating that case multiple case studies are selected (Creswell, 2007). This design may be used when the researcher intends to provide a better understanding related to a theme by exploring perceptions of participants (Gall et al., 2007). Each prospective teacher was observed in a real-life context to explore real experiences of participating in the lesson study model and its effects on prospective teachers’ professional development and learning. The use of this approach also helped the researcher to gather vital information from careful participant selection, rather than a statistical representation of sampling for quantitative studies.

Yin (2014) who is a renowned expert in case study research, promoted the idea of combining qualitative and quantitative evidentiary sources for data collection in case study research as he considered these both techniques equally instrumental. Yin (2003) emphasizes examining, categorizing, tabulating, and testing both types of data i.e. quantitative and qualitative for getting in-depth information about the area of study. It has been further advocated by Yin (2014) that, as a researcher is required to handle both

types of evidence (quantitative as well as qualitative), so he must be competent in various kinds of analysis techniques that are being utilized for quantitative and qualitative data analysis. Merriam (2009) promoted the use of interviews and observations to support qualitative research. A mixed-methods paradigm has been suggested by Creswell and Plano (2007) as well as by Tashakkori and Teddlie (1998) for collecting data in this research. A case study method has been utilized as the researcher had definable cases with boundaries and attempted to gain in-depth information on the cases involved in this study.

The researcher illustrated the cases by collecting data from the experience of prospective teachers, students' marks, and perception of cooperative teachers and supervisors. The mixed-methods multiple case study design (Stake, 2005; Yin, 2009) helped to explore the effectiveness of the lesson study model in improving the instructional process of prospective teachers as well as students' achievement. Likewise, random selection did not take place within this study because this study required a purposive selection of prospective teachers who were in their training phase after completing course work, supervisors and cooperative teachers who were observing prospective teachers during their internship, and students who were being taught by prospective teachers.

The lesson study cycle occurred for one semester (February-June, 2021) as a part of a teaching practice course. The study was based on duration of 20 weeks. Two cycles of lessons development, implementation, and evaluation were carried out by three groups of prospective teachers. The practice of lesson study was carried out with students in 6th and 7th classes studying the subjects of computer education and geography at three

sampled institutions. And for discussion, formulation, presentation, and evaluation of the research lesson one period per week was allocated with the consent of the school supervisor. The data were analyzed to explore similarities and differences in the perception of participants and relevant themes were merged up using a triangulation strategy. A pictorial description of that strategy is as follows:

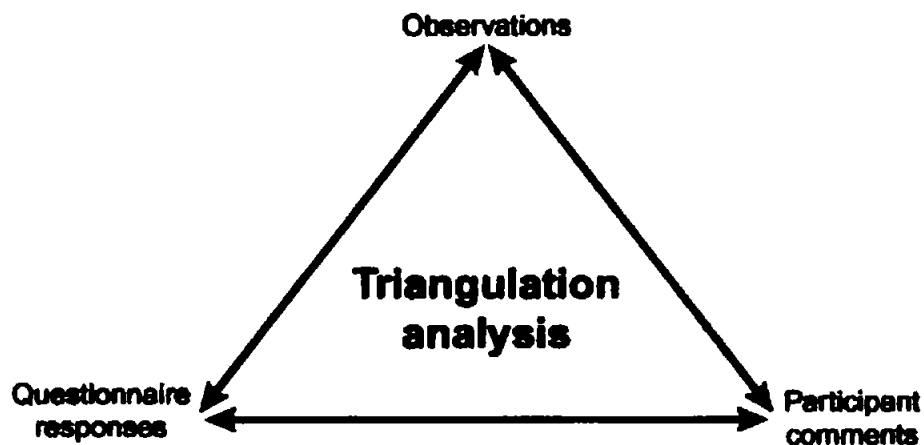


Figure 3.1: Triangulation Strategy

Keeping in view the key requirements of that strategy, at the end of the findings section, the researcher has triangulated the findings based on the data collected from observations (conducted by the researcher and prospective teachers), prospective teachers' perceptions (by practicing lesson study model and reading their reflection) students' marks, perceptions of cooperative teachers, teacher educators, and schools principals (by interviews).

3.3 Population

The population of the study consisted of teacher educators and prospective teachers of all Islamabad based universities and principals, cooperative teachers and students of all Islamabad based schools/colleges (affiliated with FED: Federal Directorate of Education). As the purpose of this study was to practice lesson study model with

prospective teachers during their long term internship, therefore this study was delimited to teacher educators and prospective teachers of IIUI. Target population of the study consisted of internship supervisors/course coordinators and 8th semester students of the 4-Year undergraduate program (BS Education) in the education department of International Islamic University Islamabad (who were sent to various schools of Islamabad for the long-term internship which is their degree requirement and also termed as teaching practice). Complete list of prospective teachers and the educational institutions where they were placed for teaching practice has been given in appendices section (appendix-1).

It has been indicated by Cerbin and Kopp (2011) that the minimum number of teachers required for the lesson study group is three and the maximum number is six. Therefore, for the formulation of lesson study groups, the researcher contacted to course coordinator of long term internship program and she was informed that there were only two such educational institutions (Islamabad Model College for Girls (I-XII), Tarlai and Islamabad Model School for Girls (VI-X), F-7/2) where the required number of prospective teachers (4-5) for practicing lesson study model were available. It was further informed that cooperative teachers have assigned the subjects of computer education and geography to these prospective teachers for teaching (to students of 6th and 7th class) during their whole internship period along with various arrangements.

Therefore for selecting prospective teachers for practicing lesson study model and prospective teachers who were doing individual teaching (and were teaching the subjects of computer education and geography to students of 6th and 7th class), this study was delimited to only those Islamabad based model schools and college (4 schools and 4 colleges) where the students of middle classes (6-8) were available, list of Islamabad

model schools and college (8) having the classes from 6-8 has been attached in appendices section (appendix-2). Therefore, target population of this study was supervisors (schools principals), cooperative teachers (who were assisting of prospective teachers during their internship), and students of grade 6th and 7th of four Islamabad model schools and four colleges. Furthermore, it is important to mention here that as in Islamabad model schools, students have been divided into various sections (i.e. sections A, B, C, D, etc.), therefore students of all sections constituted the target population of this study. Data related to the total number of students in grades 6th and 7th were collected from those schools'/colleges' administration sections. Detail of total number of 6th and 7th grade students in each institution has been given in appendices section (Appendix-3). Tabular description of target population has been given in table 3.1 which is as follows:

Table 3.1

Target Population of the Study

S.No	Strata	Total Number
1.	Supervisor/ Course Coordinators at University	5
2.	Prospective Teachers of BS program	21
3.	Supervisors at Schools/Colleges (1 in each institution)	8
4.	Cooperative Teachers at Schools (2 in each institution)	16
5.	Students of 6 th Class	1288
6.	Students of 7 th Class	1288

Source: Schools' Administration Section

3.4 Sample & Sampling Technique

Multistage sampling technique was used to select three institutions (one school and two colleges) as initially those 11 Islamabad based schools and colleges were selected where the students of BS program were placed for long term internship. Then at second stage; after getting information that required number of prospective teacher for formulating lesson study groups are available in only in two institutions and they are going to teach the students of middle level (6-8 grades) for whole semester, those eight educational institutions were selected where the students of middle level (6-8 grades) were available. Afterwards, at third stage those three institutions were selected where the prospective teachers (practicing lesson study model and prospective teachers doing individual teaching) were teaching the same subjects at same grades.

Convenient sampling technique was used to select prospective teachers for practicing lesson study model ($4+4=8$) from BS program (Session 2017-21) of education department as during the practice of lesson study model researcher was required to engage prospective teachers for whole semester (February 2021-June 2021) and it was easy to take permission from course coordinators and to conduct frequent meetings with prospective teachers. After conducting a meeting with these prospective teachers, it was explored that they were teaching the subjects of computer and geography to the students of 6th and 7th grades for the whole semester. Keeping in view these considerations, purposive sampling technique was utilized to select those prospective teachers ($1+1=2$) who were teaching same subjects (computer education and geography) at same levels (6th and 7th grades) by doing traditional teaching. Prospective teachers were placed into three groups; the first two groups were labeled as “lesson study group 1” and “lesson study

group 2” and the third group was labeled as “prospective teachers Doing Individual Teaching”. Detail of sampled prospective teachers and institutions has been given in appendices section (appendix-4).

The census sampling technique was used to select course’ coordinators/ supervisors at the university (which were five in number) as it has been indicated by Surbhi (2017) that it is a method in which all units of the population are enumerated for data collection. As Patton (2002) noted that a purposive sampling technique allowed creditability for a sample size, therefore purposive sampling technique was utilized to select three supervisors (two from colleges and one from school) and six cooperative teachers (four from colleges and two from school) who were directing and guiding the prospective teachers throughout internship duration and it was quite relevant to take their feedback for exploring the effectiveness of lesson study model.

According to John Curry's (1984) rule of thumb; if the population is between 1001-5000 then 5% of the total population may be selected as a sample of the study (Zahidullah et al., 2017). Therefore, keeping in view this formula simple random sampling technique was applied to select the required number of students from the 6th and 7th classes. For lesson one; two sections of the 7th class were selected, the total number of students was 40 in the class of prospective teacher one (who was teaching through the lesson study model), and on the day of the test number of present students was 35. While the total number of students was 28 in the class of prospective teacher two (who was doing individual teaching) and on the day of the test number of present students were 25. Researchers selected 68 students as a sample and took the test of 60 students who were present on test day.

For lesson two; two sections of the 6th class were selected; the total number of students was 34 in the class of prospective teacher one (who was teaching through the lesson study model) and on the day of the test number of present students was 26. While the total number of students was 32 in the class of prospective teacher two (who was doing individual teaching) and on the day of the test number of present students was 28. Researchers selected 66 students as a sample and took the test of 54 students who were present on test day. Tabular description of the sample has been given in table 3.2.

Table 3.2

Sample of the Study

S.No	Strata	Total Number
1.	Supervisor/ Course Coordinators at University	5
2.	Prospective Teachers (involved in the practice of LS model)	8(4+4)
	Prospective Teachers (teaching via traditional methods)	2(1+1)
3.	Supervisors at Schools (1 in each school)	3
4.	Cooperative Teachers at Schools (2 in each school)	6
5.	Students of 6 th Class (selected section)	26+28=54
6.	Students of 7 th Class (selected section)	25+35=60

For involving prospective teachers in this study; formal permission was taken from long-term internship (teaching practice) supervisors at the university, permission letter has been attached in appendices section (appendix-5). Lesson study groups consisted of 8 prospective teachers (who were voluntarily willing to participate in the study) and they were divided into further two groups (4+4). Two more prospective teachers (doing individual teaching via the traditional method) were also engaged in this

study for class observation and evaluation with the aim of comparison regarding instructional practices.

Consent forms (to participate in this study) were signed by all sampled prospective teachers at the request of the researcher and signed forms have been attached in appendices section (appendix-6). After getting permission from the supervisor at the university and the consent of prospective teachers, the researcher drafted a letter for the supervisor of prospective teachers at school to get permission for practicing the lesson study model (appendix-7). As the researcher (after discussion with prospective teachers) selected two subjects for practicing the lesson study model, therefore students of both sections (taught via lesson model and individual teaching) were selected as a sample of the study.

3.5 Research Instruments

For accomplishing the purpose of the study and collecting relevant data both qualitative and quantitative tools were used by the researcher. Qualitative instruments were group meetings, pre-lesson reflections, lesson plans developed by prospective teachers doing individual teaching and practicing the lesson study model (Appendix-8 & 9), researcher's field notes/reflections, post-lesson reflections of prospective teachers practicing the lesson study model (Appendix-10), interviews with university supervisors/course coordinators and supervisors and cooperative teachers at schools (Appendix-11,12, & 13). While quantitative instruments were observation sheets for prospective teachers (Appendix-14) and class tests developed by the researcher to evaluate the academic performance of students taught by the traditional method and lesson study

model (Appendix-15). A detailed description of these instruments has been given in relevant appendices' numbers while their brief description is as follows:

3.5.1 *Group Meetings*

These group meetings were conducted with prospective teachers, cooperative teachers, school principals, and university supervisor/course coordinators. The basic purpose of the meetings that were conducted with prospective teachers was to: clarify the real essence of the lesson study model; take their consent for participation in the practice of the lesson study model, record their pre-lesson reflections, familiarize them with the whole schedule of practicing lesson study model, assist them to resolve their problems related to lessons planning, presentation, observation, evaluation, and students engagement, and explore data related to their post-lesson reflections and give them a celebration lunch.

The basic purpose of the meetings that were arranged with university supervisor/course coordinators was to: take their consent for involving prospective teachers in the practice of the lesson study model, take guidelines from them about the successful practice of the lesson study model, schedule time with them for exploring their perceptions about the effectiveness of lesson study model, and take their suggestion for proposing a framework to ensure university-school partnership. The basic purpose of meetings that were conducted with schools principals and cooperative teachers was to: take their consent for practicing the lesson study model at their institutions, brief them about the real essence of the lesson study model; ask them to provide adequate guidance to prospective teachers for practicing lesson study model effectively, schedule time with

them for exploring their perceptions about the effectiveness of lesson study model, and take their suggestion for developing a framework to ensure university-school partnership.

3.5.2 *Pre-Lesson Reflections*

After briefing prospective teachers about the real essence of the lesson study model, and taking their formal consent to participate in the practice of the lesson study model, they were asked to write a pre-lesson reflection about their participation in the practice of the lesson study model. The basic purpose of getting data from pre-lesson reflections of prospective teachers was to explore their concerns, anticipated benefits, and expectations associated with the practice of the lesson study model.

3.5.3 *Lesson Plans*

Creating a detailed lesson plan was the basic requirement of practicing the lesson study model; therefore a template for developing a lesson plan was given to prospective teachers. This template was divided into major sections: General Information and specific (keeping in view the decided time). Major indicators in the section of general information were: team no, the id of teachers, school name, grade, date of lesson presentation, subject, topic, total time of lesson presentation, lesson objectives, teaching method, and audiovisual aids. While major indicators in the section of specific information were: previous knowledge testing, the announcement of the topic, presentation by the teacher, students' activities, ways to assess students' understanding, wrap-up, and homework. Prospective teachers were also directed to write the time of each activity (which they plan to conduct during lesson presentation) and paste relevant material in the section of BB (BlackBoard) writing.

3.5.4 Researcher' Field Notes/Reflections

The basic purpose of writing these notes and reflections was to: brief participants about the real essence of the lesson study model, collect data about the placement of prospective teachers at various colleges/schools of ICT (Islamabad capital territory), ensure the practice of all lesson study phases at the scheduled time and in an appropriate way, note the points for improving the instructional practices of prospective teachers, and communicate each participating member about her expected role during the practice of lesson study model.

3.5.5 Post-Lesson Reflections

After practicing the complete cycle of the lesson study model, prospective teachers were invited by the researcher to attend a meeting at the university, and they were asked to write post-lesson reflections on the researcher' developed open-ended questionnaire. Key themes of that open-ended questionnaire were: prospective teachers' experience, using lesson study model in the future, producing effective reflective practitioners, motivation for getting a full command of the topic, increasing knowledge of instructional strategies, and support for effective classroom management, ensuring active students' engagement, upgrading assessment-related competencies, development of professional attitude, and learning from lesson study model.

3.5.6 Interview Guide for University Supervisors/Course Coordinators

An interview guide was developed by the researcher with the valuable suggestions of supervisors; for exploring the perception of university supervisors/course coordinators (who were instructing prospective teachers during their coursework and

observing their instructional practices throughout the internship phase) about the effectiveness of the lesson study model. Key themes of that interview guide were: elevating pedagogical content knowledge, developing collaborative attitude, enlightening professional development practices, upgrading the academic performance of students, university-level initiatives for the practice of lesson study model, school-level initiatives for the practice of lesson study model, cooperative teachers' role in the practice of lesson study model, and strategies to ensure university-school partnership.

3.5.7 Interview Guide for Schools Supervisors

An interview guide was developed by the researcher with the valuable suggestions of supervisors; for exploring the perception of school principals (who were supervising prospective teachers throughout the practice of the lesson study model) about the effectiveness of the lesson study model. Key themes of that interview guide were: the uniqueness of the lesson study model, ideal strategies for teaching at the middle level, expectations from university supervisors, strategies to practice the lesson study model, school-level initiatives for the practice of the lesson study model, university-level initiatives for the practice of lesson study model, and strategies to ensure university-school partnership.

3.5.8 Interview Guide for Cooperative Teachers

An interview guide was developed by the researcher with the valuable suggestions of supervisors; for exploring the perception of cooperative teachers (who were assisting prospective teachers throughout the practice of the lesson study model) about the effectiveness of the lesson study model. Key themes of that interview guide were: effectiveness of lesson study model, motivation to utilize multiple teaching

strategies, increased collaboration among teachers, improved students' understanding of lessons, development of professional attitude, upgraded observation and evaluation skills, modification in classroom practices, expectations from university supervisors, and learning from lesson study model.

3.5.9 Observation Sheet

An observation sheet was developed by the researcher with the valuable suggestions of supervisors; for exploring the difference in the instructional practices of teachers teaching through traditional methods and teachers teaching by the practice of the lesson study model. Major skills that were observed by that observation sheet were: lesson planning, lesson presentation, application of teaching methods, interaction with students, use of audiovisual aids, and assessment-related competencies.

3.5.10 Class Tests

Class tests for the students of grades 6th and 7th were developed by the researcher with the help of cooperative and prospective teachers for exploring the difference in the academic performance of students taught by traditional methods and students taught by practicing the lesson study model.

3.5.10.1 Test Construction Process for Test 1 (Grade 6): The test developed for the students of grade 6th was based on the following items: grade, name of the student, subject, chapter number and name, total marks, allocated time, multiple-choice questions, fill in the blanks, label the items, and short questions answers. For developing the test of grade 6th students, content was taken from Chapter 01: ICT Fundamentals (pages: 07-22) of "Computer Education" book that has been published by National book Foundation as

Federal Textbook Board Islamabad (2020). In order to ensure the alignment between objectives and test items, table of specification was also developed. Detail of learning outcomes, table of specification, parts of test, and marks is as follows:

3.5.10.1.1 Learning Outcomes

Figure 3.2: Learning Outcomes of Chapter 1

- Define ICT
- Identify various ICT devices
- Define a computer
- Differentiate between data and information
- Explain the advantages and daily usage of ICT Devices
- Understand the ICT Lab Rules
- Explain the difference between hardware and software
- Define system and application software
- Identify hardware components of a computer
- Identify health risks and its mitigations from ICT devices

Figure 3.2: Learning Outcomes of Chapter 1

3.5.10.1.2 Table of Specification

Table 3.3

Table of Specification for the Subject of Computer Education (Grade 6th)

Topics	Knowledge	Comprehension	Analysis	Total
		/Application		
What is ICT?	2	1	1	4 (31%)
Advantages and Daily usage of ICT devices	2	1	0	3 (23%)
The Components of a Computer	4	1	1	6 (46%)
Total	8 (62%)	3 (23%)	2(15%)	13 (100%)

3.5.10.1.3 Parts of Test and Marks

- Part I: Multiple Choice Questions 4 (1+1+1+1=4)
- Part II: Fill in the Blanks 4 (1+1+1+1=4)
- Part III: Label the Items 1 (1+1+1+1+1+1=6)
- Part IV: Short Questions 4 (4+4+4+4=16)
- Total Items 13
- Total Marks 30

3.5.10.2 Test Construction Process for Test 2 (Grade 7): Likewise, test developed for the students of grade 7th was based on the following items: grade, name of the student, subject, chapter number and name, topics, total marks, allocated time, multiple-choice questions, fill-in-the-blanks, and short questions answers. For developing the test of grade 7th students, content was taken from Chapter 04: Major Landforms of the Earth (pages: 36-45) of “Geography” book that has been published by National book Foundation as Federal Textbook Board Islamabad (2020). In order to ensure the alignment between objectives and test items, table of specification was also developed. Detail of learning outcomes, table of specification, parts of test, and marks, is as follows:

3.5.10.2.1 Learning Outcomes

After studying this unit, you will be able to:

- ① understand the difference between a hill and a mountain.
- ② know how all the major landforms emerged (folding and faulting)
- ③ define plateaus.
- ④ identify the types and major plateaus of the world and specify the types found in Pakistan.
- ⑤ understand the impact of plateaus on Human life.

Figure 3.3: Learning Outcomes of Chapter 4

3.5.10.2.2 Table of Specification

Table 3.4

Table of Specification for the Subject of Geography (Grade 7th)

Topics	Knowledge	Comprehension/A Analysis pplication	Total	
Mountains	4	2	1	7 (54%)
Plateaus	2	2	2	6 (46%)
Total	6 (46%)	4 (31%)	3 (23%)	13(100%)

3.5.10.2.3 Parts of Test and Marks

- Part I: Multiple Choice Questions 5 (1+1+1+1+1=5)
- Part II: Fill in the Blanks 5 (1+1+1+1+1=5)
- Part IV: Short Questions 3 (4+3+3=10)
- Total Items 13
- Total Marks 20

3.6 Validity of Research Instruments

Major instruments that were utilized to collect for this study were interview guide for teacher educators, school principals, cooperative teachers and prospective teachers (for getting their post lesson reflections); observation sheet to evaluate the instructional practices of PTs and class test to measure the academic performance of students. For ensuring the validity of interview guides that were developed for teacher educators, schools principals, cooperative teacher and prospective teachers, expert opinion from senior teacher educators of university was taken. Only minor changes related to some

terminologies (such as teaching/instructional strategies instead of pedagogical strategies, collaboration instead of cooperation) were made in the interview guides on the basis of experts' opinion.

Observation sheet was also validated before data collection and for improving it keeping in view the suggestion of experts; it was divided into six major sections on the basis of major themes. In order to ensure the validity of class test, expert opinion was sought out and for it the opinion of experienced teachers working at university, selected colleges, and schools were consulted. Keeping in view the feedback of experts, required changes were made in the layout of class test. Furthermore, double blanks were removed from the fill in the blanks and only one blank was placed for all statements.

3.7 Pilot Testing

All the instruments were pilot tested after validation and basic purpose of this process was to ensure the reliability of these instruments as well. Interview guides developed for teacher educators, schools principals and cooperative teachers were also pilot tested and for it those teacher educators, school principals, and cooperative teachers were interviewed that were not included in the sample of study. Observation sheet was pilot tested by conducting the observation of those prospective teachers who were the part of same batch but were not selected as participants of present research study.

For pilot testing of Computer Education' class test, students of grade 6th (section B) from "Islamabad Model School for Girls, F-7/2" were selected and total number of students in this section were 23. While for pilot testing of Geography' class test, students of grade 7th (section D) from "Islamabad Model College for Girls, I-8/4" were selected and total number of students in this section were 19. Sections for pilot testing were

selected from the classes of cooperative teachers and students of those sections were included in pilot testing, who were completed the revision of selected units.

3.8 Reliability of Research Instruments

For interview guides, intra-rater reliability was measured by using Cohen Kappa coefficient and k value of these interview guides was as follows: k value of interview guide that was developed for teacher educators was 0.79, for interview guide of cooperative teachers that value was 0.80 and this value was 0.75 for interview guide that was developed for schools principals. Therefore, on the basis of these results it was deduced that k value of interview guide that was developed for cooperative teachers was excellent while k value of interview guides that were developed for teacher educators and school principals was good according to the distribution of renowned researchers (Baird, Healy, Johnson, Bogie, Dankert, & Scharenbroch, 2013). For ensuring the reliability of observation sheet, Cronbach alpha was calculated and the value of alpha was 0.73 which is considered good.

For ensuring the reliability of class tests, item analysis was conducted for tests of both subjects (computer education and geography) separately. It is a statistical analysis that is used to decide the selection or rejection of test items on the basis of their difficulty and discrimination index. For determining the item difficulty, formula: $D = \frac{L+H}{N}$ is used and for determining the value of discrimination index formula: $d = \frac{L-H}{n}$. Criteria for analysis is as follows:

- Items need to be discarded, if the value is 0 or 1
- Items are considered difficult, if the value is from 0.1 to 0.29
- Items are considered good, if the value is from 0.3 to 0.79

- Items are considered easy, if the value is from 0.8 to 0.99

For tests, difficulty and discrimination index was calculated and decisions were made accordingly. Detail of item analysis is as follows:

Table 3.5

Item analysis for test of Grade 6th "Computer Education"

Item#	Difficulty Index	Discrimination Index	Decision
Part 1			
i.	0.75	0.50	Item was included in the test
ii.	0.83	0.33	Item was included in the test
iii.	0.83	0.33	Item was included in the test
iv.	0.75	0.50	Item was included in the test
Part 2			
i.	0.25	0.50	Item was included in the test
ii.	0.83	0.33	Item was included in the test
iii.	0.41	0.50	Item was included in the test
iv.	0.75	0.50	Item was included in the test
Part 3			
i.	0.75	0.50	Item was included in the test
ii.	0.25	0.10	Item was included in the test
iii.	0.75	0.10	Item was included in the test
iv.	0.58	0.83	Item was included in the test
v.	0.50	0.33	Item was included in the test
vi.	0.83	0.33	Item was included in the test
Part 4			
i.	0.75	0.50	Item was included in the test
ii.	0.50	0.6	Item was included in the test
iii.	0.60	0.33	Item was included in the test
iv.	0.90	0.10	Item was included in the test

Table 3.6

Item analysis for test of Grade 7th “Geography”

Item#	Difficulty Index	Discrimination Index	Decision
Part 1			
i.	0.90	0.20	Item was included in the test
ii.	0.80	0.40	Item was included in the test
iii.	0.60	0.40	Item was included in the test
iv.	0.70	0.20	Item was included in the test
v.	0.80	0.40	Item was included in the test
Part 2			
i.	0.30	0.20	Item was included in the test
ii.	0.30	0.20	Item was included in the test
iii.	0.40	0.40	Item was included in the test
iv.	0.40	0.40	Item was included in the test
v.	0.50	0.60	Item was included in the test
Part 3			
i.	0.80	0.40	Item was included in the test
ii.	0.70	0.60	Item was included in the test
iii.	0.60	0.40	Item was included in the test

3.9 Data Collection

This mixed-methods multiple case study was based on four major cases concerning the key theme “effectiveness of lesson study model”. A brief description of these cases is as follows:

- i. Case I: Practice of Lesson Study Model
- ii. Case II: Comparing Prospective Teachers’ Instructional Practices
- iii. Case III: Evaluation of Students’ Academic Performance

iv. Case IV: Supervisors' and Cooperative Teachers' Views

Several rigorous and varied data collection techniques (including research meetings, activity/purpose-based reflections, field notes, lesson videos, observation sheets, class tests, and interview guides) were utilized by the researcher to get detailed data related to each case. The researcher personally visited schools for getting permission to practice the lesson study model and scheduled interviews with cooperative teachers and supervisors. Prior permissions were taken from heads of institutions where this study takes place. A meeting was conducted with prospective teachers with the approval of the course coordinator to describe the study's purpose as well as to take consent for participation. As the first case of the present study was more comprehensive as compared to other cases and it was based on the duration of 12 weeks, therefore it has been denoted as cycle one. And the duration of data collection related to the other three cases has been denoted as cycle 2. The detail of both cycles following the weeks is as follows:

3.9.1 Cycle 1 (1-12 weeks)

The first cycle of data collection related to the practice of the lesson study model was based on the duration of 13 weeks. Week-wise detail of conducting activities in the scenarios of the lesson study model was as follows:

3.6.1.1 First Week: In the first week a meeting was conducted with the supervisors of prospective teachers at the university. The major aims of conducting this meeting were to: get the permission of the university supervisor to involve prospective teachers in the practice of the lesson study model, brief about the whole process (including the schedule) for practicing that model, and get the record of prospective

teachers' placement at various colleges and schools of Islamabad capital territory. Data collection tools that were utilized for this week were permission letters and the researcher's notes/artifacts.

3.6.1.2 Second Week: After getting formal permission from the university supervisor to engage prospective teachers in the practice of the lesson study model, a meeting with prospective teachers and course coordinators at the university. The major purpose of that meeting was to: provide a basic introduction of the lesson study model, brief about the practice of the lesson study model, get information about: the type of Schools (where prospective teachers have been placed for internship), group of prospective teachers (that have been placed in the same school), and time duration of one period/class at school. The data collection tool that was utilized for this week was the researcher's notes /artifacts and as a result of that meeting, the final list of prospective teachers' placement at various ICT-based schools/colleges were obtained.

3.6.1.3 Third Week: After getting the record of prospective teachers' placement, a meeting was arranged with the help of the course coordinator with those prospective teachers that were selected to practice the lesson study model for getting their formal consent to participate in the study (as there were only two institutions: one school and one college, where the required number of prospective teachers for practicing lesson study model were available, therefore researcher selected only two educational institutions for the formulation of lesson study groups). Prospective teachers seem very enthusiastic and they sign the consent form of voluntary participation in the practice of the lesson study model. After getting the consent of prospective teachers, their groups were formed. The first group of prospective teachers was selected from IMCG, Tarlai

(that was labeled as group 1), and the second group of prospective teachers was selected from IMSC, F-7/2 (that was labeled as group 2). The researcher also collected personal contact numbers from prospective teachers to create a WhatsApp group for effective coordination. Data collection tools that were utilized for third week were consent letters and the researcher's notes/artifacts

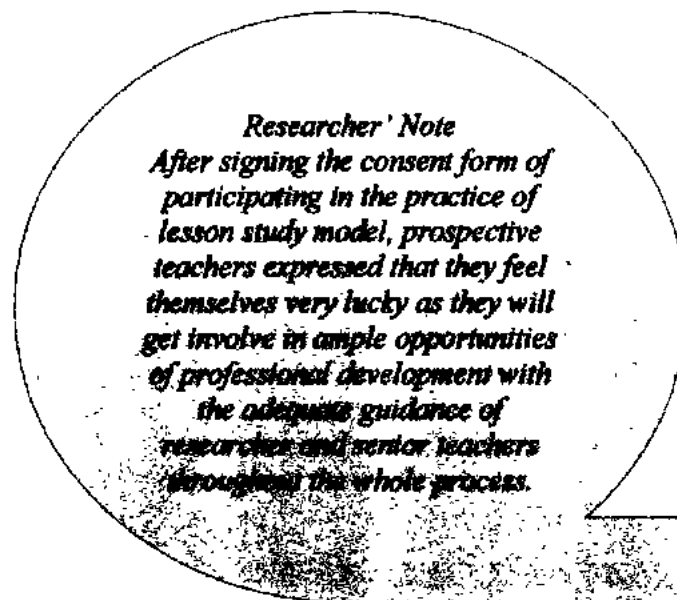


Figure 3.4: Researcher's Note

3.6.1.4 Fourth Week: After getting the consent of prospective teachers and formulation of lesson study groups, a meeting was arranged with supervisors of prospective teachers at ICT-based schools/colleges for briefing them about the research process, getting permission to practice the lesson study model at their school/college, and observing teaching context and overviewing curriculum. The attitude of school principals was very supportive for the practice of the lesson study model at their institutions with the help of prospective and cooperative teachers. And they were ensured that the practice of this model can prove effective not only for the professional

development of prospective teachers but for cooperative teachers as well. Data collection tools that were utilized for this week were permission letters and the researcher's notes/artifacts.

3.6.1.5 Fifth Week: After getting the permission of schools principals regarding the practice of the lesson study model; a meeting with prospective teachers was conducted and they were asked to: explore their perception/expectations about participation in the practice of the lesson study model, identify challenging content area, finalize subject and topic (to practice lesson study model). Group one finalized the subject of geography and group two finalized the subject of computer education for developing a lesson plan to practice the lesson study model. Data collection tools that were utilized for this week were textbooks (that were being taught to students of grades 6th and 7th) and pre-lesson reflections of prospective teachers.

3.6.1.6 Sixth Week: After finalizing the subject for developing a lesson plan with lesson study groups, the researcher consulted with the internship course coordinator and requested her support in identifying the two more prospective teachers who are teaching the same subjects (who were selected to practice lesson study model) and doing individual teaching. After identifying those prospective teachers, a meeting was conducted with them for getting their consent to participate in this study, getting information about their schedules. Data collection tools that were utilized for this week were consent letters, and researcher's notes/artifacts (prospective teachers' contact detail). The researcher's communication with the internship course coordinator is attached in Figure 3.5.

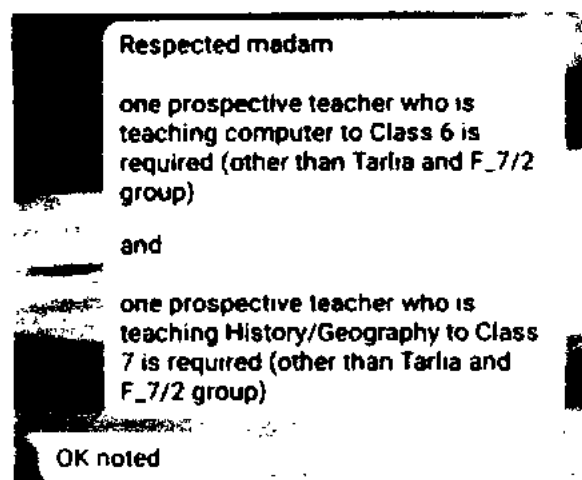


Figure 3.5: Screenshot of Researcher and Course Coordinators Discussion

3.6.1.7 Seventh Week: After finalizing the group of prospective teachers teaching through traditional methods. A meeting was conducted with prospective teachers. And major aims of that meeting were: to determine the goals of the research lesson with the assistance of the researcher and supervisors, to develop a template for the research lesson plan, and arranging a discussion session to finalize selected content-related activities. After conducting a meeting with prospective teachers, the researcher takes time from her supervisor to finalize the template of drafting a lesson plan for the practice of the lesson study model. Data collection tools that were utilized for this week were consent letters, researcher's notes /artifacts, and a template for lesson plans. As that template get final, the researcher shared it with prospective teachers' lesson study groups and gave them directions to start work on developing lesson plans. The researcher's communication with prospective teachers has been given in Figure 3.6.

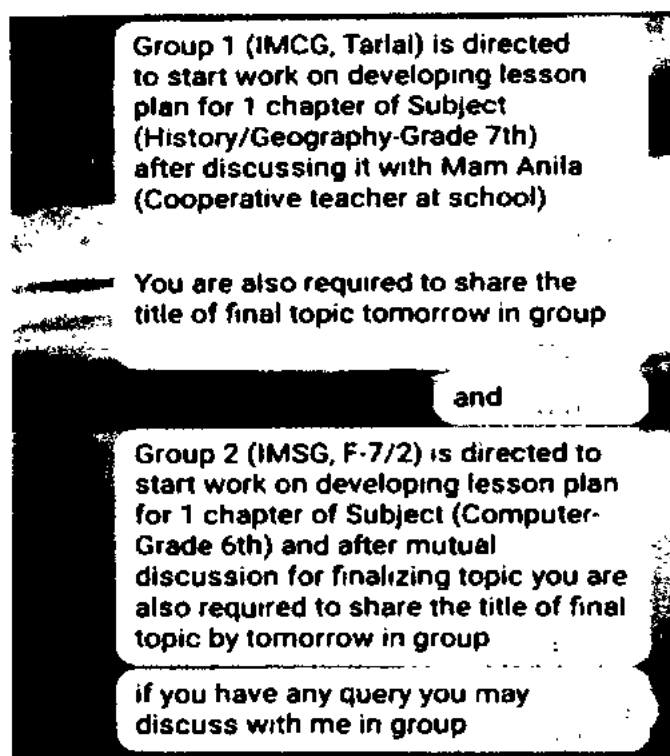


Figure 3.6: Screenshot of Researcher's Communication with Prospective Teachers

3.6.1.8 Eighth Week: After giving some baseline direction to prospective teachers via WhatsApp, a meeting was conducted with them to the generation of a detailed draft research lesson plan by all team members collaboratively under the supervision of the researcher, deciding the time and venue for lesson presentation, and ensuring the availability of required AV Aids. Data collection tools that were utilized for this week were drafts of the lesson plan, and school timetable.

3.6.1.9 Ninth Week: In this week, the first practice of lesson by lesson study groups takes place in school and college (selected for the experiment). One prospective teacher from participating group delivered the content, one take the responsibility of videotaping of lesson presentation and the other two were directed to note down observations for lesson improvement along with assisting their fellow teachers in ensuring effective classroom management. The researcher and cooperative teacher also

wrote reflections highlighting the points to improve the research lesson. It was clarified by the researcher to cooperative teachers and prospective teachers that they are required to observe the classroom setting, the way of starting the lecture, prospective teachers' behavior toward students, and the effectiveness of AV aids & learning activities. Data collection tools that were utilized for this week were observation done by prospective teachers, the reflection of cooperative teacher and researcher, and presented lesson video.

3.6.1.10 Tenth Week: After completing the presentations of the first research lesson by prospective teachers of both groups, discussion among all team members and researcher for evaluating observation results, recorded lesson, and reflections take place. Areas for revision of the initially drafted lesson plan were highlighted and prospective teachers were directed to improve their lesson plan drafts by taking guidelines from their cooperative teachers. Data collection tools that were utilized for this week were the researcher's and cooperative teachers' reflections, as well as observation notes of prospective teachers.

3.6.1.11 11th Week: Afterwards, a meeting was conducted with prospective teachers of both groups for the finalization of the lesson plan draft, ensuring the availability of required, relevant and effective AV Aids, and observing/evaluating the final lessons and AV Aids developed by lesson study groups. Data collection tools that were utilized for this week were the researcher's notes /artifacts, and drafts of final lesson plans. The next plan was shared by researchers via WhatsApp message which is as follows:

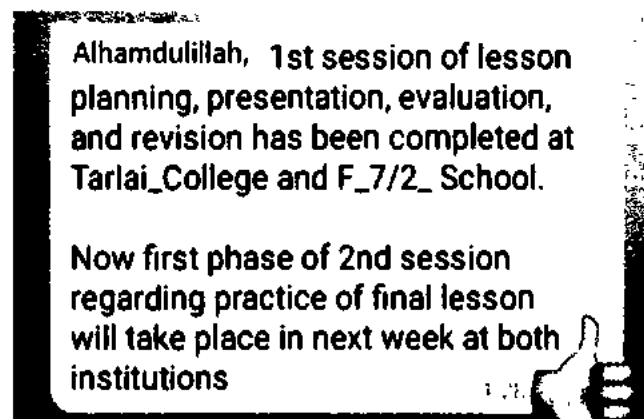


Figure 3.7: Screenshot of Completion of First and Initiation of Second Session

3.6.1.12 12th Week: In this week following activities take place: presentation of revised research lesson by lesson study groups (the lesson was presented by another prospective teacher instead of the first presenter), videotaping of lesson presentation by one prospective teacher, notes taking and observation by researcher and other team members. This observation lasted for 40 minutes and researcher used observation sheet to rate the difference in instructional practices of PTs. After the lesson presentation, a discussion session among the researcher and all team members was conducted to discuss the recording and observation sheets of the revised lesson. Data collection tools that were utilized for this week were observation sheets, and researcher notes /artifacts

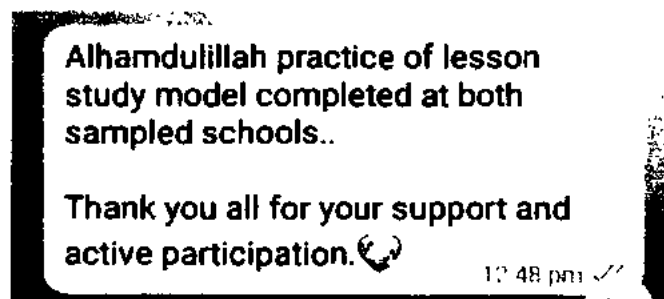


Figure 3.8: Screenshot of Completion of Lesson Study Model' Practice

3.9.2 Cycle 2 (13-20 Weeks)

3.6.2.1 13th Week: In this week tests of students (who were taught by practicing the lesson study model) were conducted by the researcher with the help of prospective and cooperative teachers. Besides conducting the tests, the researcher also decided on the Schedule of interviews with cooperative teachers. Data collection tools that were utilized for this week were tests of class 6th and 7th and researcher notes /artifacts.

3.6.2.2 14th Week: In this week observation of those prospective teachers' lessons take place who were teaching the same lessons (that were taught were lesson study groups) by doing individual/traditional teaching. This observation lasted for 40 minutes and researcher used observation sheet to rate the difference in instructional practices of PTs. After giving the gap of two days, tests were conducted to evaluate the performance of those students who were taught by practicing traditional methods of teaching. Besides conducting the tests, the researcher also decided on the Schedule of interviews with cooperative teachers. Data collection tools that were utilized for this week were lesson plans, observation sheets, tests of classes of 6th and 7th and researcher notes /artifacts, and tests of classes 6th and 7th

3.6.2.3 15th Week: Tests of 6th and 7th-grade students were evaluated by the researcher and team members and results of both groups (taught by traditional methods and taught by practicing the lesson study model) were compiled. The data collection tool that was utilized for this week was the lists of students' marks.

3.6.2.4 16th Week: After preparing the reports of students' marks, a meeting of all team members involved in the research process was conducted to collect data from their post-lesson reflections about the effectiveness of the lesson study model. All the

participants were asked to share their overall experience as well and at the end celebration lunch with all team members was enjoyed. Data collection tools that were utilized for this week were post-lesson reflections of prospective teachers, and researcher notes /artifacts.

3.6.2.5 17th Week: In this week, experts were contacted and their feedback was taken for validation of the researcher' developed interview guides. Keeping in view the comments provided by experts, the finalization of interview guides was assured with the assistance of research supervisors. Data collection tools that were finalized in this week were interview guides of university supervisors, school supervisors, and cooperative teachers as well as researcher notes /artifacts.

3.6.2.6 18th Week: During this week interviews were conducted with the cooperative teachers at ICT-based two sampled colleges and one school. Researcher utilized her mobile voice recorder for recording interviews with the consent of cooperative teachers. Besides completing interviews with cooperative teachers, the researcher also decided the schedule of interviews with school principals after getting information about their available slots. Data collection tools that were utilized this week were interview guides and researcher notes /artifacts.

3.6.2.7 19th Week: During this week interviews were conducted with the prospective teachers' supervisors at schools (schools' principals) at ICT-based two sampled colleges and one school. Researcher utilized her mobile voice recorder for recording interviews with the consent of schools' principals. Besides completing interviews with schools' principals, the researcher also decided on the schedule of interviews with university supervisors/course coordinators after getting information about

their available slots. Data collection tools that were utilized this week were interview guides and researcher notes /artifacts

3.6.2.8 20th Week: During this week interviews were conducted with teacher educators at the university (prospective teachers' supervisors and course coordinators) at IIUI (International Islamic University, Islamabad). Researcher utilized her mobile voice recorder for recording interviews with the consent of teacher educators. Data collection tool that was utilized this week was interview guides.

3.10 Data Analysis

Open, axial, and selective coding (Corbin & Strauss, 2008) was carried out to analyze the data collected through interviews from cooperative teachers of prospective teachers at school and supervisors of prospective teachers at schools and university. The researcher emphasized the use of open coding to divide the data into manageable sections and identify concepts that help to determine themes from the data. Axial coding was accessed to connect the data back together relating to the concepts and codes. And selective coding was carried out to connect all themes under the category of "effectiveness of lesson study model in improving the professional development of prospective teachers and academic achievement of students.

Data collected from group meetings, lesson plans, research lessons' videos, post-lesson reflections, and researcher field notes were analyzed by the inductive content analysis technique as it has been identified by Kyngas (2020) that inductive content analysis is the most effective method that can be used by researchers to analyze qualitative data. This method enables the researcher to utilize the process of abstraction to summarize and organize collected data by using themes/ categories/concepts while

keeping in view the study objectives. Themes identified in the inductive content analysis method through identifying open codes and then combining these open codes with other open codes (that emerged from similar content collected through a variety of data collection instruments) serve as a baseline for reporting qualitative data analysis considerably.

For the analysis of data collected by the researcher through observation sheets (for prospective teachers doing individual teaching and involved in the practice of the lesson study model) percentages and mean scores were calculated. And data related to students' academic achievement that were collected by conducting a test of both classes that were selected as a case in this study were analyzed by applying the t-test as it has been argued by Lavrakas (2008) that the t-test is the widely used method to compare the performance and exploring mean differences between two groups. Besides it, for calculating the effect size for the t-test, the value of Hedges'g was also calculated.

3.11 Summary

This chapter is based on research methodology and major points that have been discussed in that chapter are philosophical assumptions, research design, population, sample, instrument, data collection, and data analysis concerning the practice of the lesson study model. The next chapter (4) is based on data analysis and interpretation collected by utilizing multiple data collection instruments from selected participants of the study.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

The fundamental purpose of this mixed-methods multiple case study was to explore the effectiveness of the lesson study model by:

- i. Practicing this model with the:
 - Engagement of prospective teachers (who were placed in various schools keeping in view their living area and personal preferences),
 - The assistance of cooperative teachers (who; on the directions of the school's principal, holds the responsibility of prospective teachers' training by engaging them in various teaching and non-teaching activities) at school and
 - Valuable directions of prospective teachers' supervisors at schools and university
- ii. Comparing the instructional practices of prospective teachers using traditional ways of teaching and the prospective teachers involved in the practice of the lesson study model for teaching the subjects of computer and geography in grades 6th and 7th
- iii. Evaluating the academic performance of students (of grades 6th and 7th) who were taught by applying the lesson study model with those who were taught by traditional methods
- iv. Exploring the views of supervisors (at schools and university) regarding the instructional activities and meetings that take place during the practice of lesson study as well as about the overall benefits that prospective teachers can be enjoyed by participating in the practice of the lesson study model

The context of this study was three educational institutions (one school: where classes from kindergarten to 10th grade take place and two colleges: where classes from kindergarten to Master's Level take place). 10 prospective teachers and six cooperative teachers contributed to the practice of lesson study model. While three principles of these educational institutions and three supervisor/course coordinators of prospective teachers participated in this study for highlighting the overall benefits associated with this model. Phases along with steps of practicing the lesson study model have been elaborated in chapter 1 (on pages: 1-21). Conceptualizing of lesson study model and national as well as international practices related to this model have been outlined in chapter 2 (on pages 22-86). A detailed description of the study design, population, sample, instruments, data collection process, and data analysis techniques has been given in chapter 3 (on pages 87-121). This chapter deals with the analysis and interpretation of collected data. This chapter has been divided into four major cases keeping in view the objectives and research questions of the study, their overview is as follows:

4.1 Case I: Practice of Lesson Study Model

4.2 Case II: Comparing Prospective Teachers' Instructional Practices

4.3 Case III: Evaluation of Students' Academic Performance

4.4 Case IV: Supervisors' and Cooperative Teachers' Views

Each case contains various sub-sections according to the nature of the collected data. A detailed description of all sections is as follows:

4.1 Case I: Practice of Lesson Study Model

This case is based on the first objective and research question of the study which were as follows:

Objective 1: Determine the effectiveness of the lesson study model as a collaborative approach to teacher professional development

Research Question 1: How do prospective teachers reflect on their experiences and skills in the various phases of the lesson study model?

4.1.1 Pre-Lesson Reflections of Prospective Teachers (PTs)

Before starting the practice of the lesson study model a meeting was arranged with prospective teachers and in that meeting they were asked to write their reflections based on their expectations about the participation in the practice of this model. Detailed pre- lesson reflections of prospective teachers have been given in Appendix-16. The major skills that they were expecting from the practice of this model were as follows:

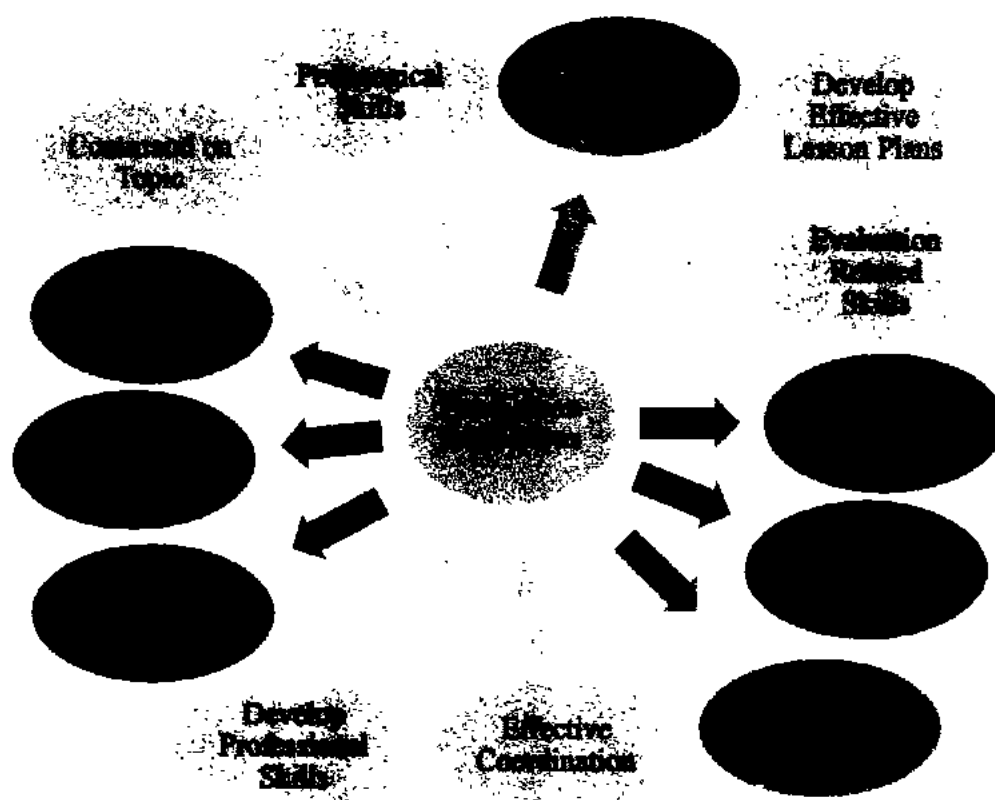


Figure 4.1: Pre-Lesson Reflections of Prospective Teachers

Interpretation

Results of figure 4.1 showed that prospective teachers described a lot of expectations about their participation in the practice of the lesson study model. Most of the prospective teachers indicated that participation in the practice of this model can enable them to design effective lesson plans before going into classroom teaching in the future. This practice would provide them with a platform to plan and teach lessons under the supervision of senior teachers. They stated that along with planning; by this practice, their skills of working in a team with close coordination and cooperation would also get improved. In this regard, one prospective teacher stated that *"I hope that this practice will provide me the productive experience of practicing team teaching"*.

They further indicated that participation in the practice of the lesson study model can assist them a lot in improving their classroom teaching as this model demands them to get prepared well before going to the classroom for teaching. Prospective teachers highlighted that by practicing this model they would get familiarization with the practices that could support them to get command on topics before its final presentation. It is an obvious fact that at the initial phase of teaching most prospective teachers face problems due to a lack of confidence; in this regard one prospective specified that *"above all, a great benefit of participation in the practice of this model is that, it will raise my confidence level regarding classroom teaching, management and assessment"*. Their responses indicated that they would also get opportunities to improve their classroom management skills as during the practice of this model their fellow teachers would assist them to ensure effective management in the classroom.

Besides these expectations, it has been also indicated by prospective teachers that after practicing this model their pedagogical skills are expected to get improve as this model not only provide the opportunity to practice theoretical knowledge regarding various pedagogical strategies in an effective way, but it familiarize PTs about the real essence of various teaching methods and about their practice in a considerable way. It has been expected by prospective teachers that practice of this model can play an imperative role in upgrading their instructional practices as it offers ample opportunities to learn from each other experiences and feedback provided by their colleagues, cooperative teacher, and researcher. Reflective practices are considered very important for effective teaching and in this regard, one prospective teacher expressed that:

Participation in this model will provide me with effective training to write a reflection about my performance as well as the performance of my colleagues. This skill of writing reflection will support me a lot to upgrade my teaching skills in the future as well.

They have further specified that the practice of this model would develop professional skills among them and they can learn to improve their skills of effective communication and giving respect to other views. One prospective teacher stated that “*I hope that after practicing this model I will be able to develop/prepare low-cost and effective audio-visual aids for concept clarification of students*”. Furthermore, their responses indicated that participation in the practice of this model would also enable them to use multiple assessments and evaluation techniques for getting information about the level of students’ understanding regarding overall content generally and complicated topics specifically.

For collecting data related to next phases/stages (4.1.2 and 4.1.3) five stage model of clinical supervision presented by Gold hammer in 1969 was utilized (Aldarhami, 2017). Pictorial description of clinical supervision model is as follow:

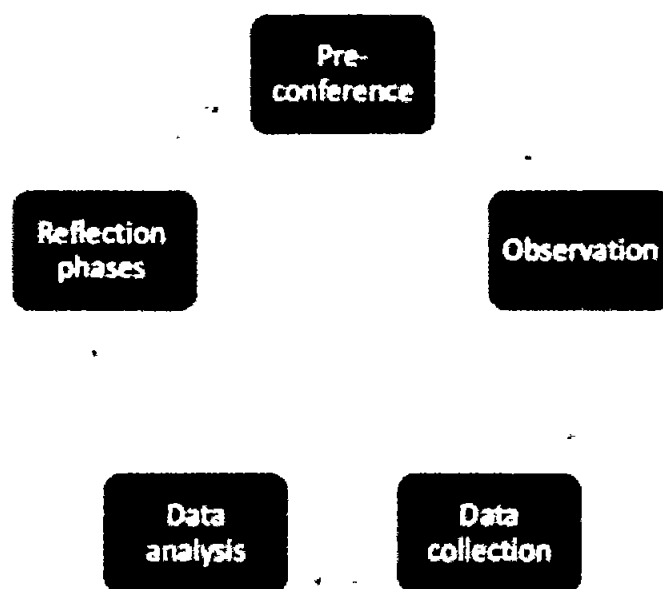


Figure 4.2: Clinical Supervision Model

By following the major characteristics of this model, initially a meeting was conducted with PTs and CTs and they were informed that during the lesson presentation, they have to observe the lesson of PT and note down the points for improving the lesson planning and presentation. Researcher herself was pretty much clear about the important points that she has to observe during the lesson presentation. After collecting data from observation (conducted by PTs) and reflections (noted by CTs and researcher) a meeting was conducted to analyze collected data and points of improvement were clearly defined.

On the basis of identified points, LS groups were directed/assisted to improve their lessons and present it during the second phase of practicing lesson study model. During the second round of lessons presentations, reflections were also noted down by

PTs, CTs, and researcher and alignment between recommended and incorporated changes was ensured. After the completion of practicing lesson study model, PTs were also directed to write post lesson reflections to share their views about the effectiveness of observations and reflections (carried out during the practice of this model) in improving their instructional practices.

4.1.2 Observations Done by Prospective Teachers

During the lesson presented in the first round of the lesson study model, the researcher asked the prospective teachers (PT) to observe the lesson presentation of their fellow teacher considerately and write down the points that may highlight the areas of improvement. It was informed to prospective teachers that this observation must be based on a constructive point of view instead of the critical point of view and they were also directed that the focus of observation must be the lesson that is being delivered; not on the teacher who is delivering that lesson. As in both groups, there were a total of eight (4+4) cooperative teachers; that's why one teacher has taken the responsibility of presenting the prepared topics in front of the class and other teachers assisting her in classroom management were directed to write observations for improving that lesson. All the teachers were well prepared and enthusiastic as it was their first formal presentation after detailed planning and drafting of the lesson plan. Detailed observations have been given in Appendix-17, and their analysis is as follows:

4.1 2.1 Observation of First Lesson Presented by Group 1

4.1.2.2 Observation of First Lesson Presented by Group 2

Observations conducted by prospective teachers for both subjects are as follows:

4.1.2.1 Observation of First Lesson Presented by Group 1: The first session of the lesson presentation took place with those prospective teachers who were teaching the subject Geography and topic “Mountains and Plateaus” to students of grade 7th (and that group has denoted the title of group 1). Points for lesson improvement highlighted by prospective teachers and cooperative teachers were as follows

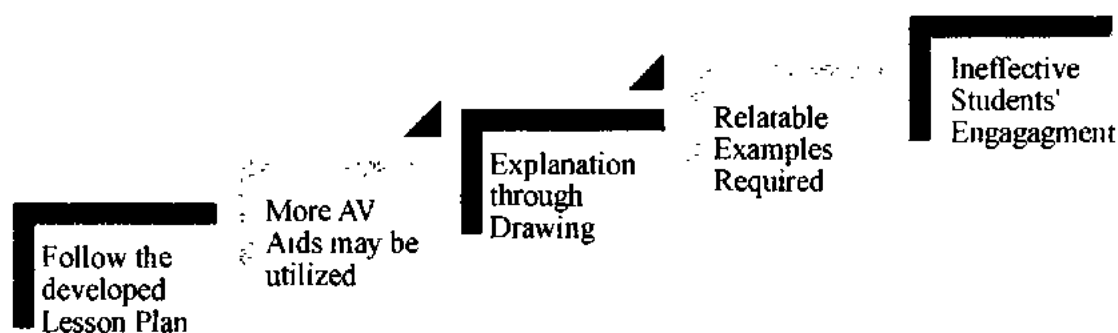


Figure 4.3: Observation of First Lesson (Geography) by Prospective Teachers

Interpretation

Results of figure 4.3 showed that prospective teachers noted that their fellow teacher was not following the developed lesson plan as she did not maintain the whiteboard writing during the announcement of the topic and various activities that were conducted in the classroom. Utilization of audiovisual aids was also ineffective, as one prospective teacher highlighted that *“only a few audiovisual (AV) aids were used, while for making lesson effective and understandable some more aids may be utilized”*. The whiteboard writing of the teacher was very poor, as the teacher neither wrote the topic on board nor writes the names of important heading/activities. The teacher was not explaining the difficult concepts through illustration, while illustration through drawing can play an important role in highlighting the difference between various types of mountains.

The teacher was also not giving examples from daily life experiences as one teacher indicated that *"the teacher did not give relatable examples of the topic, which were compulsory for students' concept clarification"*. Besides these drawbacks, it was also observed by prospective teachers that only a few students were repeatedly participating in the class and all the students were not effectively engaged in the classroom. Instead of maintaining effective interaction with students, the focus of the teacher was only on the delivery of content.

4.1.2.2 Observation of First Lesson Presented by Group 2: The second session of the lesson presentation took place with those prospective teachers who were teaching the subject computer and topic "ICT Fundamentals" to students of grade 6th (and that group has denoted the title of group 2). Points for lesson improvement highlighted by prospective teachers and cooperative teachers were as follows



Figure 4.4: Observation of First Lesson (Computer) by Prospective Teachers

Interpretation

Results of figure 4.4 showed that there was too much fluctuation in the teacher's voice as one prospective teacher indicated that *"there must be balance in teacher's voice Though at some points it is good to raise volume the frequent fluctuation of voice may be avoided"*. It was observed that teacher was asking multiple questions from one student and

due to it anxiety was prevailing among students; therefore it was suggested by one prospective teacher that *"it is good to ask one point from one student"*. The teacher was unable to manage class time effectively; as multiple audiovisual aids were developed but the teacher had not presented these aids in front of the class due to a shortage of time.

At the start of class; the teacher asked only a few questions from students in previous knowledge testing, it has been suggested by one prospective teacher that *"some more questions may be asked during previous knowledge testing related to daily usage things"*. Teacher-students interaction in the class was not effective, this interaction may be improved by maintaining eye contact with students and the teacher may also call students by names to involve them in classroom discussion/question-answer sessions. It was also observed by one prospective teacher in the class that the *"teacher was focusing on content coverage and not ensuring concept clarification of students"* therefore, this aspect of classroom teaching also needs to be improved accordingly.

4.1.3 Researchers and Cooperative Teachers' Reflections

A cooperative teacher (CT) who was assisting the researcher in the implementation of the lesson study model was also requested to highlight areas for improvement. Besides it, the researcher also wrote reflections during the presentation of the lesson and these reflections have been denoted as RR (Researcher's Reflection). Detailed reflections noted by the cooperative teacher and researcher have been given in Appendix-18. Key points highlighted by cooperative teacher and researcher for lesson improvements are as follows.

4.1.3.1 Reflections on First Lesson Presented by Group 1

4.1.3.2 Reflections on First Lesson Presented by Group 1

Reflections composed by researcher and cooperative teachers for both subjects are as follows:

4.1.3.1 Reflections on First Lesson Presented by Group 1: As researcher and cooperative teachers were familiar with various instructional methods, techniques of effective classroom management, the importance of having good communication skills, etc. therefore, despite the various points highlighted by prospective teachers, the researcher and cooperative teacher have also identified some points to improve lesson presentation for the second cycle. The detail of their identified points is as follows:

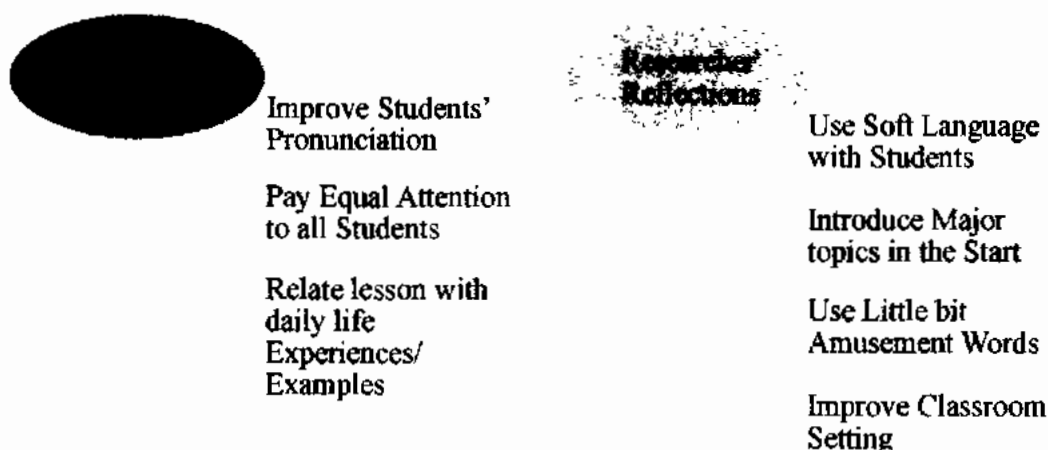


Figure 4.5. Reflections on First Lesson (Geography)

Interpretation

Results of figure 4.5 showed the reflections of cooperative teachers and researcher. CTs indicated that prospective teachers can make their instructional process more effective by focusing on improving the students' pronunciation of difficult words during reading. Furthermore, according to the reflections of cooperative teachers, the prospective teacher was unable to give equal attention to all students as she highlighted that *"equal attention was not given to all students, only a few students were participating during the question-answer session"*. Furthermore, she suggested that for making the

lesson more interesting, understandable, and easy; prospective teachers can relate their lesson to daily life experiences such as the examples of the computer lab and technological devices that are being used at general stores and schools may be given to students to familiarize them about use of ICT in daily life.

For improving the lesson presentation during the second cycle of lesson study mode, the researcher suggested that *“as a teacher, you are always required to use soft language for students as due to harsh words some students may lose their confidence and as a consequence, they will never participate in the classroom”*. As researcher noted that some students were ignoring the topic that was being discussed therefore prospective teachers were directed to call students by names for catching their quick and full attention. The prospective teacher was unable to announce the topic understandably; therefore, they were directed to introduce major topics of the lesson at the start of class by writing on a whiteboard/blackboard.

During the class, some students were staring here and there and they were getting bored, therefore researcher indicated that *“for creating an attractive learning environment, the teacher may use little bit amusement words during the lecture”*. There was not much difference in the classroom setting between teachers teaching routinely and teachers teaching through the practice of the lesson study model, therefore prospective teachers were expected to change the classroom setting /layout keeping in view the demand of the lesson study model.

4.1.3.2 Reflections on First Lesson Presented by Group 2: Data of figure 4.5 indicated that according to the cooperative teacher’ reflections, the teacher was looking so much lazy as she suggested that *“she must be active in class, as until teachers will not*

seem energetic and motivated, students cannot be expected to show active participation”.

It was also highlighted by the cooperative teacher that during instruction prospective teacher was using difficult words and terminologies that were not understandable to students. She directed that they must use vocabulary in class according to the level of students and the use of difficult words/ terminologies may be avoided. Furthermore, it was also stated by cooperative teachers that instead of explaining audio-visual aids and writing on whiteboard/blackboard; the teacher was emphasizing book reading and this practice needs to be eliminated

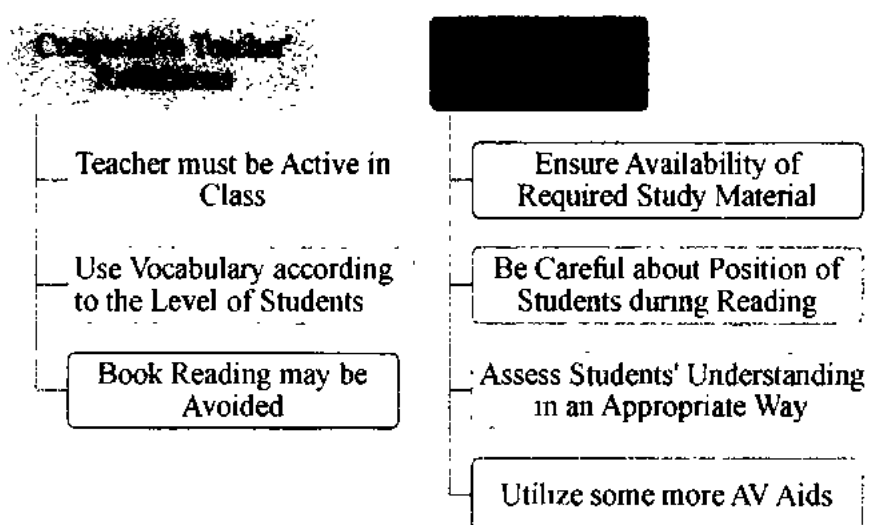


Figure 4 6: Reflections on First Lesson (Computer Education)

During the lesson presentation, the researcher observed that most of the students were unaware from topic as they were not having notes or books, therefore prospective teachers were directed that before starting the lecture, the teacher must ensure that all the students have the required study material (i.e. books or notes). It was also observed that when students were reading the lesson content, other students were unable to listen to their voices; therefore it was suggested by the researcher that *“if the teacher asked the students sitting in the first row to read the chapter content, then she must ask them to turn*

their faces towards class instead of the wall". The teacher was unable to involve all students in classroom activities and some students were getting bored due to the teacher's focus on book reading. In this regard, the researcher guided prospective teachers by stating that "to ensure the attentiveness and active participation of students in the classroom; the teacher may tell some little jokes to the students or may ask students to share something good (such as golden words or quotations) with class". It was also noticed that teacher was assessing more and teaching less, prospective teachers were directed to improve this practice and utilize assessment techniques keeping in view the nature of the topic/content. It was also suggested that some more audio-visual aids may be also utilized for making lesson presentations effective.

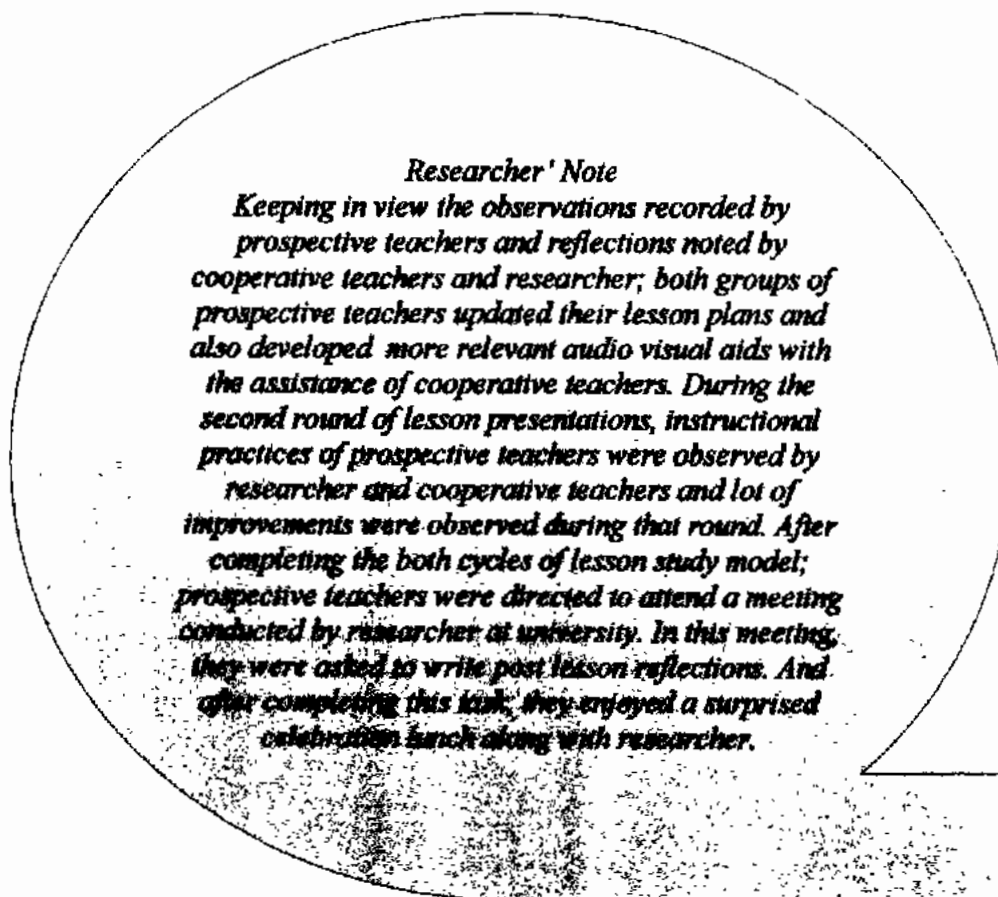


Figure 4 7: Researcher's Note

4.1.4 Post-Lesson Reflections of Prospective Teachers

Detailed transcription of prospective teachers' post-lesson reflections has been given in Appendix-19. While for the analysis of their reflections; 10 major themes were developed. Sketch and description of these themes are as follows:

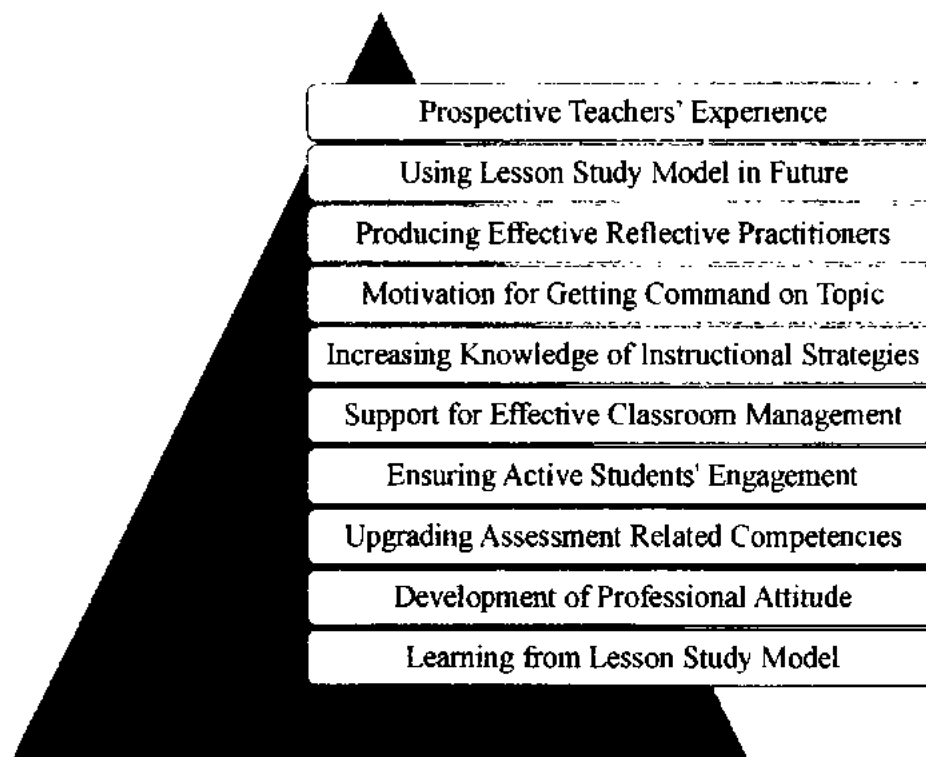


Figure 4.8: Post Lesson Reflections of Prospective Teachers

4.1.4.1 Prospective Teachers' Experience: Prospective teachers expressed that their experience was very good as during the practice of this model they have learned to work collaboratively with other teachers, manage class time effectively, overcome the gap in the teaching practice and lesson plan, and ensure active participation of students in the classroom. They stated that practice of this model has helped them a lot in examining and improving their teaching practice, in this regard one prospective teacher stated that *"it has improved our knowledge as well as practice regarding innovative teaching-*

learning strategies”. It has also motivated them to polish their instructional abilities and has boosted their confidence as well. Furthermore, prospective teachers stated that this practice has developed a lot of qualities such as patience, cooperation, collaboration, etc. among us and we have learned a lot of new things.

4.1.4.2 Using Lesson Study Model in the Future: All the prospective teachers who were involved in the practice of this model stated that surely, they would practice this model to make instructional practices effective and improve students’ performance in the future. They have stated many reasons to practice this model in the future as they said that this model can enable teachers to:

- Design lesson plans before lesson presentation,
- Work collaboratively with teachers,
- Understand the topic fully before its presentation,
- Overcome the gap between theory and practice,
- Get command on the subject matter,
- Increase their motivation and confidence level,
- Practice a variety of innovative teaching-learning strategies,
- Utilize a variety of audio-visual aids to make lesson effective,
- Observe and evaluate students’ performance effectively,
- Design learning activities keeping in view the mental abilities of students,
- Engage students in the class even when they are not showing interest,
- Write reflections about their teaching practice, and
- Ensure active engagement of students in classroom activities.

4.1.4.3 Producing Effective Reflective Practitioners: Prospective teachers stated that by observing student performance and the instructional practice of their fellow teachers, now they have become able to write reflections about their teaching styles as well. This model has contributed a lot to make them reflective practitioners by allowing them to evaluate their content lessons and write reflections about them. In this regard, one prospective teacher stated that *"it has developed the habit of writing reflections for day-to-day activities, which is a great source to overcome gaps/flaws associated with our tasks"*.

Another prospective teacher uttered that practice of lesson study model has disclosed the importance of writing reflection for all academic tasks and now i prefer to write reflection for all my activities. The practice of this model has provided prospective teachers an opportunity to write reflections about the instructional practices of their fellow teachers and according to them before practicing this model; they were not used to writing reflections about their teaching practice, but now at the end of class they evaluate their teaching themselves.

4.1.4.4 Confirming Command on Topic: Prospective teachers stated that activities that take place during the practice of this model such as developing a lesson, learning material, and audiovisual aids with the collaboration of team members and supervisors have contributed a lot to getting a command on the topic before its presentation. As one prospective teacher stated that *"lesson study is very helpful to increase subject matter knowledge as it motivates me to search relevant material/things from other sources as well besides the book. And in this way, my grip on the topic becomes very strong"*. According to prospective teachers, during the process of lesson

plans development, knowledge of different minds comes together and this practice played an important role in getting a full command of the topic.

One prospective teacher stated that *“yes, lesson study has increased our knowledge as we evaluate lesson from various angles and content resources other than book have been also utilized, which has resulted in knowledge improvement”*. Data collected from prospective teachers indicated that thorough study of topic-related content, utilization of various content-related resources, development of various teaching aids, and discussion on topic-related content has improved their knowledge of the selected topic.

4.1.4.5 Increasing Knowledge of Instructional Strategies: Reflections of prospective teachers depicted that planning and development of lesson plans after the mutual discussion familiarized prospective teachers with varied instructional strategies such as discussion method, activity method, and demonstration method. As one prospective teacher responded that *“before it, I was habitual to use lecture method only, but the practice of this model enables me to utilize multiple teaching strategies such as discussion, lecture, and activity to deliver my lesson appreciably”* Prospective teachers stated that during the practice of this model they have learned to teach lesson effectively by utilizing the combination of various methods. Another teacher expressed that *“this practice has falsified my established concepts regarding teaching methods, as before practicing this model it seems difficult to me to practice two or more than two strategies at a time”*. This practice has trained them to utilize a mixture of teaching strategies for making lessons effective and understandable for students.

4.1.4.6 Support for Effective Classroom Management: Prospective teachers communicated that the practice of this model has enabled them to manage their

classroom time effectively as their fellow teachers helped them in displaying audiovisual aids and writing on board. One prospective teacher responded that

"During the practice of this model, teachers do cooperative teaching and if one teacher is focusing on the delivery of lesson then the other can own the responsibility of managing the classroom effectively. This practice has proved very beneficial for me to ensure classroom management".

Prospective teachers stated that this model has also enabled them to ensure active students' engagement which eventually helps in good classroom management. Another teacher declared that *"despite involving all students in multiple activities like reading lesson, writing on board, filling the flow chart, we tried our best to ensure better management of our classroom"*. They further indicated that by practicing this model, they have become able to conduct effective learning activities for making their lesson understandable and ensuring the effective engagement of students.

4.1.4.7 Ensuring Active Students Engagement: Ensuring active students' engagement is the crux of the lesson study model, prospective teachers expressed that this practice has given them ample training to ensure active engagement of all students in the classroom. One prospective teacher stated that *"during the practice of this model, one teacher was delivering the lesson; while others were observing the classroom overall environment/activities and motivating those students to speak who were passive listeners in the classroom"*. This practice has motivated prospective teachers to utilize multiple audio-visual aids for making their lessons effective; according to prospective teachers, this initiative also supported them a lot in ensuring the active engagement of all students. Furthermore, they stated that keeping in view the basic requirements of this model;

multiple activities were conducted in the classroom, which has proved very helpful in ensuring the participation of all students. Besides it, calling students by their names and asking questions about them are also supportive techniques that they practiced for keeping students active throughout the whole class.

4.1.4.8 Upgrading Assessment Related Competencies: A lesson study aimed at upgrading assessment-related competencies and reflections of prospective teachers also showed that participation in the practice of this model has offered great opportunities for them to strengthen their assessment-related skills. Their responses indicated that the practice of this model has motivated them the implementation of multiple innovative assessment techniques for assessing the level of students' understanding. One prospective teacher uttered that *“before it, I usually asked simple oral questions from students to assess their understanding level. But now beyond questions, I prefer to take short written quizzes from students for assessing their level of understanding”*.

They further indicated that developing multiple audio-visual aids and quizzes, arranging short activities in class, engaging students in discussion, giving them play cards to fill in, and motivating them to write the answer to questions on board are some of the common assessment techniques which they have utilized to evaluate students' performance during the practice of this model.

4.1.4.9 Development of Professional Attitude: The lesson study model has contributed a lot in developing the professional attitude among prospective teachers as they indicated that practice of this model has trained them to complete their tasks on time, attain professional traits, improve coordination and communication skills as well as grow their personalities professionally. In this regard, one prospective teacher answered that

"yes, it surely has developed professional attitude among us. Because frankly speaking before this practice, we used to develop lesson plan after lesson presentation instead of prior planning". This model has trained them to do effective collegial discussions for improving their instructional practices.

Among prospective teachers, this model has promoted the habits of teamwork, giving respect to others' points of view, and designing effective lesson plans before going into class for lesson delivery. One prospective teacher responded that *"practice of this model has made me realize that teachers' way of communication has a strong impact on students. And this model has improved my communication abilities to a great extent".* Therefore, it can be deduced that participation in the practice of this model has also familiarized prospective teachers with professional ways of communication.

4.1.4.10 Learning from Lesson Study Model: When prospective teachers were asked to reflect on their overall learning and experience after participating in the practice of this model, then they responded that by practicing this model they have learned to practice a variety of innovative teaching methods, work collaboratively with team members, plan lesson effectively, achieve desired objectives, and write self-reflection. This model has also supported enhancing their skills related to the teaching profession, as one prospective teacher responded that *"it was beneficial for me; it helped me in learning many new ideas concerning lesson planning and professional development".*

In this regard, another prospective teacher responded that *"my experience is very good, as I have learned to respect each other points and get maximum benefits from the knowledge and experience of colleagues and supervisors".* Besides this, they stated that practice of this model has enhanced not only their skills but also professional

competencies and they have learned to practice multiple teaching strategies during instructional practice and engage students effectively in classroom activities.

4.2 Case II: Comparison of Prospective Teachers' Instructional Practices

This case is based on the second objective and research question of the study which was as follows:

Objective 2: Compare the instructional practices of prospective teachers' using traditional ways of teaching and the prospective teachers involved in the lesson study process

Research Question 2: Does lesson study make the learning processes and instructional practices of prospective teachers (involved in the lesson study process) different than prospective teachers using traditional ways of teaching?

In order to address this objective and research question, an observation sheet was developed by the researcher after consultation with the supervisor and there were six major themes in that observation sheet (detail of each theme with sub statements has been given in Appendix-14). Data collected from the observation sheet were analysed by calculating mean scores. As the researcher conducted observation for two subjects, therefore, their results have been described separately. A group of prospective teachers who were teaching geography to grade 7 has been denoted as group 1 and a group of prospective teachers who were teaching computer education to grade 6 has been denoted as group 2. Detailed theme-wise data analysis is as follows:

4.2.1 Lesson Planning by Prospective Teachers

For exploring the difference between prospective teachers' instructional practices, observation was carried out regarding following major themes:

- Lesson Planning
- Lesson Presentation
- Application of Teaching Methods
- Interaction with Students
- Use of Audio-Visual Aids
- Assessment-related Competencies

Mean scores were calculated to present the results of that observation sheet. Data related to lesson planning ability of prospective teachers and its interpretation is as follows:

Table 4.1

Lesson Planning by Prospective Teachers of Group 1

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Plan the lesson in an effective way	1	1.25
	Address learning outcomes during instruction	1	
	Testing students' background knowledge before starting the lesson	2	
	Manage class time in an effective way	1	
Teacher Teaching by Lesson Study Model	Plan the lesson in an effective way	3	2.25
	Address learning outcomes during instruction	2	
	Testing students' background knowledge before starting the lesson	2	
	Manage class time in an effective way	2	

Interpretation

Table 4.1 showed the results of (group 1) prospective teachers' observation (who were teaching Geography to Grade 7) conducted by the researcher regarding their skill of "lesson planning". Mean scores of prospective teacher' observation (concerning lesson

presentation) who was teaching the subject of geography by traditional methods was 1.25 which indicated that though the teacher was testing students' background knowledge before starting the lesson, her ability to plan the lesson, address learning outcomes during instruction, manage time in the classroom was not good. While on the other hand mean cumulative mean scores of prospective teachers' observation who taught by practicing the lesson study model was 2.25 which showed that the prospective teacher was not only planning her lesson effectively but she was addressing students learning outcomes during her instruction, testing students background knowledge before starting lecture and managing classroom time effectively as well.

Table 4.2

Lesson Planning by Prospective Teachers of Group 2

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Plan the lesson in an effective way	2	1.25
	Address learning outcomes during instruction	1	
	Testing students' background knowledge before starting the lesson	1	
	Manage class time in an effective way	1	
Teacher Teaching by Lesson Study Model	Plan the lesson in an effective way	2	2.75
	Address learning outcomes during instruction	3	
	Testing students' background knowledge before starting the lesson	3	
	Manage class time in an effective way	3	

Interpretation

Table 4.2 indicated that the results of (group 2) prospective teachers' observation (who were teaching computer science to Grade 6) conducted by the researcher

concerning their skill of “lesson planning”. Cumulative mean scores of prospective teacher’ observation (regarding lesson planning) who was teaching the subject of the computer by traditional methods was 1.25 which indicated that though the teacher has developed a lesson plan before coming to the classroom, she did not address learning outcomes in the classroom effectively, did not test students’ background knowledge before starting the lesson, and she was unable to manage her classroom time effectively. While on the other hand cumulative mean score of prospective teachers’ observation taught by the lesson study model was 2.75 which specified that the prospective teacher was not only planning her lesson effectively but she was addressing students learning outcomes during her instruction, testing students’ background knowledge before starting lecture and effectively managing classroom time as well.

Values of group one’ mean scores (MS=1.25, 2.25) and group two’ mean scores’ (MS=1.25, 2.75) for this theme indicated that lesson planning ability of prospective teacher teaching by traditional methods was different than prospective teacher teaching by practicing lesson study model. This data further showed that the practice of the lesson study model has strengthened prospective teachers’ ability to lesson planning and they were very enthusiastic to practice it in future to design and plan their lessons effectively; as compared to teachers who are doing individual teaching and practicing traditional methods during their teaching practice.

4.2.2 Lesson Presentation by Prospective Teachers

Data related to lesson presentation ability of prospective teachers (those who were teaching by traditional methods and those who were involved in the practice of lesson study model) along with its interpretation is as follows:

Table 4.3

Lesson Presentation by Prospective Teachers (Group 1)

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Present new lessons before students in an appealing way	1	1.71
	Address students queries regarding lesson	2	
	Relate lesson with everyday life experiences	1	
	Maintain eye contact with students during the lesson	2	
	Display content management skills	2	
	Demonstrate Islamic/ethical values while teaching	1	
	Wrap up lesson in an understandable way	3	
Teacher Teaching by Lesson Study Model	Present new lesson before students in an appealing way	3	3.00
	Address students queries regarding lesson	3	
	Relate lesson with everyday life experiences	3	
	Maintain eye contact with students during the lesson	3	
	Display content management skills	3	
	Demonstrate Islamic/ethical values while teaching	3	
	Wrap up lesson in an understandable way	3	

Interpretation

Data in table 4.3 showed the results of prospective teachers' observation conducted by the researcher concerning their skill of "lesson presentation". Cumulative mean scores of prospective teacher observation who were teaching the subject of geography by traditional methods were 1.71 which indicated that though the teacher was

addressing students' queries during instruction, maintaining eye contact with students, displaying content management skills, and wrapping up lesson in an understandable way. But she was not presenting the lesson content in an appealing way for students as she was not relating the lesson to everyday life experiences. Furthermore, during instruction teacher was not demonstrating Islamic values and was not focusing on the moral development of the students.

While on the other hand cumulative mean score of the prospective teacher's observation taught by the lesson study model was 3.00 which indicated that the prospective teacher was presenting the lesson content in an appealing way for students, addressing students' queries during instruction, relating lesson with everyday life experiences, maintaining eye contact with students, displaying content management skills, demonstrating Islamic values for ensuring moral development of students, and wrap up lesson in an understandable way

Table 4.4

Lesson Presentation by Prospective Teachers (Group 2)

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Present new lesson before students in an appealing way	2	1.57
	Address students queries regarding lesson	1	
	Relate lesson with everyday life experiences	1	
	Maintain eye contact with students during the lesson	1	
	Display content management skills	1	
	Demonstrate Islamic/ethical values while teaching	2	
	Wrap up lesson in an understandable way	3	
Teacher Teaching by Lesson Study Model	Present new lesson before students in an appealing way	3	2.86
	Address students queries regarding lesson	3	
	Relate lesson with everyday life experiences	3	
	Maintain eye contact with students during the lesson	3	
	Display content management skills	3	
	Demonstrate Islamic/ethical values while teaching	2	
	Wrap up lesson in an understandable way	3	

Interpretation

Data in table 4.4 indicated the results of prospective teachers' observation conducted by the researcher regarding their skill of "lesson presentation". Cumulative mean scores of prospective teacher observation who was teaching the subject of computer education by traditional methods were 1.57 which indicated that though the teacher was

presenting the lesson content in an appealing way for students, demonstrating Islamic values for ensuring the moral development of students and concluding her lesson understandably. But she was unable to address students' queries during instruction, relate lessons with everyday life experiences, maintains eye contact with students, and display content management skills.

While on the other hand cumulative mean score of prospective teacher' observation who taught by practicing the lesson study model was 2.86 which revealed that the prospective teacher was presenting the lesson content in an appealing way for students, addressing students' queries during instruction, relating lesson with everyday life experiences, maintaining eye contact with students, displaying content management skills, demonstrating Islamic values for ensuring moral development of students, and wrap up lesson in an understandable way. Values of group one' mean scores (MS=1.71, 3.00) and group two' mean scores' (MS=1.57, 2.86) for this theme indicated that lesson presentation skills of prospective teacher teaching by traditional methods were not as good as the skills of prospective teacher teaching by lesson study model. This data further specified that involvement in the lesson study model has positively contributed to improve lesson presentation-related skills of prospective teachers and for future it has enabled them to present and conclude their lesson effectively as compared to those teachers who are doing individual teaching and practicing traditional methods during their teaching practice.

4.2.3 Application of Teaching Methods by Prospective Teachers

Data related to ability of prospective teachers (those who were teaching by traditional methods and those who were involved in the practice of lesson study model) regarding the use of multiple teaching methods along with its interpretation is as follows:

Table 4.5

Application of teaching methods by Prospective Teachers (Group 1)

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Ensure active engagement of students in the learning process	2	2.17
	Focus on developing students critical/creative thinking	3	
	Use multiple teaching strategies (i.e. lecture, discussion, QA)	2	
	Practice discovery/inquiry-based approach to learning	2	
	Motivate students to ask questions from the teacher	2	
	Focus on learner-centered instruction	2	
Teacher Teaching by Lesson Study Model	Ensure active engagement of students in the learning process	3	3.00
	Focus on developing students critical/creative thinking	3	
	Use multiple teaching strategies (i.e. lecture, discussion, QA)	3	
	Practice discovery/inquiry based approach to learning	3	
	Motivate students to ask questions from teacher	3	
	Focus on learner centered instruction	3	

Interpretation

Data in table 4.5 represented the results of prospective teachers' observation conducted by the researcher about their skill of "applying multiple teaching strategies".

The cumulative mean scores of prospective teacher' observation who was teaching the subject of geography by traditional methods were 2.17. While cumulative mean scores of prospective teachers' observation who taught by the lesson study model were 3.00 which showed that both teachers were ensuring the active engagement of students by assigning them various activities, concentrating on developing critical and creative thinking skills among students by motivating them to ask questions. They were focusing on learner-centered instruction, as along with the lecture method they were also utilizing discussion method, question/answer method, and discovery/inquiry-based approaches to make their teaching-learning process effective and attractive for students.

Table 4.6

Application of teaching methods by Prospective Teachers (Group 2)

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Ensure active engagement of students in the learning process	1	1.17
	Focus on developing students critical/creative thinking	1	
	Use multiple teaching strategies (i.e. lecture, discussion, QA)	1	
	Practice discovery/inquiry-based approach to learning	2	
	Motivate students to ask questions from the teacher	1	
	Focus on learner-centered instruction	1	
	Focus on learner-centered instruction	1	
Teacher Teaching by Lesson Study Model	Ensure active engagement of students in the learning process	3	3.00
	Focus on developing students' critical/creative thinking	3	
	Use multiple teaching strategies (i.e. lecture, discussion, QA)	3	
	Practice discovery/inquiry-based approach to learning	3	
	Motivate students to ask questions from the teacher	3	
	Focus on learner-centered instruction	3	
	Focus on learner-centered instruction	3	

Interpretation

Data in table 4.6 represented the results of prospective teachers' observation conducted by the researcher about their skill of "applying multiple teaching strategies". Cumulative mean scores of prospective teacher' observation who was teaching the subject of computer education by traditional methods were 1.17 which indicated that though the teacher was utilizing discovery/inquiry-based approaches to make their teaching-learning process effective and attractive for students but she was neither

ensuring the active engagement of students by assigning them various activities, nor focusing on developing critical and creative thinking skills among students by motivating them to ask questions. Besides lecture methods and inquiry-based approaches; the teacher was not utilizing innovative teaching strategies. Her teaching strategies were based on teacher-centered instruction instead of student-centered instruction.

While cumulative mean scores of prospective teachers' observation who taught by the lesson study model were 3.00 which revealed that teacher was ensuring the active engagement of students by assigning them various activities, concentrating on developing critical and creative thinking skills among students by motivating them to ask questions. She was focused on learner-centered instruction, as along with the lecture method she was also utilizing the discussion method, question/answer method, and discovery/inquiry-based approaches to make her teaching-learning process effective and attractive for students. Values of group one' mean scores (MS=2.17, 3.00) and group two' mean scores' (MS=1.17, 3.00) for this theme indicated that prospective teachers' involved in the lesson study process were utilizing multiple teaching methods as compare to prospective teachers' teaching through traditional ways of teaching. This data further specified that the practice of the lesson study model can motivate prospective teachers to utilize multiple teaching strategies during the instructional process. And in the future, it has enabled them to adopt and practice innovative teaching-learning strategies more frequently as compared to teachers who are doing individual teaching and practicing traditional methods during their teaching practice.

4.2.4 Interaction of Prospective Teachers with Students

Data related to ability of prospective teachers (those who were teaching by traditional methods and those who were involved in the practice of lesson study model) regarding interaction with students along with its interpretation is as follows:

Table 4.7

Interaction of Prospective Teachers with students (Group 1)

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Behave with students in a considerate way	2	1.67
	Promote the habit of teamwork among students	1	
	Make students feel comfortable in attending the class	2	
	Train students to appreciate other students' opinion	1	
	Appreciate students showing good performance	3	
	Provide equal attention to all students	1	
Teacher Teaching by Lesson Study Model	Behave with students in a considerate way	3	2.83
	Promote the habit of teamwork among students	2	
	Make students feel comfortable in attending the class	3	
	Train students to appreciate other students' opinion	3	
	Appreciate students showing good performance	3	
	Provide equal attention to all students	3	

Interpretation

Data in table 4.7 articulated the results of prospective teachers' observation conducted by the researcher concerning their skill of "interaction with students". Cumulative mean scores of prospective teacher' observation who was teaching the subject of geography by traditional methods were 1.67 which specified that the teacher was behaving with students considerably, making students feel comfortable in attending the class, and appreciating students for showing good performance but she was not promoting the habit of teamwork among students, training students to appreciate other students' opinion, and not providing equal attention to all students. While cumulative mean scores of prospective teacher' observation who taught by practicing the lesson study model were 2.83 which indicated that teacher was behaving with students considerably, promoting the habit of teamwork among students, making students feel comfortable in attending the class, training students to appreciate other students' opinion, appreciating students on showing good performance and providing equal attention to all students in a considerable way.

Table 4.8

Interaction of Prospective Teachers with students (Group 2)

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Behave with students in a considerate way	2	1.50
	Promote the habit of teamwork among students	1	
	Make students feel comfortable in attending the class	2	
	Train students to appreciate other students' opinion	1	
	Appreciate students showing good performance	2	
	Provide equal attention to all students	1	
Teacher Teaching by Lesson Study Model	Behave with students in a considerate way	2	2.50
	Promote the habit of teamwork among students	2	
	Make students feel comfortable in attending the class	2	
	Train students to appreciate other students' opinion	3	
	Appreciate students showing good performance	3	
	Provide equal attention to all students	3	

Interpretation

Data in table 4.8 showed the results of prospective teachers' observation conducted by the researcher regarding their skill of "interaction with students". Cumulative mean scores of prospective teacher' observation who was teaching the subject of computer education by traditional methods were 1.50 which indicated that the teacher was behaving with students considerably, making students feel comfortable in attending the class, and appreciating students for showing good performance but she was

unable to promote the habit of teamwork among students, train students to appreciate other students' opinion, and to provide equal attention to all students. While cumulative mean scores of prospective teacher' observation who taught by practicing the lesson study model were 2.50 which indicated that teacher was behaving with students considerably, promoting the habit of teamwork among students, making students feel comfortable in attending the class, training students to appreciate other students' opinion, appreciating students on showing good performance and providing equal attention to all students in a considerable way.

Values of group one' mean scores (MS=1.67, 2.83) and group two' mean scores' (MS=1.50, 2.50) for this theme indicated that prospective teachers' involved in the lesson study process were interacting with students more effectively as compare to prospective teacher using traditional ways of teaching. This data further specified that participation in the practice of the lesson study model can enable prospective teachers to ensure effective interaction with students. And in the future, this practice has enabled them to engage their students in the learning process more effective as compared to teachers who are doing individual teaching and practicing traditional methods during their teaching practice.

4.2.5 Use of Audio-Visual Aids by Prospective Teachers

Data related to ability of prospective teachers (those who were teaching by traditional methods and those who were involved in the practice of lesson study model) regarding the utilization of multiple audio-visual aids along with its interpretation is as follows:

Table 4.9

Use of Audio-Visual aids by Prospective Teachers (Group 1)

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Use a variety of AV Aids (i.e. charts, graphs, models)	1	1.00
	Ensure the relevance of AV Aids with the lesson' topic	1	
Teacher Teaching by Lesson Study Model	Use a variety of AV Aids (i.e. charts, graphs, models)	2	2.00
	Ensure the relevance of AV Aids with the lesson' topic	2	

Interpretation

Data in table 4.9 described the results of prospective teachers' observation conducted by the researcher regarding their skill of "utilizing various audio-visual aids". Cumulative mean scores of prospective teacher' observation who was teaching the subject of geography by traditional methods were 1.00 which indicated that teacher was neither using attractive audio-visual aids nor ensuring the relevancy of available audio-visual aids with the lesson that she was presenting. While cumulative mean scores of prospective teacher' observation who taught by practicing the lesson study model were 2.00 which indicated that teacher was not only utilizing multiple audio-visual aids such as charts and graphs but she was also ensuring their relevance with the topics that she was presenting.

Table 4.10

Use of Audio-Visual aids by Prospective Teachers (Group 2)

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Use a variety of AV Aids (i.e. charts, graphs, models)	1	1.50
	Ensure the relevance of AV Aids with the lesson' topic	2	
Teacher Teaching by Lesson Study Model	Use a variety of AV Aids (i.e. charts, graphs, models)	3	3.00
	Ensure the relevance of AV Aids with the lesson' topic	3	

Interpretation

Data in table 4.10 presented the results of prospective teachers' observation conducted by the researcher concerning their skill of "utilizing various audio-visual aids". Cumulative mean scores of prospective teacher' observation who was teaching the subject of computer education by traditional methods were 1.50 which indicated that though the teacher was not using innovative audio-visual aids, she was ensuring the relevancy of available audio-visual aids with the lesson that she was presenting. While cumulative mean scores of prospective teacher' observation who taught by practicing the lesson study model were 3.00 which indicated that teacher was not only utilizing multiple audio-visual aids such as charts and graphs but she was also ensuring their relevance with the topics that she was presenting considerably.

Values of group one' mean scores (MS=1.00, 2.00) and group two' mean scores' (MS=1.50, 3.00) for this theme indicated that prospective teachers' involved in the lesson study process were utilizing effective audio-visual aids as compare to prospective teachers' using traditional ways of teaching. This data further specified that the practice

of the lesson study model can enable prospective teachers to utilize a variety of audio-visual aids for making their instructional process effective. This practice has enabled them to utilize low cost-no cost audio-visual aids more effectively as compared to teachers who are doing individual teaching and practicing traditional methods during their teaching practice.

4.2.6 *Assessment-related Competencies of Prospective Teachers*

Data related to assessment competencies of prospective teachers (those who were teaching by traditional methods and those who were involved in the practice of lesson study model) along with interpretation is as follows:

Table 4.11

Assessment-related Competencies of Prospective Teachers (Group 1)

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Ensure students' understanding by asking random questions	2	2.00
	Assess students learning using multiple assessment strategies	3	
	Provide clear directions to students about ways of assessment	1	
Teacher Teaching by Lesson Study Model	Ensure students' understanding by asking random questions	3	3.00
	Assess students learning using multiple assessment strategies	3	
	Provide clear directions to students about ways of assessment	3	

Interpretation

Data in table 4.11 presented the results of prospective teachers' observation conducted by the researcher regarding their "assessment-related competencies".

Cumulative mean scores of prospective teacher' observation who was teaching the subject of geography by traditional methods were 2.00 which indicated that though the teacher was ensuring students' understanding by asking random questions and assessing their learning by using multiple teaching strategies, she was not providing clear directions to students about ways of assessment in advance. While cumulative mean scores of prospective teacher' observation who taught by the lesson study model were 3.00 which indicated that teacher was not only ensuring students' understanding by asking random questions and assessing their learning by using multiple teaching strategies but she was also providing clear directions to students about ways of assessment in advance.

Table 4.12

Assessment-related Competencies of Prospective Teachers (Group 2)

Groups	Statements	Responses	Mean Scores
Teacher Teaching by Traditional Methods	Ensure students' understanding by asking random questions	1	2.00
	Assess students learning using multiple assessment strategies	2	
	Provide clear directions to students about ways of assessment	3	
Teacher Teaching by Lesson Study Model	Ensure students' understanding by asking random questions	3	2.67
	Assess students learning using multiple assessment strategies	3	
	Provide clear directions to students about ways of assessment	2	

Interpretation

Data in table 4.12 showed the results of prospective teachers' observation conducted by the researcher regarding their "assessment-related competencies". Cumulative mean scores of prospective teacher' observation who was teaching the

subject of computer education by traditional methods were 2.00 which indicated that though the teacher was assessing students learning by using multiple teaching strategies and was providing clear directions to students about ways of assessment in advance but she was not ensuring their understanding during class by asking random questions. While cumulative mean scores of prospective teacher' observation who taught by practicing the lesson study model were 2.67 which indicated that teacher was not only ensuring students' understanding by asking random questions and assessing their learning by using multiple teaching strategies but she was also providing clear directions to students about ways of assessment in advance.

Values of group one' mean scores (MS=2.00, 3.00) and group two' mean scores' (MS=2.00, 2.67) for this theme indicated that assessment related competencies of prospective teacher teaching by traditional methods were not as effective as the competencies of prospective teacher teaching by lesson study model. This data further specified that involvement in the practice of the lesson study model can strengthen the assessment-related competencies of prospective teachers. This practice has enabled them to assess their students learning by utilizing multiple innovative assessment techniques more efficiently as compared to teachers who are doing individual teaching and practicing traditional methods during their teaching practice.

4.3 Case III: Evaluation of Students' Academic Performance

This case is based on the third objective and research question of the study which were as follows:

Objective 3: Evaluate the academic performance of students who were taught by applying the lesson study model to those who were taught by traditional methods

Research Question 3: To what extent does the lesson study process improve the academic performance of students (who were taught by applying the lesson study model) as compared to those who were taught by traditional methods?

For addressing this objective and research question, classroom tests were developed by the researcher with the assistance of cooperative and prospective teachers (Detailed tests have been attached in appendix-15) for the students of both subjects (Geography and computer education). The same tests were taken from both groups (who were taught by traditional methods and those who were taught by practicing the lesson study model. Detail of students' marks in these tests has been given in Appendix-20. T-test was applied for exploring the difference in academic performance of students. Detailed data analysis is as follows:

4.3.1 Academic Performance of Students Studying Geography (Grade-7)

For exploring the difference between the academic performances of geography students who were taught by traditional methods and students who were taught by practicing the lesson study model, the following research hypothesis was developed.

H_{A1} There is a significant difference in the marks of geography students taught by traditional methods and taught by practicing the lesson study model

Table 4.13

t-test summary for the students of Geography

Groups	N	Mean Scores	Standard Deviation	t value	df	p-value	Hedges' g value
Students who were taught by traditional methods	25	8.44	3.21	0.483	58	0.63	0.12
Students who were taught by the lesson study model	35	8.91	4.08				

Interpretation

Data in table 4.13 showed that there were total 25 students in the class of the teacher who was teaching the subject of geography by applying traditional methods of teaching. While there were total 35 students in the class of the teacher who was teaching through the lesson study model and with her colleagues' assistance. The mean scores and standard deviation of students' marks who were studying geography and were taught by traditional methods of teaching were $MS=8.44$, $SD=3.21$. And mean scores and standard deviation of students' marks who were taught by the lesson study model were $MS=8.91$, $SD=4.08$. Values of t , df , and p ($t(58)=0.483$, $p=0.63$) indicated that there is no significant difference in the marks of geography students taught by traditional methods and lesson study model. As the sample size was different in both groups, therefore for calculating the effect size of the t -test, the formula of Hedges, g was applied and its value (0.12) indicated that the effect size was small for the t -test in this case.

4.3.2 Academic Performance of Students Studying Computer (Grade-6)

For exploring the difference between the academic performances of computer education' students who were taught by traditional methods and students who were taught by practicing the lesson study model, the following research hypothesis was developed.

H_{A2} There is a significant difference in the marks of computer education' students taught by traditional methods and taught by practicing the lesson study model

Table 4.14

t-test summary for the students of Computer Education

Groups	N	Mean Scores	Standard Deviation	t value	df	P-value	Hedges' g value
Students who were taught by traditional methods	28	19.07	6.07	0.396	52	0.69	0.10
Students who were taught by the lesson study model	26	19.73	6.14				

Interpretation

Data in table 4.14 showed that there were total 28 students in the class of the teacher who was teaching the subject of computer education by applying traditional methods of teaching. While there were total 26 students in the class of the teacher who was teaching through the lesson study model and with her colleagues' assistance. The mean scores and standard deviation of students' marks who were studying geography and were taught by traditional methods of teaching were MS=19.07, SD=6.07. And mean scores and standard deviation of students' marks who were taught by practicing the lesson study model were MS=19.73, SD=6.14. Values of t, df, and p ($t(52)=0.396$, $p=0.69$) indicated that there is no significant difference in the marks of computer education' students taught by traditional methods and practicing lesson study model. Hedges, g value (0.10) indicated that the effect size was small for the t-test in this case.

4.4 Case IV: Supervisors' and Cooperative Teachers' Views

This case is based on the fourth objective and research question of the study which was as follows:

Objective 4: Explore the views of supervisors (at schools & university) and cooperative teachers regarding the instructional activities and meetings that take place during the practice of the lesson study model

Research Question 4: What are the views of supervisors (at schools & university) and cooperative teachers regarding the instructional activities and meetings that take place during the practice of lesson study?

In order to explore the detailed effects of the lesson study model, despite practicing this model with prospective teachers at schools, getting reflections about this model, conducting observations during the practice of this model, comparing the instructional practices of prospective teachers involved in the lesson study model with prospective teachers utilizing traditional ways of teaching, and comparing the academic performance of students taught by practicing lesson study model and traditional ways of teaching; interviews were also conducted with cooperative teachers and principals at schools and teacher educators at university. The basic purpose of these interviews was to explore the perceptions of concerned officials about the usability and implementation of this model for improving the instructional practices of teachers and the academic performance of students at schools. This case has been divided into three sub-sections, and their detail is as follows:

4.4.1 Perceptions of University Supervisors about Lesson Study Model

Detailed transcribed interviews of university supervisors have been given in Appendix-21, while key aspects related to the lesson study model about which the perception of university supervisors was explored were as follows:

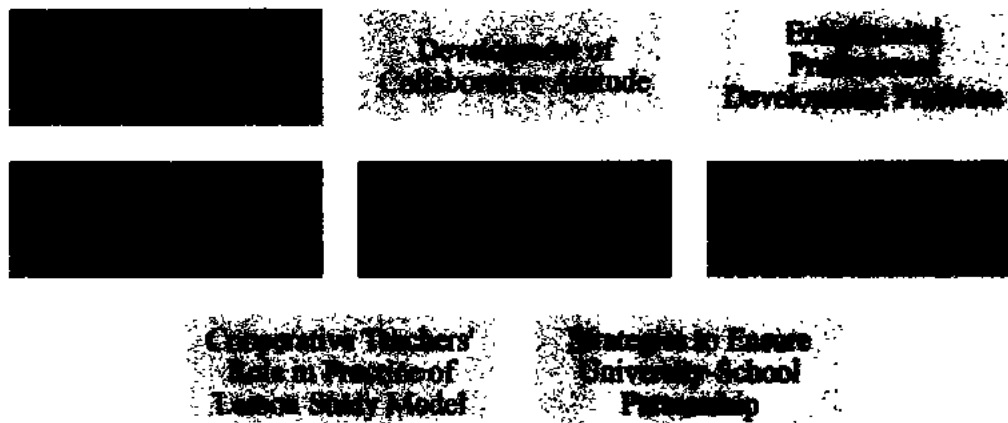


Figure 4.9: Perceptions of University Supervisors about Lesson Study Model

4.4.1.1 Elevating Pedagogical Content Knowledge: University supervisor expressed that they implement various practices for elevating pedagogical content knowledge of prospective teachers, such as:

- Teaching various courses on pedagogy,
- Involving them in the practices related to developing effective lesson plans,
- Providing them opportunities to practice micro-teaching,
- Training them to utilize various teaching methods,
- Motivating them to utilize multiple teaching aids and skills of teaching,
- Coordinating with schools administrators for their internships,
- Familiarizing them with various strategies to improve their classroom teaching,
- Engaging them in reflective practices to improve their weak areas, and
- Conducting multiple activities related to:

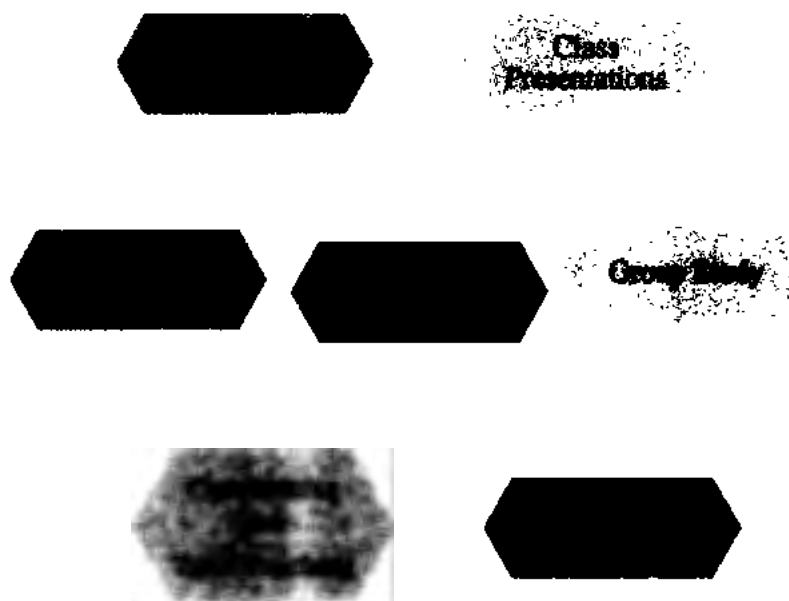


Figure 4.10. Strategies to improve Pedagogical Content Knowledge

They expressed that despite of all these strategies, a model for effective professional development of prospective teachers is required that can offer ample opportunities for practicing these strategies during teaching practice with strong coordination of university and school supervisors. The practice of the lesson study model during the internship of prospective teachers can prove very effective to bridge the gaps between theory and practice of teacher education programs. And this practice can enable them to strengthen the variety of skills needed throughout their professional careers generally and in teaching specifically.

4.4.1.2 Development of Collaborative Attitude: Various initiatives are being taken by university supervisors to develop collaborative attitudes among prospective teachers such as cooperative teaching, team-based teaching activities, classroom discussion, and group activities in different pedagogy-based courses. In this regard, one university stated that:

"All types of collaborative activities are conducted keeping in view the need of the students. Most of the time students have to work in pairs, or groups of four to five according to their overall class strength, and sometimes a whole class may be given a project to accomplish in which every participant can feel like a team player".

They stated that results of various studies conducted in the perspective of this model described that it includes rigorous practices and deliberate preparation on the part of the teacher/team leader/group leader who is going to guide the prospective teachers and it is a strong indicator of developing collaborative attitude among prospective teachers. As one university supervisor indicated:

"This model offer opportunities for prospective teachers to collaborate for discussing the lesson and this opportunity can enable them to improve their instructional practices as well as the practices of their fellow teachers as well by identifying their weaknesses".

Data collected from university supervisors indicated that effective practice of the lesson study model can play a pivotal role in developing professional attitudes among teachers.

4.4.1.3 Enlightening Professional Development Practices: University supervisors stated that the lesson study model can serve as an effective model for enlightening the professional development of prospective teachers if it is applied in a real sense. They stated that it is significant not only for the professional development of prospective teachers, but it is equally important for the professional development of in-service teachers as well. One university supervisor indicated that:

“Yes, I am very much confident to say that the lesson study model if applied with true letter and spirit can be very helpful for prospective teachers to get an in-depth understanding of various aspects of the teaching-learning process, and application of various teaching strategies”

According to their point of view, all activities that are undertaken during the practice of the lesson study model such as working collaboratively, giving feedback to each other, evaluating other works, and reflecting on their strengths and weaknesses can enable prospective teachers to get benefits from each other experiences for improving their instructional practices.

4.4.1.4 Upgrading Academic Performance of Students: University supervisors also uttered that the practice of the lesson study model by prospective teachers at school can contribute a lot to improving the academic performance of students. They indicated that when the teachers are well prepared for answering students' queries and involving them in classroom discussion; they can surely ensure better academic performance of students. In this regard, one participant responded that *“it will raise their confidence level to get engaged in classroom activities. Their communication skills and abilities to respect each other's views will also get improve. Their attitude and behavior will also get improved through this practice”*. They indicated that teachers who get training to practice the lesson study model during their teaching can overview its ultimate effect on the academic achievement of students.

Furthermore, they stated that the practice of the lesson study model demands teachers to get involved in reflective practices; by this practice, they have become able to

identify the gaps in their teaching through reflection and to develop the same habit among students as well. Through this practice, students were motivated to play an active role in designing classroom activities and in evaluating the level of their learning. And these indicators can positively contribute to the attainment of students learning outcomes in an appreciable way.

4.4.1.5 University Level Initiatives for Practice of Lesson Study Model:

According to university supervisors, the successful practice of this model requires equal attention from the school and university administrators. Concerning university-level initiatives, one participant responded that:

"This model may be proposed to be inculcated in the scheme of study of long term internship & pedagogy based course for imparting basic knowledge about this model to students. And in this regard, students may be also trained for the practice of this model by giving them various activities/ tasks/ projects associated with this model"

They further stated that if this model is included in the teacher education curriculum as an activity, then universities and teacher training institutes can ensure its practice more comprehensively. Besides it, strong coordination may be ensured between the administrators of teacher education institutions and schools (where prospective teachers are sent for teaching practice) for its successful implementation. University administrators may be requested to provide all the necessary equipment and facilities needed to apply this approach in a comfortable environment.

4.4.1.6 School Level Initiatives for Practice of Lesson Study Model:

University supervisor indicated that schools administrators are also expected to play their

role in ensuring the successful practice of this model. And for ensuring their participation, the first and foremost step is to gain their confidence in the practice of the lesson study model. For familiarizing them with the real essence of the lesson study model, a prior meeting or a presentation regarding the lesson study model can be arranged. Expectations from the practice of this model, plan of implementation, and schedule along with the list of students may be also shared with them for the practice of this model. One participant responded that:

"Practice of lesson study model can be ensured through interaction with school supervisors and orientation can be provided to them about the best practices of prospective teachers' professional development such as lesson study and many more. And they can be ensured this model can benefit not only to prospective teachers but working teachers' can also get benefit from it".

Moreover, they suggested that before the start of prospective teachers' teaching practice; teacher educators can conduct a meeting with school principals to brief them about the astonishing benefits of the lesson study model. And adequate training may be provided to the teaching staff by teacher educators to practice the lesson study approach with prospective teachers.

4.4.1.7 Cooperative Teachers' Role in Practice of Lesson Study Model: As, along with school administrators, cooperative teachers are also required to play an imperative role in the successful practice of the lesson study model. That's why university supervisors have set forth various suggestions to ensure the effective participation of cooperative teachers in the practice of this model. They said that regular

meetings may be conducted to familiarize them with the lesson study model and frequent feedback regarding the performance of prospective teachers can be obtained from them. They may be asked to properly guide prospective teachers in identifying and solving their instruction-related problems. One respondent suggested that:

"When prospective teachers' go to various schools; then along with recommendation letters, we can provide them a booklet regarding the lesson study model for cooperative teachers. We can make some study groups related to the lesson study model and we can include cooperative teachers in these study groups".

Besides it, adequate training may be provided to both cooperative and prospective teachers by teacher educators for designing effective lesson plans about need assessment. Orientation sessions and weekly meeting may be also organized with them for ensuring the successful completion of each activity associated with the practice of the lesson study model.

4.4.1.8 Strategies to Ensure University-School Partnership: University supervisors indicated that ensuring university-school partnership is a very good idea for strengthening the professional development of prospective teachers as through it we can build a collaborative bond/partnership with schools for the implementation of this model. And for building such kind of partnership between these entities (school and university), they suggested that:

- Ensure strong collaboration between teacher education departments and schools,
- Arrange monthly or semester-wise meetings with cooperative teachers,
- A proper plan for implementation of the lesson study model may be developed,

- Some honorarium may be provided to cooperative teachers,
- Create a liaison between teacher education institutions and officials of FDE
- The teaching workload of university supervisors may be minimized, and
- Policies may be documented and applied to practically implement this model.
- Ensure a triangular relationship among:

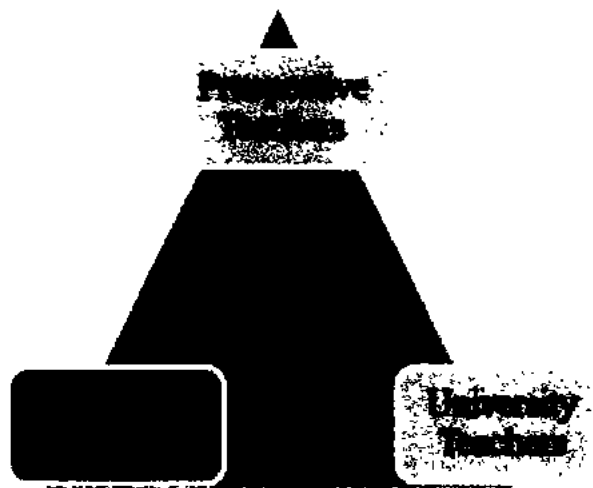


Figure 4.11: Triangular Relationship among Teachers

It has been argued by university supervisors that prospective teachers that the university produces ultimately join these schools as professional teachers, therefore both parties are the stakeholders in this process. And, for ensuring that partnership, one university supervisor indicated that *“there must be an MOU between the university and school authorities that would help them to understand the importance and benefits of lesson study model and the mutual benefits they would get through this approach”*. Data collected from university supervisors indicated that for the professional development of prospective teachers, lesson study can serve as an effective model, and for ensuring the successful practice of that model close coordination of university and school administrators is required.

4.4.2 Perceptions of School Supervisors about Lesson Study Model

Detailed transcribed interviews of schools supervisors (principals) have been given in Appendix-22, while key aspects related to the lesson study model about which the perception of schools supervisors was explored were as follows.

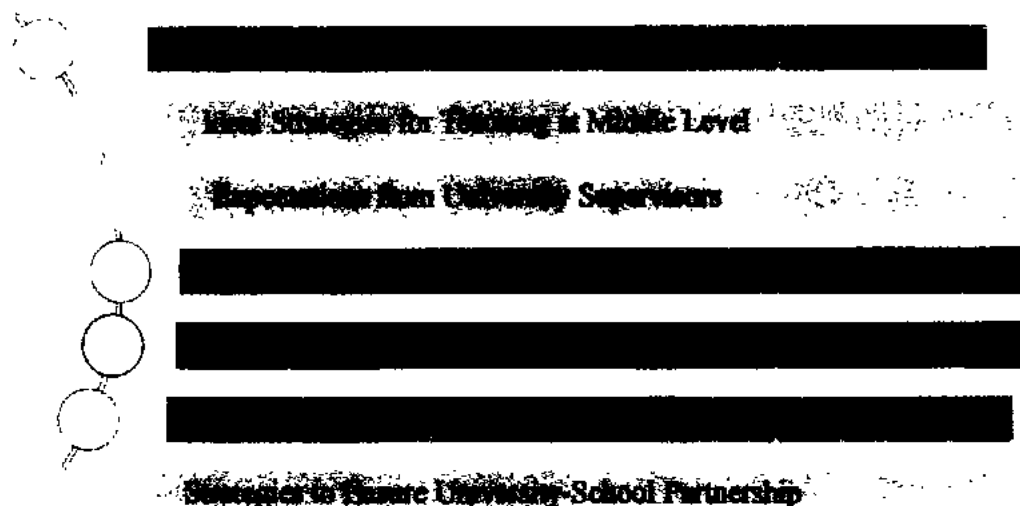


Figure 4.12: Perceptions of School Supervisors about Lesson Study Model

4.4.2.1 Uniqueness of Lesson Study Model: According to school supervisors, lesson study can be considered a unique model for the professional development of prospective teachers; and its most important elements are planning and implementation of lessons with close coordination of university supervisors, cooperative teachers, and prospective teachers. Utilization of innovative teaching strategies and twice presentation of a topic are those unique elements of that model which has a great role in unproving students' academic performance. For highlighting the importance of the lesson study model, one participant responded that *“active collaboration among prospective teachers, university supervisor and school supervisors for topic identification, planning,*

implementation and evaluation of a lesson makes lesson study model different from all other models of professional development".

Furthermore, they indicated that “continuous feedback from university supervisor and cooperative teachers to prospective teachers is the most important element of this model. They also indicated that for its practical implementation, there is a need to ensure drastic changes in our education system as we lack proper facilities regarding AV aids. Due to the lack of discussion sessions, our students lack concept clarification, they can take good marks in exams but cannot perform well when they appear in entry tests like exams.

4.4.2.2 Ideal strategies for teaching to the middle level (6th-8th Grade):

School supervisors indicated that team teaching can be the best strategy as it offers opportunities for experience and knowledge sharing. But for it, there is a need to ensure the availability of proper labs, and the number of teachers must be according to students’ strengths. And if due to unavoidable circumstances, individual teaching becomes mandatory for prospective teachers then a culture of collaborative planning must be promoted among teachers.

4.4.2.3 Expectations from University Supervisors: As school supervisors have vast experience to deal with prospective teachers, therefore they were asked to reflect on their expectations from university supervisors for ensuring the effective professional development of prospective teachers. They stated that due to the lack of budget, school administrators cannot create effective audio-visual aids and a learning environment. Therefore, it is expected from university supervisors that they should train prospective teachers to:

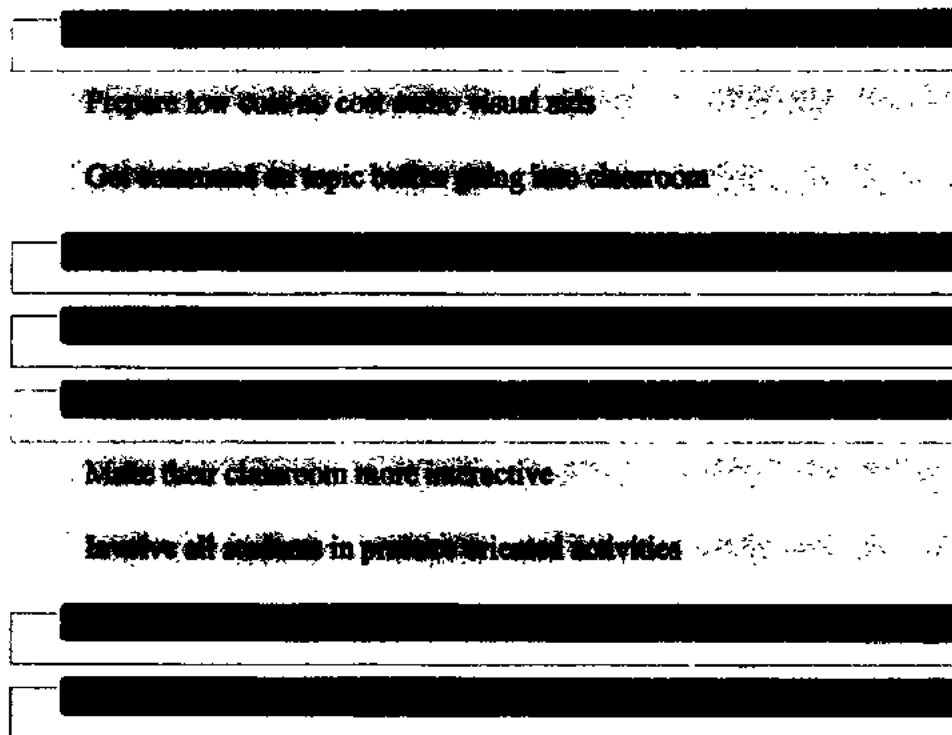


Figure 4.13: Expectations from University Supervisors

4.4.2.4 Strategies to practice Lesson Study Model: School supervisors uttered that if we want to develop the habit of practicing the lesson study model among prospective teachers, then one or two sessions of practicing the lesson study model may be conducted at the university before the start of prospective teachers' teaching practice and two to three sessions may be conducted during their teaching practice at school. They further indicated that this model is a great source to develop the habit of collaborative planning among prospective teachers, therefore, after developing the habit of teamwork, prospective teachers may be allowed to start individual teaching with collaborative planning.

4.4.2.5 School Level Initiatives for Practice of Lesson Study Model: School supervisors responded that the school environment and personnel mattered a lot for the

successful implementation of the lesson study model, therefore school administrators can take the following initiatives to ensure the practice of this model.

- Arrange training facilities for cooperative teachers to practice the lesson study model,
- Train prospective teachers by involving them in practical activities,
- Assist prospective teachers in ensuring effective classroom management,
- Familiarize prospective teachers with the importance of following time table,
- Guide prospective teachers to follow supervisor's instructions,
- Train prospective teachers to follow the rules and regulations of schools,
- Direct experienced teachers to mentor prospective teachers effectively,
- Motivate senior teachers to share their experience with prospective teachers, and
- Increase the confidence level of prospective teachers by giving them individual tasks.

4.4.2.6 University Level Initiatives for Practice of Lesson Study Model:

Besides school-level initiatives to practice the lesson study model, university-level initiatives for the successful implementation of this model were also explored by school supervisors. One participant suggested that:

"Teacher educators are expected to select 2-3 teachers from all those schools where they are sending their prospective teachers for teaching practice. And they must provide adequate training related to this model firstly to school teachers (cooperative teachers) as this initiative can support a lot in the successful implementation of lesson study model".

They expected university supervisors to give relaxation from university attendance to prospective teachers to make them more punctual and responsible for classroom teaching. Furthermore, they stated that university supervisors must:

- Develop the habit of obeying rules/regulations among prospective teachers,
- Make frequent schools visits during teaching practice,
- Provide a detailed agenda of internship to school administrators,
- Take Demo lessons from prospective teachers during course work,
- Take proper feedback from school administrators at the end of teaching practice,
- Focus on grooming prospective teachers from the perspective of teamwork,
- Train prospective teachers to put their serious efforts into planning lessons, and
- Prepare prospective teachers for developing low cost-no cost audio-visual aids.

4.4.2.7 Strategies to Ensure University-School Partnership: For ensuring university-school partnership, school supervisors have suggested various strategies for concerned officials, which are as follows:

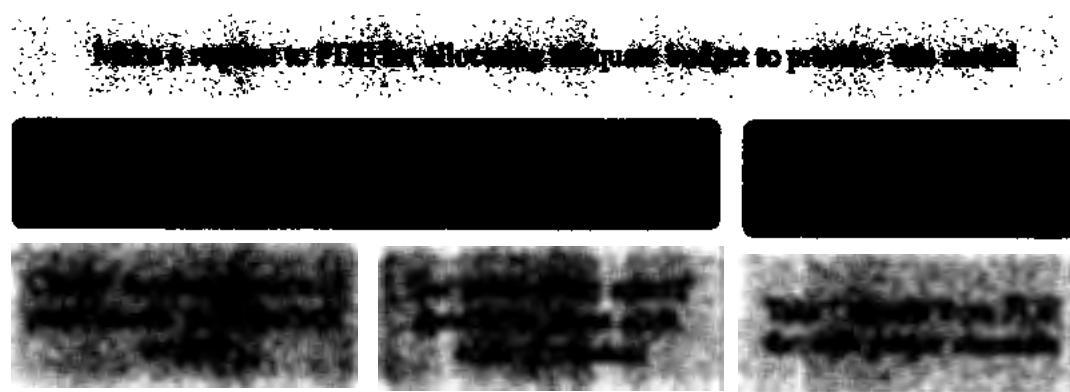


Figure 4.14: Suggestions of Schools Supervisors for University-School Partnership

Interpretation

It has been suggested by schools' principals that for ensuring successful implementation of the lesson study model, a request may be made by supervisors (schools principals and teacher educators) to FDE (Federal Directorate of Education) for allocating an adequate budget due to financial crisis innovative audio-visual aids and learning material is not available at schools. By mutual collaboration of supervisors, the services of those cooperative teachers and teacher educators may be availed who have ample teaching and research-related experience. At the initial phase of teaching practice, complete data about those schools can be collected from FDE which has a sufficient number of cooperative teachers and are willing to practice the lesson study model.

Teacher educators are expected to prepare a documentary or presentation on the lesson study model for clarifying its real essence in front of officials of FDE and school principals. A detailed meeting may be conducted with school principals to get detail about the school's timetable, dress code, as well as code of conduct and prospective teachers may be trained accordingly. There is a need to take formal consent from FED through proper channels for selecting schools to practice the lesson model and all these steps can play a pivotal role in ensuring university-school partnership.

4.4.3 Perceptions of Cooperative Teachers about Lesson Study Model

Detailed transcribed interviews of cooperative teachers have been given in Appendix-23, while key aspects related to the lesson study model about which the perception of cooperative teachers was explored were as follows:

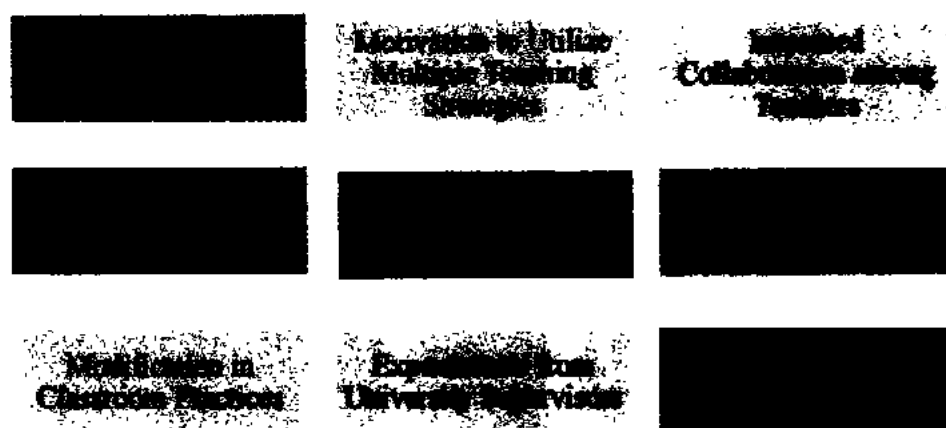


Figure 4.15: Perceptions of Cooperative Teachers about Lesson Study Model

4.4.3.1 Effectiveness of Lesson Study Model: The researcher explored the perception of cooperative teachers about the effectiveness of the lesson study model and they responded that it is a very effective model for prospective teachers' professional development. One participant responded that *"during the 2nd cycle of lesson presentation, prospective teachers have taught the lesson diligently, she has effectively explained all points and ensure the proper utilization of audio-visual aids as well"* Another participant responded that:

"By utilizing lesson study model, prospective teachers have taught effectively as they have learned a lot of thing after observing the instructional practice of their fellow teacher and have learned even from negative points of their fellow teacher instruction".

They further indicated that this model has supported the professional development of prospective teachers to a great extent as it puts great emphasis on:

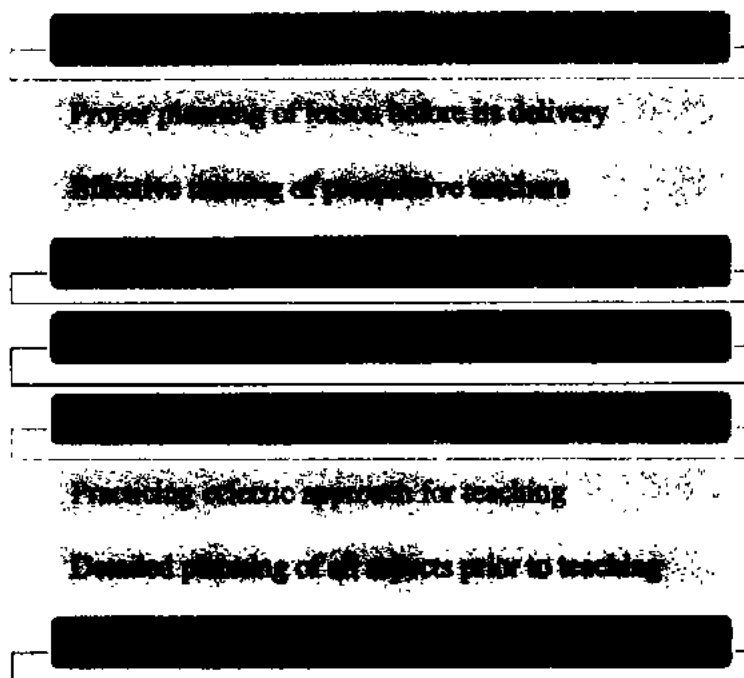


Figure 4.16. Effectiveness of Lesson Study Model

They responded that keeping in view the requirements of this model, prospective teachers came to class with full preparation, and their style of instructing students was very good. Decisively, for highlighting the importance of practicing the lesson study model with prospective teachers, they stated that prospective teachers remained very active throughout the whole process, and this liveliness proved very helpful in creating a conducive learning environment.

4.4.3.2 Motivation to Utilize Multiple Teaching Strategies: According to cooperative teachers, various activities that were undertaken during the practice of this model have enabled prospective teachers to ensure the utilization of multiple teaching strategies during teaching, such as sharing of experiences with one another, designing activities to ensure active participation of students in classrooms, taking frequent

guidelines from school supervisors, etc. Along with the lecture method, various teaching-learning strategies that they have utilized during their instructional practice are as follow



Figure 4.17: Teaching Strategies Practiced by Prospective Teachers

4.4.3.3 Increased Collaboration among Teachers: Cooperative teachers also noted that for increasing collaboration among prospective teachers, this model can prove very effective as it demands teachers to work collaboratively at each step. They further specified that as prospective teachers were guided by supervisors to evaluate the instructional practices of their fellows, therefore, they focused on effective collaboration for minimizing the weaknesses in lesson delivery. Likewise, one participant responded that *"this model has developed among them sincerity for the profession, and they collaboratively work to do their best for effective lesson presentation"*. Besides it, they responded that group activities were the crux of that model, and participation of all team members throughout the whole process (from planning to evaluation) has polished the collaboration skills of prospective teachers.

4.4.3.4 Improved Students' Understanding of Lessons: This model is a great source to ensure concept clarification and a better understanding of students during the practice of this model; after close coordination and sharing of experiences, prospective teachers select those teaching-learning strategies that seem most favorable for teaching complicated topics. One participant responded that *"as in this model prospective teachers take short quizzes from students and display flow charts, these activities have proved very*

helpful in better understanding of students". Another cooperative teacher stated that "prospective teachers have conducted multiple activities at the classroom and also informed students that their performance will be evaluated by written test, therefore all the students were taking interest in classroom activities and were listening lecture attentively"

Furthermore, their responses indicated that prospective teachers asked multiple questions from students, involve all students to participate in classroom activities, create amusement in class, students gain the attention of two to three teachers, they get their queries addressed on the spot, these all these steps have positively contributed towards a better understanding of students.

4.4.3.5 Development of Professional Attitude: This model has contributed a lot to developing professional attitude among prospective teachers as one participant responded that *"they were sharing their ideas during planning and implementation of the lesson, giving feedback for lesson improvement and also developed audio-visual aids by cooperation, so these practices have polished their multiple abilities"*. They further indicated that it has developed professional attitude among prospective teachers as it is based on the notions of:

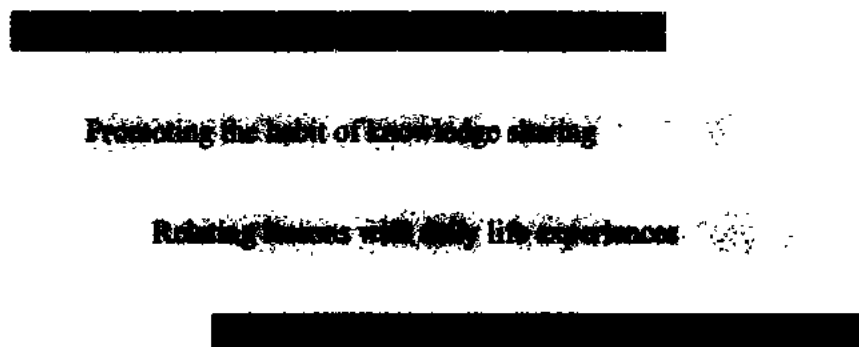


Figure 4.18: Key Notions of Lesson Study Model

Besides, cooperative teachers indicated that revision of the whole process has played a very significant role in improving their learning of professional skills and attitudes.

4.4.3.6 Upgraded Observation and Evaluation Skills: Cooperative teachers specified that the practice of the lesson study model has also contributed a lot to upgrading the observation and evaluation-related skills of prospective teachers. In this regard, one participant answered that “as this model motivates prospective teachers to observe each other work and give constructive feedback to improve instructional practices, then it can be said that this model is making prospective teachers good evaluators and observers”. Another participant indicated that they were not only observing each other work; but also the work of senior teachers as well, and focusing on doing constructive evaluation; therefore these practices were a clear sign that in the future they can play the role of keen observer and good evaluator. Another participant responded that:

“One was teaching and the others were taking classroom rounds. The teacher who was teaching was also evaluating her instructional practices as well. Other teachers also provide comments for lesson improvement, so all these activities have played an imperative role to make prospective teachers good observers and evaluators”.

Besides it, they indicated that observation and evaluation of the student that was done during the first cycle of lesson presentation have enabled prospective teachers to remain more careful during the second cycle of lesson presentation. And in this way, this

practice has not only improved their observation and evaluation-related skills but also has improved their instructional practices.

4.4.3.7 Modification in Classroom Practices: The practice of this model has also ensured effective modifications in the layout and environment of schools' classrooms as it motivated prospective teachers to ensure active participation of students in classroom activities instead of making them passive listeners. This practice has enabled them to behave professionally and teach in an organized way. In this regard one participant answered that *"during the practice of this model, they have learned that ensuring pin drop silence is not the best strategy, they must involve students in classroom activities discussion for ensuring their concept clarification"*. They indicated that keeping in view the requirements of this model, prospective teachers were focusing on student-centered teaching, and this idea has made the classroom environment attractive for all students. Teachers were focusing not only on bookish knowledge, but were also trying to clarify students' concepts by utilizing various audio-visual aids and this practice of prospective teachers has changed the overall environment of class to a great extent.

4.4.3.8 Expectations from University Supervisors: As cooperative teachers were supervising prospective teachers throughout the teaching practice, therefore, their expectations from university supervisors were also explored to ensure the effective professional development of prospective teachers. They stated that university supervisors must train prospective teachers to:

- Properly follow the school's rules and regulations,
- Create a distance between teacher and students,
- Practice innovative pedagogical and classroom management techniques,

- Plan their lesson effectively for each class,
- Utilize technological tools during their teaching,
- Take required guidance from senior teachers,
- Develop audio-visual aids during spare time,
- Bring revolutionary changes in teaching practice, and
- Select content for the lesson keeping in view the attention span of students.

Furthermore, one participant responded that “university teachers must make frequent and surprise visits to evaluate the performance of prospective teachers and take feedback from cooperative teachers about their regular performance”. Teacher educators are expected to develop among them the motivation for work and qualities of professional teachers and they must focus on their overall personality development.

4.4.3.9 Learning from Lesson Study Model: As cooperative teachers were actively engaged throughout the whole process of practicing the lesson study model, therefore researcher also explored their learning associated with the practice of this model. They indicated that the most significant points which they have learned from it are:



Figure 4.19: Benefits of Participating in the Practice of Lesson Study Model

Besides it, they expressed that this model has developed among them the spirit to become good teachers, honesty with the profession, and has offered many opportunities to learn new skills. Therefore, it can be concluded that effective practice of the lesson study model in schools with the help of teacher educators can support not only the professional development of prospective (pre-service) teachers but can also contribute a lot to improving instructional practices of cooperative (in-service) teachers and academic performance of students.

4.5 Summary

This chapter is based on data analysis of four cases that were the major part of the present research study. Data collected from reflections, observations, students' marks, and interviews have been presented in the form of tables and figures for a better understanding of readers. In the next chapter (five), the researcher has composed the summary findings, conclusions, discussions, and recommendations drawn from the data mentioned in chapter four.

CHAPTER 5

SUMMARY, FINDINGS, DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The previous chapter (chapter 4: pages 122-189) comprised the data analysis related to research objectives and questions. The present chapter contained the following major sections:

- Summary of the first four chapters,
- Findings related to objectives and research questions,
- A pictorial and detailed description of the framework,
- Triangulation of findings (cumulative findings)
- Discussion related to obtained findings,
- Conclusions related to study objectives and research questions, and
- Recommendations that reflect the ways for improving the existing context to practice the lesson study model and aspects related to the lesson study model that may be explored by future researchers.

A detailed description of this chapter's major sections is as follows:

5.1 Summary

Various countries are adopting diverse strategies for prospective teachers' professional development. One of the most important, highly successful, and well-studied forms of teacher professional development is lesson study. As lesson study model involves the recursive, reflexive, and collaborative process for improving the quality of the teaching-learning process. The present research study was conducted to reconnoissance the perception and experience of prospective teachers about the role

played by the lesson study model in their professional development. Furthermore, this study also compared the instructional practices of prospective teachers using traditional ways of teaching and the teachers involved in the practice of the lesson study model. For exploring the wide-ranging impact of lesson study, the performance of students was also compared (taught with traditional teaching strategies and taught by applying the lesson study model). The model of lesson study was practiced and the researcher facilitated prospective teachers throughout the process. This study employed mixed methods multiple case study approach, as in this approach each participating group is conceptualized as a case. Prospective teachers of the 4-Year undergraduate program in the education department of International Islamic University Islamabad, supervisors of prospective teachers (at schools & university), cooperative teachers at schools, and students of Islamabad model colleges/schools constituted the population of this study.

Convenient, purposive, random, and census sampling techniques were applied to select prospective teachers, cooperative teachers, and supervisors at schools, students, and university supervisors respectively as a sample for this study. For practicing the lesson study model and collecting relevant data both qualitative and quantitative tools were utilized by the researcher. Prior permissions were taken from the heads of the institutions where the practice of the lesson study model has to be conducted. The researcher personally visited supervisors and cooperative teachers for interviews. Inductive content analysis and thematic analysis was used to analyze qualitative data, while mean scores, and t-test were applied for the analysis of quantitative data. Based on data analysis, various findings, conclusions, points for discussion, and recommendations were drawn which are as follows:

5.2 Findings

5.2.1 Case I: Practice Lesson Study Model

1. Pre-lesson reflections of prospective teachers indicated that they expect that participation in the practice of the lesson study model can improve their skills related to team teaching, lesson planning, utilization of audiovisual aids, evaluation, management, practicing theoretical knowledge, effective communication, professional attitude, collaboration, confidence level, writing reflections, getting a command on topic, and practice of innovative teaching-learning strategies (Figure 4.1).
2. Clinical supervision model was utilized to conduct observations of lesson. Observation of the first lesson presentation of geography done by prospective teachers of their fellow teachers indicated that this lesson may be improved by following a developed lesson plan sequentially, utilizing some more attractive audiovisual aids, explaining complicated topics through illustration, giving relatable examples, and ensuring the active engagement of all students in classroom activities (Figure 4.2 & 4.3).
3. Observation of the first lesson presentation of computer education done by prospective teachers of their fellow teachers indicated that this lesson may be improved by avoiding frequent fluctuations in voice, asking one point from one student, ensuring effective classroom management, adding some more questions in the section of previous knowledge testing, improving interaction with students, and by ensuring concept clarification of students instead of focusing on content coverage (Figure 4.4).

4. Reflections of cooperative teacher about the first lesson presentation of the geography subject indicated that this lesson presentation may be improved by improving students' pronunciation, giving equal attention to all students, and relating the lesson with daily life experiences and examples. While in this regard researcher's reflection showed that this lesson presentation may be further improved by using soft language with students, introducing major topics at the start of class, using a little bit amusing words, and improving the classroom setting as it was looking same as traditional classroom setting (Figure 4.5).
5. Reflections of cooperative teacher about the first lesson presentation of computer education subject indicated that lesson presentation by prospective teachers may be improved by motivating/directing teacher to work actively in the classroom, use vocabulary according to the level of students, not her level, and avoid constant book reading during lecture presentation. While in this regard researcher's reflection showed that in the second phase of lesson presentation, prospective teachers are required to ensure the availability of required study material before starting the lesson's formal presentation, be careful about the position of students during reading, appropriately assess students' understanding, and utilize some more audio-visual aids for effective delivery of content material (Figure 4.6).
6. Prospective teachers presented the revised lesson in second cycle of lesson study model and make a lot of improvements in their instructional practices. Post lesson reflections of prospective teachers indicated that their overall experiences of participating in the practice of the lesson study model were very good as they have learned a lot from this practice and as a result of this learning they are intended to

utilize this model in their professional career. They further indicated that practice of this model has developed among them the abilities of effective reflective practitioners. getting a command on the topic before its presentations, utilizing multiple teaching strategies, ensuring effective class management, confirming active engagement of all students, and practicing multiple assessment techniques for evaluating students' performance (Figure 4.7 & 4.8).

5.2.2 Case II: Comparing Prospective Teachers' Instructional Practices

7. Prospective teachers (MS=2.25, 2.75) teaching by lesson study model plan their lesson more effectively as compare to prospective teacher (MS=1.25, 1.25) teaching by traditional methods (Tables 4.1 & 4.2).
8. Lesson presentation skills of prospective teachers (MS= 3.00, 2.86) teaching by lesson study model were better as compare to prospective teacher (MS= 1.71, 1.57) teaching by traditional methods (Tables 4.3 & 4.4).
9. Practices of prospective teachers (MS= 3.00, 3.00) teaching by lesson study model regarding the use of multiple teaching methods were more effective as compare to prospective teacher (MS= 2.17, 1.17) teaching by traditional methods (Tables 4.5 & 4.6).
10. Practices of prospective teachers (MS= 2.83, 2.50) teaching by lesson study model regarding interaction with students were more effective as compare to prospective teacher (MS= 1.67, 1.50) teaching by traditional methods (Tables 4.7 & 4.8).
11. Practices of prospective teachers (MS= 2.00, 3.00) teaching by lesson study model regarding the use of audiovisual aids were more effective as compare to prospective teacher (MS= 1.00, 1.50) teaching by traditional methods (Tables 4.9 & 4.10).

12. Assessment-related competencies of prospective teachers ($MS= 3.00, 2.67$) teaching by lesson study model plan their lesson more effectively as compare to prospective teacher ($MS= 2.00, 2.00$) teaching by traditional methods (Tables 4.11 & 4.12).

5.2.3 Case III: Evaluation of Students' Academic Performance

13. There is no significant difference ($t(58)= 0.483, p=0.63$) in the marks of geography students taught by traditional methods and lesson study model (Table 4.13). The mean scores of students who were taught by the lesson study model were slightly greater than the mean scores of students who were taught by practicing traditional methods of teaching. Value of Hedges, g also supported these results.
14. There is no significant difference ($t(52)= 0.396, p=0.69$) in the marks of computer education' students taught by traditional methods and lesson study model (Table 4.14). Mean scores of students who were taught by the lesson study model were slightly greater than the mean scores of students who were taught by practicing traditional methods of teaching. Value of Hedges, g also supported these results.

5.2.4 Case IV: Supervisors' and Cooperative Teachers' Views

15. University supervisors indicated that though they are utilizing various strategies for elevating pedagogical content knowledge of the prospective teachers and developing collaborative attitudes among them, still a model for effective professional development of prospective teachers is required that can offer ample opportunities for training to improve their instructional practices. The lesson study model can serve as an effective model for not only enlightening the professional development of prospective teachers but can improve the academic performance of students as well and cooperative teachers can play an imperative role in the successful practice of the

lesson study model. According to them, the successful practice of this model required equal attention from school and university administrators (Figure 4.9).

16. Data collected from the university supervisor indicated that they are conducting multiple activities such as discussion and group study sessions, class presentations, activities related to brainstorming, demonstrations, portfolio development, and cooperative and team teaching to improve the pedagogical content knowledge of prospective teachers (Figure 4.10).
17. University supervisors suggested that for effective professional development of prospective teachers, there is a need to ensure a triangular relationship among teacher educators, prospective and cooperative teachers. For ensuring such relationships, developing a framework for university-school partnership is a very good idea. They further stated that it is not only the task of one university; all the universities must take initiative for it (Figure 4.11).
18. Data collected from school supervisors indicated that the lesson study can be considered a unique model for the professional development of prospective teachers. As team teaching can be the best strategy for teaching at the middle level (6th-8th grade) therefore, the practice of the lesson study model with the help of university and school administrators is a good idea for developing the skills related to team teaching among prospective and regular teachers (Figure 4.12).
19. For ensuring the effective professional development of prospective teachers, school supervisors have a lot of expectations from university supervisors. They stated that university supervisors must train them to develop effective lesson plans and audio-visual aids. They must strengthen their abilities to get command of the topic, utilize

innovative teaching strategies, follow the instructional practices of senior teachers, show active participation in all curricular and co-curricular activities, make classrooms interactive by involving all students and cope with their instructional problems (Figure 4.13).

20. School supervisors suggested that a request for getting adequate budget may be put up to FDE, a team of cooperative teachers and teacher educators may be nominated, the real essence of professional development models may be clarified and consent may be taken from FDE to ensure effective university-school partnerships (Figure 4.14).

21. Data collected from cooperative teachers indicated that the lesson study model is a very effective model for prospective teachers' professional development as it can motivate them to utilize multiple teaching strategies with the collaboration of fellow teachers for improving students' understanding and academic performance. They further indicated that it is an effective model for developing professional attitudes among prospective teachers and it is a great source not only to upgrade the observation and evaluation skills of prospective teachers but can also ensure desired modifications in classroom practices (Figure 4.15).

22. Cooperative teachers indicated that the practice of the lesson study model has enabled prospective teachers to identify the challenging topic for collaborative planning, utilize multiple teaching strategies and audiovisual aids for making their lessons effective, practice an eclectic approach to teaching, and get involved in detailed planning of all effective lesson' aspects before teaching. It put great emphasis on

effective training of prospective teachers and ensuring their good behaviour with students (Figure 4.16).

23. They indicated that during the practice of the lesson study model; prospective teachers have utilized multiple innovative teaching strategies such as taking short notes, question answers, role play, activity, and reading aloud method (Figure 4.17).
24. According to cooperative teachers, by ensuring collaborative work, promoting the habit of knowledge sharing, motivating to relate lessons with daily life experiences, and demanding to get command of the topic, the lesson study model has proved very helpful to develop professional attitudes among prospective teachers (Figure 4.18).
25. Besides effective professional development of prospective teachers, the lesson study model also played an important role to upgrade the learning of cooperative teachers. As they indicated that after participating in the practice of this model, they have learned the benefits of sharing experiences with colleagues, taking feedback from fellow teachers, evaluating one's instructional practices, working as a team with colleagues, and writing reflections about own teaching (Figure 4.19).

5.2.5 Cumulative Findings

As the design of this study was mixed methods multiple case study; therefore keeping in view the requirements of mixed methods, triangulation of findings (cumulative findings) was made and the basic purpose of that triangulation was to sum up the comparable responses of the study respondents. Cumulative perceptions of researcher, prospective teachers, cooperative teachers, teacher educators, and school principals indicated that the practice of the lesson study model has proved very effective for improving the professional development of prospective teachers and academic

achievement of students. Cumulative perceptions of researcher, prospective teachers, cooperative teachers, and teacher educators uttered that the lesson study model has been found very effective for:

- Increasing the confidence level of prospective teachers,
- Improving their skills in lesson planning,
- Developing the habit of teamwork among teachers,
- Making prospective teachers reflective practitioners,
- Ensuring concept clarification of students,
- Elevating pedagogical content knowledge of prospective teachers,
- Ensuring active engagement of all students in the classroom,
- Motivating them to utilize multiple teaching strategies,
- Encouraging prospective teachers to develop multiple audio-visual aids.
- Ensuring effective classroom management/arrangement,
- Enabling prospective teachers to utilize multiple assessment techniques,
- Development of professional attitude among prospective teachers, and
- Upgrading their learning regarding effective instructional practices.

Cumulative perceptions of cooperative teachers and schools principals expressed that teacher educators are expected to train prospective teachers for:

- Appropriately planning their lesson,
- Preparing low cost-no cost audio-visual aids,
- Practicing innovative teaching-learning strategies,
- Taking guidelines from senior teachers,

- Following instructions provided by the team leader,
- Making classrooms more interactive, and
- Ensuring active participation of all students.

Cumulative perceptions of teacher educators and schools principals indicated that both administrators (university and school level) must work collaboratively for ensuring the successful implementation of the lesson study model as it has played an imperative role not only in the professional development of prospective teachers but also in the professional development of in-service teachers. They necessitated that prospective teacher must be directed to follow the rules and regulations prescribed by administrators and cooperative teachers. They further indicated that concerning authorities may be actively involved to develop university-school partnerships with the aim of effective professional development of prospective as well as in-service teachers. They specified that adequate guidance and authority may be given to cooperative teachers for ensuring the success of prospective teachers' teaching practice as they spend a lot of time with them.

5.2.6 Proposed Framework to Ensure University-School Partnership

These findings are based on the fifth objective and research question of the study which were as follows:

Objective 5: Propose a framework to ensure the collaboration of supervisors (at schools and universities) for introducing the lesson study model as a mandatory part of teaching practice (If found effective)

Research Question 5: To what extent are findings supportive of developing a framework to ensure university-school partnership for improving the teaching practice of prospective teachers?

This objective and research question was addressed by getting help from a literature review and data collected from university and school supervisors. For developing a framework to ensure university-school partnership, firstly concerned officials (responsible for professional development of prospective teachers) and their key roles have been identified/highlighted. Afterward, strategies to develop strong coordination among these officials have been drafted keeping in view the suggestions of the university and school supervisors. Initially, the first draft of the framework was proposed by the researcher (attached in Appendix-24). And after validation, the final draft of the framework was developed.

5.2.6.1 Validation of Framework: Proposed framework was validated by experts of the International Islamic University, Islamabad (IIUI), and Islamabad-based schools/colleges. Experts from these specific institutions were selected for validation due to the following reasons:

- i. For the practice of the lesson study model, the researcher selected a group of prospective teachers from the BS (Hons) program of the education department, IIUI, and teacher educators of the said university were frequently consulted for ensuring the successful implementation of that model. As they were very much clear about the baseline of proposing that framework, therefore researcher consulted them to validate that framework.

- ii. Though prospective teachers of the BS (Hons) program were placed at various Islamabad-based schools/colleges, for practicing this model researcher delimited her study to only three institutions. Throughout the whole process of model implementation, principal and cooperative teachers of these institutions remained actively involved. They found the practice of the lesson study model very effective not only for the professional development of prospective teachers but also for regular teachers. As they sensitize the need for strong collaboration among university-school administrators for ensuring the practice of such professional development models, therefore they seem most suitable for validating the proposed framework while keeping in view the baseline purposes.

A certificate of validation was prepared and firstly researcher scheduled meetings with experts of IIUI and colleges/schools for discussing the framework. According to the scheduled time, researchers visited them and discuss the proposed framework in detail. It was suggested by experts of IIUI to concise the content of the framework, present data in attractive pictorial form, provide a list of abbreviations at the end, and give detail of all aspects in the framework description. Likewise, experts of colleges/schools suggested adding the concept of monitoring in the sections of cooperative teachers and school principals and clarifying the role of FDE officials by adding some more points. Keeping in view the suggestions of experts face and content validity of the framework was ensured. After finalizing the draft of the proposed framework, the researcher requested all experts to sign the validation certificate (certification of validation has been attached in Appendix-25).

For clarifying all aspects of the framework, a detailed description has been composed with the assistance of experts. Though this framework has been developed after researching with a limited sample size, experts commented that the proposed framework can serve as a baseline for those universities and schools which are committed to offering ample opportunities for the professional development of prospective teachers. With the emergence of innovative trends in teaching and learning, preparing professional teachers has become the need of the hour; therefore, this framework can be successfully implemented by considerable efforts of teacher educators, school principals, and officials of FDE to fulfill the dream of producing professional teachers in Pakistan.

5.2.6.2 Description of Framework: Final draft of the proposed framework to ensure university-school partnership contains three major sections:

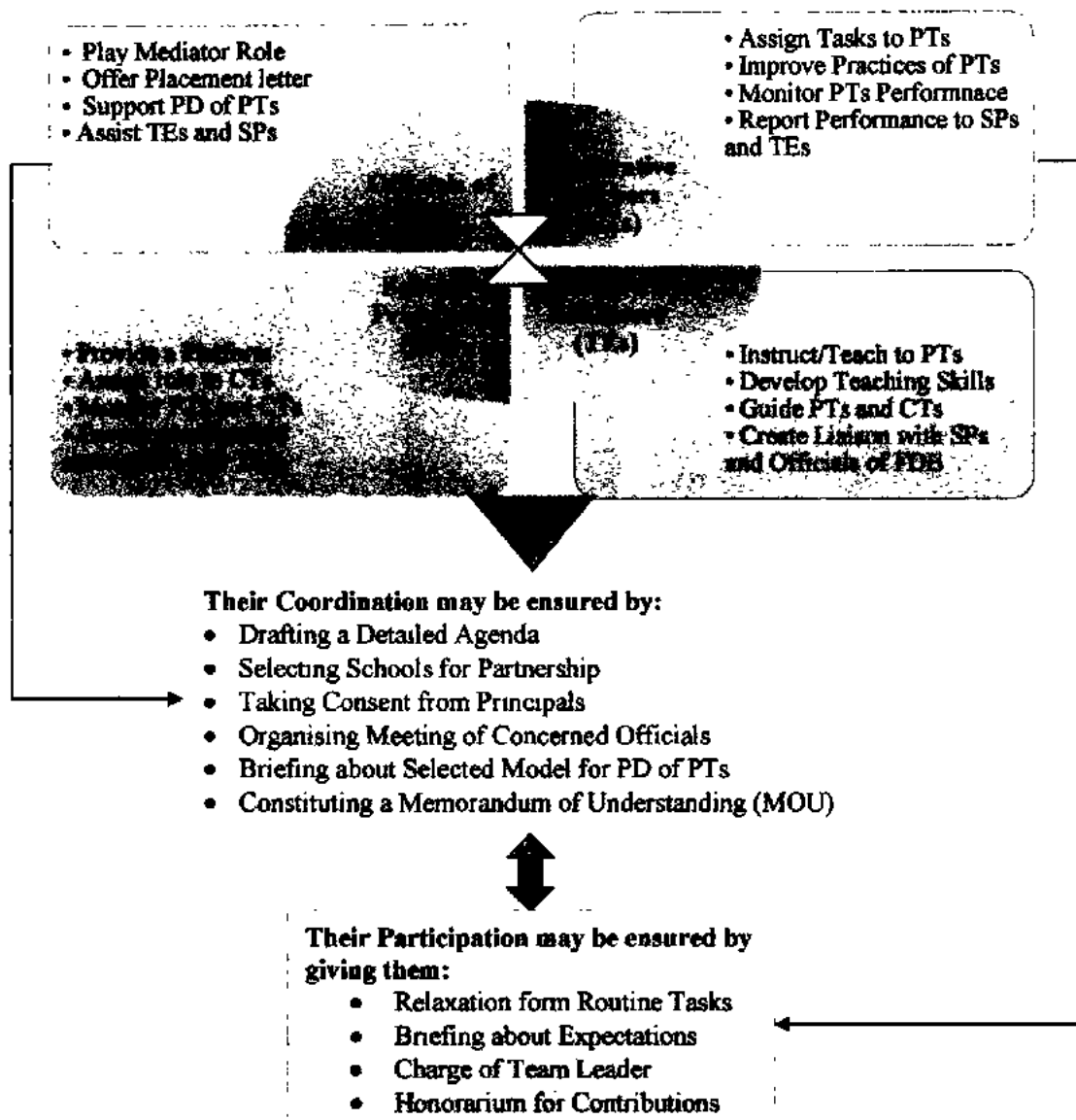
5.2.6.2.1 Roles and responsibilities of concerning authorities:

- i. FDE officials,
- ii. Schools principals,
- iii. Teacher educators, and
- iv. Cooperative teachers.

5.2.6.2.2 Ways to ensure coordination among FDE officials, teacher educators, and schools principals, and

5.2.6.2.3 Ways to ensure effective participation of cooperative teachers

A pictorial description of the proposed framework has been given in Figure 5.1 and afterward, its detailed description has been composed.



Abbreviations

Note. FDE= Federal Directorate of Education, CTs= Cooperative Teachers, PD = Professional Development, PTs= Prospective Teachers, TEs = Teacher Educators, SPs= Schools' Principals, MOU= Memorandum of Understanding

Figure 5.1: Final Draft of Proposed Framework to Ensure University-School Partnership

A detailed description of concerning authorities' roles and responsibilities for prospective teachers' professional development and ways to ensure their effective coordination and participation in the process of professionalizing prospective teachers is as follows:

5.2.6.2.1 Roles and responsibilities of concerning authorities: These authorities can play a pivotal role in ensuring the successful professional development of prospective teachers. The role of each authority is unique keeping in view their level of expertise and experience. Literature indicated that for ensuring university school partnership and offering ample opportunities for professional development to prospective teachers, strong coordination of concerning authorities is of great importance. Therefore, before suggesting the ways of ensuring their coordination, a detailed distinct description of each authority role has been composed, which is as follows:

i. Roles and responsibilities of FDE' officials

The training and coordination director of the Federal Directorate of Education (FDE) plays an important leadership role in the effective professional development of prospective teachers. They provide the required assistance to teacher educators for placement of prospective teachers at various school-colleges that are affiliated with their organization/department and issue a formal permission letter for supporting the professional development of prospective teachers. Besides teacher educators, they have also a direct connection with principals of affiliated school-colleges and provide them considerable support to get familiar with innovative trends of training and professional development. Keeping in view their active role in the teaching practice phase of prospective teachers, it is expected that they can play the role of mediator to ensure the

partnership of universities and schools for the professional development of prospective as well as in-service teachers.

ii. Roles and responsibilities of schools principals

School principals have a considerable role in the professional development of prospective teachers as they play the role of the master trainer by providing a platform of practice to them. When prospective teachers are sent to their respective institutions by university administrators with the coordination of FDE officials, they assign the role of the team leader to a group of cooperative teachers for monitoring the performance of prospective teachers. During the teaching practice phase of prospective teachers, they also monitor the performance of cooperative teachers to ensure that they are working according to supervisors' (school principals and teacher educators) expectations and provide them with directions/instruction whenever required. They also play an imperative role to ensure effective coordination among cooperative teachers and teacher educators so that teacher educators can clarify their expectations and provide required guidance to cooperative teachers for effective professional development of prospective teachers. As their services in the professional development of prospective and in-service teachers are of great importance, therefore they may be consulted to play a leadership role in ensuring university-school partnership.

iii. Roles and responsibilities of teacher educators

Teacher educators (working at universities) play a major role in preparing effective teachers for the nation and the future. At universities, they hold the responsibility of teaching/instructing prospective teachers for strengthening pedagogical content knowledge. They teach various courses related to effective teaching, classroom

management, students' assessment, teaching-learning strategies, information and communication technology, reflective practices, emerging trends in pedagogy, curriculum development, and educational research. The basic purpose of these courses is to set the foundation for effective prospective teachers' professional development as after studying these courses, prospective teachers become able to:

- Plan and deliver lessons professionally during their teaching practice.
- Manage classrooms effectively despite overcrowded classrooms,
- Assess students' understanding by applying various assessment techniques,
- Practice innovative teaching-learning strategies for effective teaching,
- Utilize multiple audio-visual aids for making the learning environment attractive,
- Reflect on instructional practices for self-improvement,
- Teach challenging content areas with the assistance of senior teachers, and
- Utilize emerging educational trends for improvement by doing research

Besides instructing baseline content to prospective teachers and developing the skills of professional teachers among them, teacher educators also provide required guidelines to cooperative teachers for ensuring the success of prospective teachers' teaching practice. Teacher educators also create a liaison with officials of FDE and school principals for facilitating prospective teachers to bridge the gap between theory and practice. Their prestigious role in the professional development of prospective teachers reflects that they can play the role of catalyst for ensuring university-school partnership.

iv. Roles and responsibilities of cooperative teachers

Along with school principals and teacher educators, the role of cooperative teachers also cannot be overlooked in the professional development of prospective teachers. Keeping in view the directions of teacher educators and school principals, they assign various tasks to prospective teachers during teaching practice and provide the required assistance to improve instructional practices. They monitor the performance of prospective teachers throughout the teaching practice phase and report their performance to teacher educators and school principals. They also play an important role to take initiatives with the help of teacher educators for ensuring the effective professional development of prospective teachers. Keeping in view their roles and responsibilities, it can be deduced that in ensuring and strengthening university-school partnerships, they can play a contributive role.

5.2.6.2.2 Ways to ensure coordination among FDE officials, teacher educators, and school principals: For ensuring university-school partnership, there is a need to develop close coordination among officials of the Federal Directorate of Education (FDE), schools' principals, and teacher educators. Their effective coordination may be ensured by:

- Drafting a detailed agenda for professional development of prospective teachers: Initially, it may be developed by teacher educators and schools principals and afterward may be sent to the training and coordination director of FDE for approval
- Selecting schools for partnership and taking consent from their principals: This initiative may be taken by teacher educators keeping in view the number of

prospective teachers. For taking formal consent, a meeting may be arranged with school principals and afterward, the summary may be presented to officials of FDE.

- Arranging a meeting of concerned officials: This initiative may be taken by training and coordination directors of FDE. Focus group discussion among officials of FDE, teacher educators, and school principals can pave the way for ensuring university-school partnership.
- Briefing about the selected model for PD of PTs: As the variety of innovative models for the professional development of prospective teachers are available. A comprehensive model of professional development may be selected by mutual discussion of teacher educators and school principals keeping in view national and international trends. And after highlighting the main points of that model and deciding on relevant activities, approval of practicing this model may be taken from the training and coordination director of FDE.
- Constituting a MOU: Finally, a Memorandum of Understanding (MOU) may be signed between the university and school authorities with the mediating role of FDE officials. And decided the number of students may be sent to each school by university administrators for ensuring the effective professional development of prospective teachers.

5.2.6.2.3 Ways to ensure effective participation of cooperative teachers: As cooperative teachers can play an important role in ensuring the operative professional development of prospective teachers, therefore their effective participation may be ensured by giving them:

- Relaxation from routine tasks: It can be done by school principals. Keeping in view the number of prospective teachers, two or three teachers may be nominated by school principals to guide prospective teachers during teaching practice. And the cooperative teachers who play that role may be given some relaxation from routine tasks; e.g. their number of classes may be minimized so that they can find some spare time to properly monitor and guide prospective teachers.
- Briefing about expectations: It can be done through a collaborative discussion with teacher educators and school principals. Teacher educators can brief them about the areas in which prospective teachers are required to be trained and school principals can assist them in assigning various administrative and teaching-related tasks to prospective teachers.
- Charge of team leader: The charge of team leader may be given to cooperative teachers by teacher educators and school principals (supervisors) as they have to spend a great amount of time with prospective teachers. And supervisor must bind prospective teachers to follow the instructions and directions given by cooperative teachers.
- Honorarium for Contribution: As cooperative teachers put their great efforts in terms of time and work for the professional development of prospective teachers, therefore for their appreciation and motivation some honorarium may be provided to them. And it can be arranged by the training and coordination director of FDE and the finance department of universities at the request of schools principals and teacher educators.

5.3 Discussion

This section contains a comparison of the present study research findings with the findings of other studies that have been conducted in the context of the lesson study model. In the present study, participants were asked by the researcher to write reflections about the instructional practices of their fellow teachers and they indicated that lesson plans may be improved by following a developed lesson plan sequentially, utilizing some more attractive audio-visual aids, explaining complicated topics through illustration, giving relatable examples and ensuring the active engagement of all students in classroom activities and it was a good sign for their professional development. As, it has been indicated by Byrne, Brown, and Challen (2010) writing reflection on colleagues' work in the actual classroom setting for improving their instructional practices is a valuable part of successful professional development programs. Likewise, Avalos (2011) also focused on the idea of creating such an environment for teacher professional development that may promote the habit of collaborative learning among them.

In the present study, observation carried out by fellow teachers (of prospective teachers) proved very important in improving the instructional practices of prospective teachers and it has been also indicated by Totterdell, Woodroffe, Bubb, Daly, Smart, and Arrowsmith (2008) that observation may be used as an imperative tool for providing constructive feedback to colleagues in a professional way. In the present research study, detailed feedback provided by cooperative teachers, researcher, and fellow teachers played an important role and it has been also advocated by Lambert (2003) that effective professional development practices demands from all participants to perform leadership responsibilities such as planning activities, sharing knowledge, observing others' work,

and providing feedback as these roles may positively strengthen the professional capabilities of prospective teachers.

Results of prospective teachers' post-lesson reflections indicated that their overall experiences of participating in the practice of the lesson study model were very good as it was their first practice to work intensively on one topic with close coordination of experts and colleagues. They further indicated that practice of this model with the adequate assistance of experts has developed among them the abilities of effective reflective practitioners, getting a command on command on the topic before its presentations, utilizing multiple teaching strategies, ensuring effective class management, confirming active engagement of all students, practicing multiple assessment techniques for evaluating students' performance and remaining confident during lesson presentation. These findings are aligned with the findings of Puncher and Taylor (2006) as they indicated that during the practice of the lesson study model, teachers not only received detailed feedback about their instructional practices but they also experienced amazing engagement of students in the learning process and expressed that such type of experience they never got before.

Current findings related to the experience of prospective teachers are also supported by the findings of Rock and Wilson (2005) as during the practice of the lesson study model, they explored that participants' experienced increased confidence in their roles as teachers and instructional designers. The findings of the present study revealed that lesson planning ability of prospective teacher teaching by traditional methods was quite different than prospective teacher teaching by the lesson study model. These findings are aligned with the findings of the study conducted by Lucas (2014) as he

concluded that lessons created through lesson study produced a higher quality learning experience for teachers and students than lessons that were not created through the lesson study model.

Results of the present study indicated that the practice of lesson study has enabled prospective teachers to ensure the use of multiple teaching methods during the instructional process and it has been dictated by Stigler and Hiebert (1999) that from its orientation, lesson study has been proved very effective to improve pedagogical and content related competencies of prospective teachers. Findings of the present study indicated that prospective teachers who were involved in the practice of lesson study were able to build strong interaction with students and the findings of the study conducted by Saye, Kohlmeier, Howell, McCormick, Jones, and Brush (2017) also revealed that lesson study model has proved very effective for teachers as it enables them to ensure active engagement of students in the teaching-learning process. Results of the present study indicated that there is a difference in the marks of students taught by traditional methods and lesson study model. It has been also explored by Intaros and Inprasith (2019) that lesson study has played an important role in improving the academic performance of students.

Findings of the present study revealed that the practice of the lesson study model has contributed a lot to improving the instructional practices of prospective teachers by upgrading their lesson planning, lesson presentation, application of innovative teaching methods, interaction with students, utilization of effective audio-visual aids, and assessment-related competencies. These findings are aligned with the findings of recently conducted research studies (Conceicao, Baptista, & Ponte, 2021; Prasetyoningsih

& Laksono, 2021; Bayram & Bikmaz, 2021; Okmen & Kilic, 2021) as these researchers also specified that the practice of lesson study is a great source of ensuring the effective professional development of teachers by upgrading their instructional practices and skills (such effective interaction with students and colleagues, focus on students centered methods, utilization of innovative teaching strategies, and utilization of effective teaching aids).

In the present research study, the researcher found non-significant difference in the marks of students taught by traditional methods and lesson study model. These findings are in contrast with the findings of Ayra and Kosterelioglu (2021) as they indicated that the practice of the lesson study model has resulted in the improved academic achievement of students. University supervisor indicated that though they are utilizing various strategies for elevating pedagogical content knowledge of the prospective teachers and developing collaborative attitudes among them, still a model for effective professional development of prospective teachers is required that can offer ample opportunities for training to improve their instructional practices with collegial and supervisor feedback. And it has been also suggested by Joyce and Calhoun (2010) that such types of opportunities must be offered to teachers that may enable them to strengthen their pedagogical content knowledge through a productive discussion with their colleagues.

University supervisor argued that the lesson study model can serve as an effective model for not only enlightening the professional development of prospective teachers but can improve the academic performance of students as well which is a positive sign of increasing the repute of institutions and cooperative teachers can play an imperative role

for the successful practice of lesson study model. A similar indication has been also given by Marzano, Frontier, & Livingston (2011) as they highlighted that there is a dire need to educate educational administrators about the importance of offering effective professional development programs for their teachers as their initiatives can positively influence school reputation along with students learning. According to university supervisors, the successful practice of this model required equal attention from the school and university administrators.

These findings are aligned with the results of studies conducted by a group of researchers (Lind, Franks, & Prebble, 2005; Hobson, Ashby, Malderez, & Tomlinson, 2009; Fantilli & McDougall, 2009) as they indicated that ensuring retention of teachers, improved quality of the teaching-learning process, better achievement of students; and effective management of students behavior; it is necessary to provide effective mentoring and supportive environment to beginning teachers so that they can deal intelligibly with their teaching, learning, and classroom-related problems. University supervisors indicated that the practice of the lesson study model during the teaching practice of prospective teachers can prove very effective to bridge the gaps between theory and practice of teacher education programs. These findings are aligned with the findings of McDowell (2010) who revealed that the lesson study model is playing an important role in enabling teachers to transfer theoretical concepts of course into classroom practice.

School supervisors stated that university supervisors must train prospective teachers to develop effective lesson plans and audiovisual aids, take guidance from senior teachers, follow the instructional practices of experienced teachers, show active participation in all curricular and co-curricular activities, and make the classroom

interactive by involving all students and cope up their instructional problems. These findings are similar to the findings of Castro, Kelly, and Shih (2010) as they indicated that it is the responsibility of experienced teachers to provide mentoring facilities and demonstrate strategies for creating work-life balance to ensure the effective professional development of prospective teachers; so that they may get engage in completion of academic tasks without having the feeling of overworked. Devos (2010) also asserted that such type of assistance can also help them to improve their instructional and reflective practices.

School supervisors suggested that a request for getting an adequate budget may be put up to school administrators, detailed agenda for the internship plan may be prepared, and consent may be taken from concerning authorities to ensure effective university-school partnerships. These findings have been supported by Akiba and Wilkinson (2015) as they stated that if school administrators want to practice the lesson study model, then they are required to provide adequate funding for teacher payment and substitutes. Furthermore, they are required to develop sustainable plans for ensuring the effective implementation of the lesson study model. Data collected from cooperative teachers indicated that the lesson study model is a very effective model for prospective teachers' professional development as it can motivate them to utilize multiple teaching strategies with the collaboration of fellow teachers for improving the classroom environment and students' understanding.

These findings are supported by Stigler and Hiebert (1999) as they highlighted that the lesson study model may be effectively utilized for promoting collaboration among teachers, as it contains the logic of continuous improvement, maintains a constant

focus on the learning of prospective teachers, and focuses on the improvement of teaching context. School supervisors further indicated that it is an effective model for developing professional attitudes among prospective teachers and it is a great source not only to upgrade the observation and evaluation skills of prospective teachers but can also ensure desired modifications in classroom practices. These findings are aligned with the results of the study conducted by researchers (Aykan & Yildirim, 2021; Thompson, 2015) as he found that teachers who practiced the lesson study model perceived positively the effects of lesson study in enhancing their professional competencies.

Cooperative teachers indicated that the practice of the lesson study model has enabled prospective teachers to identify the challenging topic for collaborative planning, utilize multiple teaching strategies and audiovisual aids for making their lessons effective, practice an eclectic approach to teaching, and get involved in detailed planning of all effective lesson aspects before teaching. It put great emphasis on effective training of prospective teachers and ensuring their good behavior with students. These findings are aligned with the results of the study conducted by Sibbald (2009) who revealed that the success of the lesson study model is sure as it offers opportunities to teachers for addressing their content as well as pedagogy-related challenges in actual context and is authentically contextual. Furthermore, the same results have been also explored by Stigler and Herbert (2009) as they indicated that the lesson study model offers ample opportunities to teachers for improving their teaching by deciding the nature of activities while keeping in view content areas.

Cooperative teachers indicated that during the practice of the lesson study model; prospective teachers have utilized multiple innovative teaching strategies such as taking

short notes, question answers, role play, activity, and reading aloud methods for ensuring the active engagement of students. These findings are supported by Matanluka, Johari, and Matanluka (2013) as they revealed that lesson study implementation has proved very effective as it offers new perspectives of pedagogy for teachers and tends to ensure the active involvement of students in the teaching-learning process. According to cooperative teachers, by ensuring collaborative work, promoting the habit of knowledge sharing, motivating to relate lessons with daily life experiences, and demanding to get command of the topic, the lesson study model has proved very helpful to develop professional attitudes among prospective teachers. And this idea was also highlighted by Rekha and Ganesh (2012) as they stated that professional development programs must reinforce the habit of upgrading/ updating subject matter knowledge and instructional skills among prospective teachers.

Cooperative teachers indicated that after participating in the practice of the lesson study model, they have learned the benefits of sharing experiences with colleagues, taking feedback from fellow teachers, evaluating one's instructional practices, working as a team with colleagues, and writing reflections about own teaching to resolve instructional related problems. These findings are supported by Absolum (2006) as he indicated that the practice of lesson study motivates teachers to get engage in reflective practices and teamwork, and these practices can enable them to identify and resolve problems collaboratively as well as to get familiar with emerging educational trends to adapt them in their instructional practices.

5.4 Conclusions

1. Before practicing this model, the expectations of prospective teachers were very high and they indicated that this model can support them a lot in improving their instructional practices (Finding 1).
2. During the first phase of the lesson presentation; prospective teachers highlighted various points for improving the lesson presentation in the second phase by observing the instructional practices of their fellow teachers. And these observation results play an important role in improving the planning, implementation, and evaluation of lessons (Findings 2-3).
3. During the first phase of lesson presentation; cooperative teachers and researcher also wrote reflections about the instructional practices of prospective teachers and the results of these reflections play an important role in developing professional abilities among prospective teachers (Findings 4-5).
4. Post-lesson reflections of prospective teachers indicated that they have learned more than their expectations after practicing this model with the help of cooperative teachers and researcher (Finding 6).
5. Findings showed that lesson planning and presentation-related skills of prospective teachers teaching by traditional methods were very much different than prospective teachers teaching by lesson study model. Therefore, it has been concluded that the practice of the lesson study model has strengthened prospective teachers' ability in lesson planning and lesson presentation and it is expected that in the future prospective teachers who have practiced the lesson study model during their teaching practice can perform better as compared to prospective teachers who are doing

individual teaching and practicing traditional methods during their teaching practice (Findings 7-8).

6. Findings indicated prospective teachers teaching by traditional methods were not as good in practicing multiple teaching methods and building effective interaction with students as prospective teachers teaching by lesson study model. Therefore, it has been concluded that the practice of the lesson study model can motivate prospective teachers to utilize multiple teaching strategies during the instructional process and can enable them to ensure effective interaction with students (Findings 9-10).
7. Findings indicated that prospective teachers teaching by traditional methods were not as good in developing and utilizing multiple audio visual aids as prospective teachers teaching by lesson study model. Therefore, it has been concluded that the practice of the lesson study model can enable prospective teachers to utilize a variety of audiovisual aids and assessment techniques for making their instructional process effective as well as ensuring students' understanding (Findings 11-12).
8. Findings indicated non-significant differences in the marks of geography and computer education students who were taught by traditional methods and lesson study model. Therefore, it can be concluded that the lesson study model has positively contributed to the improved academic performance of students (Findings 13-14).
9. University supervisor indicated that though they are utilizing various strategies for elevating pedagogical content knowledge of the prospective teacher and developing collaborative attitudes among them, still a model for effective professional development of the prospective teachers is required and the lesson study model can

serve as an effective model for not only enlightening professional development of prospective teachers but it can improve the academic performance of students as well and cooperative teachers can play an imperative role for the successful practice of lesson study model. Developing a framework for ensuring university-school partnership is a very good idea for ensuring the successful implementation of prospective teachers' professional development models (Findings 15-17).

10. The school supervisor indicated that lesson study can be considered a unique model for improving the professional development of prospective teachers and the academic performance of students. Successful implementation of that model may be ensured by proposing a framework for ensuring university-school partnerships (Findings 18-20).
11. Cooperative teachers indicated that the practice of the lesson study model has enabled prospective teachers to deliver their lessons professionally. This model has put great emphasis on effective training of prospective teachers and ensuring their good behavior with students. Besides effective professional development of prospective teachers, the lesson study model also played an important role to upgrade their learning regarding innovative pedagogical strategies (Findings 21-25).
12. Keeping in view the data collected from literature review and supervisors (of university and school) a framework of university-school partnerships has been proposed for ensuring the effective professional development of prospective teachers. This may be implemented with close coordination of teachers educators, school principals, and training directors of FDE on a priority basis as it has been proved helpful not only for teachers' professional development but also for upgrading the

academic achievement of students (Findings of framework given under the heading 5.2.6).

5.5 Recommendations

Keeping in view the findings of the study, the following recommendations were made

1. Results of present study indicated that prospective teachers not only expected the benefits from lesson study model; rather the practice of the lesson study model has supported them a lot in growing professionally and improving instructional practices, therefore it is recommended that teacher education department of colleges and universities may include that model in their course outlines for familiarizing all prospective teachers with its real essence (Conclusions 1).
2. Results of the present study indicated that observation of lesson presentation carried out by prospective teachers, teacher trainer (researcher), and cooperative teachers played an important role in improving the planning, implementation, and evaluation of lessons, therefore it is recommended that researchers (who intend to practice this model with prospective teachers) and cooperative teachers may be necessarily guided by teacher educators for providing support and constructive feedback to prospective teachers to raise their motivation and confidence level. (Conclusions 2).
3. As study findings indicated that reflections composed by cooperative teachers and researcher also played an important role in developing professional abilities among prospective teachers and improving their instructional practices, therefore it is recommended that at schools/colleges and universities teacher educators may conduct at least one or two sessions to practice this model and giving feedback to prospective teachers accordingly for improving their instructional practices so that they become

habitual to utilize provided feedback for improving their lesson planning and lesson presentation (Conclusions 3).

4. As findings indicated that the lesson study model can make a substantial improvement in the instructional practices of prospective teachers, therefore it is recommended that teacher education departments may revisit their internship programs to include the practice of the lesson study model as its mandatory part. This model can expose them to the practice of innovative teaching methods and audiovisual aids that may not have been practiced previously (Conclusions 4).
5. Results of the study revealed that the practice of the lesson study model has strengthened prospective teachers' ability in lesson planning and lesson presentation, therefore it is recommended that the lesson study model can be practiced initially at universities and finally at schools (where prospective teachers are sent for teaching practice) as powerful means so that they gain sufficient awareness related to teaching-learning context and influence of such professional development models on professional growth before the start of teaching as regular teaching (Conclusions 5).
6. Results of the study indicated that the practice of the lesson study model demands prospective teachers to utilize multiple teaching strategies during the instructional process; therefore it is recommended that during course work teacher educators must provide in-depth knowledge to prospective teachers regarding innovative teaching strategies and their application (Conclusions 6).
- 7 Results indicated that the practice of the lesson study model motivates prospective teachers to utilize a variety of audiovisual aids and assessment techniques for making their instructional process effective as well as ensuring students' understating.

therefore it is recommended that during course work teacher educators must familiarize prospective teachers with multiple strategies to design low cost-no cost instructional material (audio-visual aids) as well as assessment-related activities (Conclusions 7).

8. Results indicated a non-significant difference in the marks of students who were taught by traditional methods and lesson study model, therefore it is recommended that administrators of teacher education institutions and schools can take collaborative initiatives for practicing this model to upgrade students' achievement and institutions' repute (Conclusions 8).

9. As results of the study indicated that cooperative teachers have played an imperative role in the successful implementation of the lesson study model, therefore it is recommended that experienced teachers working at school may be engaged as part of the lesson study team through proper channels (Conclusions 9).

10. Results of the study indicated that successful implementation of professional development models may be ensured by proposing a framework to ensure university-school partnerships. Therefore it is recommended that adequate funding may be provided to teacher education institutions for conducting research studies to explore possible strategies for practicing models of prospective teachers' professional development effectively and realizing the dream of university-school partnership (Conclusions 10).

11. As findings indicated that the lesson study model has proved beneficial not only for improving instructional practices of prospective teachers but has also benefited school teachers to learn emerging trends in pedagogy. Therefore, it is recommended that

school principals may develop deliberate partnerships with local universities to practice this model at their institutions and assist the professional learning of their academic staff (Conclusions 11).

12. As findings indicated that by the practice of the lesson study model at schools, fruitful benefits can be gained from the presence of teacher educators in schools. Therefore it is recommended that school administrators (officials of FDE) are required to map out possible strategies for ensuring the successful implementation of that model and the required budget may be also allocated in this regard, wherever it is mandatory (Conclusions 12).

5.5.1 Recommendations for Future Researchers

1. As due to time constraints, this study has been delimited to the prospective teachers and teacher educators of one university (International Islamic University, Islamabad), future studies may be conducted with prospective teachers and teacher educators of other universities located in Islamabad capital territory and the various provinces of Pakistan to explore the effectiveness of lesson study model regarding professional development of prospective teachers.
2. This study was delimited to two colleges and one school (IMCG Tarlai F.A., IMCG, I-8/4, and IMSG (VI-X), F-7/2) in Islamabad capital territory. Further studies may be conducted with students, cooperative teachers, and principals of other schools/colleges located in Islamabad capital territory and various provinces of Pakistan to explore the effectiveness of the lesson study model concerning the academic performance of students to enhance the credibility of the research.

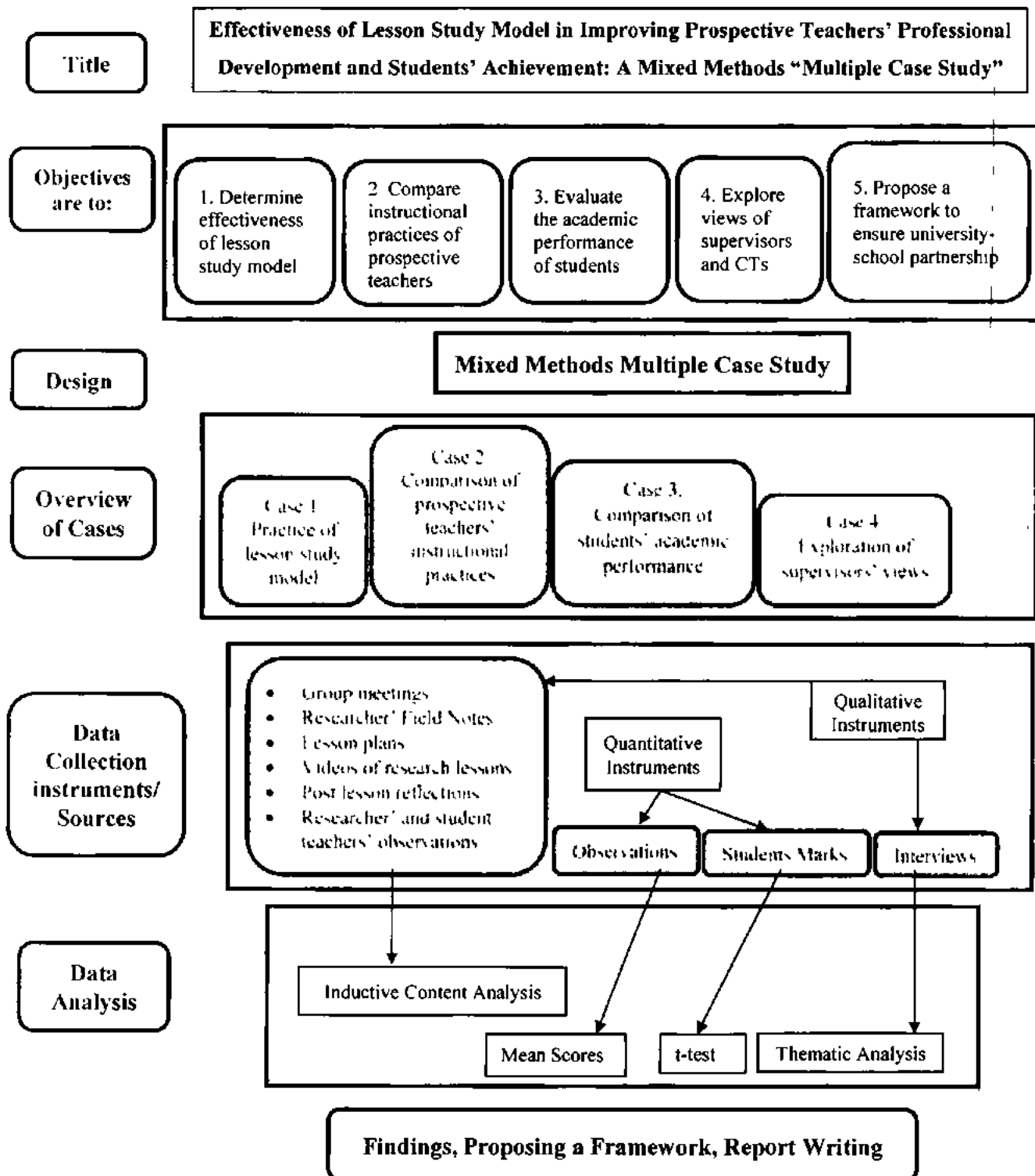
3. In this study cooperative teachers and prospective teachers were requested to write reflections about lesson presentation (in the first and second cycle of the lesson study model) voluntarily. Future researchers may provide specific checklists/observation sheets (based on important areas) to assist them in composing lessons' reflections.
4. Regarding students, the main focus of this study was to explore the effect of the lesson study model on the academic achievement of students, in future studies, and other parameters concerning students (such as the role of lesson study in developing positive attitudes among students, increasing self-efficacy, motivation and confidence level of students, etc.) may be explored.
5. The main focus of the present research was to explore the effect of practicing the lesson study model on improving the instructional practices of teachers as a result of teamwork and providing feedback. Future studies may explore the effects of professional development models on other teaching-related factors such as teachers' self-efficacy, outcome expectancy, level of coordination with senior teachers and colleagues, etc.
6. In this research study, from the university side researcher play the active role of coordinating with cooperative teachers and school principals as well as assisting prospective teachers throughout the practice of his model. Future research studies may be conducted to explore the role of effective participation of university teachers (teacher educators) in the successful implementation of that model.
7. Another significant area that may be investigated by future researchers in the context of lesson study is finding the interpersonal barriers to participating in the practice of the lesson study model.

8. In this research study, due to limited time span of practicing lesson study model, limited sample size, gap between teaching date and test date and some other unavoidable circumstances, non-significant differences has been found between students' performance (based on the practice of LS model and traditional methods of teaching). Future researchers may conduct studies specifically to explore the impact of practicing this model on students achievement by taking large sample size and keeping in view the considerations of experimental research with the aim of exploring significant effect of this model on students' achievement (as proved by previously conducted research studies).

5.6 Chapter Summary

This chapter is based on the summary of the first four chapters, findings (that have been obtained from data analysis), discussion (in which a comparison of research findings has been made with previously conducted research studies), conclusions (based on findings), and recommendations (based on conclusions). Based on the literature review and data analysis researcher has proposed a framework for ensuring university-school partnership. pictorial and detailed description of that framework has been also given in the findings sections. In the next sections of that thesis draft, a summary of the complete thesis (in pictorial form), references (of relevant studies that have been reviewed for the present research study), and appendices (related to various sections of that thesis) have been described.

Pictorial Summary of Thesis



REFERENCES

- Abd Rahim, E. M., & Abd Rahim, M. E. (2020). Professional Development through Lesson Study: A Practical Model to Refine Teaching, Learning and Teacher Practice Knowledge. *Journal of Advanced Research in Social and Behavioural Sciences*, 19(1), 33-39. <https://doi.org/10.37934/arsbs.19.1.3339>
- Al Masaeid, T., James, W. F., Ramachandran, S., & Zahran, A. R. (2021) The Effectiveness of the Lesson Study Strategy on Classroom Practices Among University Students. *Review of International Geographical Education (RIGEO)*, 11(5), 2237-2251. doi: 10.48047/rigeo.11.05.126
- Absolum, M. (2006). *Clarity in the classroom using formative assessment Building learning in focused relationships*. Auckland: Hodder Education.
- Ahmad, A. A. S. P. H. (2011). *Improving teaching and learning in congruency through lesson study, Master Research Exercise*. Darussalam: Universiti Brunei.
- Aimah, S., Ifadah, M., & Bharati, D. A. (2017). Building Teacher's Pedagogical Competence and Teaching Improvement through Lesson Study. *Arab World English Journal*, 8(1), 66-78. <https://dx.doi.org/10.24093/awej/vol8no1.6>.
- Akiba, M., & Wilkinson, B. (2015). Adopting an international innovation for teacher professional development: State and district approaches to lesson study in Florida. *Journal of Teacher Education*, 67(1), 1-20. <https://doi.org/10.1177/0022487115593603>.

- Akiba, M., Murata, A., Howard, C. C., & Wilkinson, B. (2019). Lesson study design features for supporting collaborative teacher learning. *Teaching and Teacher Education*, 77, 352-365. <https://doi.org/10.1016/j.tate.2018.10.012>
- Aldaihani, S. (2017). Effect of Prevalent Supervisory Styles on Teaching Performance in Kuwaiti High Schools. *Asian Social Science*, 13(4), 25-36.
doi: 10.5539/ass.v13n4p25
- Arani, M. R., Fukaya, K., & Lassegard, J. P. (2010). Lesson Study as Professional Culture in Japanese Schools: An Historical Perspective on Elementary Classroom Practices. *Japan Review* 22, 171–200.
doi: <https://core.ac.uk/download/pdf/198395339.pdf>.
- Archer, R. (2016). Lesson Study, a Trip to Japan. *Mathematics Teaching*, 250, 36-40.
- Arslan, F.Y. (2018). The role of lesson study in teacher learning and professional development of EFL teachers in Turkey: A case study. *TESOL International Association*, 10(2), 1-13. doi: 10.1002/tesj.409.
- Audette, A. (2004). Lesson study: teachers learning together. *New England Reading Association Journal*, 40(2), 31-40.
- Avalos, B. (2011). Teacher professional development in Teaching and Teacher Education over ten years. *Teaching and teacher education*, 27, 10-20.
- Avalos, B. (2016). *Learning from Research on Beginning Teachers*. In: Loughran J., Hamilton M. (eds) International Handbook of Teacher Education. Singapore: Springer.

- Aykan, A., & Dursun, F. (2021). Investigating lesson study model within the scope of professional development in terms of pre-service teachers. *International Online Journal of Educational Sciences*, 13(5), 1388-1408.
<https://doi.org/10.15345/iojes.2021.05.007>
- Aykan, A., & Yıldırım, B. (2021). The Integration of a Lesson Study Model into Distance STEM Education during the COVID-19 Pandemic: Teachers' Views and Practice. *Technology, Knowledge and Learning*, 1-29.
<https://doi.org/10.1007/s10758-021-09564-9>
- Ayra, M. & Kosterelioglu, I. (2021). Effect of the Lesson Study Practice on Students' Academic Achievements in Life Sciences Course. *Educational Policy Analysis and Strategic Research*, 16(1), 249-270. doi: 10.29329/epasr.2020.334.14
- Baird, C., Healy, T., Johnson, K., Bogie, A., Dankert, E.W., & Scharenbroch, C. (2013). *A comparison of risk assessment instruments in juvenile justice*. National Council on Crime & Delinquency.
https://www.nccdglobal.org/sites/default/files/publication_pdf/nccd_fire_report.pdf.
- Baumert, J., Kunter, M., Blum, W., Brunner, M., Voss, T., Jordan, A., Klusmann, U., Krauss, S., Neubrand, M., & Tsai, Y.M. (2010). Teachers' Mathematical Knowledge, Cognitive Activation in the Classroom and Student Progress. *American Educational Research Journal*, 47(1), 133–180.
- Bayram, I., & Bıkmaz, F. (2021). Implications of Lesson Study for Tertiary-Level EFL Teachers' Professional Development: A Case Study from Turkey. *SAGE Open*, 11(2), 1-15. <https://doi.org/10.1177/21582440211023771>

- Bjuland, R. & Mosvold, R. (2015). Lesson study in teacher education: learning from a challenging case. *Teaching and Teacher Education*, 52, 83–90.
doi: 10.1016/j.tate.2015.09.005.
- Boonsena, N., Inprasitha, M., & Sudjamnong, A. (2019). Pre-Service Teachers as a Part of Lesson Study Team. *Creative Education*, 10(6), 1259-1270.
<https://doi.org/10.4236/ce.2019.106095>
- Boyle, B., While, D., & Boyle, T. (2004). A longitudinal study of teacher change: What makes professional development effective? *The Curriculum Journal*, 15(1), 45-68.
- Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Briede, L. (2016). The Relationship between Mathematics Teachers' Teaching Approaches and 9th Grade Students' Mathematics Self. *Journal of Teacher Education for Sustainability*, 18(1), 34-47. <https://doi.org/10.1515/jtes-2016-0003>
- Brownell, M., Adams, A., Sindelar, P., Waldron, N., & Vanhover, S. (2006). Learning from Collaboration: The Role of Teacher Qualities. *Council for Exceptional Children*, 72(2), 169-185.
- Bubb, S. (2007). *Successful induction for new teachers. A guide for NQTs & induction tutors, co-ordinators and mentors*. London: Paul Chapman.
- Burns, M. (2014). *Five Models of Teacher-Centred Professional Development: Beyond Workshops and Trainings*
<https://www.globalpartnership.org/blog/five-models-teacher-centered-professional-development>

- Byrne, J., Brown, H., & Challen, D. (2010). Peer development as an alternative to peer observation: a tool to enhance professional development. *International Journal for Academic Development*, 15, 215- 228.
- Cajkler, W., Wood, P., Norton, J., Pedder, D., & Xu, H. (2015). Teacher perspectives about lesson study in secondary school departments: a collaborative vehicle for professional learning and practice development. *Research Papers in Education*, 30(2), 192-213. doi: 10.1080/02671522.2014.887139.
- Cameron, M. (2009). *Lessons from beginning teachers: Challenges for school leaders*. Wellington: NZCER Press.
- Castro, A. J., Kelly, J., & Shih, M. (2010). Resilience Strategies for New Teachers in High-Needs Areas. *Teaching and Teacher Education*, 26, 622-629.
- Cerbin, B. (2011). *Lesson study: Using classroom inquiry to improve teaching and learning in higher education*. Sterling, VA: Stylus Publishing.
- Cerbin, B., & Kopp, B. (2006). Using Lesson Study to Improve Teaching and Learning. *Lesson Study Project*. www.uwlax.edu/sotl/lsp
- Cerbin, B., & Kopp, B. (2006). Lesson study as a model for building pedagogical knowledge and improving teaching. *International Journal of Teaching and Learning in Higher Education*, 18(3), 250-257.
- Cerbin, B., & Kopp, B. (2011). *Lesson study project overview*.
<http://www.uwlax.edu/sotl/lsp/overview.htm>
- Charalambous, C. Y., & Philippou, G. N. (2010). Teachers' concerns and efficacy beliefs about implementing a mathematics curriculum reform: integrating two lines of inquiry. *Educational studies in Mathematics*, 75(1), 1-21.

- Chokshi, S. & Fernandez, C. (2004). Challenges to importing Japanese lesson study: Concerns, misconceptions, and Nuances. *Phi Delta Kappan*, 520-525.
- Chong, J. S. Y., Han, S. H., Abdullah, N. A., Chong, M. S. F., Widjaja, W., & Shahrill, M. (2017). Utilizing lesson study in improving year 12 students' learning and performance in mathematics. *Mathematics Education Trends and Research*, 1, 24-31.
- Churchill, R., Ferguson, P., Godhino, S., Johnson, N.F., Keddle, A., Letts, W., & Vick, M. (2011). *Teaching making a difference*. Milton, QLD: John Wiley & Sons Australia.
- Clement, M., & Vandenberghe, R. (2000). Teachers' professional development: A solitary or collegial (ad) venture? *Teaching and Teacher Education*, 16(1), 81-101.
- Cobb, P., & Yackel, E. (1996). Constructivist, emergent, and sociocultural perspectives in the context of developmental research. *Educational Psychologist*, 31(17), 3-4.
- Coenders, F., & Verhoef, N. (2019). Lesson Study: professional development (PD) for beginning and experienced teachers. *Professional Development in Education*, 45(2), 217-230. doi: 10.1080/19415257.2018.1430050.
- Conceicao, T., Baptista, M., & Ponte, J. P. (2021). Lesson Study as a Means to Change Secondary Preservice Physics Teachers' Practice in the Use of Multiple Representations in Teaching. *Education Sciences*, 11(12), 791.
<https://doi.org/10.3390/educsci11120791>
- Corbin, J. & Strauss, A. (2008). *Basics of qualitative research. (3rd ed.)*. Los Angeles, CA: Sage.

- Creswell, J. (2007). *Qualitative inquiry & research design: Choosing among five approaches*. (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Creswell, J. W., & Plano, C. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.
- Danday, B. A. (2019). Active vs. passive microteaching lesson study: Effects on pre-service teachers' technological pedagogical content knowledge. *International Journal of Learning, Teaching, and Educational Research*, 18(6), 181-200.
<https://doi.org/10.26803/ijlter.18.6.11>
- Darling-Hammond, L. (2006). Assessing teacher education: the usefulness of multiple measures for assessing program outcomes. *Journal of Teacher Education*, 57(3), 300–314. doi: 10.1177/0022487105283796.
- Darling-Hammond, L. (2010). Teacher education and the American future. *Journal of Teacher Education*, 6(102), 35-47.
- Darling-Hammond, L. (2013). *Getting teacher evaluation right: What really matters for effectiveness and improvement?* New York: Teachers College Press.
- Darling-Hammond, L., & M. W. McLaughlin. (1995). Policies That Support Professional Development in an Era of Reform. *Phi Delta Kappan*, 76(8), 597-604.
- Darling-Hammond, L., & Richardson, N. (2009). Teacher Learning: What Matters? *Educational leadership: journal of the Department of Supervision and Curriculum Development, N.E.A*, 66(5), 46-53.
- Darling-Hammond, L., & Sykes, G. (1999). *Teaching as the learning profession. Handbook of policy and practice*. San Francisco: Jossey-Bass.

- Darling-Hammond, L., Wei, R.C., Andree, A., Richardson, N., Orphanos, S. (2009). *Professional Learning in the Learning Profession: A Status Report on Teacher Development in the United States and Abroad*. Palo Alto, CA: School Redesign Network at Stanford University.
- Deci, E.L., & Ryan, R.M. (2000). The “what” and “why” of goal pursuits: human needs and the self-determination of behavior. *Psychological Inquiry* 11, 227-268.
- Desimone, L. (2011). A Primer on Effective Professional Development. *Kappan*, 92(6), 68-71.
- Devos, A. (2010). New teachers, mentoring and the discursive formation of professional identity. *Teaching and Teacher Education*, 26 (5), 1219-1223.
- Diaz, A. L. (2003). Personal, family, and academic factors affecting low achievement in secondary schools. *Electronic Journal of Research in Educational Psychology and Psychopedagogy*, 1(1), 43 – 66.
- Diem, H. T. T., & Thathong, K. (2019). Enhancing the pre-service biology teachers to construct better lesson plans: A lesson study. *International Journal of Learning, Teaching and Educational Research*, 18(11), 218-231.
<https://doi.org/10.26803/ijlter.18.11.13>
- Dudley, P. (2004, November). *Lessons for learning: research Lesson Study, innovation, transfer and meta-pedagogy; a design experiment?* paper presented at the 5th Annual Conference of the TLRP, Cardiff, Wales. 22-24.
- Dudley, P. (2013). Teacher learning in Lesson Study: What interaction-level discourse analysis revealed about how teachers utilized imagination, tacit knowledge of teaching and fresh evidence of pupils learning, to develop practice knowledge and

- so enhance their pupils' learning. *Teaching and Teacher Education*, 34, 107-121.
doi: 10.1016/j.tate.2013.04.006.
- Dudley, P. (2012). Lesson Study development in England: from school networks to national policy. *International Journal for Lesson and Learning Studies*, 1(1), 85-100. <https://doi.org/10.1108/20468251211179722>
- Dudley, P. (2014). *Lesson Study: A Handbook*. San Francisco: Word Press.
- Ellis, V., Edwards, A., & Smagorinsky, P. (2010). Introduction. In V. Ellis, A. Edwards & P. Smagorinsky (eds.), *Cultural–Historical Perspectives on Teacher Education and Development* (pp. 1–11). London, UK and New York, NY: Routledge.
- Enonbun, O. (2010). Constructivism and web 2.0 in the emerging learning era: A global perspective. *Journal of Strategic Innovation and Sustainability*, 6(4), 16-25.
- Fantilli, R., D. & McDougall, D., E. (2009). A study of novice teachers: challenges and supports in the first years. *Teaching and Teacher Education*, 25 (6), 814–825.
- Fernandez, C. (2002). Learning from Japanese approaches to professional development; The case of lesson study. *Journal of Teacher Education*, 53(5), 393–405. doi: 10.1177/002248702237394.
- Fernandez, C., & Chokshi, S. (2002). A practical guide to translating lesson study for a U.S. setting. *Phi Delta Kappan*, 128-34.
- Fernandez, C., & Yoshida, M. (2004). *Lesson Study: A Japanese Approach to Improving Mathematics Teaching and Learning*. Mahwah: Lawrence Erlbaum Associates, Inc.

- Fernandez, C., Cannon, J., & Chokshi, S. (2003). USA–Japan lesson study collaboration reveals critical lenses for examining practice. *Teaching and Teacher Education*, 19(2), 171–185. [https://doi.org/10.1016/s0742-051x\(02\)00102-6](https://doi.org/10.1016/s0742-051x(02)00102-6).
- Fishman, B., Best, S., Foster, J., & Marx, R. (2000). *Fostering teacher learning in systemic reform: A design proposal for developing professional development*. Paper presented at NARST 2000, New Orleans, LA. <http://www-personal.umich.edu/~fishman/papers/FishmanNARST2000.pdf>
- Fraser, D. (2008). Teaching that makes a difference. In C. McGee., & D. Fraser. (Eds.). *The professional practice of teaching*. (pp.47-64). Melbourne, Vic: Cengage Learning.
- Fujii, T. (2014). Implementing Japanese Lesson Study in Foreign Countries: Misconceptions Revealed. *Mathematics Teacher Education and Development*, 16(1), 1-18.
- Fujii, T. (2016). Designing and Adapting Tasks in Lesson Planning: A Critical Process of Lesson Study. *ZDM Mathematics Education*, 48, 411-423. <https://doi.org/10.1007/s11858-016-0770-3>
- Fullan, M., & Langworthy, M. (2014). *A Rich Seam: How New Pedagogies Find Deep Learning*. London: Pearson.
- Easton, L. (2009). An Introduction to Lesson Study. Florida and the Islands Regional Comprehensive Center. *Day One*, 1-35.
- Gabler, I. A. & Schroeder, M. (2003). *Constructivist methods for the secondary classroom*. Boston, MA: Pearson Education, Inc. & Allyn & Bacon.

Gaible, E. & Burns, M. (2007). *Using technology to train teachers: Appropriate uses of ICTs for professional development*.

<https://www.globalpartnership.org/blog/five-models-teacher-centered-professional-development>

Gall, M., Gall, J., & Borg, W. (2007). *Educational research: An introduction (8th ed.)*. Boston: Pearson.

Garet, M., Porter, A., Desimone, L., Birman, B., & Yoon, K. (2001). What makes professional development effective? Analysis of a national sample of teachers. *American Education Research Journal*, 38(4), 915-945.

Gerber, M. (2017) *Seeing babies with new eyes*.

<http://www.magdagerber.org/blog/problems-with-rie-debunked-what-did-magda-gerber-really-say>

Gergen, K. J. (2009). *Relational being: Beyond self and community*. New York, NY: Oxford University Press.

Gerstein, A. & Ragey, N. (2008). *Professional learning for improved outcomes, community and renewal: The professional development experience of tenured faculty years six and above*. Los Altos Hills, CA: The Foothill-De Anza Community College District Teaching and Learning Project.

Gerstein, A. (2009). *Community college faculty and developmental education: An opportunity for growth and investment*. Stanford, CA: The Carnegie Foundation for the Advancement of Teaching.

Gersten, R., Gillman, J., Morvant, M., & Billingsley, B. (1995). *Working paper #4: Working conditions, job design*. Paper presented at the National Forum on Issues

relating to Special Education Teacher Satisfaction, Retention, and Attrition, Washington, DC.

Gilbert, P. (2007). *Psychotherapy and counseling for depression* (3rd ed.). London: Sage.

Goldrick-Rab, S. (2010). Challenges and opportunities for improving community college student success. *Review of Educational Research*, 80(3), 437-469.

Gomba, G. K. B. (2019). *Challenges Faced by Educators in the Implementation of Continuing Professional Teacher Development (CPTD). Gauteng Province.*

<https://www.intechopen.com/books/teacher-education-in-the-21st-century/challenges-faced-by-educators-in-the-implementation-of-continuing-professional-teacher-development-c>

Gore, J. M., Miller, A., Fray, L., Harris, J., & Prieto, E. (2021). Improving student achievement through professional development: Results from a randomized controlled trial of Quality Teaching Rounds. *Teaching and Teacher Education*, 101, 1-12. doi:10.1016/j.tate.2021.103297

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed method evaluation designs. *Educational Evaluation and Policy Analysis*, 11(3), 255-274. Doi: 10.1.1.1004.4570&rep=rep1&type=pdf.

Guskey, T. (2005). Five key concepts kick off the process. *Journal of the National Staff Development Council. Oxford, OH: NSDC* 26(1), 36-40.

Hallgren, K. A. (2012). Computing Inter-Rater Reliability for Observational Data: An Overview and Tutorial. *Tutorials in Quantitative Methods for Psychology*, 8, 23-34.

- Hamilton, L., Halverson, R., Jackson, S., Mandinach, E., Supovitz, J., & Wayman, J. (2009). *Using student achievement data to support instructional decision making (NCEE 2009-4067)*. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
- Hamzeh, F. (2014). *Lesson Study-Building Communities of Learning among Pre-Service Science Teachers*. (Master's Thesis). University of Windsor, Windsor, Canada.
doi: <https://scholar.uwindsor.ca/etd/5114>
- Hanley, U., & Torrance, H. (2011). Curriculum innovation: difference and resemblance. *Mathematics teacher education and development*, 13(2), 67-84.
- Heijne-Penninga, M., Wijkamp, I., Hogenstijn, M., & Wolfensberger, M. (2018). Implementing theory in the design of a professional development course for honors teachers: A Teacher's Road to Excellence. *Journal of European Honors Council*, 2(1), 1-13.
- Hiebert, J., Gallimore, R., & Stigler, J. (2002). A Knowledge base for the teaching profession: What would it look like and how can we get one? *Educational Researcher*, 31(5), 3-15. <https://doi.org/10.3102/0013189X031005003>
- Hill, H. C., & Ball, D. L. (2004). Learning mathematics for teaching: Results from California's mathematics professional development institutes. *Journal for research in mathematics education*, 35(5), 330-351.
doi: <https://doi.org/10.2307/30034819>

- Hill, H. C., Beisiegel, M., & Jacob, R. (2013). Professional development research: Consensus, crossroads, and challenges. *Educational researcher*, 42(9), 476-487.
<https://doi.org/10.3102/0013189X13512674>
- Hill, R., & Sewell, A. (2010). Teachers as Learners: 'Developing a Community of Learners through Inquiry'. *Set: Research Information for Teachers*, (3), 31-37.
- Hindin, A., Morocco, C. C., Mott, E. A., & Aguilar, C. M. (2007). More than just a group: Teacher collaboration and learning in the workplace. *Teachers and Teaching: theory and practice*, 13(4), 349-376.
- Hobson, A., Ashby, P., Malderez, A., & Tomlinson, P. (2009). Mentoring beginning teachers: What we know and what we don't. *Teaching and Teacher Education*, 25(1), 207-216.
- Holloway, J. (2003). Linking professional development to student learning. *Educational Leadership*, 61(3), 85-87.
- Holloway, J.H. (2006). Connecting Professional Development to Student Learning Gains. *Science Educator*, 15(1), 37-43.
- Hudson, P. B. (2012). How can schools support beginning teachers? A call for timely induction and mentoring for effective teaching. *Australian Journal of Teacher Education*, 37(7), 70-84.
- Huffman, D. & Kalnin, J. (2003). Collaborative inquiry to make data-based decisions in schools. *Teaching and Teacher Education*, 19(6), 569-580.
- Hull, T., Balka, D., & Miles, R. (2010). Overcoming resistance to change. *Principal Leadership*, 10(8), 36-37, 40-42.

- Hummond, D.R., Wei. C., R., Andree, A.& Richardson, N. (2017). *Professional Learning in the Learning Profession*.
<https://learningforward.org/docs/pdf/nsdcstudy2009.pdf>
- Imants, J. & Van Veen, K. (2010). *Teacher learning as workplace learning*. In E. Baker, B. McGaw & P. Peterson (Eds), *International Encyclopaedia of Education*, 3rd Edition (part 7, pp. 569-574). Oxford: Elsevier Scientific Publishers.
- Ingersoll, R. M., & Strong, M. (2011). The impact of induction and mentoring programs for beginning teachers: A critical review of the research. *Review of educational research*, 81(2), 201-233.
- Inprasitha, M. (2010). One Feature of Adaptive Lesson Study in Thailand: Designing Learning Unit. *Proceedings of the 45 National Meeting of Mathematics Education*, 193-206. Gyeongju: Dongkook University.
- Intaros, P., & Inprasitha, M. (2019). How Students' Mathematical Ideas Emerged through Flow of Lesson in Classroom Using Lesson Study and Open Approach. *Psychology*, 10(6), 864-876. doi: 10.4236/psych.2019.106056.
- Jalongo, M. R., Rieg, S.A., & Helterbran, V. R. (2007). *Planning for Learning: Collaborative Approaches to Lesson Design and Review*. New York: Teachers College, Columbia University.
- Joyce, B., & Calhoun, E. (2010). *Models of Professional Development: A Celebration of Educators*. SAGE Publications: Corwin Press.
- Jumani, N.B., Malik, S.Y., & Amin, S. (2018). *Lesson study: a stimulus to improve pedagogical skills of pre-service teachers*. Islamabad: International Islamic University.

- Kadroon, T., & Inprasitha, M. (2013). Professional development of mathematics teachers with Lesson Study and open approach: The process for changing teachers values about teaching mathematics. *Psychology*, 4(2), 101–105.
- Kampen, M. (2019). *5 Ways To Make Teacher Professional Development Effective [With Examples]*.
<https://www.prodigygame.com/main-en/blog/teacher-professional-development/>
- Kanellopoulou, E.M., & Darra, M. (2018). The Planning of Teaching in the Context of Lesson Study: Research Findings. *International Education Studies*, 11(2), 67-82.
doi: 10.5539/ies.v11n2p67.
- Karemera, D. 2003. The Effects of academic environment and background characteristics on students' satisfaction and performance: The Case of South Carolina State University's School of Business. *College Student Journal*. 37(2): 298- 11.
- Kennedy, M. M. (2019). How we learn about teacher learning. *Review of research in education*, 43(1), 138-162. <https://doi.org/10.3102/0091732X19838970>
- Keogh, J., Garvis, S., & Pendergast, D. (2010). Plugging the leaky bucket: The need to develop resilience in novice middle year's teachers. *Primary & Middle Years Educator*, 8(2), 17-26.
- Kohlmeier, J., & Saye, J. (2017). Developing discussion leaders through Scaffolded lesson study. *The Social Studies*, 108(1), 22–37.
<https://doi.org/10.1080/00377996.2016.1237466>.
- Koo, J. S. (2010). *Education Minister calls for enhancement of lessons study*. The Brunei Times.

- Kyngas, H. (2020) Inductive Content Analysis. In H, Kyngas., K. Mikkonen., & M. Kaariainen (eds), *The Application of Content Analysis in Nursing Science Research* (pp. 13-21). Cham: Springer. https://doi.org/10.1007/978-3-030-30199-6_2.
- Lambert, L. (2003). *Leadership capacity for lasting school improvement*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Lasley, T. J., Siedentop, D., & Yinger, R. (2006). A systemic approach to enhancing teacher quality: The Ohio model. *Journal of Teacher Education*, 57(1), 13-21.
- Lavrakas, P.J. (2008). *Encyclopedia of Survey Research Methods*. Thousand Oaks, Calif: SAGE Publications. doi: <https://dx.doi.org/10.4135/9781412963947>
- Leavy, A.M., & Hourigan, M. (2016). Using Lesson Study to support knowledge development in initial teacher education: insights from early number classrooms. *Teaching and Teacher Education*, 57, 161–175.
doi: 10.1016/j.tate.2016.04.002.
- Lee, J. F. (2008). A Hong Kong case of lesson study—benefits and concerns. *Teaching and Teacher Education*, 24(5), 1115–1124. doi: 10.1016/j.tate.2007.10.007.
- Lee, V. E., Dedrick, R., & Smith, J. (1991). The effect of the social organization of schools on teachers' efficacy and satisfaction. *Sociology of Education*, 64, 190–208. <http://dx.doi.org/10.2307/2112851>
- Legault, L. (2017). Self-Determination Theory. In Garcia, D., Lester, N., Cloninger, K. M., Cloninger, C. R., Zeigler-Hill, V., & Shackelford, T. (Eds), *The temperament and character inventory (TCI): Encyclopedia of personality and individual*

differences (pp. 1-3). Cham: Springer. https://doi.org/10.1007/978-3-319-28099-8_1162-1

- Lenski, S., Caskey, M.M., & Anfara Jr, V.A. (2009). Using the Lesson Study Approach to Plan for Student Learning. *Middle School Journal*, 40(3), 50-57.
- Leung, F. K. S. & Yuen, Y. Y. (2007). *Teaching and Learning Mathematics through Lesson Study. An example from Hong Kong*. Paper presented at Third APEC-Tsukuba International Conference Innovation of Classroom Teaching and Learning through Lesson Study – Focusing on Mathematical Communication, CRICED, University of Tsukuba, Japan, December, 9-14.
- Lewis, C., & Perry, R. (2017). Lesson study to scale up research-based knowledge: A randomized, controlled trial of fractions learning. *Journal for Research in Mathematics Education*, 48(3), 261–299.
- Lewis, C. (2002). *Lesson study: A handbook of teacher-led instructional change*. Philadelphia, PA: Research for Better Schools.
- Lewis, C., & Hurd, J. (2011). *Lesson Study step by step. How Teacher Learning Communities Improve Instruction*. USA: Portsmouth, NH.
- Lewis, C. C., Perry, R. R., & Hurd, J. (2009). Improving mathematics instruction through lesson study: A theoretical model and North American case. *Journal of Mathematics Teacher Education*, 12, 285–304. doi: 10.1007/s10857-009-9102-7.
- Lewis, C., & Tsuchida, I. (1997). Planned educational change in Japan: The case of elementary science instruction. *Journal of Education Policy*, 12(5), 313–331. doi: 10.1080/0268093970120502.

- Lewis, C., & Tsuchida, I. (1999). *The secret of trapezes: Science research lesson on pendulums*. Available at <http://www.lessonresearch.net/trapeze.html>
- Lewis, C., Perry, R., & Murata, A. (2003). "Lesson study and teachers knowledge development: Collaborative critique of a research model and methods," Report in Annual Meeting of the American Educational Research Association ERIC ED47812. *American Educational Research Association*, Chicago, Ill, USA, April.
- Lewis, C., Perry, R., & Murata, A. (2006). How should research contribute to instructional improvement? The case of lesson study. *Educational Researcher*, 35(3), 3–14. doi:10.3102/0013189X035003003.
- Lewis, C., Perry, R., Foster, D., Hurd, J. & Fisher, L. (2011). Lesson-Study: Beyond coaching. *Educational Leadership*, 69(2), 64-68.
- Lewis, C., Perry, R., Hurd, J., & O'Connell, M. (2006). Lesson study comes of age in North America. *Phi Delta Kappan*, 88(4), 273–281.
- Lind, P., Franks, G., & Prebble, T. (2005). *Accessing advice and guidance programs* In P. Adams, K. Vossler & C. Scrivens (Eds.), *Teachers' work in Aotearoa New Zealand* (pp. 296–306). UK: Victoria Publishing.
- Lucas, M. (2014). *Lesson Study, A Means for Fostering Collaborative Reflection: Effects on the Self-Efficacy and Teaching Practices of Developmental Education College Success Course Instructor* (Doctoral Dissertation). Arizona State University, Tempe, Arizona. doi: ce059d4af0cafaaa24c2571404f07962d64b.pdf.
- Lucenario, J., Yangco, R., Punzalan, A., & Espinosa, A. (2016). Pedagogical Content Knowledge-Guided Lesson Study: Effects on Teacher Competence and Students' Achievement in Chemistry. *Education Research International*, 1-10.

doi: 10.1155/2016/6068930.

Lunenberg, M., Dengerink, J., & Korthagen, F. (2013). *The profession of teacher educator. Professional roles, professional acting and professional development of teacher educators*. Review study commissioned by NWO / PROO. Amsterdam: Vrije Universiteit. <https://research.vu.nl/ws/portalfiles/portal/47659819>

Makinae, N. (2010). *The origin of Lesson Study in Japan*.

<http://www.lessonstudy.net/lg/readingsTheOriginofLessonStudyinJapanMakinaeN/pdf>.

Marzano, R. J., Frontier, T., & Livingston, D. (2011). *Effective supervision: Supporting the art and science of teaching*. Alexandria: Association for Supervision and Curriculum Development.

Matanluka, M., Johari, K., & Matanluka, O. (2013). The Perception of Teachers and Students toward Lesson Study Implementation at Rural School of Sabah: A Pilot Study. *Procedia - Social and Behavioral Sciences*, 90, 245 – 250.

doi: 10.1016/j.sbspro.2013.07.088.

McDowell, A. (2010). *Pre service Teachers' Use of Lesson Study in Teaching Nature of Science*. (Doctoral Dissertation). Georgia State University, Atlanta, Georgia.

https://scholarworks.gsu.edu/msit_diss/65

McSweeney, K., & Gardner, J. (2018). Lesson Study Matters in Ireland. *Rural Environment Education Personality*, 11, 304-313. doi: 10.22616/REEP.2018.037

Mee, L., & Oyao, S. G. (2013). Establishing learning communities among science teachers through Lesson Study. *Journal of Science and Mathematics Education in South East Asia*, 36(1), 1–22.

- Meiliasari, M. (2013, November). *Lesson study with pre-service teachers. Investigating the learning of pre-service teachers in lesson study model of teaching practice course*. Paper presented at the Fifth International Conference on Science and Mathematics Education, Malaysia. <https://3c5.com/hjNaT>
- Merchie, E., Tuytens, M., Devos, G. & Vanderlinde, R. (2016). Evaluating teachers' professional development initiatives: towards an extended evaluative framework. *Research papers in Education*, 33(2), 143-168.
<https://doi.org/10.1080/02671522.2016.1271003>
- Merriam, S. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.
- Meyer, R. (2005). *Lesson Study: The Effects on Teachers and Students in Urban Middle Schools*. (Doctoral Dissertation). Baylor University, Waco, Texas.
doi: <http://hdl.handle.net/2104/3007>
- Miller, K. W. & Davidson, D. M. (2006). What makes a secondary school science and/or mathematics teacher "highly qualified"? *Science Educator*, 15(1), 56-59.
<http://files.eric.ed.gov/fulltext/EJ773254.pdf>
- Ministry of Education. (2013). *The National Education System for the 21st Century: SPN21 (Revised ed.)*. Brunei Darussalam: Ministry of Education.
- Moir, E. (2012). Foreword. In A. Lieberman, S. Hanson and J. Gless (Eds.), *Mentoring teachers: Navigating the real-world tensions*. San Francisco: The New Teacher Center, Jossey-Bass.

- Murata, A. (2011). Introduction: Conceptual overview of lesson study. In Hart, L.C., Alston, A. S., & Murata, A. (Eds.), *Lesson Study Research and Practice in Mathematics Education*, 13–24. New York, NY: Springer.
- Murphy, S. (2005). Changing perspectives in professional development. *Science Educator*, 14(1), 9-15.
- Murray, J. (2002). The current state of faculty development in two-year colleges. *New Directions for Community Colleges*, 118, 89-98. doi: 10.1002/cc.67
- Mushtaq, I., & Khan, S.N. (2012). Factors Affecting Students' Academic Performance. *Global Journal of Management and Business Research*, 12(9), 17-22.
- Mynott, J. (2017). *A Primary Head Teacher's Exploration of Lesson Study* (Doctoral Dissertation). University of Hertfordshire, Hatfield, England.
doi:10.18745/TH.18330.
- Nakatome, T. (1984). *Developing Teacher Training in School: A comprehensive study of management of Teacher Training in Japanese School*. Tokyo: Eideru Kenkyusyo.
- Naresh, N. (2013). Traverses through the landscape of reflective thinking: Teachers' actions in the context of lesson study. *Fields Mathematics Education Journal*, 1(1), 21–42.
- National Research Council (2002). *Investigating the influence of standards: A framework for research for mathematics, science, and technology education*. Washington, DC: National Academy Press.
- National Staff Development Council. (2001). *NSDC's standards for staff development*. Oxford, OH: Author.

- Nauerth, D.A. (2015). *The impact of lesson study professional development on teacher self-efficacy and outcome expectancy* (Doctoral Dissertation). Kansa: Kansas State University. doi: <https://core.ac.uk/download/pdf/33355195.pdf>.
- Ndongfack, M. N. (2015). Mastery of active and shared learning processes for technopedagogy (MASLEPT): A model for teacher professional development on technology integration. *Creative Education*, 6(1), 32–45.
- NEP. (2017). *National Educational Policy*. Ministry of Education. Islamabad: Government of Pakistan.
- Neubrand , M., Jordan, A., Krauss, S., Blum, W., & Lowen, K. (2013). Task Analysis in COACTIV: Examining the Potential for Cognitive Activation in German Mathematics Classrooms. In Kunter, M., Baumert, J., Blum, W., Klusmann, U., Krauss, S. and Neubrand , M. (eds). *Cognitive Activation in the Mathematics Classroom and Professional Competence of Teachers: Results from the COACTIV Project*. New York: Springer.
- Norwich, B., & Ylonen, A. (2013). Design-based research to develop the teaching of pupils with moderate learning difficulties (MLD): Evaluating lesson study in terms of pupil, teacher, and school outcomes. *Teaching and Teacher Education*, 34, 162–173. <https://doi.org/10.1016/j.tate.2013.04.012>.
- Oanh, D.T.H. (2012). Global vs. glocal English: attitudes and conceptions among educators, administrators and teachers in eight Asian countries. In A. Kirkpatrick & R. Sussex (eds.), *English as an International Language in Asia: Implications for Language Education, Multilingual Education* (pp. 107–135). Dordrecht, The Netherlands: Springer Science & Business Media.

- OECD. (2009). *Creating Effective Teaching and Learning Environments*
<https://www.oecd.org/berlin/43541636.pdf>
- Okmen, B., & Kilic, A. (2021). Examining the Professional Development Processes of Pre-service English Teachers in Turkey. In *FIRE: Forum for International Research in Education*, 7(1), 68-96.
<https://fire-ojs-ttu.tdl.org/fire/index.php/FIRE/article/view/227>
- Palardy, G. J., & Rumberger, R. W. (2008). Teacher effectiveness in first grade: The importance of background qualifications, attitudes, and instructional practices for student learning. *Educational Evaluation and Policy Analysis*, 30, 111–140.
doi:10.3102/0162373708317680
- Panasuk, R., & Todd, J. (2005). Effectiveness of Lesson Planning: Factor Analysis. *Journal of Instructional Psychology*, 32(3), 215-233.
- Patterson, S., & Thornton, K.(2014). Challenging New Zealand mentor practice. *Journal of Educational Leadership, Policy, and Practice*, 29(1), 41-57.
- Patton, M. (2002). *Qualitative research & evaluation methods*. Thousand Oaks, CA: Sage.
- Pillen, M., Beijard, D. & Den, B.P. (2012). Profiles and change in beginning teachers' professional identity tensions. *Teaching and Teacher Education*, 34, 87–93.
<https://doi.org/10.1016/j.tate.2013.04.003>.
- Prasetyoningsih, L. S. A., & Laksono, P. T. (2021). Enacting Scenario Card-Lesson Study in Pre-service Teacher Education: A Case Study on Indonesian Pre-service Teachers with Disabilities. *AL-ISHLAH: Jurnal Pendidikan*, 13(2), 1403-1410.
doi: 10.35445/alishlah.v13i2.1014

- Prawat, R.S. (1996). Constructivism. modern and postmodern. *Educational Psychologist*, 31(3/4), 215-225.
- Puchner, L. D., & Taylor, A. R. (2006). Lesson study, collaboration and teacher efficacy: Stories from two school-based math lesson study groups. *Teaching and Teacher Education*, 22, 922–934.
- Rebecca, P., & Lewis, C. (2003). Teacher-Initiated Lesson Study in a Northern California District. *Lesson Study Group at Mills College*, <http://www.lessonresearch.net>.
- Reeves, P. (2010). *Transforming professional development into student results*. Alexandria, VA: ASCD.
- Regan, K. S., Evmenova, A. S., Kurz, L. A., Hughes, M. D., Sacco, D., Ahn, S. Y., & Chirinos, D. S. (2016). Researchers apply lesson study: A cycle of lesson planning, implementation, and revision. *Learning Disabilities Research and Practice*, 31(2), 113–122. <https://doi.org/10.1111/ldrp.12101>
- Rekalidou, G. (2012). Improving teaching. The case of Lesson Study. *Pedagogy-Theory and Practice*, 5, 98-109.
- Rekha, K., & Ganesh, M.P. (2012) “Do mentors learn by mentoring others?”, *International Journal of Mentoring and Coaching in Education*, 1(3), 205-217. <https://doi.org/10.1108/20466851211279466>.
- Remillard, J., & Bryans, M.B. (2004). Teachers' Orientations toward Mathematics Curriculum Materials: Implications for Teacher Learning. *Journal for Research in Mathematics Education*, 35(5), 1-55. doi:10.2307/30034820
- Report Teacher training: Teacher education in transition. (2013, January 06). *Dawn*, p.1.

- Richardson, J. (2004). Lesson study: teachers learn how to improve instruction. *Tools for Schools*, [http:// www.nsd.org/library/publications/tools/tools2-04rich.cfm](http://www.nsd.org/library/publications/tools/tools2-04rich.cfm).
- Rock, T. C., & Wilson, C. (2005). Improving teaching through lesson study. *Teacher Education Quarterly*, 32(1), 77–92.
doi: <https://files.eric.ed.gov/fulltext/EJ795305.pdf>.
- Ross, J. A., Bruce, C. D., & Hogaboam-Gray, A. (2006). The impact of a professional development program on student achievement in grade 6 mathematics. *Journal of Mathematics Teacher Education*, 9, 551-577.
- Rutkowski, D., Rutkowski, L., Bélanger, J., Knoll, S., Weatherby, K., & Prusinski, E. (2013). Teaching and Learning International Survey TALIS 2013: Conceptual Framework. Final. *OECD Publishing*. Sage.
- Saye, J., Kohlmeier, J., Howell, J., McCormick, T., Jones, R. & Brush, T. (2017). Scaffolded lesson study. *Social Studies Research and Practice*, 12(1), 95-112.
<https://www.emerald.com/insight/content/doi/10.1108/SSRP-03-2017-0008/full/html>.
- Shaun, A. (2014). *Perfect CPD Teacher-Led*. U.K.: Independent Thinking Press.
- Sibbald, T. (2009). The relationship between lesson study and self-efficacy. *School Science and Mathematics*, 109(8), 450-460.
- Simmons, M. (2016). The Role of the ‘Koshi’ in UK Lesson Study. *Mathematics Teaching*, 250, 41-43.
- Smith, M. S. (2001). *Practice-based professional development for teachers of mathematics*. Reston, VA: The National Council of Teachers of Mathematics, Inc.
- Solheim, K. (2017). *Importance of teacher learning for students’ achievement*.

<http://laringsmiljosenteret.uis.no/programmes-and-project/classroom-interaction-for-enhanced-student-learning-ciesl/news/importance-of-teacher-learning-for-students-achievement-article121594-22147.html>

Sparks, D. & Horsley, S. (1989). Five models of staff development. *Journal of Staff Development*, 10(4), 1–34. doi: <http://www.nsdc.org/educatorindex.htm>.

Stake, R. E. (2005). *Multiple case study analysis*. New York: Guilford Press.

Stepanek, J., Appel, G., Leong, M., Mangan, M. T., & Mitchell, M. (2007). *Leading lesson study: A practical guide for teachers and facilitators*. Thousand Oaks, CA: Corwin Press.

Stewart, R. A., & Brendefur, J. L. (2005). Fusing lesson study and authentic achievement: A model for teacher collaboration. *Phi Delta Kappa International*, 86(9), 681–687.

Stigler, J., & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom*. New York: Free Press.

Stigler, J., & Hiebert, J. (2009). Closing the teaching gap. *Phi Delta Kappan*, 91, 32–37. <https://doi.org/10.1177/003172170909100307>

Suhaili, H. A. S. H. (2010). *Enhancing primary mathematics instructional practices via lesson study*, Master Research Exercise. Darussalam: Universiti Brunei.

Sukirman. (2007). *Improving the quality of secondary mathematics teaching through lesson study in Yogyakarta, Indonesia*. Paper presented at Third APEC-Tsukuba International Conference Innovation of Classroom Teaching and Learning through Lesson Study - Focusing on Mathematical Communication, CRICED, University of Tsukuba, Japan.

- Surbhi, S. (2017). *Difference between Census and Sampling*.
<https://keydifferences.com/difference-between-census-and-sampling.html>
- Takahashi, A. (2014). The role of the knowledgeable other in lesson study: Examining the final comments of experienced lesson study practitioners. *Mathematics Teacher Education and Development*, 16(1), 4–21.
 doi: <https://www.researchgate.net/publication/289504209>
- Takahashi, A., & McDougal, T. (2016). Collaborative lesson research: maximizing the impact of lesson study. *ZDM Mathematics Education*, 48(4), 513-526
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.
- Taylor, A.R., Anderson, S., Meyer, K., Wagner, M. K., and West, C. (2005). Lesson Study: A Professional Development Model for Mathematics Reform. *The Rural Educator*, 26(2), 17-21.
- Thompson, D. (2015). *An analysis of the perceived impact of lesson study on improving secondary school stem teacher effectiveness* (Doctoral Dissertation). Florida: University of Central Florida. <https://stars.library.ucf.edu/etd/1311/>
- Timperley, H. (2008). *Teacher Professional Learning and Development*. International Academy of Education Educational Practices Series, no. 18.
- Totterdell, M., Woodroffe, L., Bubb, S., Daly, C., Smart, T., & Arrowsmith, J. (2008). *What are the effects of the roles of mentors or inductors using induction programs for newly qualified teachers (NQTs) on their professional practice, with special reference to teacher performance, professional learning, and retention rates?*

London: Social Science Research Unit, Institute of Education, University of London.

Trippstad, T.A. (2013). *The Glocal Teacher and Researcher. Policy, Theory and Practice*. Available at: <http://www.hib.no/aktuelt/konferanse/2013/The-glocal-teacher-conference-june2013.asp>

Van Veen, K., Zwart, R., & Meirink, J. (2012). *What Makes Teacher Professional Development Effective? A Literature Review.* " In *Teacher learning that matters International perspectives*. London: Routledge.

Verhoef, N., & Goei, S.L. (2016). *Lesson Study as a tool for teacher learning: the context of combinatorial reasoning problems*. The Netherlands: University of Twente.
doi: <https://www.researchgate.net/publication/310498130>

Verhoef, N., & Tall, D. (2011). Lesson Study: The effect on teachers' professional development. *Proceedings of the 35th Conference of the International Group for the Psychology of Mathematics Education*, 1, Ankara, Turkey.

Vinz, S (2020). Developing your theoretical framework.
<https://www.scribbr.com/dissertation/theoretical-framework/>

Vui, T. (2007). *Using Lesson Study as a means to innovation for teaching and learning Mathematics in Vietnam research lesson on the property of the three medians in a triangle* Paper presented at Third APEC-Tsukuba International Conference Innovation of Classroom Teaching and Learning through Lesson Study - Focusing on Mathematical Communication, CRICED, University of Tsukuba, Japan.

Wallace, J. D., Nesbit, C. R., & Newman, C. R. (2001). Bringing about school change: Professional development for teacher leaders. In J. Rhoton & P. Bowers,

Professional Development Leadership and the Diverse Learner. Arlington, VA: NSTA Press.

Wang, A. H., Coleman, A. B., Coley, R. J., & Phelps, R. P. (2003). *Preparing Teachers around the World*. Princeton: Policy Information Centre.

Warwick, P., Vrikki, M., Vermunt, J.D., Mercer, N., & Halem, N.V. (2016). Connecting observations of student and teacher learning: an examination of dialogic processes in Lesson Study discussions in mathematics. *ZDM Mathematics Education*, 48, 555–569. doi: <https://link.springer.com/article/10.1007/s11858-015-0750-z>.

Wilén, W., Bosse, M. I., Hutchison, J., & Kindsvatter, R. (2004). *Dynamics of effective teaching (5th ed.)*. Boston, MA: Pearson Education, Inc. & Allyn & Bacon.

Wilson, S. M., & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. *Review of Research in Education*, 24, 173-209.
doi: <http://www.jstor.org/stable/1167270>

Wolfensberger, M. V. C. (2015). *Talent development in European Higher Education. Honors programs in the Benelux, Nordic and German-speaking Countries*. Springer Nature.

Wood, K. (2018). The many faces of lesson study and learning study. *International Journal for Lesson and Learning Studies*, 7(1).
doi: <https://www.emerald.com/insight/content/doi/10.1108/IJLLS-10-2017-0047/full/html>.

- Xiaofeng, W., Qi, W., & Ling, C. (2015, June). *A case study of online-based collaborative lesson planning*. Proceedings of the Eighth International Conference on E-Learning in the Workplace (ICELW 2015), Kaleidoscope Learning, New York.
- Yin, R. K. (2003). *Case study research: Design and methods (3rd ed.)*. Thousand Oaks, CA: SAGE Publications.
- Yin, R. K. (2009). *Case study research: Design and methods (4th ed.)*. Thousand Oaks, CA:
- Yin, R. K. (2014). *Case Study Research Design and Methods (5th ed.)*. Thousand Oaks, CA: Sage.
- Yoon, K. S., Duncan, T., Lee, S. W. Y., Scarloss, B., & Shapley, K. L. (2007). Reviewing the evidence on how teacher professional development affects student achievement. Issues & answers. rel 2007-no. 033. *Regional Educational Laboratory Southwest (NJ1)*.
- Yoong, J. I. (2011). *Let the students tell us how they learn, SingTeach, 32*.
<http://singteach.nie.edu.sg/issue32-scienceed/>
- Zahidullah. Ayaz. M., Ullah, M., Ullah, W., & Khan, A.S. (2017). Impact of Parents' Role on the Academic Achievement of Secondary School Students in North Waziristan Agency. *Sci.Int.*, 29(6), 1277-1281.
<http://www.sci-int.com/pdf/636527551684409267.pdf>

APPENDICES

Appendix 1: Complete List of Prospective Teachers and Educational Institutions

Detail of Prospective Teachers' Placement at Various Schools/Colleges

S.No	Number of Prospective Teachers	List of Schools
1	Prospective Teacher 1	Islamabad Model College for Girls (I-XII), Tarlai F.A Islamabad
	Prospective Teacher 2	
	Prospective Teacher 3	
	Prospective Teacher 4	
2.	Prospective Teacher 5	Islamabad Model School for Girls (I-V), G-6/2 Islamabad
3.	Prospective Teacher 6	Islamabad Model School for Girls (VI-X), Street No 10, Sector G-11/I, Islamabad
	Prospective Teacher 7	
	Prospective Teacher 8	
4.	Prospective Teacher 9	Islamabad Model School for Girls (VI-X), I-10/4 Islamabad
	Prospective Teacher 10	
	Prospective Teacher 11	
5.	Prospective Teacher 12	Islamabad Model College for Girls (I-XII), Kot Hathial Bhara Kahu, Islamabad
6.	Prospective Teacher 13	Islamabad Model College for Girls (I-XII), I-8/4 Islamabad
7.	Prospective Teacher 14	Islamabad Model School for Girls (I-V), PWD Colony (FA), Islamabad
8.	Prospective Teacher 15	Islamabad Model School for Girls (I-X), Sector, G-11/2, Islamabad
9.	Prospective Teacher 16	Islamabad Model College for Girls, Sector (I-XII), G-10/2, Islamabad
10.	Prospective Teacher 17	Islamabad Model School for Girls (I-V), Shahzad Town (F.A), Islamabad
11.	Prospective Teacher 18	Islamabad Model School for Girls (VI-X), Sector F-7/2, Islamabad
	Prospective Teacher 19	
	Prospective Teacher 20	
	Prospective Teacher 21	
	Prospective Teacher 22	

Appendix 2: Islamabad Model Schools and Colleges having The Classes From 6-8

S.No	List of Schools
1.	Islamabad Model School for Girls (VI-X), Street No 10, Sector G-11/1, Islamabad
2.	Islamabad Model School for Girls (VI-X), I-10/4 Islamabad
3.	Islamabad Model School for Girls (I-X), Sector, G-11/2, Islamabad
4.	Islamabad Model School for Girls (VI-X), Sector F-7/2, Islamabad
5.	Islamabad Model College for Girls (I-XII), Tarlai F.A Islamabad
6.	Islamabad Model College for Girls (I-XII), Kot Hathial Bhara Kahu, Islamabad
7.	Islamabad Model College for Girls (I-XII), I-8/4 Islamabad
8.	Islamabad Model College for Girls, Sector (I-XII), G-10/2, Islamabad

Appendix 3: Total Number of Students in 6th and 7th Classes

S.No	List of Schools	Total number of students in 6 th class	Total number of students in 7 th class
1.	Islamabad Model School for Girls (VI-X), Street No 10, Sector G-11/1, Islamabad	134	146
2.	Islamabad Model School for Girls (VI-X), I-10/4 Islamabad	168	190
3.	Islamabad Model School for Girls (I-X), Sector, G-11/2, Islamabad	90	70
4.	Islamabad Model School for Girls (VI-X), Sector F-7/2, Islamabad	185	175
5.	Islamabad Model College for Girls (I-XII), Tarlai F.A Islamabad	230	262
6.	Islamabad Model College for Girls (I-XII), Kot Hathial Bhara Kahu, Islamabad	80	30
7.	Islamabad Model College for Girls (I-XII), I-8/4 Islamabad	221	235
8.	Islamabad Model College for Girls, Sector (I-XII), G-10/2, Islamabad	180	180
Total		1288	1288

Appendix 4: Sampled Prospective Teachers and Educational Institutions

S.No	Groups	Prospective Teachers	Name of School
1.	Lesson Study Group 1	Prospective Teacher 1	Islamabad Model College for Girls, Tarlai F.A Islamabad
		Prospective Teacher 2	
		Prospective Teacher 3	
		Prospective Teacher 4	
2.	Lesson Study Group 2	Prospective Teacher 5	Islamabad Model School for Girls (VI-X), Sector F-7/2, Islamabad
		Prospective Teacher 6	
		Prospective Teacher 7	
		Prospective Teacher 8	
3.	Prospective Teachers Doing Individual Teaching	Prospective Teacher 9	Islamabad Model College for Girls, Sector I-8/4, Islamabad
		Prospective Teacher 10	Islamabad Model School for Girls (VI-X), Sector F-7/2, Islamabad

Appendix 5: Permission Letter (For Supervisors at University)

The Supervisor
Long Term Internship Program
Department of Education
Faculty of Social Sciences
International Islamic University- Islamabad

Respected Madam

It is stated that I Fatima Batool, PhD Scholar Registration: 148-FSS PHDEDU-S18 working on my dissertation entitled **"Effectiveness of Lesson Study Model in Improving Prospective Teachers' Professional Development and Students' Achievement: A Mixed Methods Multiple Case Study"**. For this study I have to collect data by practicing the lesson study model with prospective teachers in actual context (schools) during their long term internship (which is a major part of my research work). Kindly allow me to involve some of prospective teachers to be in my study. Your cooperation will be highly acknowledged in this perspective.

Thanking you in anticipation



Yours Sincerely

Fatima Batool

Registration: 148-FSS PHDEDU-S18

Dated: 08-02-2021

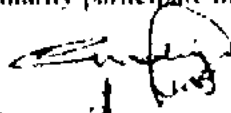
Appendix 6: Consent Form for Prospective Teachers For Participation in Lesson Study Group

Prospective Teachers' Consent Form

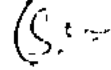
My name is Fatima Batool and I am a PhD candidate in Department of Education, International Islamic University, Islamabad. I have completed my Masters and MS Degrees from the same department respectively in 2016 and 2017. Currently, I am working on my doctoral dissertation thesis entitled "EFFECTIVENESS OF LESSON STUDY MODEL IN IMPROVING PROSPECTIVE TEACHERS' PROFESSIONAL DEVELOPMENT AND STUDENTS' ACHIEVEMENT: A MIXED METHODS MULTIPLE CASE STUDY". Key objective of this study is determine the effectiveness of lesson study model as a collaborative approach to teacher professional development and as a key to improve academic achievement of students. Data for this study will be collected by practicing the lesson study model with prospective teachers (that have been placed at schools colleges by Department of Education, International Islamic university, Islamabad) during their long term internship. Duration of practicing lesson study model is 14 weeks and researcher will guide prospective teachers throughout the process. Collected data will be shared and discussed with prospective teachers before finalization the report. Names of prospective teachers will be kept confidential and data will be used only for research purposes. You may share your concerns with researcher before signing this consent form.

Your participation will be greatly acknowledged and appreciated.

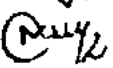
I am willing to voluntarily participate in this study.

Prospective Teacher 1 

Prospective Teacher 2 

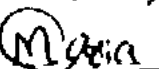
Prospective Teacher 3 

Prospective Teacher 4 

Prospective Teacher 5 

Prospective Teacher 6 

Prospective Teacher 7 

Prospective Teacher 8 

For Routine Class Observation and Evaluation

Prospective Teachers: please indicate the following on a 1-4 form

1 2 3 4

EFFECTIVENESS OF THE FOLLOWING MODELS IN
IMPROVING PROSPECTIVE TEACHERS' PROFESSIONAL DEVELOPMENT AND
SKILLS IN ACHIEVING A MINIMUM EFFECTIVE MULTIPLE CASE STUDY

Appendix 7: Permission Letter (For Supervisors at Schools)



INTERNATIONAL ISLAMIC UNIVERSITY

ISLAMABAD - PAKISTAN

Faculty of Social Sciences

Department of Education

P.O. Box 1743 Telephone: ALJAMIA Tel: 54068 88. PK. Fax 9077908

Tel: 901.4216008

Dated: Feb 18, 2021

TO WHOM IT MAY CONCERN

It is stated that Farzana Batool, Registration: 148-FSAPHIDEEDK/ST18 is a PhD Scholar in Department of Education, International Islamic University, Islamabad. Currently, she is working on her thesis entitled "Effectiveness of Lesson Study Model in Improving Prospective Teachers' Professional Development and Students' Achievement: A Mixed Methods Multiple Case Study". Key objective of her study is to determine the effectiveness of lesson study model as a collaborative approach to teacher professional development and as a tool to improve academic achievement of students. For this study she has to collect data by practicing the lesson study model with prospective teachers (who have been placed at your school by Department of Education, International Islamic University, Islamabad) during their long term internship. You are requested to facilitate her in data collection. The collected data will be kept confidential and will only be used for research purpose.

Your cooperation will be highly acknowledged in this matter

Best Regards

Supervisor: _____

Dr. Samia Malik

Professor of Education

Former Dean, Faculty of Social Sciences

International Islamic University, Islamabad

Co-Supervisor: _____

Dr. Nida

Professor of Education

International Islamic University, Islamabad

Appendix 8: Template for Lesson Plan

S.No	Main Indicators	Description
General Information		
1.	Team	
2.	ID of Teachers	
3.	School Name	
4.	Grade	
5.	Subject	
6.	Topic	
7.	Date of lesson presentation	
8.	Total Time of lesson presentation	
9.	Lesson objectives	
10.	Teaching Method	
11.	Audio-Visual Aids	
Specific (keeping in view decided time)		Allocated Time for each activity
		Black Board Writing
12.	Previous Knowledge Testing (PKT)	
13.	Announcement of topic	
14.	Presentation by teacher	
15.	Students activities	
16.	Ways to assess students understanding	
17.	Wrap up	
18.	Home work	

Appendix 9: Lesson Plans Developed by Prospective Teachers
Lesson plans of prospective Teachers doing Individual
Teaching
Lesson Plan 1

1. COVERING SHEET

Class: 7th

Subject: Geography

Plateaus

Duration of period: 40 minutes

Number of Students: 25

Topic: Mountains and

Teacher ID: 9

2. INSTRUCTIONAL MATERIAL: Book, pictures, and flowchart

3. GENERAL OBJECTIVES: To teach the students about mountains and plateaus to enhance knowledge.

SPECIFIC OBJECTIVES: Students will be able

- To define the mountains and their types.
- To understand the difference between mountains and plateaus.
- To identify the major types of mountains and plateaus in the world.

4. PREVIOUS KNOWLEDGE:

Q1: What are landforms?

A: A landform is a natural feature of the surface of the earth. Common landforms are mountains, plateaus, and valleys.

Q2: What are mountains?

A. a mountain is an elevated portion of the earth's crust.

Q3: What are plateaus?

A: A plateau is a flat, elevated landform that rises sharply above the surrounding area on at least one side.

5. INTRODUCTION AND ANNOUNCEMENT OF THE TOPIC:

Introduction:

Mountains

A mountain is a natural elevation of the earth's surface.

Which rises at least 1000 meters above sea level.

A mountain differs from a plateau in having a limited summit area

Plateaus

Plateaus are table-shaped lands that rise at least 300 meters above sea level.

A plateau is sometimes called a table land.

6 Announcement of the Topic:

Today we are going to study the topics of our textbook Mountains and Plateaus.

7. PRESENTATION:

Matter	Method	BBS
Read loud the lesson and understand it.	Reading	Mountains and plateaus
Explain the types of mountains and plateau	Discussion	Flowcharts of types

8. GENERALIZATION:

Today we studied Mountains and their types, like Fold Mountains, Block Mountains, and volcanic mountains. Plateaus and its types Tectonic plateaus, Intermontane plateaus, piedmont plateaus, Volcanic Plateaus.

9. ASSOCIATION/COMPARISON:

What is the difference between mountains and plateaus?

Mountains	Plateaus
Mountain is an elevated landform.	Plateau is an elevated flat land that is different from the surrounding plains.
Mountain generally has a cone-shaped structure.	Plateau looks like a large table.
Mountains have steep slopes with a pointy summit.	Plateaus have inclined slopes. The top of a plateau is a flat expanse of land

10. APPLICATION:

Q: How do you explain volcanic mountains?

A. volcanic mountains are conical mountains built by deposition of lava or pyroclastic around the vents of the volcanoes.

11. RECAPITULATION:

Q1: What is Fold Mountain?

A: mountains that were built by the folding of rock layers b colliding tectonic plates are called Fold Mountains.

Q2: What is Intermountain Plateaus?

A: Those tectonic plateaus which are surrounded by mountains are known as intermountain plateaus e.g., the Tibetan and Bolivian plateaus, etc.

12. ASSIGNMENT:

In the next class, a written test will be held on these topics.

Lesson Plan 2

❖ **Covering Sheet:**

- ❖ **Class:** 6th
- ❖ **Number of Students:** 28
- ❖ **Subject:** Computer Science
- ❖ **Teacher ID:** 10
- ❖ **Duration of Period:** 40 mins
- ❖ **Topic:** ICT Fundamentals

❖ **Instructional Material:**

- Marker, White Board, Text Book, Pointer.

❖ **Objectives:**

↓ **General Objectives:**

- The student will be able to provide knowledge of computers.

↓ **Specific Objectives:**

- To create interest in the computer.
- To develop thinking and logical understanding power.
- To able to know the characteristics and limitations of computer.

❖ **Previous Knowledge:**

- What is a computer?
- What tasks can be performed with the help of a computer?

❖ **Introduction and Announcement of Topic:**

↓ **Introduction:** A computer is an electronic device that processes data, stores, and retrieves information with great accuracy and speed according to the given instructions. It provides a basic understanding of ICT, networks, and services and their technologies. It covers the basic principles of storage, retrieval, manipulation, processing, access, transmission, and switching of digital data and the way people and organizations communicate and share information digitally with each other.

↓ **Announcement of the Topic:** Today we are going to study the chapter of our textbook, "ICT Fundamentals".

❖ **The procedure that is Matter, Method and Blackboard Summary:**

↓ **Presentation Steps:**

Matter	Method	BBS
• Read the lesson loud with the correct	Direct Method	Reading

pronunciation.		
• Meaning of difficult words.	Direct Method	Words Meaning
• Discussion with students.	Discussion	Reflection
• Ask students to give views.		Critical Analysis

❖ **Generalization:** Today we studied the topic of ICT Fundamentals. Firstly we introduce computers and define data and information. Then we studied the advantages and daily usage of ICT devices like ICT Applications in Communication, Measurement, and Industries. Then we studied components of computer two main components of a computer are Hardware & Software. Hardware divide 5 components like Input devices, System Units, Storage devices, Output devices, Communication devices. Software divide two types Application & System Software.

❖ **Association/Comparison:**

- Differentiate between data and information for example?

❖ **Application:**

- How can we use ICT in the industry?

❖ **Recapitulation:**

- What is a system unit?
- Define components of a computer?

❖ **Home Work:**

- Do prepare a test for the next class.

Lesson plans of prospective Teachers Practicing Lesson Study Model
Lesson Plan 1
Geography Lesson Plan

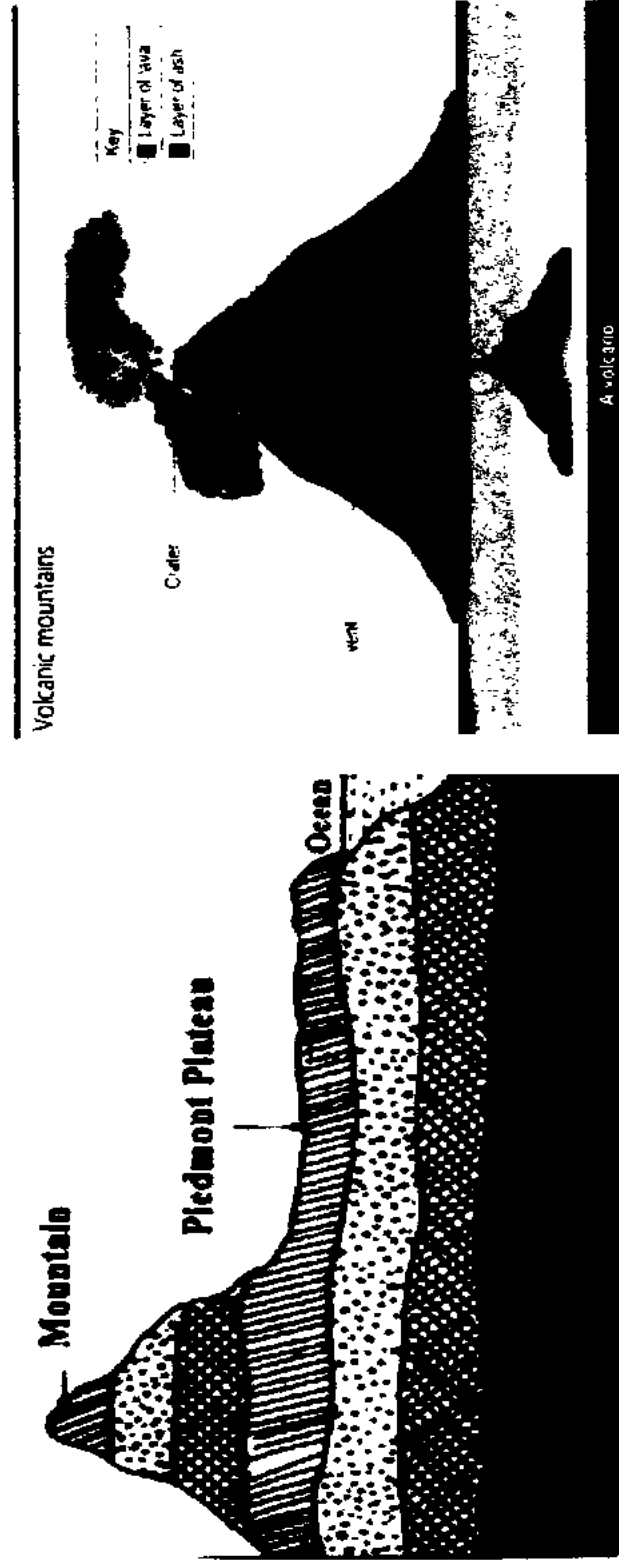
S.No	Main Indicators	Description
General Information		
1.	Team	Team 1
2.	ID of Teachers	Prospective Teacher 1,2,3, and 4
3.	School Name	IMCG Tarlai
4.	Grade	7th
5.	Number of Students:	35
6.	Subject	Geography
7.	Chapter	Major Landforms of Earth
8.	Topic	- Mountains and their types - Plateaus and their types
9.	Reasons for selecting the topic	- Students were unable to understand the main difference between plateaus and mountains - Students were facing problems in understanding the types of mountains and plateaus - It was also difficult for them to differentiate among various types. - Students did not know the impact of plateaus on human life.
10.	Total Time of Lesson presentation	40 mins
11.	Lesson Objectives	After studying this lesson students will be able to: - Identify the major landforms of the earth - Know about the concept of mountains - Describe how mountains and plateaus emerged (folding and Faulting) - Know about the types of major plateaus of the world and specify mountains found in Pakistan.

		Understand the impact of plateaus on human life
12.	Teaching Method	- Lecture Method. - Discussion Method. - Demonstration Method. - Activity Method, - Question Answer Method
13.	Audio-Visual Aids	Charts, Printouts, Relevant Books
Specific (keeping in view decided time)		
14.	Previous Knowledge Testing	Do you like mountains? If yes then why do you like mountains? If no then why you do not like mountains? Can anyone tell us about the shape of mountains Do you ever hear the word Plateaus? Is it similar to mountains?
15.	Announcement of Topic	Today we are going to study the topic of our book Mountains and Plateaus.
16.	Presentation by teacher	Introduction: Landforms are the natural features that make up the earth's surface. These natural features have different shapes and structures; therefore there is a vast variety of landforms. The major landforms are: - Mountains, - Plateaus, - Plains and - Valleys. Major landforms like mountains, plateaus, plains are present everywhere in the world. Their appearance and functions are different and they emerged
		Questions for PK Testing will be written
		Mountains and their types Plateaus and their types
		Major landforms Mountains Types of mountains Fold Mountains Bold Mountains Volcanic Mountains Plateaus

		through different processes. The teacher will ask student 1 to read 1st paragraph loudly with the correct pronunciation. The teacher will pronounce the difficult words side by side while reading. The teacher will explain the 1st paragraph by discussing the meaning of difficult words. The teacher will explain the mountains its types and plateaus its types. The teacher will teach the types of mountains and plateaus by showing the pictures.		Types of Plateaus Tectonic Plateaus Intermontane Plateaus Piedmont Plateaus Volcanic Plateaus
17.	Student Activities	The teacher will paste pictures of mountains and plateaus on board and will ask students: Name the types of mountains and label them?	8 mints	Activity time
18.	Ways to assess students Understanding	The teacher will assess students through the question-answer session: What are the impacts of Plateaus on human life? What is a fold mountain? What is a volcanic mountain?	5 mints	What are the impacts of Plateaus on human life? What is a fold mountain? What is a volcanic mountain?
19.	Wrap up	Today we have studied the different types of mountains and how they formed as a result of folding and faulting like the block and fold mountains. We have also discussed the plateaus, their types, and the impacts of plateaus on human life.	4 mints	Teacher will write important points on board
20.	Home Work	Learn today's lecture: Mountains, Types of Mountains Plateaus, Types of Plateaus Written tests of these topics will be in the next class.	2 mints	Mountains, Types of Mountains Plateaus. Types of Plateaus Written tests of these topics will be in the next class.

Audio-Visual Aids

Charts of the following pictures, the teacher will use during the presentation



During the activity session, students will be asked to identify the types of mountains and plateaus from the following pictures:



Lesson Plan 2

Lesson Plan of Computer Education

S. No	Main Indicators	Description
General Information		
1.	Team	Team 2
2.	ID of Teachers	Prospective Teacher 5.6,7,8
3.	School Name	IMCG F7/2
4.	Grade	6 th
5.	Number of Students	
6.	Subject	Computer
7.	Chapter	ICT Fundamentals
8.	Topics	Introduction Advantages and Daily usage of ICT ICT laboratory Rules Components of Computer
9.	Reasons for Selecting this topic	Students were unable to label the given pictures Students were unable to differentiate input and output devices.
10.	Total Time of lesson presentation	30 minutes
11.	Lesson objectives	After studying this lesson students will be able to • To know the concept of ICT. • To acknowledge the advantage and disadvantages of ICT. • To identify various devices of ICT. • To understand the laboratory rules of ICT. • To know the difference between application and system software.
12.	Teaching Method	• Lecture Method, • Discussion Method, • Demonstration Method,

		- Activity method and - Question answer method.
13.	Audio-Visual Aids	Charts, Printouts, Relevant Book and Notes
Specific (keeping in view decided time)		
		Allocated Time for each activity BB Writing
14.	Previous Knowledge Testing	- What do you know about ICT? - How do we use technology in our daily life?
15.	Announcement of topic	Today we are going to study 1st chapter of our book "ICT Fundamental".
16.	Presentation by teacher	Introduction - ICT is the diverse set of technological tools and resources that are used to create, store, manage and communicate information. - We use ICT in every aspect of our life, we can find them almost everywhere at school, homes, hospitals, workplaces, etc. - ICT - Major Input devices are: - Major storage devices are: - Major output devices are:
17.	Students Activities	- Name devices/ label ICT devices. - Separate Dos and Don'ts of ICT laboratory.
18.	Ways to assess students understanding	Teacher will assess students through the question-answer session: - Define ICT. - Give examples of ICT. - How ICT is applicable in industries? - What is the system unit of the computer?
		Activity Time Question Answer Session

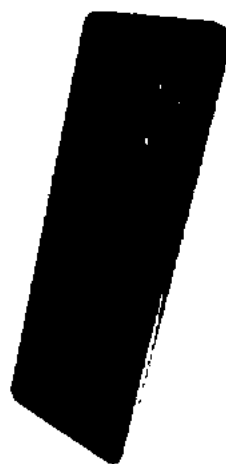
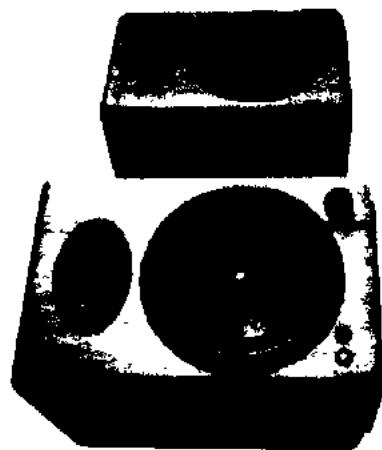
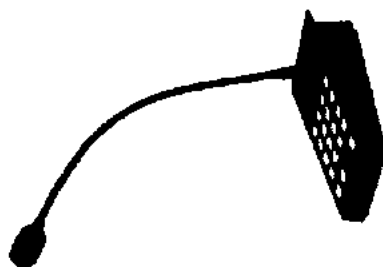
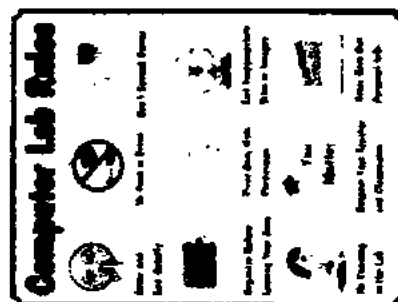
19	Wrap Up	Today we have studied ICT, its applications, its devices and advantages, its laboratory rules, hardware components of the computer, and health-related issues related to ICT	4 minutes	• ICT • Applications of ICT in our life, • Major ICT devices and advantages, • Laboratory rules for ICT, Components of computer, and Health-related issues related to ICT
20.	Home Work	List communication devices of the 80s and 90s. And write the answer to questions written on the board on your homework copies.	3 minutes	• Differentiate between input and output devices • Define major components of the computer

Audio-Visual Aids

An Activity was conducted in which students were asked to identify Input and Output devices



Following Pictures were used to make charts



Appendix 10: Post-Lesson Reflections

Post Lesson Reflections of Prospective Teachers

1. How practicing the lesson study model has impacted your experience during teaching practice?

2. Do you think this model can be practiced to make teaching effective and improve students' performance when you will get involved in full-time teaching (as a permanent teacher)?

Yes

☐

No

☐

3. Would you like to practice the lesson study model again by forming a team with your colleagues?

- i. If yes, then briefly state its benefits?

- ii. If no, then tell me about difficulties that you face during the practice of this model?

4. Which innovative teaching-related ideas you have learned after practicing this model and how you will disseminate it to your future colleagues?

5. How lesson study model has contributed to making you an effective reflective practitioner?

6. Do you think that lesson Study is a great source to increase knowledge of that topic which you are going to teach?

7. How lesson study model has proved helpful in increasing your knowledge of varied instructional strategies?

8. How does Lesson Study enable you to manage the classroom more effectively during teaching?

9. What is the contribution of the lesson study model to ensure active students' engagement in the classroom?

10. Does the lesson study model has improved your assessment-related competencies?

11. Do you think the Lesson Study process has contributed a lot to make you a professional instructor?

12. In general what you have learned after participating in the lesson study model?

Thank You So Much for Your Participation in this Research

Appendix 11: Interview Guide for University' Supervisor/Couse Coordinators
Topic: Effectiveness of Lesson Study Model in Improving Prospective Teachers'
Professional Development and Students' Achievement: A Mixed Methods "Multiple Case
Study"

Greetings

Respected Madam

I am pursuing my Ph.D. Degree in Education from International Islamic University Islamabad and doing my thesis (based on mixed methods multiple case study) in the area of "Prospective Teachers' Professional Development". This multiple case study research will integrate a variety of data collection and analysis procedures to examine the effectiveness of the "lesson study model" in improving prospective teachers' professional development and students' academic achievement. The model of lesson study has been practiced by involving the prospective teachers of your class and the researcher as well as sampled school staff members have facilitated prospective teachers throughout the process. Based on the application of the lesson study model, the following objectives were formulated, to:

1. Determine the effectiveness of the lesson study model as a collaborative approach to teacher professional development
2. Compare the instructional practices of prospective teachers' using traditional ways of teaching and the prospective teachers involved in the lesson study process
3. Evaluate the academic performance of students' who were taught by applying lesson model with those who were taught by traditional methods
4. Explore the views of supervisors (at schools) regarding the instructional activities and meetings that take place during the practice of lesson study
5. Propose a framework to ensure collaboration of supervisors (at schools and universities) for introducing lesson study model as a mandatory part of teaching practice

As you have extensive teaching and training experience and serve as a catalyst for the professional development of prospective teachers by teaching them pedagogical courses and improving their instructional abilities, your feedback regarding the practice of this model will be very valuable for me. Your suggestions will contribute a lot in proposing a framework for ensuring university-school partnership to strengthen professional development opportunities for prospective teachers which will ultimately contribute to improved students' academic performance. You are requested to give me your valuable time (approximately 30 to 40 minutes) to record your opinion. It is assured that confidentiality of collected data will be maintained and collected data will be only used for research purposes.

Thanking you in anticipation

Regards
Fatima Batool
Ph.D. Scholar
Department of Education
International Islamic University, Islamabad

1. Do you think the Lesson Study model is an effective form of professional development?

i. If yes then, briefly describe its significance?

ii. If no, then which model is most suitable for the effective professional development of prospective teachers?

2. Besides teaching models of professional development, which kind of practical activities do you conduct in the classroom for strengthening the pedagogical content knowledge of prospective teachers?

3. As the success of the lesson study model is based purely on the collaborative attitude of teachers, which kind of activities do you undertake for developing this attitude among prospective teachers?

4. Knowing multiple innovative teaching strategies is the basic requirement of the lesson study model, how do you ensure the prospective teachers' familiarization with emerging trends in pedagogy?

5. Do you think that the realistic practice of the lesson study model can positively contribute to prospective teachers' professional development?

6. How do you perceive the lesson study model as a key indicator to improve the academic achievement of students?

7. According to you, what kind of departmental level initiatives are required to facilitate teacher learning through Lesson Study?

8. How the supervisors of prospective teachers (at school) can be convinced/motivated to ensure the practice of the lesson study model during teaching practice?

9. As cooperative teachers play an important role in the training of prospective teachers during teaching practice, which kind of initiatives may be taken to familiarize them with the real essence of the lesson study model?

10. As the practice of lesson study model for professional development of prospective teachers like developed countries required active university-school partnership, which kind of strategies do you suggest for ensuring such kind of partnership?

Thank You So Much for Your Participation in this Research

Appendix 12: Interview Guide for Supervisors at Schools

Topic: Effectiveness of Lesson Study Model in Improving Prospective Teachers' Professional Development and Students' Achievement: A Mixed Methods "Multiple Case Study"

Greetings

Respected Madam

I am pursuing my Ph.D. Degree in Education from International Islamic University Islamabad and doing my thesis (based on mixed methods multiple case study) in the area of "Prospective Teachers' Professional Development". This multiple case study research will integrate a variety of data collection and analysis procedures to examine the effectiveness of the "lesson study model" in improving prospective teachers' professional development and students' academic achievement. The model of lesson study has been practiced at your institution and the researcher as well as your staff members have facilitated prospective teachers throughout the process. Based on the application of the lesson study model, the following objectives were formulated, to:

- 4 Determine the effectiveness of the lesson study model as a collaborative approach to teacher professional development
- 5 Compare the instructional practices of prospective teachers' using traditional ways of teaching and the prospective teachers involved in the lesson study process
- 6 Evaluate the academic performance of students' who were taught by applying lesson model with those who were taught by traditional methods
- 7 Explore the views of supervisors (at schools) regarding the instructional activities and meetings that take place during the practice of lesson study
- 8 Propose a framework to ensure collaboration of supervisors (at schools and universities) for introducing lesson study model as a mandatory part of teaching practice

As you have extensive teaching and training experience and serve as a catalyst for the professional development of prospective teachers by offering them an opportunity to work under your kind supervision, your feedback regarding the practice of this model will be very valuable for me. Your suggestions will contribute a lot in proposing a framework for ensuring university-school partnership to strengthen professional development opportunities for prospective teachers which will ultimately contribute to improved students' academic performance. You are requested to give me your valuable time (approximately 30 to 40 minutes) to record your opinion. It is assured that confidentiality of collected data will be maintained and collected data will be only used for research purposes.

Thanking you in anticipation

Regards
Fatima Batool
Ph.D. Scholar
Department of Education
International Islamic University, Islamabad

1. What do you think is the most important element of the lesson study model and team members must focus on it considerably? (please tick in front of most operative element)
 - i. Identification of challenging content area
 - ii. Planning
 - iii. Implementation
 - iv. Evaluation
2. Which aspect of the lesson study model has a great role in improving students' academic performance? (please tick in front of most operative element)
 - i. Effective planning
 - ii. Twice presentation of a topic
 - iii. Innovative teaching strategies
 - iv. Engaging activities
 - v. Constructive feedback
3. What makes Lesson Study different from other types of professional development that you have experienced?

4. According to you which type of instructional strategies can be regarded as ideal strategies for teaching to middle level (Grade VI-VIII) students? (please tick in front of the most suitable answer)
 - i. Individual teaching
 - ii. Team Teaching
 - iii. Individual cum team teaching
5. Do you think teaching through Lesson Study is more attractive as compared to previous models?

6. What do you suggest for university supervisors, should they train prospective teachers to teach through lesson study model (team teaching), or individual teaching is best?

7. Researchers proved that the lesson study model can certainly improve the quality of teaching and academic performance of students. It can motivate the teacher to take feedback from their colleagues about lesson activities and assessment ways before presenting it to class. Would you like to ensure its successful practice for the training of prospective teachers that will be placed in the future at your institution for teaching practice?

8. Which kind of initiatives school administrators can take for the promotion of the lesson study model with the aim of effective professional development of prospective teachers?

9. Which kind of initiatives may be taken by university administrators to make the lesson study model an imperative part of prospective teachers' professional development programs?

10. As in foreign countries, there is a system of enriched university-school partnership for ensuring the continuous professional development of prospective as well as in-service teachers; according to you which kind of measures may be taken in our context for ensuring such kind of partnership?

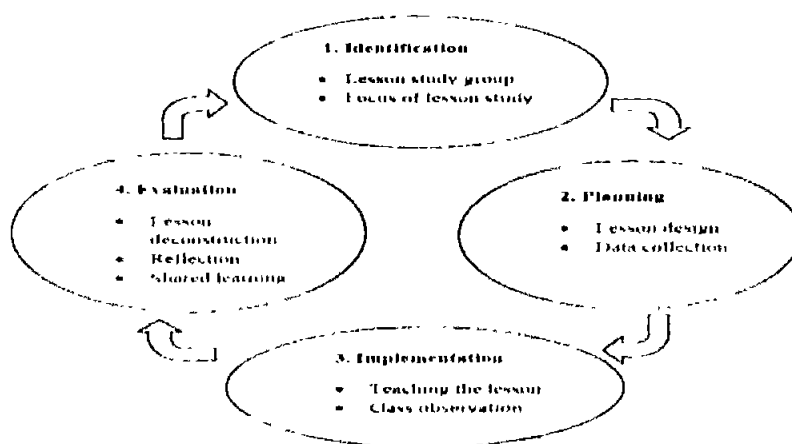
Thank You So Much for Your Participation in this Research

Appendix 13: Interview Guide for Cooperative Teachers at Schools
Topic: Effectiveness of Lesson Study Model in Improving Prospective Teachers' Professional Development and Students' Achievement: A Mixed Methods "Multiple Case Study"

Greetings

Respected Madam

I am pursuing my Ph.D. Degree in Education from International Islamic University Islamabad and doing my thesis (based on mixed methods multiple case study) in the area of "Prospective Teachers' Professional Development". This multiple case study research will integrate a variety of data collection and analysis procedures to examine the effectiveness of the "lesson study model" in improving prospective teachers' professional development and students' academic achievement. The model of lesson study has been practiced at sampled institutions and the researcher as well as cooperative teachers have facilitated prospective teachers throughout the process. Interviews of prospective teachers' supervisors at school and university have been also conducted in this regard. A pictorial description of lesson study model for your kind observation is as follows:



Model of Lesson Study (McSweeney & Gardner, 2018)

As you have extensive teaching and training experience and serve as a catalyst for the professional development of prospective teachers by offering them an opportunity to work under your kind supervision, your feedback regarding the practice of this model will be very valuable for me. Your suggestions will contribute a lot in ensuring the successful implementation of the lesson study model for the professional development of prospective teachers and highlighting its importance to improving prospective teachers' professional development and students' achievement. You are requested to give me your valuable time (approximately 30 to 40 minutes) to record your opinion. It is assured that confidentiality of collected data will be maintained and collected data will be only used for research purposes.

Thanking you in anticipation

Regards
Fatima Batool
Ph.D. Scholar
Department of Education
International Islamic University, Islamabad

1. How do you perceive the lesson study model for effective training of prospective teachers?

2. To what extent teachers have taught diligently during the practice of the lesson study model?

3. How lesson study is beneficial to encourage prospective teachers for using multiple teaching strategies?

4. To what extent lesson study model has increased collaboration among teachers?

5. How you will explain the role of lesson study as the best strategy to increase students' understanding?

6. Do you think the lesson study model is more effective for developing the abilities of collaboration, teamwork, knowledge sharing, and adequate content understanding among teachers as compared to individual teaching?

7. To what extent lesson study is playing its role to make prospective teachers good observers and evaluators?

8. How the practice of the lesson study model can modify prospective teachers' thinking about classroom practice?

9. Which type of skills do you expect that university supervisors must cultivate in prospective teachers before sending them for teaching practice?

10. In general what you have learned after participating in the lesson study model?

Thank You So Much for Your Participation in this Research

Appendix 14: Observation Sheet for Prospective Teachers

Observation Sheet for Prospective Teachers

Teacher ID: _____ Time for observation: _____
 Class: _____ Subject: _____
 Name of School: _____

Scale Description: Disagree: DA, Moderately Agree: MA, Strongly Agree: SA

S.No	Statements	DA	MA	SA
Theme 1: Lesson Planning				
Prospective teachers:				
1.	Plan the lesson in an effective way			
2.	Address learning outcomes during instruction			
3.	Testing students' background knowledge before starting the lesson			
4.	Manage class time in an effective way			
Theme 2: Lesson Presentation				
5.	Present new lesson before students in an appealing way			
6.	Address students' queries regarding lesson			
7.	Relate lessons with everyday life experiences			
8.	Maintain eye contact with students during the lesson			
9.	Display content management skills			
10.	Demonstrate Islamic/ethical values while teaching			
11.	Wrap up lesson in an understandable way			
Theme 3: Application of teaching methods				
12.	Ensure active engagement of students in the learning process			
13.	Focus on developing students critical/creative thinking			
14.	Use multiple teaching strategies (i.e. lecture, discussion,			

	QA)			
15.	Practice discovery/inquiry-based approach to learning			
16.	Motivate students to ask questions from the teacher			
17.	Focus on learner-centered instruction			
Theme 4: Interaction with students				
18.	Behave with students in a considerate way			
19.	Promote the habit of teamwork among students			
20.	Make students feel comfortable in attending the class			
21.	Train students to appreciate other students' opinion			
22.	Appreciate students showing good performance			
23.	Provide equal attention to all students			
Theme 5: Use of Audio Visual aids				
24.	Use a variety of AV Aids (i.e. charts, graphs, models)			
25.	Ensure the relevance of AV Aids with the lesson' topic			
Theme 6: Assessment-related Competencies				
26.	Ensure students' understanding by asking random questions			
27.	Assess students learning using multiple assessment strategies			
28.	Provide clear directions to students about ways of assessment			

Test for Grade 6th

Subject: Computer Education

Fundamentals

Total Marks: 30

Name: _____

Chapter 1: ICT

Allocated Time: 30 Minutes

Part I: Multiple Choice Questions (Encircle the best option)

Marks 4

i. ICT stands for:

- | | |
|--|---|
| a. Information and computer technology | b. Information and communication technology |
| c. Internet and computer technology | d. Internet and communication technology |

ii. The printed output from a computer is called:

- | | |
|--------------|--------------|
| a. Paper | b. Copy |
| c. Soft Copy | d. Hard Copy |

iii. The device used for security identification is:

- | | |
|---------------|---------------|
| a. Microphone | b. Biometric |
| c. Switch | d. Multimedia |

iv. Which of the following stores more data:

- | | |
|-----------------|-----------------|
| a. CD | b. DVD |
| c. Blu-ray disk | d. Flash memory |

Part II: Fill in the Blanks

Marks

4

- i. Flash drive is small _____ storage device.
- ii. A computer is collection of software and _____ components.
- iii. _____ allows computer users to input audio in their computer.
- iv. RAM stand for _____.

Part III: Name the Following Devices

Marks

6



i. _____



ii. _____



iii. _____



iv. _____



v. _____



vi. _____

Part IV: Answer the Short Questions (each question contains 04 marks Marks 16

i. Differentiate between data and information with examples.

Answer: _____

ii. Differentiate between input and output devices with example.

Answer: _____

iii. Define the main components of a computer.

Answer: _____

iv. Write down any four advantages of ICT in daily life.

Answer: _____

GOOD LUCK

Test for Grade 7th

Name: _____

Subject: Geography

Chapter 1: Major Landforms of the Earth

Plateaus

Topics: Mountains and

Total Marks: 20
Minutes

Allocated Time: 30

Part I: Multiple Choice Questions (Encircle the best option)

Marks 5

- i. A mountain rises at least _____ meters above sea level:
a. 800 b. 1000
c. 1100 d. 1100
- ii. Process of squeezing layers of rock is termed as:
b. Folding b. Breaking
d. Faulting d. Cracking
- iii. _____ plateau of Pakistan is famous for its rich minerals and natural gas deposits:
a. Punjab b. Baluchistan
c. Potwar d. Sindh
- iv. Tectonic plateaus are located in:
a. India b. China
c. Pakistan d. Argentina
- v. _____ is not the part of major landforms of the earth:
a. Mountains b. Forests
c. Plains d. Valleys

Part II: Fill in the Blanks

Marks 5

- Landforms are the natural features that make up the _____.
- Examples of Horst are the Vosges Mountains, which are located in _____.
- _____ is another prominent region of volcanoes.
- Tectonic plateaus are also classified as _____.
- _____ of India is an example of a volcanic plateau.

Part III: Answer the Short Questions

Marks 10

- i. Define mountains and plateaus and give one example of each. **4**

Marks

Answer: _____

- ii. Name three types of mountains and briefly explain any one of them. **3**

Marks

Answer: _____

- iii. Differentiate between tectonic and volcanic plateaus. **3**

Marks

Answer: _____

GOOD LUCK

Appendix 16: Pre-Lesson Reflections of Prospective Teachers

PT₁ (Prospective Teacher 1): I have a lot of expectations from the practice of the lesson study model. I hope that this practice will provide me with productive experience of practicing team teaching. I will become able to develop effective lesson plans after getting involved in this practice of lesson study model. And above all, a great benefit of participation in the practice of this model is that it will raise my confidence level regarding classroom teaching, management, and assessment.

PT₂: Participation in this model will provide me effective training to write a reflection about my performance as well as the performance of my colleagues. This skill (writing reflection) will support me a lot to upgrade my teaching skills in the future as well. I will get experience to get command on the topic before presenting it in front of students.

PT₃: I think that practice of this model will enable me to improve my pedagogical skills. Participation in the practice of this model will also enable me to design an effective lesson plan before going for classroom teaching in the future.

PT₄: Participation in the practice of this model will enable me to improve my skills regarding lesson planning and teaching. This practice will also enhance my confidence level and collaboration skills. This model will also train me about the practices that can support to get grip on the topic before its final presentation.

PT₅: I am expecting that participation in the practice of this model will enable me to work as a professional teacher in the future. It will strengthen my ability of planning and evaluate a lesson effectively. Participation in the practice of this model will also develop my abilities of teamwork and coordination that are considered keys to success in a profession.

PT₆: I hope that this model will provide me a platform to practice my theoretical knowledge regarding various pedagogical strategies in an effective way. It will also contribute to improving my classroom teaching and management-related skills.

PT₇: It will provide us a platform to plan and teach a lesson under the supervision of senior teachers and this practice will play an important role in improving our skills related to planning and teaching effective lessons. We will get familiarized with the real essence of various teaching methods and about their practice in a considerable way. It will raise our confidence and abilities to learn from each other feedback and experience.

PT₈: I am expecting to improve my skills related to lesson planning and classroom teaching. I hope that after practicing this model I will be able to develop/prepare low-cost and effective audio-visual aids for concept clarification of students.

Appendix 17: Observations Done by Prospective Teachers

Observations of First Lesson Presented by Group 1

PT₁: The teacher did not follow the developed lesson plan and did not write the name of the lesson (topic) on board. Only a few audio visual (AV) aids were used, while for making the lesson effective and understandable some more aids may be utilized.

PT₂: While explaining the types of mountains teachers did not utilize whiteboard or AV aids. Explanation through illustration (that can play important role in highlighting the difference between various types of mountains) was missing.

PT₃: The teacher did not give relatable examples of the topic, which were compulsory for students' concept clarification. Students have not engaged actively, the focus of teacher was only on the delivery of content.

Observations of First Lesson Presented by Group 2

PT₁: There must be balance in teacher voice. Though at some points it is good to raise volume but the frequent fluctuation of voice may be avoided. It is good to ask one point from one student; teacher was asking multiple questions from one student and it was creating anxiety among students.

PT₂: Teacher was unable to manage class time effectively. AV aids were developed but she couldn't find time to present them in front of the class. In previous knowledge testing, some more questions may be asked related to daily usage things.

PT₃: To develop effective interaction with class; eye contact with students may be maintained and the teacher may call students by names to involve them in classroom discussion/question-answer sessions. Teacher was focusing on content coverage and not ensuring concept clarification of students.

Appendix 18: Researchers' and Cooperative teacher' Reflections

Reflections on First Lesson Presented by Group 1

Cooperative Teacher' Reflections: The confidence level of the teacher was good but teacher did not focus on improving the students' pronunciation of difficult words during reading. Equal attention was not given to all students, only a few students were participating during the question-answer session. For making your lecture/topic more understandable and easy, teacher may relate it with daily life experiences/examples.

Researcher's Reflections: As a teacher, you are always required to use soft language for students as due to harsh words some students may lose their confidence and as a consequence, they will never participate in your classroom. For catching the quick attention of students, teacher may call them by name (if possible). You are expected to introduce major topics of the lesson at the start to clarify students about whole class activities (it may be also done by writing main points on whiteboard/blackboard). For creating an attractive learning environment, the teacher may use a few amusing words during lectures. There was not much difference in the classroom setting of teachers teaching in routine was and teachers teaching through practice of lesson study model.

Reflections on First Lesson Presented by Group 2

Cooperative Teacher' Reflections: Teacher was looking so much lazy, she must be active in class; as until teachers will not show seem energetic and motivated, students cannot be expected to show active participation. Teacher must use vocabulary in class according to the level of students. Use of difficult words/ terminologies may be avoided. Book reading was emphasized by the teacher, which is not a good practice

Researcher's Reflections: Before starting the lecture, the teacher must ensure that all the students have the required study material (i.e. books or notes). If the teacher asked the students sitting in the first row to read the chapter content, then she must ask them to turn their faces towards class instead of the wall. To ensure the attentiveness and active participation of students in the classroom teacher may tell some little jokes to the student or may ask students to share something with the class. Ensure the involvement of all students in classroom activities as most of the students were being ignored. Teacher was assessing more, and teaching less. More audio visual aids may be utilized for making lesson presentations effective.

Appendix 19: Transcribed Post-Lesson Reflections of Prospective Teachers

1. How practicing the lesson study model has impacted your experience during teaching practice?

P₁: It enables us to work collaboratively with other prospective teachers. I have learned to manage my time effectively. This practice enables us to overcome the gap in the teaching practice and lesson plan.

P₂: This model helps us to examine and improve our teaching practice. It motivates teachers to overcome gaps between theatrical knowledge (learned during coursework) and teaching practice.

P₃: It has enabled me to ensure the active participation of students in the classroom. It has polished my instructional abilities and has boosted my confidence as well.

P₄: Definitely it has impacted my experience during teaching practice by improving my skills and boosting confidence in me.

P₅: Lesson study has a significant impact on my experience as it helps me to examine and improve my teaching-related skills.

P₆: The lesson study model has developed a lot of qualities such as patience, cooperation, collaboration, etc. I have learned a lot of new things.

P₇: It has improved our knowledge as well as practice regarding innovative teaching-learning strategies.

P₈: It has polished my instructional abilities and has boosted my confidence as well.

2. Do you think this model can be practiced to make teaching effective and improve students' performance when you will get involved in full-time teaching (as a permanent teacher)?

Yes

☐

No

☐

P₁, P₂, P₃, P₄, P₅, P₆, P₇, P₈: Yes

3. Would you like to practice the lesson study model again by forming a team with your colleagues?

iii. If yes, then briefly state its benefits?

P₁: Yes, I would like to practice this model in my professional life by collaborating with my team members.

P₂: Yes, it has increased our competencies to understand the topic fully before its presentation.

P₃: It has helped me a lot to overcome the gap between theory and practice.

P₄: Yes, it has increased my skills to get command of the subject matter. It has increased my motivation and confidence level.

P₅: It has increased our knowledge related to a variety of innovative teaching-learning strategies.

P₆: It enables me to ensure the utilization of a variety of audiovisual aids to make lessons effective and understandable for students.

P₇: It has improved our abilities to observe and evaluate students' performance during classroom teaching.

P₈: It has increased our motivation and confidence level.

4. Which innovative teaching-related ideas you have learned after practicing this model and how you will disseminate it to your future colleagues?

P₁: I have learned to utilize a variety of AV aids and write reflections about my teaching practice.

P₂: Writing self-reflection about own teaching to improve instructional practices and learned various ways to ensure active engagement of students in classroom activities.

P₃: I have learned team teaching and learned to engage the students in classroom activities efficiently. Through discussion, I will share my thoughts with my future colleagues.

P₄: I will disseminate the skills of writing self-reflection, designing lesson plans before lesson presentation, and teamwork (cooperation) to my future colleagues.

P₅: I have learned to write reflections about my teaching practice and I will like to share this idea with my future colleagues as well.

P₆: I have learned to utilize various techniques to ensure active engagement of students in the classroom, in the future I will also share these techniques with my colleagues.

P₇: I have learned the importance of getting benefits from each other experiences. And, through the discussion, I will share my thoughts with my future colleagues.

P₈: I tend to develop a team with my colleagues for the successful practice of this model in the future.

5. How lesson study model has contributed to making you an effective reflective practitioner?

P₁: It has contributed in many ways like enhancing our skills to ensure students' engagement in classroom activities, and designing learning activities keeping in view the mental abilities of students.

P₂: By observing student performance and the instructional practice of my fellow teachers, now I can write my reflections about my teaching styles as well.

P₃: It has contributed in many ways; it enables us to engage students in the class even when they are not showing interest.

P₄: This model has contributed by allowing us to evaluate our lesson and write our reflections about it.

P₅: It has developed the habit of writing reflections for day-to-day activities, which is a great source to overcome gaps/flaws associated with our tasks.

P₆: This practice has realized me to write the importance of reflections for all academic tasks.

P₇: It has provided me an opportunity to write reflections about the instructional practices of my fellow teacher, and now I can critically evaluate my instructional practices as well.

P₈: Before practicing this model, we were not used to writing reflections about our teaching practice. But now at the end of class, I evaluate my teaching by myself.

6. Do you think that lesson Study is a great source to increase knowledge of that topic which you are going to teach?

P₁: Yes, as we have developed lessons, learning material, and audio-visual aids with the collaboration of team members, and supervisors, these practices contribute a lot in getting a command on the topic before its presentation.

P₂: Lesson study is very helpful to increase subject matter knowledge as it motivates me to search relevant material/things from other sources as well besides the book. And in this way, my grip on the topic becomes very strong.

P₃: Yes, as when we were developing lesson plans, knowledge of different minds come together and it has played an important role in getting a command on the topic.

P₄: Yes, lesson study has increased our knowledge as we evaluate lessons from various angles and content resources other than books have been also utilized, which has resulted in knowledge improvement.

P₅: While developing the lesson plan we study the topic-related content thoroughly and also discuss it with team members. So, in this way it has increased knowledge of the topic which we were going to teach.

P₆: As we take material by utilizing of variety of sources, this activity has increased our command on the topic content.

P₇: By designing various teaching aids, my concepts clear regarding difficult points, and concepts of the topic got clear.

P₈: As we discussed the topic content a lot during the development of the lesson, so this rehearsal has improved my knowledge of the selected topic.

7. How lesson study model has proved helpful in increasing your knowledge of varied instructional strategies?

P₁: Through planning and developing of lesson plan after mutual discussion, I have come to know about varied instructional strategies that can be utilized to ensure concept clarification of students.

P₂: Before it, I was habitual to using the lecture method only, but the practice of this model enables me to utilize multiple teaching strategies such as discussion, lecture, and activity to deliver my lesson appreciably.

P₃: It helped me to implement various strategies like discussion method, activity method, lecture method, etc.

P₄: Practice of lesson study model has helped a lot in increasing my knowledge of varied instructional strategies by providing the experience of utilizing various methods such as discussion, activity, and demonstration method along with lecture method.

P₅: When I teach according to the lesson study model, I focused on different strategies. While doing individual teaching my focus was only on the lecture method.

P₆: I have learned to teach lessons effectively by utilizing the combination of various methods such as lecture, discussion, and activity methods.

P₇: This practice has falsified my established concepts regarding teaching methods, as before practicing this model it seems difficult to me to practice two or more than two strategies at a time.

P₈: I have learned the importance of utilizing a mixture of teaching strategies for making lessons effective.

8. How does Lesson Study enable you to manage the classroom more effectively during teaching?

P₁: This model enables us to manage our classroom time effectively as our fellow teachers help us in displaying AV aids and writing on board. With the help of colleagues, we were able to engage all students effectively in classroom activities.

P₂: During the practice of this model, teachers do cooperative teaching and if one teacher is focusing on the delivery of the lesson then the other can own the responsibility of managing the classroom effectively. This practice has proved very beneficial for me to ensure classroom management.

P₃: As during the practice of the lesson study model, at a time there were two to three teachers in the classroom, therefore the presence of fellow teachers enable me to manage the classroom efficiently.

P₄: It helps by acting upon the idea of ensuring active students' engagement which eventually helps in good classroom management.

P₅: We learned to manage more class effectively by getting the help of fellow teachers as two to three teachers were involved, so one teacher take the responsibility of teaching and the other were observing the students to ensure better management of the classroom collaboratively

P₆: We were able to conduct more and more activities to make our lesson understandable and ensure the active engagement of students.

P₇: Despite involving all students in multiple activities like reading lessons, writing on board, filling the flow chart, we tried our best to ensure better management of our classroom.

P₈: In individual teaching our much more focus remains on the delivery of content but this practice enables us to utilize multiple AV aids to make our lesson interesting and effective.

9. What is the contribution of the lesson study model to ensure active students' engagement in the classroom?

P₁: During the practice of this model, one teacher was delivering the lesson; while the other was observing the classroom overall environment/activities and were motivating those students to speak who were passive listeners in the classroom.

P₂: By using multiple AV Aids and observing the activities of students, the active engagement of all students was ensured.

P₃: By motivating me to arrange multiple activities and involve students in classroom discussion, this model has contributed a lot in ensuring the active engagement of students.

P₄: It has contributed a lot to ensure the active participation of students.

P₅: When there are two to three teachers in the classroom, one is teaching and the other is observing the students then both all teachers collaboratively work to ensure active involvement of all students.

P₆: By calling students through their names and by asking questions from them, their active engagement was ensured.

P₇: As two teachers were fully responsible to observe students' activities, that's why they were also motivating passive students to participate in class discussion and questions answer session and through these steps, active engagement of students was ensured.

P₈: By using multiple teaching aids active engagement of all students was ensured.

10. Does the lesson study model has improved your assessment-related competencies?

P₁: The lesson study model has improved my assessment-related skills, as before it I usually ask simple oral questions from students to assess their understanding level. But now beyond questions, I prefer to take short written quizzes from students.

P₂: Yes, I get familiar with a variety of innovative assessment techniques, now besides arranging question-answer sessions. I can develop multiple audio-visual aids and quizzes to assess students' understanding levels.

P₃: Yes, it has directed me to use more than one assessment tool for assessing the level of students understanding

P₄: It helps to engage the class by asking questions, using the quiz method, and arranging short activities in class.

P₅: Besides asking the oral question I have learned to take short written quizzes from students as well to check their understanding level.

P₆: This practice has enabled me to evaluate students' performance by utilizing various assessment techniques such as asking questions, giving them play cards to fill in, and motivating them to write the answer to questions on board.

P₇: Yes, before it I was habitual to take an oral quiz of students only but now I also engage them in discussion as well for getting information about their understanding level.

P₈: I have learned the importance of utilizing multiple techniques to evaluate students' performance.

11. Do you think the Lesson Study process has contributed a lot to make you a professional instructor?

P₁: It enables me to complete my tasks on time. It has motivated me to attain professional traits and to grow my personality professionally.

P₂: Yes, it surely has developed a professional attitude among us. Because frankly speaking before this practice, we use to develop lesson plan after lesson presentation instead of prior planning.

P₃: Yes, it has improved my coordination and communication skills to a great extent.

P₄: Yes, it has contributed a lot in making me professional, as it has not improved my teaching skills only but has also upgraded my skills related to collegial discussion and cooperation.

P₅: Yes, it has contributed a lot. It also helped me to improve my teaching, discussion, and team work-related skills

P₆: This model has improved my ability to give respect to others' points of view.

P₇: The practice of this model has made me realize that teachers' way of communication has a strong impact on students. And this model has improved my communication abilities to a great extent.

P₈: This model has motivated me to design an effective lesson plan before going into class for lesson delivery.

12. In general what you have learned after participating in the lesson study model?

P₁: overall, it was a great experience, as we have learned to practice a variety of innovative teaching methods. By working collaboratively, we learned to plan lessons effectively and achieve our desired objectives.

P₂: My experience was very good. I have learned to write self-reflection, develop effective lesson plans and work collaboratively with team members.

P₃: My experience was great; this model has enhanced my skills related to the teaching profession.

P₄: It was very beneficial for me; it helped me in learning so much new concerning lesson plans and professional development.

P₅: My experience was great, practice of this model has enhanced my personal as well as professional competencies. I have learned to write self-reflection, make an effective lesson plan and work effectively in a team.

P₆: My experience was very good, I am sure that in the future I will be able to practice multiple teaching strategies during my instructional practice and engage students effectively in classroom activities.

P₇: It has improved my ability to work in a team as well. I have learned a lot from this practice.

P₈: My experience is very good, as I have learned to respect each other points and get maximum benefits from the knowledge and experience of colleagues and supervisors.

Appendix 20: Marks of Students

Marks of Students taught by Traditional Methods

S.No	Marks of Grade 6 students (Computer Education-30)	Marks of Grade Students (Geography-20)
1.	28	15
2.	23	11
3.	20	11
4.	23	8
5.	25	6
6.	16	14
7.	14	8
8.	23	10
9.	19	7
10.	23	7
11.	12	12
12.	28	10
13.	25	3
14.	5	6
15.	16	6
16.	7	11
17.	16	7
18.	27	3
19.	14	8
20.	16	9
21.	24	10
22.	22	9
23.	24	2
24.	20	7
25.	20	11
26.	10	
27.	19	
28.	15	

Marks of Students taught by Lesson Study Model

S.No	Marks of Grade 6 students (Computer Education-30)	Marks of Grade Students (Geography-20)
1.	24	16
2.	16	7
3.	17	11
4.	26	8
5.	20	8
6.	28	3
7.	25	4
8.	26	15
9.	15	13
10.	16	9
11.	28	17
12.	26	5
13.	29	13
14.	12	2
15.	12	6
16.	14	12
17.	18	5
18.	19	16
19.	11	13
20.	24	8
21.	14	11
22.	9	5
23.	17	11
24.	29	13
25.	21	12
26.	17	6
27.		5
28.		5
29.		7
30.		11
31.		7
32.		5
33.		6
34.		5
35.		12

Appendix 21: Transcribed Interviews of University Supervisors

1. Do you think the Lesson Study model is an effective form of professional development?

iii. If yes then, briefly describe its significance?

P₁: Yes, it is a very effective form of professional development, as it includes rigorous practice and deliberate preparation on the part of the teacher/team leader/group leader who is going to guide the prospective teachers. Various research studies have also proven its benefits for the professional development of prospective teachers.

P₂: This model offer opportunities for prospective teachers to collaborate for discussing the lesson and this opportunity can enable them to improve their instructional practices as well as the practices of their fellow teachers as well by identifying their weaknesses. And when the team leader provides feedback on the lessons/lesson plans, he/she provide them a room for improvement and this improvement is professional development.

P₃: Definitely, it is significant, prospective teachers can identify gaps and weaknesses in their teaching. Teacher educators can improve these gaps while performing micro-teaching in class.

P₄: Yes it is indeed an effective form of professional development. This approach can help prospective teachers to strengthen a variety of skills needed throughout their professional careers, specifically in teaching.

2. Besides teaching models of professional development, which kind of practical activities do you conduct in the classroom for strengthening the pedagogical content knowledge of prospective teachers?

P₁: In every pedagogy-based course/subject students/ prospective teachers are required to prepare and practice the lesson plans. There are various courses on pedagogy like Teaching of General science, Teaching of English, Teaching of Pakistan studies, Teaching of Mathematics, etc. that are being taught to students. In these courses, there are very specific and sophisticated practices like lesson plans, micro-teaching, and presentations, so we can say that we are conducting a lot of practical activities for strengthening the pedagogical content knowledge of prospective teachers.

P₂: We have courses regarding pedagogy and in these courses, prospective teachers are being familiarized with the theory of pedagogy along with the utilization of various teaching methods, teaching aids, and skills of teaching. And this learned knowledge is actually practiced through their lesson planning and lesson presentations. Along with that when they go for teaching practice; they integrate theory with the practice that provides room for their improvement and strengthens their pedagogical knowledge and practice of implementing learned teaching skills. We also teach them some further courses that are not directly related to pedagogy but can improve their classroom teaching such as

classroom assessment, classroom management, etc. We engage them in reflective practices so that they can evaluate themselves and improve their weak area.

P₁: We teach them by following the principles of cooperative teaching, team teaching, micro-teaching, and group study.

P₄: Brainstorming, discussion sessions, reflective practices, portfolios, demonstrations, class presentations, etc.

3. As the success of the lesson study model is based purely on the collaborative attitude of teachers, which kind of activities do you undertake for developing this attitude among prospective teachers?

P₁: We are conducting cooperative teaching, team-based teaching activities, and group activities in our different pedagogy-based courses for developing collaborative attitudes among prospective teachers.

P₂: We do have some activities which are done such as group projects, classroom discussion, and peer group. These activities help them in collaborating with others and developing team skills.

P₃: During their pedagogical courses, we engage prospective teachers in actual practices, such as group projects, group assignments, and presentations.

P₄: All types of collaborative activities are conducted keeping in view the need of the situation. Most of the time students have to work in pairs, or groups of four or five according to their overall class strength, and sometimes a whole class may be given a project to accomplish in which every participant should feel like a team player. It is all about how you are giving them responsibilities as a team player. Types of projects can also vary according to the requirement.

4. Knowing multiple innovative teaching strategies is the basic requirement of the lesson study model, how do you ensure the prospective teachers' familiarization with emerging trends in pedagogy?

P₁: Our students are having a separate course on teaching-learning strategies and besides it, prospective teachers are getting information about knowledge and related guidance about various latest and modern pedagogies through various pedagogy courses. Similarly, when we are training/calling our students for on-campus classes during the short-term and long-term internships, we also share some latest teaching practices/strategies with our students. We guide students in making/designing lesson plans based on a variety of pedagogical strategies. We bound them to utilize a variety of teaching strategies keeping in view the relevance of the subject matter. They are guided sometimes for conducting computer-based activities, sometimes for project activities, and sometimes for constructive activities. We always motivate our students to use a variety of teaching strategies during teaching practice.

P₂: We do have a course on “trends and issues in education” that can help in identifying the problems and finding the solutions. The solution to most of the classroom problems is utilizing innovative teaching strategies. We do have a course on teaching-learning strategies and teaching methodology courses, they also include information about the latest teaching techniques/methodologies. We develop among prospective teachers the skills of lesson planning and utilization of the latest teaching strategies. And when we make visits for assessing their teaching practice we also make sure that they are practicing innovative teaching strategies.

P₃: By practice, by organizing group activities, problem-based learning, discussion-related activities, practices related to the model lesson, and objective writing; familiarization of prospective teachers with emerging trends in pedagogy is ensured.

P₄: Various types of assignments and projects provided them an opportunity to search and observe emerging trends in pedagogy. Class lectures and discussions also help them to get familiar and have an in-depth understanding of emerging trends and how to practice them in the real situation.

5. Do you think that the realistic practice of the lesson study model can positively contribute to prospective teachers’ professional development?

P₁: Definitely, it will contribute to the professional development of prospective teachers if it is applied in a real sense.

P₂: Yes, of course, as when they will be working collaboratively, giving feedback to each other, evaluating other works, and reflecting on their strengths and weaknesses. All these practices will enable them to get benefits from each other experiences and improve their instructional practices.

P₃: Yes, it is significant not only for the professional development of prospective teachers, but it is equally important for the professional development of in-service teachers a well.

P₄: Yes I am very much confident to say that the lesson study model if applied with true letter and spirit can be very helpful for prospective teachers to get an in-depth understanding of various aspects of teaching and learning, application of various teaching strategies, how to overcome challenges, adopting, creating learning environments according to the need of students, etc.

6. How do you perceive the lesson study model as a key indicator to improve the academic achievement of students?

P₁: It will raise their confidence level to get engaged in classroom activities. Their communication skills and abilities to respect each other’s views will also get improve. Their attitude and behavior will also get improved through this practice.

P₂: Actually, many of the teachers are not planning the lessons well and they are not being prepared for the classes. When they will be involved in the practice of the lesson study model, they will be planning it and preparing it. And this practice will improve their instructional practices which ultimately leads to the better academic performance of students.

P₃: Definitely, when prospective teachers will be able to identify the gaps in their teaching through reflection, then they will develop the same habit among students as well and in this way, students will play an active role in designing classroom activities and in evaluating the level of their learning as well. And these indicators will positively contribute to the achievement of students learning outcomes in an appreciable way.

P₄: The lesson study model can be very effective to improve the teaching skills of prospective teachers and when they would work as trained professional teachers it would have an ultimate effect on the academic achievement of students.

7. According to you, what kind of departmental level initiatives are required to facilitate teacher learning through Lesson Study?

P₁: This model may be proposed to be inculcated in the scheme of study of long-term internship & pedagogy-based courses for imparting basic knowledge about this model to students. And in this regard, students may be also trained for the practice of this model by giving them various activities/ tasks/ projects associated with this model.

P₂: If this model will be included in the teacher education curriculum as an activity. It will be disseminated more. Universities and teacher training institutes will take its practice more seriously.

P₃: By developing strong coordination between the administrators of teacher education institutions and schools (where prospective teachers are sent for teaching practice. The level of cooperation may be increased by both sides.

P₄: University should provide all the necessary equipment and facilities needed to apply this approach in a conducive environment.

8. How the supervisors of prospective teachers (at school) can be convinced/ motivated to ensure the practice of the lesson study model during teaching practice?

P₁: We have to gain their confidence about the practice of the lesson study model. A prior meeting or a presentation can be done for the familiarity of this model. A plan of implementation and schedule along with the list of students may be given to them for the practice of this model. Our expectation from the practice of this model may be also shared with them. We should build a collaborative attitude/bond/partnership with them for the implementation of this model.

P₂: That can be through interaction with them and orientation can be provided to all school supervisors about the best practices of prospective teachers' professional development such as lesson study and many more. And they can be ensured this model can benefit not only prospective teachers but working teachers' can also get benefit from this model.

P₃: By strong coordination and by getting their confidence. Before starting teaching practice teacher educators can conduct a meeting with school principals and can brief them about the astonishing benefits of the lesson study model.

P₄: They should be properly trained to practice the lesson study approach with the prospective teachers then they would be able to understand the benefits of this model that will ultimately motivate them.

9. As cooperative teachers play an important role in the training of prospective teachers during teaching practice, which kind of initiatives may be taken to familiarize them with the real essence of the lesson study model?

P₁: Regular meetings with cooperative teachers may be conducted with them to familiarize them with the lesson study model. Frequent feedback regarding the performance of prospective teachers can be obtained from them. With their association, lacking in the instructional practices of prospective teachers may be identified and ways to improve it may be also sought out.

P₂: When prospective teachers' go to various schools; then along with recommendation letters, we can provide them a booklet regarding the lesson study model for cooperative teachers' and we can conduct an interactive discussion with them as well. We can make some study groups related to the lesson study model and we can include cooperative teachers in these study groups.

P₃: A meeting can be conducted with them for briefing them about the whole process of lesson study model implementation. They may be trained to design lessons concerning need assessment. They may be made familiarized with the fact that this model is equally important also for their professional development as well as it is for prospective teachers' professional development.

P₄: Training sessions, weekly meetings, orientation sessions, etc.

10. As the practice of lesson study model for professional development of prospective teachers like developed countries required active university-school partnership, which kind of strategies do you suggest for ensuring such kind of partnership?

P₁: This is a very good idea for strengthening the professional development of prospective teachers. For building such kind of partnership between these entities (school and university) there must be a collaboration between teachers/departments with school

principals. Meetings may be arranged with principals and cooperative teachers monthly or semester-wise. Though, we use to visit various schools and meet with their principals as supervisors for placement of our students (prospective teachers). But if we want to practice the lesson study model, we must develop a proper plan of implementation, in which cooperative teachers, supervisors (teacher educators), and prospective teachers must be having regular meetings (may be monthly or semester wise) about this practice of lesson study model. This partnership may be strengthened by providing some honorarium to cooperative teachers. The teaching workload of university supervisors (who are dealing with prospective teachers during their teaching practice) may be minimized so that they can fully guide prospective teachers for practicing lesson study mode; keeping in view it's all ingredients and related steps as it is very time taking process. Indeed this model is very effective and research has proven its benefits but we have a greater number of prospective teachers at our institutions so it is very hard/difficult to manage them all for the practice of this model but it is not impossible we can do it. There is a need to ensure a triangular relationship among university teachers, prospective teachers, and cooperative teachers.

P₂: Bounding between teacher education institutes and the practicing school may be improved. A linkage may be created between these institutions through the ministry, as if the ministry will convince the managing organizations of schools for this practice, then its results will be more productive. Making a liaison between teacher education institutions and these organization is very important. And it is not only the task of one university, all the universities must take initiative for it. But at the individual level initiatives may be taken by one university and then the lesson can be spread to others.

P₃: Through proper channels like FDE and the teacher education department. Training directors may be coordinated. From top to bottom strategies may be practiced.

P₄: There must be an MOU between the university and school authorities that would help them to understand the importance and benefits of the lesson study model and the mutual benefits they would get through this approach. Prospective teachers that university would produce ultimately would join these schools as professional teachers therefore both parties are the stakeholders in this process. Policies may be documented and applied to practically implement this process.

Appendix 22: Transcribed Interviews of Schools' Supervisors

1. What do you think is the most important element of the lesson study model and team members must focus on it considerably? (please tick in front of most operative element)

- i. Identification of challenging content area, ii. Planning, iii. Implementation, iv. Evaluation

P₁, P₂: Planning

P₃: Implementation

2. Which aspect of the lesson study model has a great role in improving students' academic performance? (please tick in front of most operative element)

- i. Effective planning, ii. Twice presentation of a topic, iii. Innovative teaching strategies

iv. Engaging activities, V. Constructive feedback

P₁, P₃: Innovative teaching strategies (as a way of teaching and teaching method matters a lot)

P₂: Twice presentation of a topic (as it enables prospective teachers to overcome their instruction-related weaknesses)

3. What makes Lesson Study different from other types of professional development that you have experienced?

P₁: Active collaboration among prospective teachers, university supervisors, and school supervisors for topic identification, planning, implementation, and evaluation of a lesson makes the lesson study model different from all other models of professional development

P₂: It involves active participation of all (school principal, cooperative teachers at school, university supervisor, prospective teachers, and students as well) for effective presentation of a lesson. That's why it can ensure better professional development of prospective teachers as compared to other models.

P₃: It involves active participation of all stakeholders, and continuous feedback from university supervisors and cooperative teachers to prospective teachers is the most important element of this model.

4. According to you which type of instructional strategies can be regarded as ideal strategies for teaching to middle level (Grade VI-VIII) students? (please tick in front of the most suitable answer)

- iv. Individual teaching, ii. Team Teaching, iii. Individual cum team teaching

P₁: Team Teaching (it can be the best opportunity as it offers opportunities for experience and knowledge sharing, but if there are proper labs and number of teachers are as per students; strength, then this concept of teaching can be practiced appropriately)

P₂, P₃: Individual teaching (but a culture of collaborative planning may be promoted among teachers)

5. Do you think teaching through Lesson Study is more attractive as compared to previous models?

P₁: Yes, it is more attractive; but for its practical implementation there is a need to ensure drastic changes in our education system as we lack proper facilities regarding AV aids. Due to the lack of discussion sessions, our students lack concept clarification, they can take good marks in exams but cannot perform well when they appear in entry tests like exams.

P₂: Yes it is more effective as it involves great and effective planning, which sets the foundations for the success of the whole instructional process.

P₃: Yes, during this implementation of this model, active participation of university supervisors, cooperative teachers and prospective teachers specifically for the implementation stage makes this model more effective as compared to other models.

6. What do you suggest for university supervisors, should they train prospective teachers to teach through lesson study model (team teaching), or individual teaching is best?

P₁: As due to a lack of budget, school administrators can't create effective audio-visual aids. Therefore, it is expected from university supervisors that they should train prospective teachers to prepare low cost-no cost audio-visual aids, get command on the topic before going into the classroom, get familiar with innovative teaching-learning strategies, and appropriately plan their lesson before lesson delivery.

P₂: University supervisors are expected to train prospective teachers to remain engaged with regular teachers (by attending their classes, by observing their way of interacting with students, and teaching skills while they are presenting lessons) throughout their teaching practice. University teachers must train prospective teachers to show active participation in all curricular and co-curricular activities that take place during their teaching practice at school.

P₃: They must train prospective teachers for making their classrooms more interactive and involve students in practice-oriented activities. They can familiarize prospective teachers with various techniques to ensure the active participation of students in classroom activities. Teacher educators are required to develop coping strategies among prospective teachers.

7. Researchers proved that the lesson study model can certainly improve the quality of teaching and academic performance of students. It can motivate the teacher to take feedback from their colleagues about lesson activities and assessment ways before presenting it to class. Would you like to ensure its successful practice for the training of prospective teachers that will be placed in the future at your institution for teaching practice?

P₁: Yes, in this regard one or two sessions of practicing lesson study model may be conducted at university before the start of prospective teachers' teaching practice and two

to three sessions may be conducted during their teaching practice. Then it can be expected that they will practice this model successfully throughout their teaching career.

P₂: Yes, I will like to ensure the practice of this model, as besides doing individual teaching it will also motivate teachers to work collaboratively for the achievement of learning outcomes.

P₃: Yes, during the initial phase of teaching practice, prospective teachers can be trained by the practice of the lessons study model. And two to three sessions of this model can be arranged (one or two at university and one or two at school). And after developing the habit of teamwork, prospective teachers may be allowed to start individual teaching with collaborative planning.

8. Which kind of initiatives school administrators can take for the promotion of the lesson study model with the aim of effective professional development of prospective teachers?

P₁: As implementation of the lesson is a very important phase of this model, in this regard, a meeting may be conducted with cooperative teachers at school and they can be familiarized with the real essence of the lesson study model. So that, they can guide prospective teachers during planning and implementation of this lesson keeping in view the principles of this model. They must provide adequate guidance to prospective teachers to follow the dress code of the school.

P₂: School administrators can train prospective teachers by involving them in as many activities as possible. They can support them in ensuring effective classroom management and realize the importance of following time table as well as the supervisor's instructions. They may train prospective teachers to follow the rules and regulations of schools as well as the principal's instruction as all these steps can positively contribute to the professional development of cooperative teachers.

P₃: They can provide an attractive platform for teaching. Schools' principals can direct experienced teachers to mentor prospective teachers for improving their instructional practices. They may involve prospective teachers in as many practical activities as possible. School administrators must share their experience with prospective teachers, must engage them in various activities, and must develop their confidence level.

9. Which kind of initiatives may be taken by university administrators to make lesson models an imperative part of prospective teachers' professional development programs?

P₁: They are suggested to select 2-3 teachers from all those schools where they are sending their prospective teachers for teaching practice. And they must provide adequate training related to this model firstly to school teachers (cooperative teachers) as this initiative can support them a lot in the successful implementation of the lesson study model. They must develop among prospective teachers the habit of obeying rules and regulations prescribed by the school administration.

P₂: University Administrators can make arrangements to give relaxation to prospective teachers from university attendance. As, when these teachers will come to school on regular basis (full week) then they may be made more punctual and responsible for classroom teaching. Moreover, the school timetable will also not get disturbed by taking this initiative at the university level. They must provide a complete sketch (containing all expectations from school administrators concerning training of prospective teachers) to school administrators for the complete duration of their teaching practice.

P₃: They can make frequent visits to assess the performance of prospective teachers during teaching practice. Demo lessons may be taken from prospective teachers before the start of their teaching practice. Proper feedback for improving the professional development of prospective teachers may be taken from school administrators at the end of teaching practice. They must focus on the grooming of prospective teachers from the perspective of teamwork. They must train prospective teachers to put their serious efforts into planning lessons along with relevant audio-visual aids.

10. As in foreign countries, there is a system of enriched university-school partnership for ensuring the continuous professional development of prospective as well as in-service teachers; according to you which kind of measures may be taken in our context for ensuring such kind of partnership?

P₁: A request can be made to FDE (Federal Directorate of Education) for allocating adequate budget to practice this model. Cooperative teachers having ample teaching experience may be selected from schools after conducting a meeting with school principals. From university; those teachers may be appointed for supervision of teaching practice, who have vast knowledge about innovative teaching-learning strategies, techniques to promote collaborative practices, and the development of adequate and relevant teaching aids.

P₂: Firstly, get the data about schools from FDE. Afterward, meetings with the principals of those schools who are interested to own prospective teachers for professional development may be arranged for getting information about the time table, dress code, code of conduct, and school rules and regulations.

P₃: Select the schools which are ready to make a partnership with the university and take permission from FDE through proper channels for it. Make a group of senior teachers from schools for training and evaluation of prospective teachers. Frequent visits of schools supervisors may be ensured for meeting and taking a report about the performance of prospective teachers.

Appendix 23: Transcribed Interviews of Cooperative Teachers

1. How do you perceive the lesson study model for effective training of prospective teachers?

P₁: It is a very effective model for prospective teachers'' professional development as it puts great emphasis on the identification of problems/topics and proper planning of lessons before their delivery in the classroom.

P₂: Its focus on effective planning and implementation can contribute a lot to the training of prospective teachers.

P₃: It gives innovative ideas about teaching, it emphasizes the utilization of multiple teaching strategies during the delivery of lessons for making the teaching-learning process effective and interactive.

P₄: Yes it can prove very effective for training prospective teachers but for their confidence building, there must be arrangements to prepare them for their teaching as well.

P₅: It is good as promotes the use of a variety of audio visual aids in the instructional process.

P₆: Detailed planning of all aspects before teaching has proved very helpful in the training of prospective teachers.

2. To what extent teachers have taught diligently during the practice of the lesson study model?

P₁: As they came to class with full preparation, therefore their style of instructing students was very good.

P₂: As prospective teachers utilized an eclectic approach for teaching and they focus on ensuring good behavior with students, therefore it can be stated that their teaching strategies were very effective.

P₃: They have taught effectively as they have learned a lot of things after observing the instructional practice of their fellow teacher and have learned even from negative points of their fellow teacher instruction.

P₄: Utilization of multiple teaching strategies has proved very helpful in making their teaching effective.

P₅: During the 2nd cycle of lesson presentation, prospective teachers have taught the lesson diligently, she has effectively explained all points and ensured the proper utilization of audio visual aid.

P₆: Prospective teachers remain very active throughout the whole process, and this liveliness proved very helpful in creating a conducive learning environment.

3. How lesson study is beneficial to encourage prospective teachers for using multiple teaching strategies?

P₁: During the planning of the lesson, for making their lesson more attractive all teachers share their experiences and this practice enables them to ensure the utilization of multiple teaching strategies during teaching

P₂: As the practice of this expect from teachers to ensure active participation of students in classrooms, therefore for achieving this target they utilized a variety of teaching strategies such as assignments, questions answer method, role-play method, activity method, reading aloud method, etc.

P₃: Practice of this model motivates them to take guidelines from school supervisors and they have directed them to utilize a variety of teaching strategies for making their lesson effective and interactive.

P₄: Definitely, through the practice of this model they can be motivated to use multiple teaching strategies for ensuring the effectiveness of their model lesson.

P₅: Yes, through this model they have been trained to use multiple teaching strategies instead of relying on the lecture method.

P₆: As they were sharing their ideas, this practice has enabled them to merge multiple teaching strategies in their instructional process.

4. To what extent lesson study model has increased collaboration among teachers?

P₁: As it demands teachers to work collaboratively at every step, therefore this model has proved very effective in developing the collaborative attitude among prospective teachers.

P₂: As prospective teachers were guided to evaluate the instructional practices of their fellows, therefore, they focused on effective collaboration for minimizing the weaknesses in lesson delivery.

P₃: This model has developed among them sincerity for the profession, and they collaboratively work to do their best for effective lesson presentation.

P₄: This model focused on group activities, and participation of all team members throughout the whole process has polished the collaboration skills of prospective teachers.

P₅: Yes, it has increased their ability of teamwork to great extent.

P₆: During the practice of this model, collaborative planning, implementation, and even evaluation of lesson has strengthened their ability to work collaboratively in the future as well.

5. How you will explain the role of lesson study as the best strategy to increase students' understanding?

P₁: As students gain the attention of two to three teachers, and they get their queries addressed on the spot. This step can ensure their better concept clarification/understanding.

P₂: As prospective teachers share their experiences with one another, so at the end, they select the most favorable teaching strategies for ensuring students' understanding. And in this model, they also take short quizzes from students and display flow charts, so these activities can prove very helpful in better understanding of students.

P₃: During the practice of this model, prospective teachers asked multiple questions from students, involve all students to participate in classroom activities, and also create amusement in class. These all steps can positively contribute towards a better understanding of students.

P₄: Active involvement of students in the teaching-learning process can improve their understanding.

P₅: As they were frequently asked questions from students and responding their queries, so these are clear indicators of increased students' understanding.

P₆: Prospective teachers have conducted multiple activities in the classroom and also informed students that their performance will be evaluated by written tests, therefore all the students were taking interest in classroom activities and were listening to the lecture attentively.

6. Do you think the lesson study model is more effective for developing the abilities of collaboration, teamwork, knowledge sharing, and adequate content understanding among teachers as compared to individual teaching?

P₁: Yes, as this model is based on the idea of collaborative work by three to four teachers, therefore definitely it can improve teachers' abilities related to teamwork, knowledge sharing, and getting a command on the subject matter.

P₂: Yes, in the practice of this model all prospective teachers work together for designing a model lesson, so this group work can promote the habit of knowledge sharing and collaborative work among students for the future.

P₃: Yes, their teaching-related skills have improved. They have learned to relate their lesson to daily life.

P₄: Yes, revision of the whole process has played a very significant role in improving content understanding, the habit of knowledge sharing, and teamwork among students.

P₅: Yes, by the practice of this model their abilities of collaboration, teamwork, knowledge sharing, and adequate content understanding get improved to great extent.

P₆: as they were sharing their ideas during planning and implementation of the lesson, giving feedback for lesson improvement, and also developed audio-visual aids by cooperation, so these practices have polished their multiple abilities.

7. To what extent lesson study is playing its role to make prospective teachers good observers and evaluators?

P₁: As this model motivates prospective teachers to observe each other work and give constructive feedback to improve instructional practices, then it can be said that this model is making prospective teachers good evaluators and observers.

P₂: As they only observe each other work, but also the work of senior teachers as well for improving their instructional practices, so it can be stated that practice of this model can make them good observers and evaluators.

P₃: Yes, they have observed the work of other teachers for improving their work, and they have self-evaluated their lesson as well. In the future, they can play the role of keen observer and good evaluator.

P₄: Definitely, the practice of this model can make them good observers and evaluators as they have been involved in the practices related to deep observation and constructive evaluation.

P₅: One was teaching and the others were taking classroom rounds. The teacher who was teaching was also evaluating her instructional practice as well. Other teachers also provide comments for lesson improvement, so all these activities have played an imperative role to make prospective teachers good observers and evaluators.

P₆: Observation and evaluation of the students during the first cycle of lesson presentation has enabled prospective teachers to remain more careful during the second cycle of lesson presentation. And as this observation and evaluation have improved their instructional practice, therefore it can be stated that they will serve as good observers and evaluators in the future.

8. How the practice of the lesson study model can modify prospective teachers' thinking about classroom practice?

P₁: It motivates them to ensure active participation of students in classroom activities instead of making them passive listeners.

P₂: Practice of this model can prove very helpful to make them professional teachers and this practice can enable them to teach in an organized way.

P₃: They have learned that ensuring pin drop silence is not the best strategy, they must involve students in classroom activities/discussion for ensuring their concept clarification.

P₄: After the practice of this model, teachers will be able to do collaborative planning and individual teaching with great confidence.

P₅: They were focusing on student-centered teaching, and this idea has made the classroom environment attractive for all students.

P₆: The teacher was not just focusing on bookish knowledge, and she was trying to clarify students' concepts by utilizing various audio-visual aids. And this practice of prospective teachers has changed the overall environment of class to a great extent.

9. Which type of skills do you expect that university supervisors must cultivate in prospective teachers before sending them for teaching practice?

P₁: They must train them to properly follow the rules and regulations prescribed by the school administration. Prospective teachers must be trained to create a distance between teachers and students.

P₂: They must focus on improving pedagogical, classroom management, and effective lesson planning-related skills of prospective teachers. Teacher educator must share with them their own experiences for improving their instructional practices. They must be trained to utilize technological tools during their teaching.

P₃: They must be trained to take guidance from senior teachers for improving their instructional practices. University teachers must make frequent visits to take feedback from cooperative teachers about the regular performance of prospective teachers. They must be guided to develop audio-visual aids during their spare time.

P₄: Prospective teachers must be prepared to bring revolutionary changes. Teacher educators are expected to develop among them the motivation for work and qualities of professional teachers. They must focus on their overall personality development.

P₅: They must train prospective teachers to develop lesson plans for every lesson before lesson presentation which they teach during teaching practice. Teacher educators may make a surprise visit to evaluate the performance of prospective teachers.

P₆: They may be trained for proper development and utilization of audiovisual aids to make their lesson more interactive and understandable. Teacher Educators must train prospective teachers to select content for lessons keeping in view the attention span of students (lengthy topics can be divided into two classes).

10. In general what you have learned after participating in the lesson study model?

P₁: I learned from it the benefits of experience sharing with colleagues for improving classroom teaching.

P₂: It is the best model as it has covered all aspects of prospective teachers' learning i.e. it focuses on improving their overall teaching skills from need assessment to evaluation. The implementation stage is the main element in this model which focuses on observing instructional practices of prospective teachers in the real classroom environment and giving them feedback accordingly for improving their practices. I have learned to write reflections about my teaching.

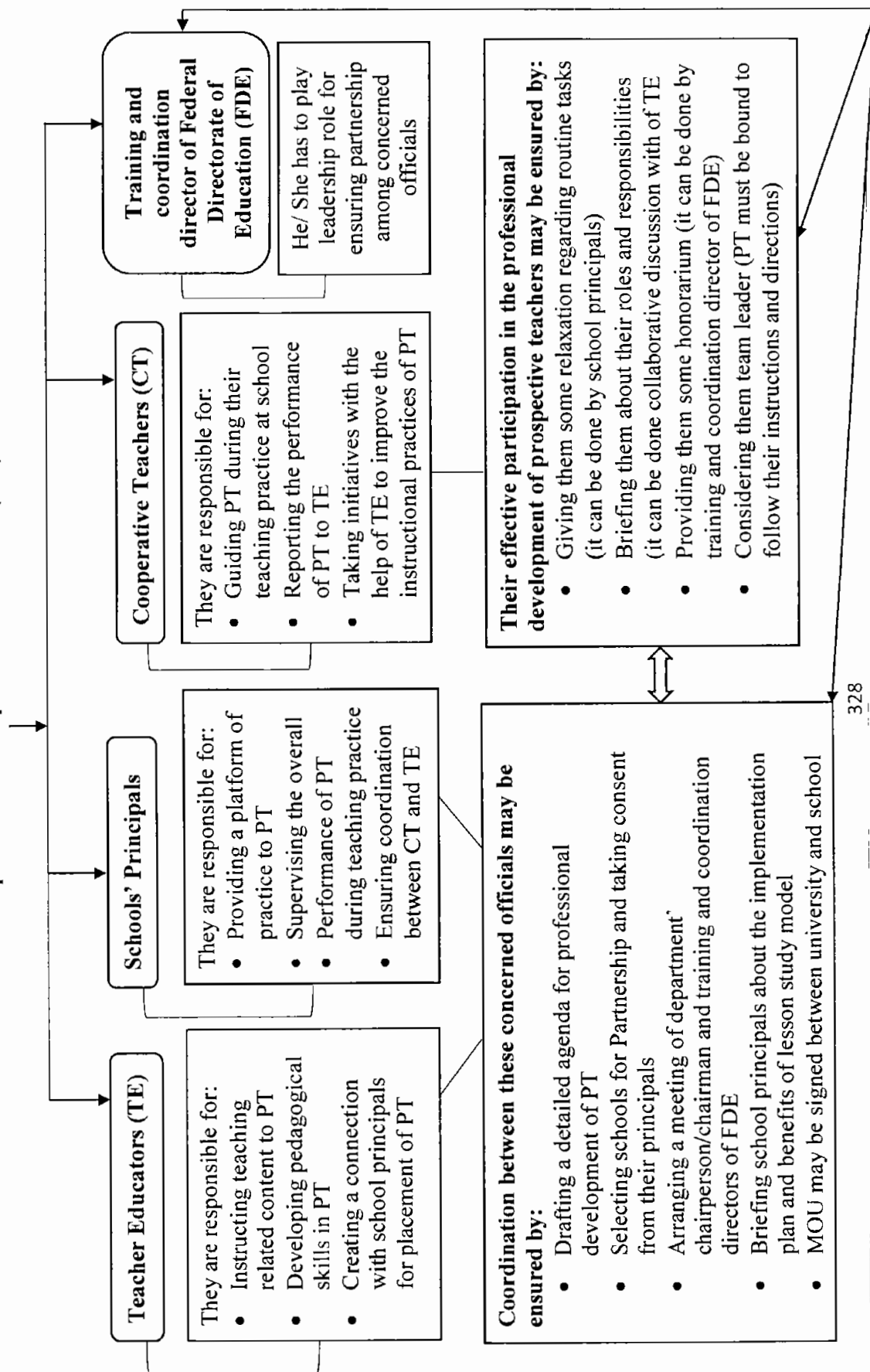
P₃: Taking feedback from fellow teachers at every step of the lesson from planning to evaluation is a very good idea that I have learned from this model.

P₄: This model has developed the spirit to become good teachers, honesty with the profession, and has offered many opportunities to learn new skills.

P₅: Promoting the habit of group work among teachers is the key benefit of the lesson study model which may be also beneficial for in-service teachers as well.

P₆: Evaluation of own instructional practice keeping in view the topics' objectives is the most significant point which I have learned from the lesson study model.

Members Involved in the Professional Development of Prospective Teachers (PT)



Appendix 25: Certificate for Validation of Framework

INTERNATIONAL ISLAMIC UNIVERSITY
ISLAMABAD, PAKISTAN

Certificate of Validation

Prof. Dr. Saima Malik
Vice-Chancellor
International Islamic University
Islamabad, Pakistan

SAIMA SHAFIEN

for Signature

21/10/2021