

**AN INVESTIGATION OF HOW MATHEMATICS TEACHERS
IMPLEMENT MASSE PRINCIPLES OF ACTIVITY, STUDENT-
CENTRED, EXPERIMENT AND IMPROVISATION (ASEI).**

**M.Ed. (CURRICULUM AND TEACHING STUDIES -
MATHEMATICS EDUCATION) THESIS.**

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**UNIVERSITY OF MALAWI
CHANCELLOR COLLEGE**

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EDUCATION) THESIS**

By

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Submitted to the Department of Curriculum and Teaching Studies, School of Education,
in partial fulfilment of the requirements for the degree of Master of Education
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May, 2017

DECLARATION

I, the undersigned, hereby declare that this thesis is my own original work which has not been submitted to any other institution for similar purposes. Where other people's work has been used, acknowledgements have been made.

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CERTIFICATE OF APPROVAL

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DEDICATION

This thesis is dedicated to my guardian late Sir John Heppell of Temple Farm, Whitfield, Dover, Kent, United Kingdom, who assumed the role of a father when my education ground to a halt due to financial handicap. He was also my mentor and a role model in the field of Mathematics Education. MAY HIS SOUL REST IN ETERNAL PEACE.

I equally dedicate it to my mother, Miss Grace Pankomera, for her moral support and endurance of my absence at a time she needed me most due to her sickness. I praise God the Healer!

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ABSTRACT

This study was an investigation of how mathematics teachers implement Strengthening of Mathematics and Science in Secondary Education (SMASSE) principles of Activity, Student-centred, Experiment, Improvisation (ASEI) through the Plan, Do, See, Improve (PDSI) approach. Social constructivism and PDSI were the main concepts that guided the research design. The study generated qualitative data through interviews, lesson observations and document analysis. One interview was conducted at the beginning of the study. Soon after its teachers worked together in a Community of Practice (CoP) for one school year and a second interview was administered at the end of the year. Guided by the PDSI conceptual framework, data were analysed and clustered around the themes of Planning, Implementation, Reflection, Improvement and knowledge of ASEI/PDSI. The following questions guided the study: How do teachers plan and deliver ASEI/PDSI lessons in mathematics? How do teachers reflect and improve on their lessons in mathematics? What challenges do teachers encounter in implementing ASEI/PDSI lessons and how can they be addressed? How does CoP support teachers in implementing ASEI/PDSI in mathematics? Its sample comprised 6 mathematics teachers from 3 secondary schools in South East Education Division of Malawi, purposively selected to target those that had been trained by SMASSE INSET Malawi. The study found that teachers had limited knowledge of some of the SMASSE principles of ASEI/PDSI due to poor accessibility of information and lack of support from each other. However, when teachers worked together in the CoP, their understanding and practice of ASEI/PDSI improved. The study, therefore, recommends that teachers work together in a CoP.

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LIST OF ABBREVIATIONS AND ACRONYMS

ASEI	Activity, Student-centred, Experiment, Improvisation
CoP	Community of Practice
DCE	Domasi College of Education
DTED	Department of Teacher Education and Development
INSET	In-Service Education and Training
JICA	Japan International Cooperation Agency
KSTC	Kenya Science Teachers' College
MoEST	Ministry of Education, Science and Technology
PDSI	Plan, Do, See, and Improve
SEED	South East Education Division
SMASE	Strengthening of Mathematics and Science Education
SMASSE	Strengthening of Mathematics and Science in Secondary Education
SPIAS	SMASSE Project Impact Assessment Survey
WECSA	Western, Eastern, Central and Southern Africa

CHAPTER 1

INTRODUCTION

1.0 Chapter overview

This study is an investigation of how teachers implement SMASSE principles of ASEI through PDSI approach in mathematics lessons. In this chapter, a description of background information to the study is presented. It is followed by a statement of the problem, the purpose of study, research questions, significance and limitations of the study. The chapter ends with a summary of what is discussed in the whole chapter.

1.1 Background Information

Research shows that Malawi is facing a lot of challenges regarding performance and participation of learners in mathematics and science at both primary and secondary school levels. Some of the reasons for this situation are lack of qualified teachers, inappropriate teaching methodologies, lack of teaching and learning resources and attitude of teachers and learners towards the subjects (Domasi College of Education [DCE], 2003). The way qualified teachers teach mathematics in Malawi secondary schools has remained didactic even in the situations where there are sufficient teaching and learning resources. Furthermore, even after teachers are trained to teach using more learner centred methods by Strengthening of Mathematics and Science in Secondary

Education In-Service Education and Training in Malawi (SMASSE INSET Malawi) program, their teaching continues to rely more on ‘chalk and talk’ especially in the first few years of the training (Department of Teacher Education and Development [DTED], 2009; DTED, 2012; Nampota & Selemani-Meke, 2014).

SMASSE INSET Malawi is an initiative by Government of Malawi in her attempt to improve the quality of secondary school mathematics and science education. It has been training mathematics and science teachers since 2004.

1.1.1 Origin of SMASSE

SMASSE originated in Kenya and it started as a joint venture between the government of Kenya through its Ministry of Education, Science and Technology, and the government of Japan through the Japanese International Corporation Agency (JICA). It was officially launched on 27th February, 1998 as a pilot project (Kenya Science Teachers College [KSTC], 2002). The whole idea had been prompted by consistent poor performance in mathematics and science that had become a matter of concern. The launch was immediately followed by a baseline survey to find out the causes of poor performance. There were many causes but the following were those within the scope of SMASSE:

1. Neutral or negative attitude of students, teachers and head teachers towards mathematics and science
2. Generally, the teaching methods were inappropriate as they were mainly teacher-centred.

3. Some teachers lacked mastery of content and it was not easy to teach and motivate the learners when they were actually struggling with the content themselves.
4. Learners were given inadequate assignments for practice. Therefore, many learners could not master the content.
5. There were few or no fora for teachers to discuss issues, share ideas and inform each other.

Thus, SMASSE Kenya was established to address these problems.

1.1.2 SMASSE Project Curriculum

KSTC (2002) further explains that SMASSE Project, therefore, developed an INSET curriculum to upgrade and strengthen teacher competence. The areas of concern were attitude, teaching methodology, mastery of content, development of teaching and learning resources and development of administrative and management skills described as follows:

Teachers' attitude: Teachers showed negative attitude towards mathematics. Thus, SMASSE targeted teachers' attitude because teachers spend a lot of time with learners. As such, attitude of learners is shaped by what the teachers do or fail to do as they interact on daily basis.

Teaching methodology: SMASSE curriculum targeted pedagogy as teacher training curriculum did not adequately address pertinent issues in secondary school teaching. It was observed that theories taught to prospective teachers in college were often outdated and not applicable in classroom. The curriculum also targeted methodology because most

teachers were syllabus or content driven and they thought that effective teaching means covering the syllabus. In such cases, lecture method was preferred as it allowed quick content coverage although very little was achieved in terms of learning.

Mastery of content: It was discovered that Kenyan classrooms had three categories of teachers. There were teachers who had good mastery of content. These tended to plan their lessons well, thought about the teaching process, taught in good sequence and were often student-centred. The second category was that of teachers who did not take time to plan their lessons, did not think about the teaching process, their teaching was not sequential and were not student-centred. In many cases, such teachers ended up confusing students. The last category was that of teachers that lacked content mastery. They could not satisfactorily explain concepts and often misled students unknowingly.

The curriculum of SMASSE INSET in Kenya was prepared to cater for all the three groups of teachers above. It was hoped that after training, teachers would use teaching and learning resources more efficiently and effectively with possible improvisation from their immediate environment. It was also hoped that teachers would learn to plan with the student in mind, deliver student-centred lessons, reflect upon the process and improve their practice (KSTC, 2002).

1.1.3 SMASSE principles

In order to achieve the objectives described above, the SMASSE Team came up with Activity, Student-centred, Experiment and Improvisation (ASEI) Principles.

Activity: Teachers must incorporate activities in lessons that actively engage learners in the teaching and learning process to enhance understanding cultivate interest and promote

retention of knowledge. Activities must be meaningful and well-bridged to the concept being taught in the lesson. These activities must be

- Hands-on: they must promote development of manipulative skills in the learners.
- Minds-on: they must stimulate and develop intellectual thinking and reasoning skills.
- Hearts-on: they must stimulate learners' interest and feelings about the subject content.
- Mouths-on: they must encourage learners to develop communication skills through discussing and reporting of their discussions or findings.

Student-centred: This aspect of ASEI encourages a shift from the teacher as the main actor to the learner as the main actor in the classroom. Thus, teachers would no longer dominate the teaching and learning process but rather facilitate it by providing opportunities for learners to express their opinions and explain their ideas based on their prior knowledge.

Experiment: As an aspect of ASEI, Experiment emphasises a shift from large scale or recipe type of experiments to small scale or investigative type where learners are allowed to make predictions, hypotheses and verify them practically. However, such experiments must always be linked to the desired skills and concepts to be learnt.

Improvisation: Improvisation in ASEI requires that teachers must improvise equipment or apparatus even when there are sufficient conventional materials. They should adopt materials from the learners' environment in order to raise learners' interest and curiosity

as this would help them to appreciate the relationship between classroom work and the materials they encounter in everyday life (KSTC, 2002).

This was to be a shift as follows:

Table 1: A paradigm shift from Pre-ASEI to ASEI-condition

FROM	TO
Pre-ASEI (before INSET)	ASEI-condition (after INSET)
Knowledge/content- based approach	Activity- focused teaching and learning
Teacher-centred teaching	Student-focused/centred learning
Theoretical or lecture method (chalk and talk)	Experiment/research-based approach
Few teacher demonstrations	Small scale and improvisation

Source: Nui & Wahome, 2008, p. 5.

1.1.4 SMASSE Approach to Achieve ASEI Principles

The team also came up with the concept of Plan, Do, See, Improve (PDSI) approach in order to achieve ASEI condition. It is a conceptual framework within which SMASSE project works and it is explained under conceptual framework for the study.

1.1.5 How SMASSE came to Malawi

SMASSE Kenya registered success in terms of student-centred approaches and learner achievement. Thus, in 2001, SMASSE Kenya focused on The African Region through SMASSE Western, Eastern, Central and Southern Africa (WECSA).

Malawi and many other countries in this region such as Ghana, Rwanda, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe joined SMASSE-WECSA to introduce ASEI/PDSI in their own countries (KSTC, 2005). As the report by Domasi College of Education points out, this was because the problems facing many of the education systems in Africa were similar to those of Kenya hence the solutions suggested by SMASSE Kenya were promising (DCE, 2003). Specifically, Malawi had the following problems to address:

- A backlog of unqualified and under-qualified secondary school teachers.
- High teacher-pupil ratios in secondary schools
- Inadequate teaching and learning resources and infrastructure.
- Lack of well-structured INSET programme in mathematics and science.
- Unavailability of mathematics and science associations at country level.
- Inappropriate approaches to the teaching and learning of mathematics and science at secondary school level.
- Poor performance by pupils.

Since the Government of Malawi had improvement of education quality as one of the five objectives in the Policy and Investment Framework (PIF) 2000-2015, which was the principal national educational policy in Malawi, SMASSE project was embraced to establish regularised and institutionalised INSETs and to improve the teaching of mathematics and science in secondary schools. The institutionalisation of INSET and Continuous Professional Development of teachers for secondary education are also included in the scope of the National Education Sector Plan (NESP) 2008-2017, the Education Sector Implementation Plan (ESIP) 2009-2013, and the National Strategy for

Teacher Education and Development (NSTED) 2007-2017. These policies stress the need for improving the quality of teachers, highlighting that a significant number (approximately 60%) of secondary school teachers in Malawi are under-qualified.

SMASSE INSET Malawi started in 2004 as a pilot project in South East Education Division and rolled out to the rest of the Divisions in 2008. It has conducted trainings on a yearly basis to all science and mathematics teachers since 2008 to date. However, literature shows that despite these trainings, there are unsatisfactory levels of teachers' implementation of ASEI principles through the PDSI approach in the classroom (DTED, 2012; Nampota & Selemani-Meke, 2014). This necessitated my study to explore how teachers implement ASEI principles through the PDSI approach in mathematics in Malawi.

1.2 Statement of the Problem

SMASSE project has realised a number of successes such as changing the attitude of teachers towards student-centred lessons and establishing sustainable regularised and institutionalised INSET system for mathematics and science teachers. However, these successes have been accompanied by limitations and challenges. Several studies done on SMASSE INSET Malawi Programme have shown that there is still very little impact on the practice of ASEI principles through PDSI approach in secondary schools (DTED, 2009; DTED, 2012; DTED, 2016; Nampota & Selemani-Meke, 2014). This implies that teachers' knowledge of ASEI/PDSI gained at the INSETs does not translate into practice

at classroom level. It is therefore, worth investigating how teachers implement ASEI principles through PDSI approach in mathematics lessons.

1.3 Purpose of the Study

The purpose of the study was to investigate the implementation of SMASSE principles of ASEI through PDSI approach in mathematics lessons.

1.4 Objectives of the Study

The study focused on the following objectives:

1. To find out how teachers plan and deliver ASEI/PDSI lessons in mathematics.
2. To find out how teachers reflect and improve on their lessons in mathematics.
3. To identify challenges that teachers encounter in implementing ASEI/PDSI lessons in mathematics and how they can be addressed.
4. To find out how a CoP may support teachers in the implementation of ASEI/PDSI in mathematics?

1.5 Research Questions

The study was guided by the following questions:

1. How do teachers plan and deliver ASEI/PDSI lessons in mathematics?
2. How do teachers reflect and improve on their lessons in mathematics?
3. What challenges do teachers encounter in implementing ASEI/PDSI lessons and how can they be addressed?
4. How does CoP support teachers in implementation of ASEI/PDSI in mathematics?

1.6 Assumptions

The research assumed that respondents would be conversant with SMASSE training so that they can provide reliable data. It also assumed that ASEI principles and the PDSI approach were applied in mathematics lessons.

1.7 Significance of the Study

The study would contribute to the body of knowledge regarding problems mathematics teachers face and support they need to actualise knowledge gained from SMASSE INSET Malawi trainings. It is hoped that this information would be useful to stakeholders such as mathematics teachers, in-service education and training providers and curriculum developers.

1.8 Limitations of the Study

Part of the investigation asked teachers to explain details of their classroom practice. Some teachers found it difficult to describe practices that would depict weakness on their part, hence a limitation of the study. However, efforts were made to rephrase the questions and probe more until teachers were led to bring out such issues where necessary. The study was done in only three secondary schools in one education division, South East Education Division. This means that the findings are limited to the studied schools and they cannot be generalised. Nevertheless, the lessons learnt might apply to other schools in similar situations.

1.9 Chapter Summary

This chapter has presented a background to the study in terms of the origin of SMASSE and how it came to Malawi. It has also stated the statement of the problem, purpose and objectives of the study and the questions that guided it. The next chapter discusses literature that has informed the study.

CHAPTER 2

LITERATURE REVIEW

2.0 Chapter Overview

This chapter reviews some studies on SMASSE project done in Kenya and those done in Malawi. It also explains the theory and concepts underpinning the study and some literature related to planning and reflective teaching as SMASSE INSET Malawi's emphasised pedagogical tenets and a brief account of Communities of Practice in which participants of this study were engaged in the course of the study. A brief summary closes the chapter.

2.1 SMASSE studies in Kenya

There are several studies that have been done in Kenya. Some of them have been done by monitoring and evaluation teams of the project and others by the academia. Most of the works have evaluated SMASSE Kenya but in different aspects and at different levels.

2.1.1. SMASSE Project Evaluation

The success of SMASSE project was evaluated on the five criteria of relevance, effectiveness, efficiency, impact and sustainability. Midterm and final evaluations of the project were conducted for both the pilot phase (1998-2003) and phase 2 (2003-2008) (KSTC, 2008). From the evaluation, relevance was rated high since the project goal and purpose were in line with the Education Policy in Kenya. Effectiveness was also rated

high since the project purpose of improving quality of mathematics and science education through training of teachers was still being achieved. Efficiency was rated high as establishment of INSET system was achieved. Impact and sustainability were rated fairly high because quality of teaching and many aspects of sustainability had not been achieved (KSTC, 2008).

2.1.2. Classroom impact of SMASSE programs

Waititu and Orado (2009) explain that the classroom impact of SMASSE programs has been monitored and evaluated in three fold. Firstly, lessons were monitored and evaluated using ASEI/PDSI checklist where lessons were observed and evaluated on a five -point scale (0-4), with zero indicating non-application and four indicating that the ASEI/PDSI aspect was applied to a great extent. The methodology was a trace study in which lessons were observed in 2003 before teachers undertook SMASSE training and in 2007 just after completion of the fourth training. The results were that in 2003 the extent of ASEI/PDSI aspects in lesson stood at 0.8 while in 2007 it stood at 2.3 indicating that SMASSE trained teachers were practicing more of the ASEI and PDSI in their classroom than teachers that had not been trained by SMASSE. However, the researchers argue that this overall rating was still far below the desired rating of four, indicating that there was still a lot of room for improvement in implementing quality lessons (Waititu & Orado, 2009, p. 15)

Secondly, the quality of lesson delivery was evaluated using a lesson observation instrument that examined and rated the lesson on a scale of 0 to 4 (poor to very good) in

three aspects of teaching procedures, fundamental techniques or methodology and class management. This was also a trace study in which the same teachers were observed in 2004 and in 2007. It was found that in 2003, the quality of lesson delivery stood at 1.0 while in 2007 it had risen to 2.4. Although this indicated a great improvement, it was still lamented to be far below the desirable scale of four.

Finally, quality of learning was evaluated using learner participation instrument on the same teachers observed in 2003 and then 2007. The results showed that the quality of learning was at 2.0 and 2.5 in 2003 and in 2007 respectively. Although this indicated improvement it was thought to be far below the ideal scale of four and needed more effort to improve the quality of learning.

2.1.3 SMASSE Project Impact Assessment Survey (SPIAS)

SMASSE project has also been evaluated using SPIAS instrument. According to Waititu and Orado (2009) the purpose of SPIAS was to monitor effect and impact of INSET on teachers in professional development and how such is linked to student ability. From the analysis of data gathered, the following inferences were made:

- SMASSE INSET has positive impact on students capacity and attainment of skills
- change on teachers pedagogical practices depends on principal's encouragement on professional development,
- change in attitude is critical for success of INSET,
- student attitude towards mathematics and science affects their achievement ,

- student participation and involvement in classroom activities significantly influence their attitude towards mathematics and sciences
- Gradual improvement on impact of INSET indicates that professional development requires effort sustained over time.

2.1.4. Effectiveness of SMASSE on performance in Embakasi District of Nairobi County

Another study evaluating SMASSE in Kenya was done by Karuri (2012). The purpose of the study was to identify the effectiveness of SMASSE towards enhancement of mathematics performance in public primary schools in Embakasi District in Nairobi County. The objectives of the study were;

- To identify the effects of public primary school managers on the management of SMASSE programme as they facilitate its implementation at school and cluster level.
- To identify challenges encountered by mathematics teachers while using SMASSE approaches.
- To find out the effects of ASEI/PDSI concept on the participation of learners in mathematics lessons.
- To review the effects of SMASSE project on learners' performance in mathematics in Kenya Certificate of Primary Education since 2009.

The study selected a total of 300 school pupils, 20 mathematics teachers for standard eight and five head teachers totalling to 325 respondents. Data was generated using interviews, questionnaires and observation. The study revealed that SMASSE programme

had helped in the improvement of learners' mathematics performance in public primary schools although it faced several challenges. However, the performance was below average.

2.1.5 Effectiveness of SMASSE training on mathematics and chemistry teachers

Kiige and Atina (2016) conducted a study in Kikuyu District in Kenya to investigate the effectiveness of SMASSE training of mathematics and chemistry teachers on the Kenya Certificate of Secondary Education performance. The study used sixteen schools selected by stratified random sampling method and gathered both qualitative and quantitative data. Contrary to the findings of Karuri (2012), the study found that SMASSE INSET has no impact on the learners' performance of mathematics and chemistry. However, the study also found that the ASEI/PDSI approaches were in use and had improved the teachers' confidence and ability to deliver, and the skills learnt were effective.

Thus, the study concluded that although SMASSE INSET does not show impact on the performance of mathematics and chemistry, it has influenced the teachers' ability to deliver in their teaching. This leaves one wondering why the ability gained by the teachers does not translate into performance although they seem to be practicing ASEI/PDSI. Therefore, investigating how teachers implement ASEI/PDSI at classroom level could provide more insights.

2.1.6 Impact of SMASSE programme on the teaching and learning of Physics in Lari District

Kahare (2011) conducted a study on impact of SMASSE programme on the teaching and learning of physics in mixed day secondary schools in Lari District, Central Province in Kenya. The researcher used descriptive survey research method to generate data in Mixed Day schools targeting 12 head teachers, 16 Physics teachers and 360 Physics students. The 12 schools were selected through simple random sampling while the administrators and physics teachers were purposively selected from the schools in the sample. The instruments used were an interview schedule for administrators, questionnaires for teachers and students and an observation guide for lessons. Data generated were analysed using both qualitative and quantitative techniques. Findings from this study showed that SMASSE had an impact on the teaching and learning of physics and there was a positive attitude among the majority of the physics teachers towards teaching physics. Similarly, a majority of the students had positive attitude towards learning physics and the students were involved during physics lessons in activities such as question/answer, group discussions and experiments. In addition, the students' physics performance in Kenya Certificate of Secondary Education had improved and also student enrolment in physics had increased.

However, the study noted that only a few teachers evaluated their lessons and used the ASEI lesson plans. This was attributed to challenges such as high workloads, inadequate teaching and learning resources and teachers' negative attitude towards SMASSE.

2.1.7 Evaluation of SMASSE Kenya Phase 2

SMASSE Kenya Phase 2 was evaluated by Inokuchi and Ito (2009). This phase had two components: The Kenyan Component (all SMASSE activities in Kenya) and The WECSA Component (inclusion or extension of activities to the WECSA region)

According to this evaluation study, the relevance of the project was rated as high because its purpose was relevant to Kenyan development policy and the needs of the education sector. The goal of the Kenyan component, which was to ensure that quality of mathematics and science education at secondary school level is strengthened through INSET for teachers, was mostly achieved by the end of the project period in 2008. The overall goal of the project which was to upgrade the capacity of young Kenyans in mathematics and science had also been accomplished.

In the WECSA component, the goal was to ensure that ASEI-PDSI lessons were practiced in teacher training institutions and secondary schools in member countries while the overall goal was to ensure that the quality of mathematics and science education at the secondary school level in the member countries is strengthened. According to Inokuchi and Ito (2009), both the goal and overall goal had also been achieved. Malawi is one of the member countries referred to in this study but SMASSE INSET studies in Malawi do not seem to agree to these findings as they always lament of low performance and practice of ASEI/PDSI.

2.1.8 Evaluation of SMASSE program in primary schools in Kenya

Kamau, Wilson and Thinguri (2014) conducted a study to evaluate the effectiveness of SMASSE program in performance of science and mathematics in primary schools in Kenya. The study was an evaluation through analysing documents that show the performance of Science and Mathematics and it had two objectives to achieve. The first one was to establish the influence of teachers' training in the performance of science and mathematics in primary schools and the second one was to establish the influence of teaching approaches in performance of science and mathematics in primary schools.

Findings of the study show that since most of the teachers were coerced to attend INSETs, they developed a negative attitude towards the INSETs and this affected their performance in mathematics and science negatively despite attending trainings. It was also found that most teachers had not adopted ASEI/PDSI approaches and poor results continued to surface in the two subjects. Thus, the study concluded that despite SMASSE programs in primary schools, performance in mathematics and science remained below average.

Most of the studies reviewed so far show that practice of ASEI/PDSI by teachers and performance in mathematics and science by learners are below the expectation of INSET providers although the INSETs have been conducted for a long time. Therefore this suggests that there were hindrances and limitations to SMASSE implementation after training.

2.1.9 Hindrances and limitations to SMASSE implementation

A study conducted by Ombaso (2008) on the impact of SMASSE-INSET in upgrading the capacity of mathematics and science teachers in terms of teaching methods, knowledge level and management of experimental equipment in mathematics subjects in Gucha District, identified hindrances that prevented teachers' implementation of SMASSE after training. Among the list were insufficient time, heavy teaching workload, lack of support from school administration, large class sizes, inadequate teaching resources, pressure to cover syllabus, lack of laboratory assistants, low morale, low entry behaviour of learners and lack of encouragement from other teachers.

Waititu and Orado (2009) have blamed the cascade system of training as a limitation to SMASSE implementation after training. SMASSE in Kenya follows the cascade system of training both at the international and national training levels which was designed and adopted as illustrated in figure 1:

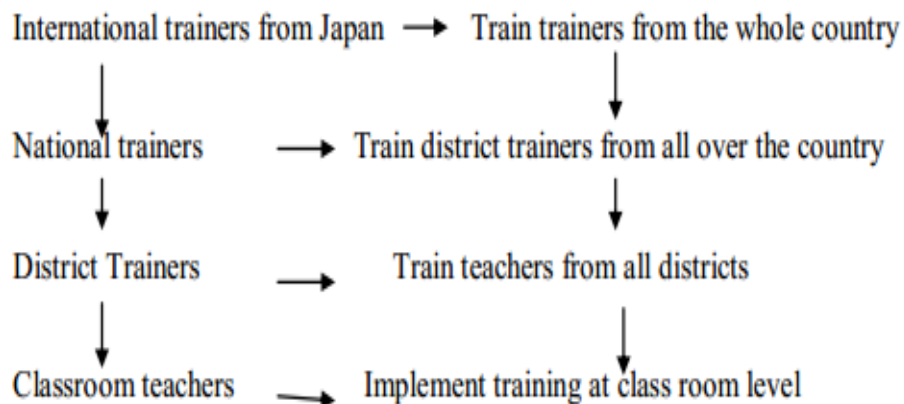


Figure 1. SMASSE KENYA Cascade system of training.

Source: Waititu & Orado, 2009.

Waititu and Orado (2009) stated that although the cascade system of training succeeded with SMASSE INSETs, it had many limitations. In the first place, the training process took a long period of time before the learners could gain at the classroom level. This was so to give time for knowledge to trickle down from international trainers to national trainers to district trainers and down to teachers before implementation at classroom level.

Secondly the content could be diluted and distorted down the ladder of training as it was passed on at every step. Thus, trainers needed to do a comprehensive preparation and mastery of the knowledge and information they were required to disseminate.

Finally, at times, the trainees in the flow system may not have readily accepted the trainers and consequently may not have responded well to the training. This may explain why teachers may show that they have acquired skills but their classroom practices remain below the desired performance levels.

2.1.10 The state of SMASSE project in Kenya and academic achievement by 2012

The SMASSE project in Kenya had been experiencing difficulties with teachers storming out of the SMASSE INSET centres. The Kenyan Nation Newspaper (2012) reported that at least 200 teachers who had converged at Njonjo Girls and Nyanyuki Boys High schools for SMASSE training refused to sleep in their designated dormitories because of the poor condition of the dormitories and abandoned the training. Another group in Asumbi Girls National School, Homa Bay stormed out of the training hall when they

were told that they would be accommodated in dormitories and they would not be given any daily allowances. Thus, the seminar whose theme was “Information Communication Technology” (ICT) integration in Education had to be disbanded. Such hiccups in the implementation of SMASSE project show that for the project to achieve quality teaching and learning that improves learner performance, it takes a lot of factors such as working conditions, attitude of all stakeholders and how the principles of ASEI/PDSI are practiced by the teacher besides just acquiring the knowledge of the principles.

2.2 SMASSE Projects in the WECSA Region

Many countries in the WECSA Region have established a similar INSET system to that of Kenya in collaboration with the Government of Kenya and Government of Japan through JICA. Some of the countries have just started a first phase while others are already in second phases of the project. Table 2 summarises stages and achievements of SMASSE projects in the different countries.

Table 2: A summary of stages and achievements of SMASSE projects in different countries.

Country	Project Phase	Period of phase	Achievements
Botswana	1	2008-2011	Improvement in general performance and in quality of results of mathematics and science in the targeted province (Central Province).
	2	2011-2015	
Burkina Faso	1	2008-2011	I was not able to find information
	2	2011-2015	

Country	Project Phase	Period of phase	Achievements
Ghana	1	2005-2008	Improved teacher motivation to teach and learner interest, Learners' readiness to learn and attendance to mathematics and science subjects.
	2	2009-2013	
Malawi	1	2004 - 2008	Successful establishment of regularised and institutionalised INSETs for mathematics and science teachers. A slight improvement in the practice of ASEI/PDSI
	2	2009-2013	
	3	2013 - 2017	
Niger	1	2006-2009	Improved test results.
	2	2010-2013	
Nigeria	1	2006-2009	Achieved active participation of learners in mathematics and science lessons
	2	2011-2013	
Rwanda	1	2008-2011	Improved teacher attitude and learner enrolment in mathematics and science.
Senegal	1	2008-2010	I was not able to find information
Uganda	1	2005-2008	Slight improvement in national examination results (Uganda Certificate of Education) in Mathematics and sciences, Improved interest in learners.
	2	2008-2011	

Source: KSTC, 2010.

2.3 SMASSE studies in Malawi

Unlike in Kenya, SMASSE studies in Malawi have been very limited and they have basically been done by SMASSE INSET Malawi project monitoring and evaluation team at the SMASSE secretariat at DTED.

2.3.1 SMASSE INSET evaluation for Phase I

SMASSE programme (phase I) started as a pilot project from 2004 to 2008 in South East Education Division (DTED, 2009). It was a technical cooperation project between Government of Malawi through Ministry of Education, Science and Technology (MoEST) and Government of Japan through JICA. The super goal of the project was to improve the abilities of learners in mathematics and science in secondary school. Its overall goal was to improve the quality of teaching of mathematics and science in secondary schools while the purpose of the project was to establish a regularised and institutionalised INSET system for secondary mathematics and science teachers.

Thus, basically, the project aimed at improving the quality of teaching of mathematics and science in secondary schools through regular INSET for Mathematics and Science teachers. DTED report (2009) outlines that major outputs of the project in the pilot phase were:

1. Strengthening the capacity of Divisional Trainers.
2. Strengthening National and Divisional INSET centres as resource centres.
3. Implementing National & Divisional INSET and Monitoring and Evaluation.
4. Strengthening sustainable INSET management system at all levels.

SMASSE INSET Malawi secretariat was established at DTED to host National Trainers and SMASSE National Management Team. The INSET followed the cascade training system. National trainers were trained with support from SMASSE-WECSA and JICA. In turn, national trainers trained divisional trainers that eventually trained mathematics and science teachers in the targeted division of South East Education Division (SEED).

In 2008, SMASSE INSET Malawi Secretariat evaluated the Fourth SEED SMASSE INSET focusing on the following aspects:

- Quality of facilitation
- The content in the facilitation modules
- INSET activities such as peer teaching and group work
- Relevance of the training
- Teaching and learning resources at INSET centres
- The communication system in preparation and implementation of INSET
- Time management, welfare, boarding and other facilities at INSET centres.
- Teachers' ideas about student-centred lessons

Questionnaires were used and the results were analysed on a five-point (0-4) ordinal scale from 0- strongly disagree to 4- strongly agree (DTED, 2009).

According to the Project Design Matrix, benchmarks were set against most of the aspects evaluated. The results were all above the benchmarks and hence the purpose of the project was said to have been achieved in SEED. It is this success that lead to the roll out of the project into a Government Programme as SMASSE INSET Malawi Phase II.

2.3.2 SMASSE INSET evaluation for Phase II

The second phase commenced in August, 2008 when it was rolled out to all the education divisions in Malawi (DTED, 2012). The divisions had to conduct preparations first in designated INSET centres before holding any training. So a baseline survey was conducted by the SMASSE Secretariat in the remaining five divisions with the purpose of establishing the current situation in the teaching of mathematics and science. It was also aimed at identifying problems teachers face when teaching mathematics and science and find out the needs of mathematics and science teachers in order to improve their teaching. Several areas were targeted including the practice of ASEI/PDSI lessons. The tools used were questionnaires, interviews and lesson observation.

The results, especially on ASEI/PDSI, indicated that many teachers had challenges in incorporating activities or experiments in lessons, improvising teaching and learning resources as well as involving learners successfully in lessons. It was, therefore, recommended that the subsequent training targets teachers' attitude change, content mastery, improvisation, lesson planning and learner involvement in meaningful activities. Using the cascade system of training from the pilot phase, more divisional trainers were trained and INSET centres identified for each division where teachers of mathematics and science would be trained.

SMASSE INSET Malawi programme was then implemented in all the six divisions on a yearly basis from 2009. INSET activities focused on enhancing the practice of ASEI movement through PDSI approach at classroom level with the aim of making

mathematics and science exciting to learners and also to expose topics considered difficult by both teachers and learners to participants.

When the project rolled out, three consecutive INSETs were conducted in all the divisions, one in each year in 2010, 2011 and 2012 (DTED, 2012). A monitoring and evaluation team comprising members from SMASSE Secretariat, Directorate of Inspection and Advisory Services (DIAS) and JICA conducted a study at the end of each INSET to check teachers' level of mastery of ASEI/PDSI using an ASEI/PDSI checklist. The results were analysed on a five-point ordinal scale (0-4) with a benchmark of 2.5 and they were also compared with the baseline survey of 2009. It was discovered that the overall improvement had changed as follows:

Table 3: Baseline survey for 2009 and INSET evaluation for 2010, 2011 and 2012

	2009 Baseline survey	2010 INSET Evaluation	2011 INSET Evaluation	2012 INSET Evaluation
Overall mean	1.1	1.7	1.8	1.8

Source: DTED, 2012.

Thus, despite the yearly INSETs the teachers received, the improvement in practicing ASEI/PDSI seemed to stagnate below the desired mean of 2.5 and it was unsatisfactory.

2.3.3 Baseline survey for SMASSE phase III

Nampota and Selemani-Meke (2014) conducted a baseline survey for SMASSE INSET Malawi Phase III which was to run from 2013 to 2017. The study, among other things, aimed at examining the extent to which in-service teachers practiced the SMASSE principles in their lessons. The study generated both qualitative and quantitative data using questionnaire, classroom observation, integrated student achievement test, focus group discussion and face-to-face interviews. It was found that teachers continued to teach in the traditional way and SMASSE training did not seem to have much impact in terms of incorporation of student activities, use of experiment and improvisation.

On the use of student-centred pedagogy, it was from teachers that had received 3 to 5 trainings that a gradual progression was observed from direct didactic to direct interactive to guided inquiry to open discovery. However, they lamented on the rate of progress to be minimal.

2.3.4 Current status of SMASSE INSET Malawi Programme

DTED (2016) conducted a final monitoring and evaluation of SMASSE INSET Malawi program for 2016 in South West Education Division and North Education Division. The purpose of the study was to find out the extent to which mathematics and science teachers practice ASEI/PDSI, to identify their needs and enhance their capacity. ASEI/PDSI checklist was used for observers to observe lessons and the observed teachers to evaluate their own lessons. Post lesson discussions were held after each lesson. A total number of 57 schools were visited and 109 lessons were observed. Out of the 109 lessons observed, 36 were for mathematics. The ASEI lesson checklist has eight attributes: Attitude, Activity, Student-centredness, Experiments, Improvisation, and Planning, Seeing and

Improving. The findings were tabled together with those of 2015 where 96 lessons were observed as follows:

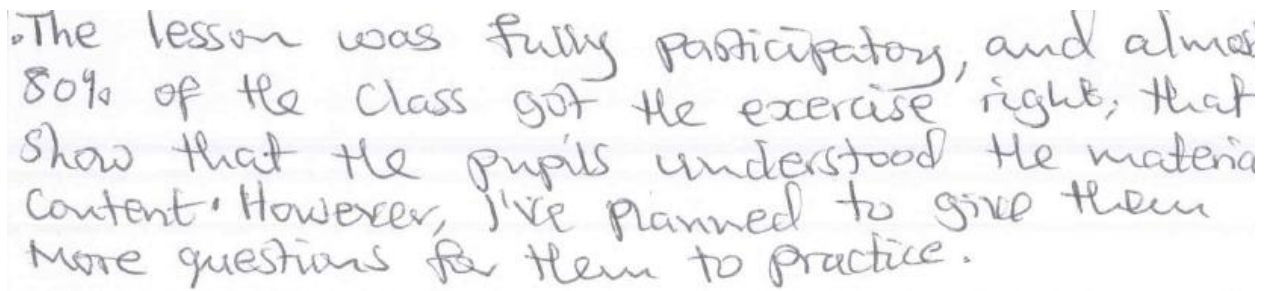
Table 4: Monitoring and evaluation (Lesson observation) results for 2015 and 2016

	Attit ude	Acti vity	Student- Centred	Experi ment	Improvi sation	Plan ning	See ing	Impro ving	Ove rall
2015	2.5	1.9	1.1	1.2	1.6	2.2.	2.3	2.0	1.9
2016	2.58	2.25	1.49	1.29	1.98	2.53	2.4	2.27	2.15
Self- evaluation 2016	3.5	3.3	2.8	2.1	2.9	3.4	3.3	3.4	3.1

Source: DTED, 2016, p. 3.

From lesson observations, the study found that Student-centred, Experiment and Improvisation were rated lower than the rest. Although the overall rating had improved from 1.9 in 2015 to 2.15 in 2016, it was still below the benchmark of 2.5 and therefore regarded as unsatisfactory from the observers' point of view. On the other hand, teachers rated themselves higher in all aspects of ASEI/PDSI than the rating of the observers and their overall score was 3.1. This implies that teachers felt that they implemented ASEI/PDSI lessons to a greater extent as compared to what was observed. For both the observers and the teachers experiment was rated lower than all the other aspects meaning that experiments were conducted to a lesser extent.

From post lesson discussions, teachers indicated that they felt they had implemented good ASEI/PDSI lessons as they had reflected in their self-evaluation using ASEI/PDSI checklist. For example, one teacher wrote her reflections as follows:



The lesson was fully participatory, and almost 80% of the class got the exercise right, that show that the pupils understood the material content. However, I've planned to give them more questions for them to practice.

Source: DTED, 2016, p. 4.

According to the observers, this was in contrast to what they had observed in the lessons. The observers also found that teachers' comments during post lesson discussions had little to do with ideas that could bring improvements of practice in as far as ASEI lessons were concerned. For example, although some teachers mentioned large class sizes and lack of resources as some of the factors hindering effective participation of students, they were not able to mention how best they could have handled such situations. They also mentioned that students' participation was very good citing putting them in groups as evidence even when the group work the students were given only demanded them to recall what the teachers had demonstrated previously and could not initiate critical thinking nor facilitate discussion among the students. Thus, the results indicated a mismatch between teachers' understanding and observers' understanding of what constituted an effectively implemented ASEI/PDSI lesson.

According to the study above, there seems to be a problem with teachers' understanding of ASEI/PDSI. It may also be that the ASEI/PDSI checklist itself has a problem regarding its use in mathematics. This study sought to cover these gaps through identifying challenges that teachers encounter in implementing ASEI/PDSI lessons in mathematics and how they can be addressed. As ASEI/ PDSI is a problem solving approach, it is worth looking at what problem solving approach is, its benefits and what some researchers have written on it in the next section.

2.4 Problem solving

The idea of problem solving is associated with George Polya (1957). Polya defines 'problem' as a situation where a learner is faced with a question to which they cannot apply any algorithm directly but they have to think critically, logically, apply their knowledge and argue to justify their solution. A problem may be related to a theorem or a procedure but the application would not be seen immediately and it is far from obvious.

Problem solving in Polya's view is about engaging with real problems that lead students to guessing, discovering, and making sense of mathematics. However, real problems do not have to be those that are applicable to real life situations they can be within mathematics itself as long as they are non-routine and new to the student. Polya identified four principles of problem solving described as follows.

1. Understanding the problem: Polya taught teachers to ask students whether they understand the question as a whole and every word of it, whether they can state it

in their own words, represent it with picture or diagrams, or whether there is sufficient information to lead to a solution.

2. Devise a plan: Polya believed that solving many problems enables a learner to develop skills to choose appropriate strategy for solving a problem and he mentioned the following as some of the strategies: Guess and check, looking for a pattern, making an orderly list, drawing a picture, eliminating possibilities, solving simpler problems, using symmetry and models, working backwards and using direct reasoning, formula and equations.
3. Carry out the plan: Polya felt that this step is usually easier given that you have the necessary skills in devising the plan. However, he advises that there is need to exercise care and patience.
4. Look back: Polya mentions that a problem solver can gain much by taking the time to reflect and look back at what they have done. This gives them the opportunity to see what worked, and what did not work so that one is able to predict what strategy to use to solve future problems.

On the other hand, the traditional meaning that has been known from time in memorial is that a problem is anything required to be done or requiring doing something. It encompasses all tasks a learner is required to do as a means of consolidating a lesson or checking academic progress over time. It refers to routine exercises that assume learners know the algorithms for finding the solutions (McClure, 2013).

Compared to the routine interpretation of problem solving, Polya's is a much more challenging for a teacher to come to terms with. However, it has the potential to be more effective in developing mathematicians who have a better understanding of the world, the ability to reason mathematically, and a sense of enjoyment and curiosity about the subject.

2.4.1 Implications of problem solving in a classroom situation

When learners engage in problem solving, they will be seeking solutions not just memorising procedures, exploring patterns instead of just memorising formulas and formulating conjectures instead of just doing exercises (Schoenfeld, 1992).

Schoenfeld (1992) further argues that problem solving helps learners to think mathematically. Thinking mathematically means developing a mathematical point of view that values the processes of mathematisation that leads to development of competence in mathematical tools. Many textbooks contain problem solving sections in which students are given drill-and-practice on problems. They are shown a strategy, given practice exercises using the strategy, given homework using the strategy, and tested on the same strategy. However, strategies used in this way become mere algorithms and not problem solving in the sense of Polya's spirit. It is learning to grapple with new and unfamiliar tasks, when the relevant solution methods are not known that develops mathematical sense making (Schoenfeld, 1992).

On the part of teachers, the task of facilitating and leading learners in true problem solving is as demanding as it is on the students. This is because teachers have to perceive the implications of learners' different approaches, whether they are useful or not. If they are not correct, the teacher has the task to know why they are wrong and give suggestions that will help the students to get to the right strategies while leaving the solution in their hands (McClure, 2013).

2.4.2 Studies on problem solving

Kantowski (1974) studied the effect of domain of specific knowledge on problem solving. The study found that for one to become a good problem solver in mathematics one must develop a base of mathematics knowledge. Furthermore, one's effectiveness in organising that knowledge and making sound decisions contributes to successful problem solving. Thus, novices only attend to surface features of a problem while the more knowledgeable learners tend to see more underlying features and are often more successful in generating solutions. Consequently, learners should be given the opportunity to reflect during problem solving activities in a systematic and constructive way (Schoenfeld, 1985). Looking back is the most important part of problem solving as it helps learners to learn from their activities when they examine their solutions and check their argument. This process helps them to see what worked and what did not work for future application. However, the study of Kantowski (1977) found little evidence of learners looking back at their problem solving activities even though the instruction had stressed it.

The same situation was found by Wilson (1990) in a year-long study with teachers in which each participant developed materials to implement some aspects of problem solving in their on-going teaching practice. During a debriefing session at their final meeting, a teacher said it clearly that there was no looking back in schools and all the teachers were in agreement that it was very difficult to get learners to engage in looking back activities. Of course they cited reasons such as pressure to cover the syllabus, absence of tests that measure processes and learner frustration as issues hindering them from engaging learners into looking back activities (Wilson, 1990).

Despite this status-quo, Wilson (1990) argues that the importance of looking back outweighs these difficulties and stresses that the following activities promote learning from problem solving: developing and exploring problem contexts, extending problems, extending solutions, extending processes and developing self-reflection. He further suggests that teachers can easily incorporate the use of writing in mathematics into the looking back phase of problem solving where learners study their work and learn from it as it is what one learns after one has solved the problem that really counts.

Thus, the idea of problem solving in teaching mathematics has not been embraced without resistance and argument. Schoenfeld (2007) explains how the mathematics curriculum had swayed back and forth from rote learning approach to problem solving approach between 1950s and 1980s. Finally, the National Council of Teachers of Mathematics in the United States of America proposed going back to problem solving, having seen how much the benefits of problem solving outweighed its challenges.

It is believe that the primary goals of mathematics learning are understanding and problem solving, and that the relationship between these two goals is that learning mathematics with understanding is best supported by engaging in problem solving (Schoenfeld, 2007). It is therefore not surprising that teachers want students to be able to solve problems in mathematics and in the real world. But for learners to be able to solve problems they must have deep, conceptual understanding of the mathematics involved; otherwise, they will be able to solve only routine problems.

2.4.3 Benefits of problem solving

There are many benefits of learning through problem solving. Problem solving develops understanding when learners are forced to think deeply and connect, extend and elaborate on their prior knowledge. Understanding in mathematics is motivating. Schoenfeld, (1992) argues that when a learner feels confident that ideas make sense, it is very rewarding whilst if learners do not understand an idea, they often feel discouraged and defeated and that they may give up even trying to learn. Such students may be motivated to learn by outside rewards such as threat of a test, money for good grades or even to please their parents.

Another important benefit of learning through problem solving is that it develops understanding that promotes even more understanding. If a learner understands a concept, they will be able to use it when confronted with unfamiliar mathematical problems and succeed with the new problem. This process expands their horizon as they tackle bigger and more complex problems using their existing knowledge (McClure, 2013).

Learning through problem solving helps one's memory. When ideas are disconnected, they are hard to remember. But when individual ideas make sense because they are connected with one another in the learner's web of understanding, much less information needs to be remembered. Besides, it is easily retrieved and applied to a situation that needs it. Thus, understanding enhances knowledge transfer (McClure, 2013).

Learners' understanding of mathematical concepts leads them to perceive mathematics positively as a subject that makes sense because it is logical and connected. As a result, their self-confidence with mathematics soars and they are generally more willing to tackle challenging problems. Such learners develop autonomy over their learning and they learn more and better (Rilley, Greeno, & Heller, 1983). By contrast, students who have learned mathematics without understanding are often successful only with solving problems that are similar to those they have already seen because they are unable to see how mathematical ideas are related (Rilley, Greeno, & Heller, 1983).

ASEI principles through the PDSI approach demand a shift from teacher-centred to student-centred lessons. Every lesson must have well-planned activities or experiments that engage learners physically and in the mind. The activities must be broken into small steps for learners to follow on their own. The teacher is there to facilitate the learning process by providing suitable activities, learning atmosphere and bridges between activities and learning points. This is a problem solving approach where a learner is challenged to explore a problem and develop new knowledge through the new experiences as the learner integrates new ideas into the existing knowledge. Thus, with

proper planning and implementation of ASEI/PDSI lessons, learners would get similar benefits as those of problem solving.

However, as it is not easy for the teacher to use this approach, the PDSI approach enables teachers to become more efficient and effective through looking back at previous lessons and capitalise on strengths to develop even better lessons. The next section explains this reflective teaching.

2.5 Reflective teaching

John Dewey, considered the father of modern education, wrote about reflective teaching in the early 20th century. Dewey (1910, 1916) believed that teachers should take time to reflect on their observations, knowledge and experience. This will enable them to effectively nurture the learning of every child in their classroom. Many researchers believe that good teaching practice is a result of careful reflection. When teachers evaluate what they do and use their self-critical evaluation they adjust what they do next and become good teachers (Brookfield, 1995).

A teacher's reflective practice is a professional requirement that brings them up to date with current practices. It also helps them to understand students and their needs and abilities. It is important to know the student because in a student-centred classroom, where students interact and develop their own knowledge, each student has their own understanding (Moon, 2005). The teacher must understand how every student understands in order to lead them to a common understanding that will eventually lead the students to demonstrate acquisition of the learning points.

The 'See' and 'Improve' aspects of PDSI require teachers to reflect back at their work in order to improve their practice as they facilitate learning. Reflection is not an easy task as it requires one to be honest with oneself and to recognise both one's successes and those areas that need improvement (Moon, 2005). It may even be more difficult to share one's reflections with others. However, it is easier in a Community of Practice (CoP), where members are committed and they have similar goals and problems to share reflections, ideas and improve one's practice as it is described below.

2.6 Community of Practice

The idea of Community of Practice (CoP) is associated with Wenger (1998) and it stems from theories based on the idea of learning as social participation. A CoP has been defined in several ways. Wenger, McDermott and Snyder (2002) define a CoP as a group of people who share a concern or passion for something they do and they interact regularly to learn how to do it better. It has also been defined as "a group of professionals informally bound to one another through exposure to a common class of problems, common pursuit of solutions, and thereby themselves embodying a store of knowledge" (Hildreth & Kimble, 2000, p. 3). However, I find the definition by Wenger and Snyder (2000) relevant and consistently useful to my particular interests. They have defined a community of practice as a group of people sharing a common concern, problem, or interest in a topic who come together to fulfil both individual and group goals and often focus on sharing best practices and creating new knowledge to improve their professional practice. This is because the CoP the participating teachers were engaged in was created among teachers that had a similar concern of low performance in mathematics. Their

interaction in the CoP would facilitate sharing of ideas on how best to handle lessons and it was expected that they would eventually improve in their practice.

2.6.1 Characteristics of CoP

Hildreth and Kimble (2000) explain the following characteristics of a CoP:

1. The domain: People in a CoP are defined by a shared domain of interest that distinguishes them from other people and that membership implies a commitment to the domain.
2. The community: In pursuit of their interest in their domain, members work together, discuss issues, help each other and share information. Such interaction helps them to learn from each other.
3. The practice: Members of a CoP are practitioners who share experiences, stories, tools and ways of addressing recurring problems over time.

CoP enables members to take collective responsibility for managing the knowledge they need. They create a direct link between learning and performance since the same people participate in CoP and in teams and business units and they are not limited by formal structures. Thus, members can create knowledge and share ideas across organisational and geographical boundaries. As such, the concept of CoP has now become a foundation of a perspective on knowing and learning, informing efforts to create learning systems in various sectors (Hildreth & Kimble, 2000).

2.7 Theoretical orientation and Conceptual Framework

This study was guided by constructivism as an umbrella theory of learning and specifically used social constructivism and PDSI as main concepts that guided the research methodology.

2.7.1 Constructivism

Constructivism is a theory that explains the nature of knowledge and the process of learning. It is therefore referred to as a theory of knowledge and a theory of learning. As a theory of knowledge, it states that there are multiple realities since reality exists in individual's point of view. It also states that knowledge is important if it can be put to practical use by the individual having it to help them achieve a goal (Bayne & Horton, 2003). Constructivists argue that individuals construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. When an individual encounter a new situation, they have to reconcile it with previous situations, ideas and experiences. In the course, they may change what they believe, or maybe discard the new information as irrelevant. In any case, they are active creators of their own knowledge through asking questions, exploring, and assessing what they know (Edwards, 2005).

Constructivist philosophy is often contrasted with positivist philosophy which views knowledge as universal or having a precise description or explanation and that it has a predictive power of natural events (Jaworski, 1995).

2.7.2 Social constructivism

Social Constructivism is associated with Russian psychologist Lev Vygotsky and it emphasises on culture and social interaction in learning (Jaworski, 1995). It asserts that knowledge is socially negotiated as learners form and test their constructs in a dialogue with other individuals and with the larger society. In this case, collaboration is a principal focus of learning activities in order to facilitate negotiation and testing of knowledge. (Jaworski, 1995).

Thus, learners can actively construct their own knowledge through interactions with their social and physical environments based on their prior knowledge. According to a constructivist model, learners do not receive knowledge passively. As children try to relate incoming knowledge to what they know, they formulate patterns, meanings and explanations of their own that eventually result into new knowledge. They construct knowledge of ideas and experiences. These personal constructions mediate formation of all further knowledge (Bauersfeld, 1992). This means that learners need to be encouraged to use dialogue and argument in class, experiences which relate to their prior ideas, opportunities to try out new ideas and make those ideas explicit (Pirie & Kieran, 1992). Knowledge gained this way is easily remembered for a long time and easily retrieved for use in daily situations and learners can easily apply it in problem solving.

Social constructivism modifies the role of a teacher, so that they help students to construct knowledge rather than to reproduce a series of facts through provision of tools

such as problem-solving and inquiry-based learning activities. These tools help students to formulate and test their ideas and to draw conclusions and inferences. A student is therefore transformed from a passive recipient of information to an active participant in the learning process. Students become engaged by applying their existing knowledge and real-world experience while learning to hypothesise, testing their theories, and drawing conclusions from their own findings (Bauersfeld, 1992). So, as students are guided by the teacher, they construct knowledge actively rather than just mechanically ingesting knowledge from the teacher or the textbook.

2.7.3 Plan, Do, See, Improve (PDSI)

PDSI is a conceptual framework within which SMASSE project works. It was developed as a vehicle to achieve ASEI condition in teaching (DTED, 2013).

Plan: The teacher is expected to prepare small steps of a lesson with its activities or experiments to allow learners to follow logical flow of the lesson by themselves. Thus, it is expected that apart from lesson plans and schemes of work, the teacher must carefully plan and try out teaching and learning materials, activities and examples before conducting lessons. In every lesson, a teacher must emphasise rationale and application of concepts in order to arouse interest in the learners. They must also prepare questions to ask in class and think in advance of questions that learners are likely to ask and the misconceptions they are likely to encounter. This will enable the teacher to understand the learners' point of view and assist them accordingly.

Do: After planning, the teacher is expected to conduct the lesson as planned. It is encouraged that the teacher should create a friendly atmosphere, be innovative in presenting the lesson and that the presentation methods have to be varied to arouse interest through learner active involvement. While delivering the lesson, the teacher has to be a facilitator who deals with questions and misconceptions while reinforcing learning at every step of the lesson.

See: As the lesson progresses, the teacher is expected to observe and evaluate the teaching and learning process using different evaluation techniques such as question and answer, exercises or allow colleagues to observe for them. This would enable the teacher to see good practices that need to be strengthened and also to see mistakes that must either be corrected or avoided.

Improve: The teacher must reflect on their performance evaluation and the extent to which lesson objectives were achieved. And, just as in the See part, the teacher must see good practices to be strengthened and mistakes to be corrected or avoided. This process would also help the teacher when planning for the next lesson to improve their own practice and performance of learners.

In SMASSE project, PDSI guides a teacher on how they should go about their teaching practice in order to achieve ASEI condition. This study uses the PDSI as a conceptual framework and it has guided the methodology.

2.8 Chapter summary

This chapter has reviewed SMASSE studies in Kenya, in Malawi and in a few countries that make up SMASSE-WECSA. It has also reviewed literature related to SMASSE principles of ASEI/PDSI such as problem solving, reflective teaching and CoP. The chapter ends with a description of theoretical orientation and conceptual framework that guided the study. The next chapter presents the methodology that the study used.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Chapter overview

This chapter begins with a definition of research design and goes on to describe the research methodology and strategy used in the study. It also describes research instruments used, how participants were sampled and how data were analysed. Finally, a description of ethical consideration is given before the chapter ends with a brief summary.

3.1 Research design and methodology

A research design is a plan or strategy of investigating a problem in order to find answers (Kerlinger, 1983). Bell (1999) defines a survey design as a way of generating data from members of a population in order to determine the current status of that population with respect to one or more variables. The study employed survey design to find out how teachers implemented SMASSE principles of ASEI through the PDSI approach in mathematics lessons. A survey design was suitable for this study since the research intended to get information that described the current status of a phenomenon, in this case, ASEI/PDSI implementation in mathematics lessons and the challenges teachers face as they implement ASEI lessons. The study generated qualitative data which was descriptive and it was generated in the setting or context of the participants.

3.2 Research instruments

The study used in-depth interviews and lesson observations in order to answer the research questions. Cohen, Manion and Morrison (2008), assert that interviews are necessary when the required information cannot be observed such as opinion or feeling.

This study sought to learn teachers' opinion of their own classroom practice as they used the PDSI vehicle to ASEI principles. In this case, semi-structured interviews were preferred to allow teachers to define and explain issues in their own unique way. One interview was conducted at the beginning of the research to find out how teachers plan and deliver ASEI lessons, and how they reflect and improve on their lessons (see appendices 9 to 13). This helped to answer the first two questions of the study.

The teachers were then introduced to a CoP. This was a project created by the University of Malawi, Chancellor College for the purpose of curriculum change. JICA had proposed that ASEI/PDSI be introduced in the curriculum for pre-service teachers being trained at the University. So the CoP was created to work with serving teachers that had been trained by SMASSE in order to find out what works and what does not work so as to share best practices in teaching mathematics. This would enable the University to incorporate the ideas that worked (Kazima, Mbano, & Nampota, 2015).

I took advantage of the CoP because I also needed to work with teachers that were familiar with SMASSE principles since I was investigating how teachers plan and deliver ASEI lessons and how they reflect and improve on their practice. Furthermore, as they

worked in their CoP, it was expected that they would share ideas and try to overcome some of their challenges.

In the CoP, teachers planned together, observed each other's lessons and critiqued both lessons and lesson plans. I observed lessons within the CoP using SMASSE INSET Malawi's ASEI/PDSI checklist. As an observer participant, I also attended the teachers' meetings as they critiqued lessons and lesson plans and I tape recorded some of their deliberations (see appendices 20 to 22). This process enabled discovery of challenges teachers face and possible support they need in practicing ASEI/PDSI.

At the end of one year of working in a CoP, a second interview was conducted to learn teachers' experience in working together and draw lessons from the experience on challenges teachers face and possible solutions that would enable them to practice ASEI/PDSI as is required. Finally, the study analysed documents that provided ASEI/PDSI information to teachers such as the compendium of training manuals from 2004 to 2013, ASEI/PDSI checklist and ASEI/PDSI lesson plan template. This part of the study helped to answer the third and fourth questions.

3.3 Validity and reliability of instruments

Validity can be defined as simply the degree to which an instrument actually represents what it is supposed to represent while reliability refers to the ability of an instrument to produce consistent results when administered repeatedly within the specified population and with passage of time (Brewerton & Millward, 2001). There are different kinds of validity but for qualitative research, validity may be addressed through depth and

richness of data and triangulation (Cohen et al., 2008). The use of different instruments to generate data ensured triangulation in this study. A pilot study was also conducted to improve the interview guide.

3.3.1 Pilot study

This section describes how the instruments used in the study were developed and improved. It also gives data generated at this stage with some interpretation so as to assure the reader of reliability of findings from the tools.

3.3.2 The ASEI/PDSI checklist

The study aimed at exploring how teachers implement ASEI principles through the PDSI approach.

SMASSE INSET Malawi uses ASEI/PDSI checklist to observe lessons in mathematics and science. Its validity and reliability have already been established by SMASSE INSET Malawi. Thus, it was deemed appropriate to use the same checklist without editing it and a copy was obtained from the SMASSE Desk Officer for Central West Education Division Office (see appendix 3).

According to Training Manuals for Previous SMASSE INSETs (2004-2013), under ASEI, this instrument examines whether activities and experiments incorporated in lessons engage students so that they develop manipulative skills, intellectual thinking, reasoning and communication skills and that they arouse students' interest in the subject. These attributes render a lesson to be student-centred. ASEI/PDSI checklist also seeks to capture whether any improvised materials in the activities enhance learning, correctly

represent the conventional materials and they fit the lesson into students' daily life experiences (DTED, 2013).

Under PDSI, the ASEI/PDSI checklist examines whether a lesson plan contains small steps for students to follow the logical flow of the lesson by themselves. The lesson plan must have questions that a teacher will ask students at various steps, expected responses from students and misconceptions that they are likely to encounter. During the actual teaching, it is expected that a teacher must create a friendly atmosphere, conduct formative evaluation at every level of the lesson while making clear learning points and arousing students' interest.

This instrument is used for supervision of all mathematics and science subjects such as biology, chemistry, physics and home economics throughout the country.

Since this study sought to explore how teachers implement ASEI principles through the PDSI approach, the instrument was thus adopted for lesson observation in the main study.

3.3.3 Interview guide for teachers

The interview guide aimed at:

1. Finding out how teachers plan and deliver ASEI/PDSI lessons in mathematics.
2. Finding out how teachers reflect and improve on their lessons.
3. Identifying challenges that teachers encounter in implementing ASEI/PDSI lessons and how these can be addressed.

Therefore, it had a section for planning and another one for implementation and reflection (see appendix 6). It was planned that the interview would be done before lesson observations so that the teachers are able to describe what they do as their normal practice on daily basis. However, in order to ensure reliability of the instrument, the supervisor provided expert critiquing. It was also piloted on three secondary school teachers to find out whether the questions were clear, easy to understand and if they would bring out intended responses.

The three teachers chosen were for biology, mathematics and physical science and this was by coincidence since the choice of subjects did not matter. However, the teachers were purposively selected to target those that had been trained by SMASSE INSET Malawi for three years or more and they were chosen from one school which is close to my home for ease of access. One of them was a SMASSE divisional trainer while the other two had been trained by SMASSE for more than three years each.

It was therefore believed that they all had sufficient knowledge of SMASSE Training in their respective subjects. Teachers with good knowledge of SMASSE were chosen in order to find out how they implement ASEI through PDSI in their classroom. Again, since the same ASEI/PDSI checklist is used to supervise lessons in all subjects, it was assumed that all these teachers were aware of what is required of them and they would explain and describe their classroom practice. Besides, since the purpose of the interviews was to improve the instrument, it was not necessary to interview only mathematics teachers.

The interviews were conducted within the school premises and each interview took an average of fifteen minutes. This study helped to improve the interview questions. Some of the questions produced similar information while others were not clear enough and the teachers usually asked for clarification. Each question was, therefore, scrutinised and through this process, new questions were introduced in the interview guide, some questions were removed, others were rephrased and in some cases, moved from the planning section to the implementation and reflection section.

The following changes were made in the planning section:

- Question 1 that originally read ‘What time of the school year or term do you plan your work?’ was rephrased to ‘What time of the school year or what time of the school term do you plan your work?’ This was easier to understand unlike the former question.
- Question 2: ‘Are there any plans that you do on daily basis?’ was omitted because the response was the same as question 7: ‘What documents are produced from your planning?’ Since all the interviewed teachers indicated that they plan their work and one of the products of the planning is a lesson plan, then this question was irrelevant.
- Question 10: ‘Who supervises your planning and how often are you supervised?’ was rephrased and it was shifted to be the last question in the planning section (question 10 in appendix 7) which read: ‘Is your plan checked by any authority in the school before implementation? If yes, who checks and what comments do they give?’ It was assumed that if the interviewee is asked to mention who

supervises them, they would be tempted to mention the one who is supposed to supervise them even if they do not do it. On the other hand, if they are asked whether they are supervised or not, they might tell the truth. The shift, however, was due to the fact that the rest of the questions talk about the planning process itself from the beginning while supervision may mainly focus on a plan that is already done.

- Question 11: ‘Do you record your work after implementation?’ and question 13: ‘Do you include self-evaluation or reflection in your record of work after implementation?’ were both moved from the planning section to implementation since they talk about lesson implementation.

The following changes were made in the Evaluation Section:

- Question 3 that read: ‘Do learners enjoy your lesson? Explain.’ Was omitted as it was deemed irrelevant since the responses to this question were not helping to answer any of the research questions.
- Question 4: ‘How do you involve learners in lesson activities?’ and question 5: ‘Do learners participate in activities of your lesson? Explain?’ gave similar responses and hence question 4 was dropped and question 5 was to be used in the main study.
- A new question: ‘Are your lessons supervised?’ was introduced to precede the question ‘who supervises your lesson implementation and how do they do it (observe lessons or just check records or both)? How often is it done?’ Thus, if one said that they were not supervised then there was no need to ask the second question. Besides, asking only the second question might get the respondents to

mention those that are supposed to supervise them even when they do not do the supervision.

The modified interview guide that was used for data generation in the main study is in appendix 7.

Besides modification of the interview guide, the pilot study helped to bring the following adjustments to the whole data generation process:

- Avoiding commenting too much as this could lead to digression in some cases.
- Avoiding asking many questions at a time to avoid the interviewee overlooking some of the questions.
- Rephrasing a question only when the interviewee shows that they did not understand it the first time.

3.3.4 Pilot study findings

Planning:

The pilot study found that teachers planned individually in their schools. When asked why, the three teachers argued that huge workloads did not allow them time for team planning. Two of them added that they were experienced and could do it without any help while the last one added that it was the culture of the school. It was also learnt that teachers were not writing lesson plans but they relied on lesson notes and that nobody checked their lesson planning. However, all the teachers interviewed were writing schemes and records of work as required. These were checked every fortnight by heads of department and head teachers. The teachers were able to improvise teaching and

learning materials in case of shortage of conventional materials but no one hinted on improvising for the sake of contextualisation.

Implementation:

When teaching, teachers found it difficult to follow lesson plans in class due to mixed ability learners. Learners were given activities to do during lessons but there was no or little lesson supervision by authorities.

Evaluation and reflection:

Lesson evaluation was done by question and answer or giving exercises during or after lessons. Teachers were not sure what self-evaluation meant and where it is supposed to be recorded whether in a lesson plan or schemes and records of work. All the teachers indicated that they conducted lesson evaluation but none indicated that they did self-evaluation. The lesson evaluation conducted was only used for deciding whether to repeat a lesson or go to the next lesson and not necessarily to improve delivery of successive lessons.

3.3.5 Pilot data analysis summary

From the pilot data generated through interviews, the teachers were able to give intended information on their daily practice and they indicated the following:

Planning:

Each teacher usually planned alone and in some cases they just consulted where necessary. Two of the three teachers cited having no partner in the subject as the reason for planning alone while one felt that confidence and experience enabled them to work

alone. Thus, it would appear that teachers did not appreciate the idea of planning together.

It was also found that teachers wrote schemes of work at the beginning of each term and completed records of work as they taught in the term. However, very few, if any lesson plans were written and this was mainly due to the fact that schemes were checked fortnightly while lesson plans were very rarely checked. It may be concluded that teachers do not understand why they have to plan in the practice of ASEI/PDSI. They may be planning for authorities and not for an ASEI lesson on which they have to base their lesson assessment and self-evaluation for improvement in the next lesson.

The teachers also lamented that lessons were not as frequently observed as it was supposed to be and two of them recalled that it was only during performance appraisal time, two years previously that they had been supervised. This may imply that if lessons were supervised, the chance of lesson plans being checked would be high and teachers would perceive lesson plans as being just as important as the schemes and records of work. Thus, it seems that lack of supervision encouraged laziness in the teachers. But this could still be attributed to the fact that teachers may not fully understand why they have to plan in ASEI/PDSI lessons.

Implementation

During the teaching process, the teachers said that sometimes they follow their plan if they have any but in many cases they do not follow it due to mixture of abilities in the students. Thus, while trying to make sure that every student is taken along; they may go

slower than the plan indicates. ASEI/PDSI lesson plan encourages planning small scale experiments and activities that all learners can handle so that they move along together (DTED, 2013). Such a lesson plan can cater for mixed class ability. It is likely that this was not considered and lessons planned for learners that were above average ability became difficult to implement on learners that were either average ability or below average.

Lesson evaluation and reflection:

Although lessons were evaluated, the information was only used to either repeat a lesson or to go to a new lesson. It was not used to improve the teachers' practice in future lessons. This may indicate that teachers were not fully conversant with what SMASSE INSET meant by evaluation and reflection. In actual sense, SMASSE INSET's evaluation and reflection refer to looking at the whole process of preparation and implementation of a lesson to check students' understanding and also to see one's strengths and weaknesses that will help one improve in the next lesson.

On where teachers record information on evaluation, they all said it is recorded in schemes and records of work. No one indicated the existence of a lesson evaluation section in the lesson plan. This shows a gap between the information SMASSE disseminates and the actual practice of the teachers.

3.3.6 Conclusion on pilot study

The pilot study aimed at improving the interview guide so that the modified interview guide in the main study would bring out valid and reliable data. Results from the pilot

study seemed to suggest that teachers are failing to appreciate the idea of team planning and that they may have limited understanding of some of the principles of ASEI/PDSI. These results were similar to those of the main study, making it clear that the aim of the pilot study had been achieved.

3.4 Sample for main study

Purposive sampling technique was used to identify participants for the study to ensure that SMASSE trained teachers were targeted. Three Government secondary schools with two teachers in each school were targeted and they were from South East Education Division for close proximity with Chancellor College, University of Malawi. One conventional secondary school and two community day secondary schools were involved so as to capture a cross-section of well-resourced and under-resourced schools. Although all the six teachers took part in the study, one teacher was not interviewed because he was busy with other equally important issues. The six teachers were coded Teacher A up to Teacher F.

3.5 Data analysis and interpretation

This study was within the interpretivist paradigm and it used qualitative research design to generate data from various sources. An interpretive study generally attempts to understand a phenomenon through the meanings that people assign to them (Cresswell, et al., 2007). As such, tape recorded interviews and lesson critiquing sessions which were part of lesson observation sessions were transcribed and read several times for familiarisation. Guided by the PDSI conceptual framework, data were analysed and clustered around the themes of Planning, Implementation, Reflection, Improvement and knowledge of ASEI/PDSI.

3.6 Ethical consideration

Cohen, Manion and Morrison (2008), advise that any research that is involving people from an institution must seek permission from the authorities and also informed consent from the participants. Gilbert (2008) concurs with this statement and adds that all persons who are invited to be participants in the research must be free to choose to participate or to refuse and they must be given full information about the nature and purpose of the study. Permission to conduct this study in the three schools was sought from the South East Education Division Manager prior to commencement of the study upon production of an introductory letter from the University (see appendices 1 and 2). Using participant consent form in appendix 8, the purpose of study was explained to all the participants while they read the form and they were asked to sign if they agreed to take part. Thus, participants were not forced to participate in any way but to do so of their own free will. Participants were assured that all data generated would be handled with confidentiality to ensure their privacy and they would not incur any harm at all from the study.

3.7 Chapter summary

This chapter has described the research method, strategy used and sampling procedures followed. It has also discussed pilot testing of the instruments used and how they were improved after the pilot study. Finally, it has given a description of how data were analysed and what ethical considerations were made.

CHAPTER 4

FINDINGS AND DISCUSSION

4.0 Chapter Overview

This chapter presents findings of the study through tables and verbatim. The three research questions are answered by presenting findings and discussion for each one in turn. The study sought to investigate how teachers implement SMASSE principles of ASEI through PDSI approach in mathematics lessons and it was guided by the following questions:

1. How do teachers plan and deliver ASEI/PDSI lessons in mathematics?
2. How do teachers reflect and improve on their ASEI/PDSI lessons?
3. What challenges do teachers encounter in implementing ASEI/PDSI lessons and how can they be addressed?
4. How does CoP support teachers in implementation of ASEI/PDSI in mathematics?

The chapter ends with a brief summary of the discussion presented.

4.1 Research Question 1: How do teachers plan and deliver ASEI/PDSI lessons in mathematics?

The study set out to explore how teachers plan and deliver ASEI lessons. This was done through interviews that used an interview guide. Development of the interview guide was guided by PDSI as a conceptual framework. As such, the interview guide had a section

on planning and another one on implementation and reflection. It should be noted that interviews were done before introducing the teachers to a CoP in order to learn their current practice. Table 5 gives an example of how teachers' responses were coded and analysed where common issues were identified and categorised.

Table 5: An example of coding and qualitative data analysis

COMMON RESPONSES	MAIN ISSUE	MAIN CATEGORY	IMPLICATION
I plan alone because: - I feel I can do it - I am alone and overloaded - It is the culture of the school, everybody does it that way.	Planning alone	Planning	Teachers may be unable to appreciate importance of sharing of ideas in group or team work
- I prepare but I keep it in my head -Lessons are rarely supervised and when performance appraisal died, nobody supervises anymore. - Schemes are checked fortnightly but not lesson plans	Poor supervision	Implementation	Teachers prepare for lessons but they do not write lesson plans.

COMMON RESPONSES	MAIN ISSUE	MAIN CATEGORY	IMPLICATION
- I evaluate my lesson using question and answer. I use that information to decide whether to repeat the lesson or not. - I record self-evaluation in schemes of work During interviews it was observed that teachers hesitated a lot when answering about self-evaluation	Teachers' limited understanding of self-evaluation and reflection	Evaluation and reflection	Teachers' understanding of evaluation is assessing learners' understanding at the end of a lesson through question and answer or exercises. They have limited understanding of the 'self-evaluation' part. .

Source: Author, 2016

4.1.1 Planning and implementation before CoP

The following were some of the responses teachers gave when they were asked whether they planned alone or with colleagues and why:

“Most of the times as for me I do plan alone... Actually I don’t really write the lesson plan as it was supposed to be but still when I am going into the class I have something” (Teacher A, Interview 1).

“Usually I plan alone. I am the only mathematics teacher... people are overloaded. We don’t have adequate time but I plan. Am going to teach this let me see what I am going to do, how I am going to start it and then where ...” (Teacher B, Interview 1).

“Aah, I plan alone... Not necessarily having a special reason but may be because I plan out of the school campus, at home. Sometimes I plan when other people are also busy. So, I usually plan alone and it seems it is a practice that everybody plans alone” (Teacher C, Interview 1).

“I plan alone just because we are few teachers of mathematics” (Teacher D, Interview 1).

Again teachers were asked whether they write lesson plans every day and these were some of the responses:

“No” (Teacher B, Interview 1).

“Eh! (Both laugh), lesson plans is a challenge, is a challenge, is a challenge” (Teacher D, Interview 1).

“No! Planning doesn’t mean writing. Eyaah, sometimes I produce lesson notes and sometimes no. Eheee, I just put in my head” (Teacher E, Interview 1).

Such responses indicated that teachers planned individually and many of them may have relied on lesson notes and sometimes even just one’s memory and not the required lesson plans. Besides, they also lamented that even when they planned it was difficult to follow the plan in class as they taught due to different ability of the learners.

From the rest of the responses, it was learnt that teachers faced difficulties to plan properly as they did not have sufficient time to do so. This was mainly due to understaffing. Teachers had heavy workloads and in some cases they had to teach two or three subjects. Thus, they spent most of the day time teaching and they would be exhausted as they went home in the evening. As everybody was busy, it was not possible to plan together and share ideas. Such a situation would have dated way back in time in the schools to the extent that one teacher directly commented that it was the culture of the school that everybody planned alone. As such, lesson planning was indeed a problem.

Although four of the five teachers said that they did not write lesson plans, they all said that they included activities in teaching. They cited group work and class exercises as examples of activities learners were involved in. They would give an exercise or a problem with already known procedures for solving so that students worked in groups. These were taken as ‘Activities’ for students

The study also learnt that although there were problems with writing of lesson plans, all the teachers interviewed indicated that they wrote schemes of work and kept updating records of work throughout the term.

When asked why this was so, teachers indicated that authorities regularly checked schemes and records of work about every fortnight while lesson plans were rarely checked and lessons rarely supervised.

The requirement for PDSI as a vehicle to achieve ASEI lessons is that a teacher must always plan for their lessons and each lesson must have a written lesson plan. As they plan, teachers must think of activities and experiments that students will do so that the lesson is student-centred. In order to contextualise the lesson, the teacher must plan to use materials from the students' immediate environment to make it easy for them to connect mathematics to everyday life. This carefully prepared lesson plan must be used as a road map during lesson delivery and it must incorporate teaching notes, activities or experiments thoroughly planned with the student in mind and broken down into small steps that students can follow (DTED, 2013). In this case, the type of planning the teachers were doing may not have been of ASEI in nature since they relied on lesson notes or just their memory to teach what they had prepared to deliver.

On the other hand, teachers worked hard and made sure they wrote schemes and records of work although they did not write lesson plans knowing that they were unlikely to be asked about them. It would therefore appear that supervision played a role in either encouraging or discouraging the spirit of planning among teachers. If authorities were

vigilant with supervision, teachers would be encouraged to write lesson plans for their lessons and they would include activities and experiments for learners. These findings agree with Waititu and Orado (2009) who found that school principals' encouragement played a role in teachers' change of teaching pedagogy from teacher-centred to student-centred.

However, this may mean that teachers understood “planning” for a different purpose other than the intended purpose in the PDSI approach. It seems teachers planned for authorities to see and to fulfil a requirement. But PDSI requires that teachers plan and try out activities for learners and any possible experiments and improvisation and produce a lesson plan. The lesson plan should be used to conduct an orderly lesson that is easy to follow and finally conduct self-evaluation basing on it to improve in subsequent lessons (DTED, 2013). This is planning for delivery, reflection and improvement. It is, therefore, unlikely to expect a teacher that depends on lesson notes or just their memory to conduct an ASEI lesson. Furthermore, as teachers had heavy workloads and they could not plan well, it is not surprising that they found it difficult to follow a lesson plan to teach when it was available. This could be attributed to failure to select and try out activities, experiments and improvised learning materials for learners to work on during lesson delivery.

4.1.2 Lesson evaluation and self-evaluation before CoP

The study found that while teaching, teachers were able to evaluate lessons to see whether objectives were achieved or not. They would do this through oral question and answer or written exercises. If the students performed satisfactorily, they would proceed

to the next lesson whilst if they performed poorly the lesson would be repeated. Thus, evaluation of lessons focused on student performance and there was no indication of self-evaluation, where they evaluated the way the teacher conducted the lessons.

It also appears that many of the teachers did not understand what self-evaluation meant. There was hesitation in answering questions to do with self-evaluation. For example, the following are some responses given when teachers were asked whether they conducted self-evaluation of their lessons or evaluated the lesson as a whole and how the information was used:

Interviewer: “Okay, then after teaching, do you evaluate your lesson as a whole?”

“(silence)” (Teacher E, Interview 1)

Interviewer: “After you have done your teaching?”

“Yes, I evaluate. Sometimes I can do it, aah (hesitation), according to, aah (more hesitation), looking back to the exercises that I have given my learners. If they have done well, I can say that my lesson was good.”
(Teacher E, Interview 1).

Interviewer: “Okay. Then how do you use that information?”

“I use this information to revise, either to revise or not”

(Teacher E, Interview 1).

“When you say Self-evaluation?” (Teacher D, Interview 1)

Interviewer: “When I say, Self-evaluation I mean whether the lesson was well-taught or not so well-taught on the part of the teacher”.

“I can see by the exercise which I give, do they really, do they really, are they really understood?” (Teacher D, Interview 1).

Such responses may indicate that teachers had limited knowledge of self-evaluation as one of the principles of ASEI/PDSI.

In PDSI, the ‘See’ part implies that during delivery of a lesson, a teacher must evaluate how the lesson is going on in terms of learners’ understanding of the intended objectives and make adjustments where necessary. DTED (2013) suggests that this can be done in many ways such as oral question and answer and class exercises. At the same time, the teacher must evaluate themselves in terms of how the lesson is unfolding, class management, ability to involve the learners in activities, effectiveness of their choice of activities and quality of their facilitation to drive learners to achieve objectives. This part of evaluation constitutes formative evaluation.

It was found that all the five teachers interviewed were able to evaluate their lessons in terms of learners’ achievement of objectives. In case of objectives not being achieved, the teacher would repeat the lesson. However, the focus was on the learners only and not on the teacher as well. They seemed to attribute all achievement of objectives to what the learners do and not necessarily a collective effort of the teacher and the learners. They seemed to ignore the role of the teacher as a facilitator of the learning process and that

their quality of facilitation matters a lot in the learners' achievement of objectives. This is not surprising because it was seen that their planning was not proper planning for ASEI lessons in which learners are actively involved in activities while the teacher facilitates the learning process.

On the other hand, the teachers may not have sufficient knowledge of evaluation encompassed in 'See' as an element of PDSI in the sense that SMASSE INSET Malawi recommends. This is discussed further under challenges in teachers' implementation of ASEI/PDSI principles where documents that inform teachers on evaluation are examined.

4.2 Research Question 2: How do teachers reflect and improve on their ASEI/PDSI lessons?

4.2.1 Reflection and improvement before CoP

According to the responses given from interviews teachers were not able to reflect on or look back at a previous lesson to see their own strengths and weaknesses. Lessons were evaluated in terms of what students had learnt and not necessarily how the teacher conducted the lessons.

The 'Improve' part of PDSI implies that a teacher reflects on a lesson and makes adjustments during teaching in class in case of objectives not being achieved hence the case of repeating a lesson or part of it being recommended as good practice within formative evaluation. 'Improve' also implies that a teacher looks back at the whole process of planning and delivery of a lesson to see how good the teacher performed (DTED, 2013). This is summative evaluation and it calls for one's honesty in reflective

teaching where a teacher looks at their practice to see and identify their strengths and weaknesses (Moon, 2005). Thus, to improve in their practice teachers need to strengthen their good practices and avoid or correct previous mistakes as they plan and deliver new lessons. Planning for ASEI lessons requires that teachers write lesson plans for all lessons. It is expected that after teaching, the lesson plan would be used to theoretically revisit the lesson and see what worked and what did not work so that the next lesson is an improvement on the previous one.

Looking at the type of planning the teachers used to do where they produced lesson notes or just some outline of a lesson in their memory instead of a written lesson plan, it is likely that they would not reflect on a previous lesson. They would not have a document to use as a basis for comparing what they are planning to do to what they did previously. They may not easily remember the details of how the lesson went on in order to see strengths and weaknesses so as to improve in their practice. So reflection and improvement in the PDSI sense was not part of their practice. This was seen from their responses and the hesitation displayed in responding to questions to do with reflection and self-evaluation that indicated lack of knowledge of the same.

However, teachers' lack of knowledge may have been a result of inconsistent information given by SMASSE INSET Malawi in their documents namely ASEI/PDSI lesson plan template, ASEI/PDSI checklist, ASEI/PDSI checklist interpretation and SMASSE INSET Malawi training manuals compendium. These documents do not stress self-evaluation in

the same way. This is also discussed further under challenges in teachers' implementation of ASEI/PDSI principles.

4.3 Research Question 3: What challenges do teachers encounter in implementing ASEI/PDSI lessons and how can they be addressed?

Soon after the first interviews that were meant to find out how teachers plan, deliver, reflect and improve on their lessons, participants were introduced to a Community of Practice (CoP). As explained earlier, a Community of Practice is defined as a group of people sharing a common concern, problem, or interest in a topic. They come together to fulfil both individual and group goals and they often focus on sharing best practices and creating new knowledge to improve their professional practice (Wenger & Snyder, 2000). The CoP was established as part of the project implemented by the University of Malawi with support from JICA to find out what can be incorporated in preservice education for teachers. I followed teachers in the CoP as a participant observer in an endeavour to identify the support teachers need in order to practice ASEI/PDSI as it is intended by SMASSE INSET Malawi. Thus, I attended all the meetings of the six teachers and recorded their deliberations with minimal interference. Meetings were held twice a month. After one year of working in the CoP, second interviews were conducted with the teachers (see appendices 15 to 19).

4.3.1 Teachers' practices in the CoP

In this CoP, teachers were planning together, observing each other's lessons and critiquing both lessons and lesson plans. For three consecutive school terms they met once before the beginning of the term to write schemes of work for the term and

thereafter they met once in every two weeks for lesson planning. Close to the end of third term, teachers were interviewed again using the second interview guide (see appendix 14) to learn from them how the CoP had improved their practice of ASEI/PDSI). The second interviews also checked teachers' understanding of some of the principles of ASEI/PDSI. These translated into possible support teachers need in order to practice ASEI/PDSI as required by SMASSE INSET Malawi.

4.3.2 Planning during the CoP

In the CoP teachers prepared schemes of work together and shared copies so that they implemented the same schemes of work. When planning lessons at the beginning of the CoP teachers shared sub-topics within a topic. It was then discovered during critiquing that merging such lesson plans left some gaps and at one point teachers had to prepare a supplementary lesson plan to cover a gap. Thus, they agreed to share complete topics and it worked better. It also minimised the amount of planning done by an individual for a school term. For example, a teacher would write lesson plans for one topic out of five topics to be done in a term and they would get the rest of the lesson plans from colleagues. This helped teachers to manage their time well and they did not complain about having too many lesson plans to write.

4.3.3 Improvement in Lesson plans

During critiquing, teachers looked at individual lesson plans and discussed each entry in turn until agreement was reached. They would adjust time allocated to sections, bring out prerequisite knowledge, look for more engaging activities and even write down as many

expected responses from students as possible. Thus, among other things, lesson plans were improved in the following areas:

Estimated times for sections:

Before CoP teachers had lamented that lesson plans were difficult to follow due to massive over planning or under planning. It was also observed during CoP, especially at the beginning that teachers were struggling to keep pace with their plans. However, with time, estimation of duration became better with input from each of the six teachers. Teachers no longer looked at a lesson plan as a burden as they sometimes commented that it was very easy to teach using a lesson plan although it was difficult to prepare.

Students' prerequisite knowledge:

Feeding into poor time management was an oversight of students' prerequisite knowledge. Teachers would discover within a lesson that learners did not have the prerequisite knowledge. So instead of teaching the planned lesson, they would go back to what was supposed to be prerequisite knowledge and the lesson plan would not be followed. However, in the CoP teachers tried their best to remind each other of all prerequisite knowledge required for a particular lesson. This enabled teachers to give room in their planning especially in the introduction part to cater for any revision that would ensure availability of this knowledge so that eventually the plan was followed and objectives were achieved.

Quality and frequency of activities for students:

It was observed that more activities were incorporated in the planning for students to do. In order to keep students active and enthusiastic, teachers preferred activities in which learners were discussing and arguing about mathematics to those in which learners simply solved a problem with known procedures in groups. With time, teachers realised that the latter did not sustain students' participation and enthusiasm.

Choice of teaching and learning resources:

Instead of relying much on the chalk board and a text book, teachers were able to use other teaching resources such as charts. Teachers were also able to contextualise mathematics. They would describe phenomena in the students' immediate environment where students would easily imagine the situation and respond freely. For example, I observed one lesson on budgeting where students were asked to imagine they had been given a sum of five thousand Kwachas to buy provisions befitting a student in a secondary school. This was a group activity that aroused a lot of discussion and students seemed to enjoy it and participated well.

Bridging of activities and learning points:

When planning, teachers made sure that every activity was concluded and linked to the appropriate learning point before the next activity so that learners would not be left wondering why an activity had been done. Oral questions to be asked in class were listed down to make sure that only those relevant to the learning point are asked.

Lesson plans produced from this type of planning lead into delivery of orderly, easy to follow and successful lessons as it can be seen from some of the teachers' responses below when they were asked to differentiate between their planning before and during CoP:

“There is a very big difference especially when we are planning in this CoP. It's like we are trying to have different views from different people especially when we are criticising the lesson plans. After each and every individual has planned on his or her own then after we meet... If there is any additional information we put in that and if there are some information to remove we remove them. So this makes the lesson plan to be more relevant compared to a lesson plan which we used to plan before this CoP.” (Teacher B, Interview 2).

“Yah, when we were planning we do share, critique the lesson plan, while previously we had to write, no any critiquing. So which means the lesson plan which we are producing now they are improved lesson plans which when we implement to our learners they really help us a lot.” (Teacher D, Interview 2).

The idea of sharing responsibility of planning where each person was given a topic to plan on and share copies after group refinement improved time management. Teachers no longer complained of having no time to plan and everyone had a complete set of lesson plans for the term. During meetings teachers supervised and encouraged each other to

write lesson plans and implement schemes of work as planned. If a teacher did not write lesson plans assigned to them, the group would give them time to write the same during meetings. This encouraged every teacher to do their part before the following meeting.

From lesson observations in the CoP, teachers had written lesson plans. They incorporated activities in the lessons and sometimes included improvisation. This was in line with the aspect of 'Plan' in PDSI.

4.3.4 Implementation in the CoP

It was interesting to discover during lesson observation that in most cases teachers were able to follow lesson plans and delivered lessons that flowed systematically. Responses from interviews revealed that teachers presented better student-centred lessons as they explained that students' participation had improved as a result of improvement in activities. Lessons were presented with varying teaching methods such as pair work, group work and role-play. This kept students active and enthusiastic throughout many of the lessons and improved achievement of objectives. In PDSI, 'Do' implies implementing a lesson in the way it has been planned. Teachers' ability to follow their lesson plans in teaching meant that their planning was good.

4.3.5 Evaluation, reflection and improvement during the CoP

Teachers observed each other's lessons once in every two or three weeks and afterwards came together to critique them. A total of 9 lessons were observed from the three schools. The one who taught the lesson would critique it first before the rest followed. Some of the lessons that were observed at the beginning showed that they had activities that did

not satisfactorily arouse students' enthusiasm. Thus, one teacher was able to give the following response:

“students do not enjoy much when you give them a problem to solve in groups using already known method, they like issues of argument.”

(Teacher A, Interview 2)

Sometimes they would discuss lessons that had been delivered by individuals even without observing them so as to know how effective their planning was. This facilitated sharing of ideas and best practices as teachers were able to talk about their own weaknesses and receive constructive ideas.

In the CoP, evaluation extended from single lesson to a series of lessons where teachers would refer to previous lessons as having had ‘dull’ activities and they would search for better activities during planning. This showed that teachers were able to reflect on their work for improvement. Furthermore, as teachers developed skills in critiquing their own work, they would adjust a lesson plan within the lesson by way of improving it.

The discussion above clearly shows that unlike before CoP, during the intervention evaluation was done for both achievement of objectives in the classroom and improvement of one's professional development which is what PDSI advocates.

4.3.6 Challenges in teachers' implementation of ASEI/PDSI

Although the teachers only talked about poor supervision, lack of teaching and learning resources, understaffing and heavy workloads, the study found that there were other challenges that could be hindering teachers from practicing ASEI/PDSI.

4.3.7 Teachers' limited knowledge of some of the ASEI/PDSI principles

It appears that teachers did not have sufficient knowledge of some of the ASEI/PDSI principles, yet SMASSE INSET Malawi uses the ASEI/PDSI Checklist to supervise lessons in mathematics and science subjects. This may imply that teachers are assessed by a tool that they do not understand well. It is, therefore, not surprising that so far evaluation of teachers indicates unsatisfactory performance as found by the studies of DTED (2009), DTED (2012), DTED, 2016 and Nampota and Selemani-Meke (2014).

'Activity' and 'Student-centred':

Before working together in the community of practice teachers said that they usually involved students through question and answer and doing group exercises. They would give an exercise or a problem with already known procedures for solving so that students worked in groups. These were taken as 'Activities' for students. In the CoP, during lesson critiquing, teachers started choosing activities that would engage students into real discussion and argument in their groups. Through discussion, teachers realised that activities given to learners should be meaningful and arousing interest. They started realising that working in groups is not necessarily involving learners but the type of activity to do in the groups matters. Thus, sharing ideas increased teachers' creativity to come up with better activities. This led learners more to problem solving than before.

Likewise, 'Student-centred' seemed to have meant that students would just be doing something. Sometimes teachers thought that using question and answer was enough for a lesson to be student-centred. The way teachers seemed to understand Activity and Student-centred in this study agrees with findings of the study conducted by DTED (2016), where teachers' self-evaluation on their use of ASEI/PDSI was higher than that by SMASSE observers. Furthermore, the teachers judged students' participation as very good when group work was used although the group activities given could not initiate critical thinking and good discussion. This clearly shows that teachers' understanding of Activity and Student-centred was different from that of the observers.

In this study, through discussion within the CoP, sharing of ideas and revisiting what 'Student centred' meant as per the ASEI/PDSI checklist interpretation, teachers started letting students do more to learn than the teachers did. For example, learners would suggest meanings or relationships of concepts and presenting or describing group findings with input from group members and comments from the rest of the class.

It can be concluded from this that teachers' sharing of ideas improved their understanding of the meaning of 'Activity and Student Centred' in ASEI/PDSI. As DTED (2013) suggests, teachers need to evaluate each other's lessons and share ideas. Team teaching is encouraged in reflecting and improving over past lessons. When teachers were working in the CoP, it was easy to support each other, observe lessons and evaluate them together. Working individually before CoP did not provide for the opportunity to hear from others

and learn from their experience. It may be concluded that teachers need to work in groups to support each other in implementation of ASEI through the PDSI approach.

Improvisation:

DTED (2013) defines Improvisation in ASEI as adopting materials and equipment from the student's environment even when conventional materials are available. In this study, the teachers' knowledge of Improvisation seemed to be limited to bringing non-conventional materials only in the case where conventional materials are not there. They seemed to miss the contextualisation part where students are supposed to link mathematics to their local environment. Working together in the CoP did not seem to change much of this perception. Four of the five teachers interviewed still thought that improvisation is only needed when conventional materials are not available. Only one teacher who was a divisional trainer talked about improvisation in the sense of contextualisation. It is therefore possible that teachers do not know exactly what improvisation in ASEI means. The divisional trainers have the opportunity to interact with training manuals during their own training at the national training and as they carry out training of teachers at division level. Teachers do not have the same opportunity and are likely to miss some of the aspects of ASEI/PDSI if they are not discussed clearly during their trainings. The document that teachers easily access is a lesson plan template which does not have much detail of ASEI /PDSI principles. With such limited information and knowledge, one cannot expect much improvisation from the teachers. It is essential that teachers access sufficient information on ASEI principles and the PDSI approach in order for them to practice it fully.

‘See’ and ‘Improve’:

Before working in the CoP, teachers seemed to have understood “See” as checking or evaluating whether objectives were achieved or not. They would give a written exercise to students or use question and answer during the lesson to verify whether they had grasped the concept satisfactorily. Alternatively, teachers asked students at the end of the lesson to say what they had learnt and the response would be taken as a complete lesson evaluation. This meant that evaluation was limited to achievement of students and it did not extend to how the teacher had performed.

In terms of “Improve”, teachers would repeat a concept within a lesson if it seems not well understood by learners. If evaluation was done at the end of the lesson and the teacher felt that there was need, the lesson would be repeated to make sure that the concept was understood. But once this was done, it seemed the evaluation was never referred to again and every lesson was treated separately. It did not feed into the teaching of the next lesson in terms of strengths and weaknesses. In the CoP, teachers evaluated lessons and based their further planning on strengths and weaknesses of previous lessons.

From their responses in the second interview it was clear that teachers evaluated a lesson for its improvement and the improvement of proceeding lessons. Furthermore, during planning, teachers would refer to a previous lesson and try to search for better activities that would be interesting and engaging to the learners. This implied that working together

had improved teachers' understanding of self-evaluation. Thus, teachers need support from each other to perform as it is expected in the PDSI approach.

4.3.8 Problems with SMASSE ASEI/PDSI checklist as an assessment tool

There are problems specifically associated with the ASEI/PDSI checklist itself, its interpretation, its lesson plan in terms of the way information is given and the expectation from mathematics lessons. These may hinder proper understanding of teachers as they try to implement ASEI/PDSI principles.

Experiment:

The word experiment is defined as a procedure carried out to verify, refute or validate a hypothesis (Schwarz, Davidson, Seaton, & Tebbit, 1990). The online dictionary defines experiment as a test, a trial, or a tentative procedure, an act or an operation for the purpose of discovering something unknown or of testing a principle or a supposition (Webster, 2016). ASEI/PDSI documents do not redefine experiment but simply emphasises that experiment refers to a shift from large scale recipe type of experiment to investigative type in which students are allowed to make predictions, hypothesis and verify them practically with the teacher bridging the activity to the intended concept (DTED, 2013). Thus, the dictionary meanings seem to be maintained with the mentioning of predictions and hypotheses. This might be easy for science subjects such as biology and chemistry but not so easy for mathematics.

Looking at the nature of mathematics in secondary schools in Malawi, there are very few topics, such as probability, where teachers can comfortably carry out experiments. It may

not be possible to conduct experiments in many of the topics. For example, in lesson observation, there was no experiment observed in the nine lessons observed. Nevertheless, there were very good lessons delivered by the teachers despite the absence of experiments. However, ASEI/PDSI checklist expects every lesson to conduct experiment which is unrealistic for mathematics. There are some topics that may not have readily available areas where a teacher would conduct experiments for example, approximation and estimation, lines and angles and social and commercial arithmetic among many others. There are not many topics in which experiments would easily be conducted.

Although ASEI/PDSI checklist has a column labelled 'Not Applicable' so that lesson supervisors can indicate when something is not applicable, it appears this feature is not utilised as such for experiment in mathematics lessons. In the study done by SMASSE INSET Malawi to evaluate the impact of its trainings, 67 lessons and 220 lessons were observed from different schools in 2010 and 2012 respectively (DTED, 2012). These figures include mathematics, biology, physical science and home economics lessons. In both years, ASEI/PDSI Checklist was used and data were analysed quantitatively to come up with an index for each item. The studies did not isolate mathematics lessons observed or exempt any lessons in which experiment would not be expected. All the lessons observed in mathematics and sciences were treated equally. Thus, experiment had an index of 1.2 in 2010 and 1.5 in 2012. Both studies lamented that these results were below the expected bench mark of 2.5 and attributed it to teachers not being able to implement

ASEI lessons and no mention was made that experiment was not applicable in some of the lessons.

In a study conducted by Nampota and Selemani-Meke (2014) to find out teachers' pedagogical practices in classrooms, ASEI/PDSI checklist was used to observe mathematics, biology and physical science lessons. A total of 26 lessons were observed and the quantitative data were analysed using SPSS software. It was also noted that this study did not isolate any mathematics lessons in which experiment would not be expected.

Results in all the three studies agreed that there was insufficient incorporation of experiments in mathematics and science lessons. These results may not be surprising because many of the mathematics lessons observed could have featured no experiment by their nature, thereby reducing the indices. Expecting experiments to be conducted in every mathematics lesson may be unrealistic and frustrating to the teachers being observed.

Improvisation:

Just as in 'Experiment', ASEI/PDSI checklist expects every lesson to have 'Improvisation' which again is not realistic. A teacher may have all the required materials such as text books, chalk board and mathematical instruments and conduct a good lesson without improvisation. From the nine lessons observed in this study, whose results are

analysed in Table 6, it can be shown that a teacher can conduct a successful lesson without improvisation or experiment.

Table 6: Analysis of ASEI/PDSI checklist from lesson observations

LESSONS OBSERVED	School A				School B			School C		Average
	1	2	3	4	5	6	7	8	9	
Attitude	3.5	4.0	3.3	3.0	3.8	3.1	2.8	3.3	3.5	3.4
Activity	2.4	1.0	1.6	2.4	3.2	3.5	4.0	1.6	2.4	2.5
Student-Centred	2.0	1.6	1.6	2.0	2.6	3.0	3.1	1.3	2.7	2.2
Experiment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Improvisation	2.3	1.0	0.7	1.0	3.7	1.3	3.0	3.0	2.3	2.0
Planning	3.0	2.7	2.7	2.7	3.7	3.2	3.7	3.3	3.7	3.3
Seeing	3.0	2.3	3.0	3.5	3.5	2.4	3.5	3.4	3.5	3.2
Improving	3.5	2.3	3.0	3.5	3.4	3.0	3.7	3.3	2.8	3.2
Average	2.5	1.9	2.0	2.3	3.0	2.4	3.1	2.4	2.6	2.5
<i>Average excluding experiment and improvisation</i>	3.3	2.5	2.7	3.0	4.0	3.3	4.0	3.2	3.5	3.3

Source: Author, 2016

For example, lesson 4 scored 1.0 on improvisation and overall it scored 2.3 while lesson 6 scored 1.3 on improvisation and an average of 2.4. This meant the practice of ASEI/PDSI in these lessons was unsatisfactory basing on SMASSE INSET Malawi benchmark set at 2.5. However, the lessons were observed to be very good and successful in achieving objectives and this was mainly due to activities that successfully engaged students and helped them to achieve the objectives. If ‘Experiment’ and ‘Improvisation’ had been rated as ‘Not Applicable’ in these lessons, then the overall scores would have been 3.0 and 3.3 for lesson 4 and 6 respectively. This would depict satisfactory practice of ASEI/PDSI.

But in this case these two scores only reduced the rating of the lesson and the teacher would be rated low on performance while in actual sense the lessons were good. It would be better to use experiment and improvisation only where they are applicable for mathematics lessons.

Evaluation and self-evaluation:

The terms ‘evaluation’ and ‘self-evaluation’ have not been presented and stressed in the same way in SMASSE INSET Malawi documents. There are several documents that are meant for teachers to use as reference material or to use on daily basis as they implement ASEI/PDSI lessons. The most important among them are the following:

1. Training Manuals for previous SMASSE INSETs: This is a compendium of Training Manuals from 2004 to 2013 for biology, mathematics, physical science and home economics. The compendium is made available in all INSET centres in Malawi. Teachers can use it for reference
2. ASEI/PDSI lesson plan template: It is a form that guides a teacher to plan ASEI/PDSI lessons. It has columns in which a teacher fills information such as students’ activity, teacher’s activity and learning points. The rows show the stages of the lesson such as introduction, development, conclusion and evaluation at the end. (See appendix 5).
3. ASEI/PDSI Checklist: This document is used to observe an ASEI/PDSI lesson. It contains a description of all features an ASEI/PDSI lesson must have. Each entry is rated on a five-point ordinal scale from zero to four, where zero means the item is not present and four implies it was used a great deal. (See appendix 3).

4. ASEI/PDSI checklist Interpretation: It explains each and every feature of ASEI/PDSI checklist for better understanding so that an observer goes into the lesson knowing exactly what to look for as they use the ASEI/PDSI checklist. (See appendix 4).

The documents above seem to present the concepts of ‘Evaluation’ and ‘Self-evaluation’ to teachers with inconsistent emphasis besides the fact that some of them are not readily available in many schools.

Firstly, in the ASEI/PDSI Lesson Plan there is a row at the end of the lesson plan headed “Evaluation”. It is assumed that a teacher should write in that space what would be taken as both lesson evaluation and self-evaluation. Since this document does not clearly indicate that “Evaluation” includes ‘self-evaluation’, when teachers use it they may not remember “Evaluation” as “Self-evaluation”. This was evident from teachers in this study who only focused on learners’ performance for evaluation before working in the CoP.

Secondly, on ASEI/PDSI checklist, there are rows labelled Attitude, Activity, Student-Centred, Experiment, Improvisation, Planning, Seeing and Improving. It is in Seeing and Improving that elements of evaluation appear and the ideas described in these elements seem to talk about the lesson in progress. They do not say clearly whether this is evaluation of the lesson or the teacher as well (see table 7).

Thirdly, as ASEI/PDSI Checklist Interpretation Document gives interpretation of seeing and Improving, it stresses on the current lesson and it does not clearly say that a teacher links lessons and be progressive in their practice (see table 7).

Table 7: Table of extracts from ASEI/PDSI information documents

From ASEI/PDSI Lesson Plan	From ASEI/PDSI Checklist	From ASEI/PDSI Checklist Interpretation
LESSON EVALUATION	Seeing	
	Was the teacher paying attention to the progress of students during class work?	This rates on how the teacher checks on the students' learning. This could be by asking questions, guiding students individually, in groups or pairs as they are carrying out the activities.
	Was the teacher keeping good eye contact?	This rates on how the teacher checks the behaviour of each student in a lesson, to involve all students.
	Did the teacher invite questions from students in the course of the lesson?	This rates on how often the teacher gives opportunity to students to ask questions at every step in the lesson.
	Did the teacher ask the questions to check the level of students' understanding?	This rate on the type of questions that the teacher asks to check students' understanding. Does the teacher ask questions in the course of the lesson (Formative evaluation) and after the lesson (summative evaluation)
	Improving	
	Did the teacher rephrase questions /instructions where necessary?	This checks on whether the teacher makes efforts to improve on the instruction/questions/methods/procedure to

		make students understand in the lesson.
	Did the teacher give further guidance to students on activities?	This is rated on how a teacher helps groups, class and individuals to understand what they are supposed to do in the activities.
	Did the teacher adjust the lesson where necessary?	This is rated on how the teacher changes some of the components of the lesson or the whole lesson altogether with the aim of making students understand.
	Was the teacher able to indicate some points to improve?	This rates the quality of the teacher's self-evaluation that can assist in improving the lesson.

Source: DTED, 2013

It is only in the SMASSE INSET Malawi Training Manuals that the idea comes out clearly as follows: “Whatever the format of evaluation, the teacher is supposed to incorporate the changes in future lessons and hence the Improve part of the PDSI approaches” (DTED, 2013, p.32). Besides, most of the information on the interpretation of ASEI/PDSI is in the compendium and not in the lesson plan and not in the ASEI/PDSI checklist. Unfortunately, this 1171 paged compendium is placed in only three to four schools per Education Division that are designated as INSET Centres. It may not be easy for all the teachers to access it from time to time. However, this information may easily be available to the observers that are Divisional or National Trainers since they develop the training manuals and practice the content before training teachers. In effect, teachers seem to have developed their own understanding from the little information available to them which is different from that of the observers. Thus, these two groups of people are

likely to rate the same lesson differently according to their own understanding of ASEI/PDSI. Again with this challenge in availability of information, if teachers miss the ‘Improve’ part of PDSI, for example, they may not see PDSI as a cycle so that they keep looking back and improving in their practice.

It may just be natural, then, that teachers follow where there is emphasis and evaluate a lesson in isolation of successive ones. As such, lesson observers are likely to rate them low in performance. It is advisable that both evaluation of a lesson for its progress and self-evaluation of the teacher for improvement of successive lessons be clearly stressed in all the three documents of ASEI/PDSI lesson plan template, ASEI/PDSI checklist and ASEI/PDSI checklist interpretation document just as it is in the SMASSE INSET Malawi training manuals.

From the findings of this study that teachers show limited knowledge of ASEI/PDSI and that the instrument for measuring the extent of practice of ASEI/PDSI itself has some shortfalls, it is not surprising that many previous studies have found that teachers do not satisfactorily practice ASEI/PDSI. Teachers observed may not have had sufficient information of ASEI/PDSI or the tool may have looked for aspects of ASEI/PDSI such as experiment and improvisation that might not have been applicable according to the topic in progress.

4.4 Research Question 4: How does CoP support teachers in implementation of ASEI/PDSI in mathematics?

Lesson observations and discussions in teachers' meetings helped to answer this question. In the CoP teachers met regularly to critique lessons and lesson plans. I attended the meetings as an observer participant and recorded some of their deliberations. Table 8 summarises the teachers' progress throughout the one year of CoP as evidenced from observations made during CoP meetings:

Table 8: Teachers' progress in the CoP

TERM 1 (September to December, 2015)	TERM 2 (January to April, 2016)	TERM 3 (April to July, 2016)
Two lessons were developed during the first meeting	Teachers discovered that some lesson plans left some gaps since they were written by different individuals and they had to develop a supplementary one to fill this gap. They agreed that each teacher plans a whole topic.	Teacher E and teacher F reported that they had made adjustments to a lesson plan while teaching. The rest of the members welcomed the idea and encouraged each other to share such adjustments in future for improvement.
Five lessons were developed during the second meeting.	One teacher commented that although planning was difficult, but teaching using a lesson plan was easy and students seemed to understand better.	Teachers emphasised on improving quality of activities as evidenced from this response: Teacher A: "Students do not enjoy much when you give them a problem to solve in groups using already known method, they like issues of argument" (Interview 2).
Teachers agreed that each individual writes lesson plans at home and bring them for critiquing by the group. Each teacher was given some subtopics to plan on. This saved a lot of time.	The team agreed that they should be meeting twice a month to give themselves more time to discuss their progress.	Each school formulated a test paper and the three test papers were consolidated into a common test paper that all the schools used as end of term test for third term.

TERM 1 (September to December, 2015)	TERM 2 (January to April, 2016)	TERM 3 (April to July, 2016)
During the third meeting all lessons required to the end of the term were prepared.	Teachers were more open to criticism and progress was faster.	There were 7 meetings and a total of three lessons were observed in term three.
During the fourth meeting a common terminal test was formed together.	Teachers were able to point out their own weaknesses and suggest a way forward. For example, Teacher E had to say, "I think we should write down the real questions that we want to ask learners in class. I was at a loss what to ask about commission."	
Throughout the term, teachers had been defensive and not open to criticism.	All schools wrote the same terminal test and teachers commented that their students had improved over term one's performance	
One school formulated its own examination claiming that the common one was not up to standard.	One school was lagging behind in terms of following schemes of work and was encouraged to have make up classes for better participation in the critiquing of lessons.	
The other two schools were not confident to administer it thinking their learners would not do well.	In term 3, teachers met 6 times and observed 3 lessons.	

TERM 1 (September to December, 2015)	TERM 2 (January to April, 2016)	TERM 3 (April to July, 2016)
However, it was agreed that the examination did not aim at comparing schools but learning how to set National standard examinations since some of the teachers were examiners for The Malawi National Examinations Board.		
Three lessons were observed in term one.		

Source: Author, 2016

From the observations above and also teachers' responses from the second interview, it can be concluded that a CoP supported teachers in implementing ASEI/PDSI in mathematics lessons. When teachers started working in the CoP in the first term, they found it difficult to write lesson plans. During critiquing, each teacher defended their ideas and they seemed not to be comfortable with criticism. However, with time, they started opening up to criticism and this minimised wastage of time and their discussions centred on improving quality of lessons that improved by each term. For example, in the

first term under the topic of Social and Commercial Arithmetic, learners were asked to calculate the custom duty that would be charged on an amount of goods following the example the teacher had given them. Figure 2 shows part of the lesson plan used:

		protect domestic industries.	
10min	Step 2: T let learners discuss the following sum in groups (on chart). T explains the sum	Learners ^{solve} discussing in groups and then report to whole class	calculating custom duties.
15min	Step 3: T gives learners an exercise to do in class individually. Ex 7b nos 1 and 2.	Learners doing the exercise.	doing exercise.
5min	Conclusion marking learners ^{and lesson} working evaluation. Self evaluation:	-stating what they have learnt, Learner doing corrections.	

Figure 2: Extract from a lesson plan on Social and Commercial arithmetic (custom and excise duties)

Source: Group lesson plans, 2016

The activity in step 2 of the lesson above was taught in November 2015 and was observed not to be involving to the students. Many students in the groups were just watching one student solving and writing the answer down. Using the ASEI/PDSI observation checklist, on activity and student-centred, this lesson was rated 1.6 and 1.3

respectively which means these aspects were used unsatisfactorily. By the end of second term, the quality of activities had improved as teachers chose questions that aroused students' interest. The following extract from a lesson plan shows the type of activity teachers gave to the students:

value as time goes passes step 1 10 min. let learners be in groups with a worksheets with the following questions ① what is devaluation ② Give an example in everyday life where devaluation has taken place.	students work in groups and give several answers Reporting	Devaluation is the situation where the value of the national currency is lowered in relation to the currencies of other countries.
Step 3 8 min distribute the exchange rates charts to groups and discuss with learners the value of different currencies in relation with us dollar	learners discuss the exchange rates in groups	

**Figure 3: Extract from a lesson plan on Social and Commercial arithmetic
(Devaluation)**

Source: Group lesson plans, 2016

The activity in step 1 of the lesson above was taught in January 2016 and was observed to be engaging to the students than the activity in figure 2. On activity and student-centred, it was rated at 4.0 and 3.1 respectively. This is because sharing ideas in the CoP improved teachers' understanding of the meaning of activity and student-centred.

Furthermore, as teachers got used to critiquing lessons and lesson plans, they became more open to talk about their own weaknesses and therefore they were able to conduct self-evaluation. Once teachers were able to conduct self-evaluation, the whole cycle of PDSI was observed to be followed as they were trying to make improvements in planning and in implementation even while a lesson was in progress. In this case, the CoP had helped teachers to practice ASEI/PDSI better than before.

4.5 SMASSE pedagogical tenets in relation to social constructivism and problem solving

SMASSE principles of ASEI, through PDSI approach, advocate for learner-centred lessons that are full of hands-on and minds-on activities. Students have to be actively involved by doing small scale experiments or activities that engage them in thinking and dialogue with peers. Teachers are encouraged to plan thoroughly for every lesson with the students in mind so that they incorporate activities that will engage the student to think, make hypotheses or predictions, perform some activities to verify their predictions, share their findings and argue for them in the classroom (DTED, 2013). This is a social constructivist classroom in which the learner is an active constructor of knowledge and not a passive recipient.

In order to capture and sustain students' interest and enthusiasm, activities have to be problems in the sense that Polya (1945) advocated for. That is, non-routine questions where relevant solution methods are not known and students have to analyse synthesise and argue for their ideas. The CoP enabled teachers to try and work towards planning for activities that would be really engaging to the learners while they drifted into the background as facilitators for the students to learn. In effect, SMASSE's pedagogical orientation is that of a shift from positivism to constructivism and it can be summarised as follows:

Table 9: A shift of pedagogical orientation in SMASSE principles

FROM (pre-ASEI/PDSI)	TO (ASEI/PDSI)
Positivism	Constructivism
Teacher- centred lessons	Learner-centred lessons
Passive learner	Active, claiming, arguing, critically thinking learner
Learner evaluation for selection or placement	Lesson evaluation for improved teaching and learning
direct didactic and direct interactive	Guided Inquiry and Open Discovery

Source: Modified from Kenya Science Teachers' College, 2002.

Since the study was done over only one school year, it may not claim to have moved teachers' practices from pre-ASEI/PDSI all the way to ASEI/PDSI. However, as the study found that seven out of the nine lessons observed had an index above the benchmark of 2.5, it means progress was made so far. It is also important to note that due to the presence of fixed teaching syllabi and examinations for grading and selection purposes in schools, the emphasis is mainly on Guided inquiry as opposed to Open Discovery. This gives an opportunity to the teacher to provide direction while playing their role as a facilitator of the learning process (KSTC, 2002; Edwards, 2005).

4.6 Chapter summary

This chapter has discussed findings of the study in terms of teachers' practices before CoP and during the CoP with emphasis on teachers' understanding of ASEI/PDSI being different from what is intended by SMASSE INSET Malawi. More importantly, it can be concluded that the CoP proved to be an effective way of supporting teachers to understand ASEI/PDSI and practice it better. The chapter has closed with a short summary and the next chapter concludes the thesis.

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS

5.1 Chapter overview

This chapter gives a summary of findings of the study, implications of the findings and suggestions for further studies.

5.2 Conclusions

The purpose of the study was to investigate the implementation of SMASSE principles of ASEI through PDSI approach in mathematics lessons. The study found out how teachers plan and deliver ASEI/PDSI lessons in mathematics and how teachers reflect and improve on their lessons. It also established challenges teachers encounter in implementing ASEI/PDSI lessons and how they can be addressed. The study adopted a survey design. It was within the interpretivist paradigm and generated qualitative data.

The first objective of the study was to find out how teachers plan and deliver ASEI/PDSI lessons in mathematics. From the study it emerged that teachers planned individually and usually came up with lesson notes or an outline of the lesson in their mind instead of a written lesson plan. This was attributed to understaffing and heavy workload that left the teachers with insufficient time to prepare ASEI lessons. As such, teachers may not have been able to carefully choose activities and try out experiments as is required by ASEI lessons. It was also found that teachers had limited skills and knowledge of activity and

student-centred as aspects of ASEI when they worked individually. This implies that teachers were not delivering ASEI lessons as intended.

After the CoP was established, teachers were able to manage their time and write lesson plans. Sharing ideas and critiquing lessons together gave teachers a chance to develop skills and knowledge in preparing ASEI lessons. They gave each other support and evaluated lessons together for improvement.

The second objective was to find out how teachers reflect and improve on their lessons. The study found that teachers evaluated lessons in terms of learners' understanding of concepts being presented. They did not focus on reflecting on their teaching. This could be attributed to the fact that most of them did not write lesson plans before participating in the CoP. Hence they had no basis to conduct reflection so as to improve in the next planning and delivery of a lesson. The study also found that there is inconsistency in the way information about evaluation, reflection and improvement is presented in SMASSE INSET Malawi documents. As such, teachers showed that they had limited knowledge of the same. But when teachers worked in a CoP, sharing knowledge covered this gap and teachers evaluated lessons and reflected on their practice for improvement.

The third objective was to establish challenges teachers encounter in implementing ASEI/PDSI lessons and how they can be addressed. Apart from the challenges associated with planning and delivery of lessons and reflection and improvement within and among lessons, the study identified other challenges emanating from ASEI/PDSI checklist. The

checklist seems to expect that every lesson must display all aspects of ASEI/PDSI. It was noted that although this checklist has a column to indicate when an aspect is not applicable, the INSET monitoring and evaluation team did not clearly indicate that they utilise it as such.

Studies that I have read so far that have indicated that practice of ASEI/PDSI is unsatisfactory in mathematics in secondary schools indicate a total number of lessons observed and percentages of those with a particular aspect. They do not indicate number of lessons in which an aspect was not expected. It is not realistic to expect experiment and improvisation in every lesson and in particular in mathematics lessons.

5.3 Implications of the findings

A general picture emerging from the study is that teachers need support in the form of supervision, encouragement and sharing ideas in order to practice ASEI/PDSI at classroom level. A CoP in this study proved to be a good source of this support. ASEI/PDSI approach is pivoted on planning. In SMASSE project, planning is of paramount importance to conduct ASEI lessons. Thus, the teacher is expected to plan thoroughly for instruction that is aligned to the curriculum goals and they must write lesson plans for each lesson. Lesson planning helps teachers to provide relevant and effective learning experiences for students to learn. Lesson plans give teachers the opportunity to think about their choice of lesson objectives that will guide them to incorporate appropriate activities and materials that will meet these objectives (Duncan & Met, 2015). ASEI lessons require this kind of planning that enables teachers to reflect on the links between one activity and the next, the bridge between activity and concept, the

relationship between the current lesson and any past or future lessons as the PDSI aspect of teaching.

Regarding the 'See' and 'Improve' aspects of PDSI, a teacher that is implementing ASEI lessons must be a reflective teacher. They must look back at the whole process of lesson planning and lesson delivery to see what worked and what did not work in order to improve in subsequent lessons. Such a practice will enhance the teacher's improvement in their practice. It is only after a teacher has planned, that 'Do', 'See' and 'Improve' can now follow.

In this study, without proper planning, teachers found it difficult to 'Do', 'See' and 'Improve' before the CoP. Once planning started, the rest of the PDSI aspects were possible. As teachers attributed their poor planning to insufficient time due to huge workloads and long syllabus, planning together in the CoP solved this problem through sharing the responsibility to plan. Thus, upon planning for only one or two topics, every teacher had lesson plans for all the topics in a term. Besides, teachers were observed to modify some lesson plans to suit their situation showing that they understood planning as a tool to simplify their teaching. This implies that establishing CoP for mathematics teachers is likely to lead to the practice of ASEI/PDSI at classroom level.

Some might argue that establishing CoP could be costly, but I would argue that conducting yearly INSETs is just as costly. The concern should be how to optimise results or how the two programmes would complement each other. Currently, SMASSE

INSET Malawi is using the Cascade system of training where national trainers train divisional trainers that train all mathematics and science teachers every year since 2010. After the Government of Japan through JICA prepared all the INSET centres to host trainings, it is now the Government of Malawi that provides funding for the running of INSETs at the centres since 2013 where teachers are accommodated for one week and each education division has a minimum of three and a maximum of five centres. Under this system, every school supports its mathematics and science teachers by providing them with transport money and an upkeep allowance. Dissemination of information at division level, therefore, targets a large group of teachers and it may not be effective. After training, teachers are left on their own to practice ASEI/PDSI at classroom level. This leaves each teacher to put into practice what they understood during training. As the study found that there was minimal or no supervision from outside the schools, it implies that teachers would just do what they saw fit and easy in their situation where time was limited. Thus, they relied on lesson notes or just the memory when preparing for lessons and this did not allow them to plan proper ASEI/PDSI lessons.

A possible way to incorporate CoP at cluster level would be to have national trainers training divisional trainers as usual but divisional trainers to be training cluster trainers that would in turn train and work together with teachers in CoP. Thus, the training organogram of this Cluster Model would appear as suggested in figure 4:

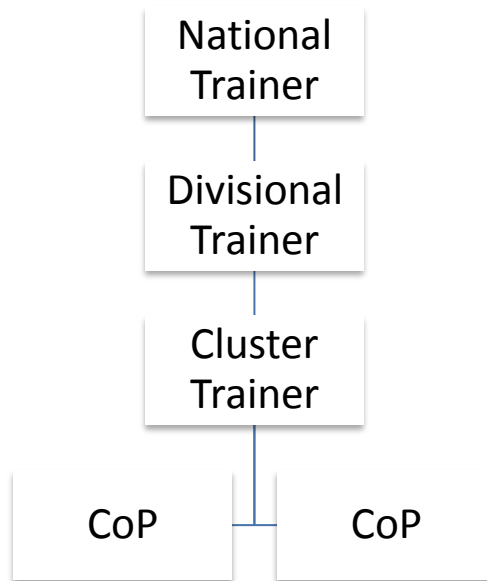


Figure 4: A three tier Cascade training system organogram with CoP

Source: Modified from Nui & Wahome, 2008.

In this case, the cluster trainers would work together with teachers in CoP which would provide a platform to share ideas, critique lesson plans, share responsibility to plan lessons and give each other support and encouragement. It would also allow the cluster trainers to monitor and evaluate the level of ASEI/PDSI practice for each individual teacher over a period of time such as a school term or year. Dissemination of information at cluster level would target a small number of teachers and it is likely to be easier and more effective. Moreover, this extension of training would take advantage of already existing structures such as the INSET centres and the national and divisional trainers. Since teachers are already supported at school level, the system would continue as such with the advantage that many of the teachers would be travelling shorter distances than before and some of them would not need accommodation.

However, adding a third level of cluster trainer may further dilute the knowledge as it trickles down to teachers in the CoP. In the case where schools are far apart, teachers may have to travel long distances to work in a CoP. Since their schools may be responsible for their transportation, it may be difficult for some schools to support the teachers for the smooth operation of CoP. This could be eased by choosing a convenient meeting point. In the case where the area has reliable network, the use of technology such as emails would facilitate operation of a CoP.

In order to make sure that teachers are fully conversant with ASEIPDSI principles, there is need to provide information that is consistent and well-stressed in SMASSE INSET documents. This will assist teachers to read and get similar sense out of the three documents of ASEI/PDSI lesson plan template, ASEI/PDSI checklist, its interpretation and the SMASSE INSET Malawi training manuals. Presenting information differently gives room for teachers to choose which document to follow and hence they tend to miss important aspects of ASEI/PDSI. If cluster centres were established as suggested above then all these important documents could be made available at each cluster and teachers could discuss and have a common understanding within each CoP.

When ASEI/PDSI checklist is used in mathematics, there is need to indicate the lessons in which any of the aspects of ASEI such as Experiment and Improvisation were not applicable and the average score calculated excluding the not applicable aspects. This would enable the observer using ASEI/PDSI checklist to capture a true picture of the lesson instead of giving it a low rate due to absence of an aspect of ASEI that was not

applicable in the lesson. Furthermore, instead of observing one lesson and expecting to see all aspects of ASEI/PDSI in it, it would be better if teachers were observed over time and in a series of lessons. A cumulative analysis of a teacher's implementation of the various aspects of ASEI/PDSI across all lessons would give a true reflection of how the teacher is implementing the approach, hence a fairer assessment of SMASSE in Malawi schools.

5.4 Suggestions for further study

The CoP in the study was supported by JICA and the University of Malawi, Chancellor College and it worked well. It might be worth investigating if the CoP in the Cluster Model of Cascade training would work equally well without similar support.

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APPENDICES

Appendix 1: Letter of introduction from Chancellor College



Principal
Prof Richard Tambulasi, BA (Pub Admin), BPA (Hon), MPA, PhD

P. O. Box 280, Zomba, MALAWI, SOUTHERN AFRICA
Tel: 011 (265) 524 222
Telex: 44742 CHANCOL MI
Fax: 011 (265) 524 046
Email: CCADMIN@chanco.unima.mw

Our Ref.:
Your Ref.:

15 SEPTEMBER 2015

To whom it May Concern

Status of Ms Ida Kamoto

I am pleased to confirm that Ms Ida Kamoto is our Master of Education Curriculum Studies (Science Education) student in the Faculty of Education at Chancellor College. Currently she is in her final year of her Masters programme and is working on her Thesis as the last stage of her programme.

Ms Ida Kamoto is very hard working and easy to work with based on our experience with her as a postgraduate student in the Faculty of Education.

I shall appreciate any consideration and support you may provide to Ms Ida Kamoto. I will be happy to provide more information about her if necessary.

Many thanks



Foster Kholowa (PhD)
Dean of Education
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UNIVERSITY OF MALAWI
CHANCELLOR COLLEGE
2015 -09- 16
DEAN
FACULTY OF EDUCATION

Appendix 2: Permission to conduct research

2015-09-18

REF. NO. SEED/ADM/VOL. II/478

FROM : THE EDUCATION DIVISION MANAGER, SOUTH EAST EDUCATION DIVISION,
PRIVATE BAG 48, ZOMBA.

TO : THE HEADTEACHERS,
Masongola Secondary School
Chichiri Community Day Secondary School
Likwenu Community Day Secondary School

AUTHORITY TO CONDUCT RESEARCH IN SCHOOLS ON THESIS AS A LAST STAGE OF MASTER
EDUCATION CURRICULUM STUDIES : A CASE STUDY OF SELECTED SECONDARY SCHOOLS IN
SEED.

I write to kindly request your office to allow Ms Ida Kamoto, currently a post graduate student at Chancellor College at the University of Malawi – to carry out a research related activity for her thesis as a last stage of her programme of Master Education Curriculum Studies (Science Education).

I will be most grateful if Ms Kamoto is given all the necessary support and guidance so that her data collection exercise is carried out successfully.

I look forward to your usual support and hoping at the same time that you will accord this request all the attention and urgency that it deserves.


M.S.D. ALUFANDIKA
EDUCATION DIVISION MANAGER

2015-09-18

Appendix 3: ASEI/PDSI checklist

SMASSE INSET MALAWI LESSON OBSERVATION CHECKLIST

Name of Monitor _____ Date _____ School _____ District _____

Name of Teacher Observed _____ (Demo 1 / Demo 2)

Class _____ Subject _____ Topic _____

KEY: 0 – Not At All; 1 – A Little; 2 – Average; 3 – Adequately; 4 – A Great Deal; N/A – Not Applicable

Attitude		0	1	2	3	4	N/A
1	Did the teacher appear to be enjoying the teaching?						
2	Was the teacher sympathetic to the problems/needs of each student?						
3	Did the teacher exercise patience with students?						
4	Was the teacher gender-sensitive?						
Activity		0	1	2	3	4	N/A
5	Did the teacher incorporate activities for students into the lesson?						
6	Did the teacher successfully engage students in the activities?						
7	Did the activities arouse students' interests?						
8	Were the activities meaningful for enhancing students' understanding?						
9	Did the teacher give students appropriate tasks for discussions?						
Student-Centred		0	1	2	3	4	N/A
11	Did students do anything to show the whole class or the group?						
12	Did students give their prior experiences or explain their ideas related to the content?						
13	Did students come up with their own predictions/suggestions for concepts/theories/rules/ methods						

	etc. in the lesson?						
14	Did students discuss the difference in their own predictions/suggestions?						
15	Did students verify their predictions/suggestions on their own?						
16	Did students present their own observations/results of their activities?						
17	Did students discuss the differences in their observations/results of their activities?						
18	Did the teacher summarise the lesson by giving clear explanation?						
19	Did students evaluate the lesson?						
Experiments (i.e. Activities to Verify the Predictions/Suggestions of the Students)		0	1	2	3	4	N/A
20	Was an experiment conducted?						
21	Did students deduce theories/concepts from the experiment?						
22	Did the teacher relate activities to theories/concepts clearly?						
Improvisation		0	1	2	3	4	N/A
23	Did the teacher simplify methods for activities, in consideration of efficient resource use?						
24	Did the teacher utilise materials available in students' immediate environment?						
25	Did the teacher use improvised equipment/materials for activities?						
Planning		0	1	2	3	4	N/A
26	Did the teacher prepare a lesson plan?						
27	Was the lesson presentation well organised (not in a haphazard way)?						
28	Did the teacher prepare appropriate materials for students' use?						
Seeing		0	1	2	3	4	N/A

29	Was the teacher paying attention to the progress of students during class work?						
30	Was the teacher keeping good eye contact?						
31	Did the teacher invite questions from students in the course of the lesson?						
32	Did the teacher ask the questions to check the level of students' understanding?						
Improving		0	1	2	3	4	N/A
33	Did the teacher rephrase questions/instructions where necessary?						
34	Did the teacher give further guidance to students on activities?						
35	Did the teacher adjust the lesson where necessary?						
36	Was the teacher able to indicate some points to improve?						
<u>General Comments:</u> 							

Appendix 4: ASEI/PDSI checklist interpretation

KEY: 0 – Not At All; 1 – A Little; 2 – Average; 3 – Adequately; 4 – A Great Deal; N/A – Not Applicable

Attitude		Interpretation
1	Did the teacher appear to be enjoying the teaching?	This is rated on impression that the teacher gives to the observer, it includes how the teacher looks prepared for the lesson, how he/she starts the lesson and how confident he/she is throughout the lesson.
2	Was the teacher sympathetic to the problems/needs of each student?	This is rated on how the teacher takes care and handles the need for each student from the beginning of the lesson until the end. Eg. Teacher accepting students' misconceptions and trying clear them.
3	Did the teacher exercise patience with students?	This is rated on how the teacher handles slow learners, students' misconceptions and the use of T/L materials by all the students. How long does the teacher wait after posing a question to students? Eg. A teacher allowing more time for students to do an activity where they are struggling.
4	Was the teacher gender-sensitive?	This is rated on how the teacher involves all students regardless of their sex, it could also be rated from examples that the teacher selects. This is applicable even in a single sex class.
Activity		
5	Did the teacher incorporate appropriate activities for students into the lesson?	This is rated using the availability/presence of appropriate activities in a lesson, clarity of instructions used and level of students.
6	Did the teacher successfully engage students in the activities?	This is rated on how the teacher engages the students in the lesson, does the activity make the students think and how does the teacher use students thoughts, ideas, responses, suggestion in making them understand the concepts.
7	Did the activities arouse	This rated on how eager students are to do the

	students' interests?	activity; it could be evidenced by how curious students are in answering questions, the numbers of questions they ask, time they take to finish the activity. Whether they taking notes or not. Discuss with their friends.
8	Were the activities meaningful for enhancing students' understanding?	This is rated on how the activity can lead to the development of the concept. By the students themselves as they do the activity.
9	Did the teacher give students appropriate tasks for discussions?	This is rated on clarity of instructions that would initiate discussions.
10	Did the teacher relate activities to theories/concepts clearly?	This is rated on how the teacher bridges the activities to the concept/theory.
Student-Centred		
11	Did students do something to show the whole class or the group?	This is rated from the interaction among students in a class when carrying out activities, how they share what they are doing/thinking or have done/thought to each other: it could be through presenting what they have to the whole class, groups, pairs. It should be noted that when a student responds to a question to a teacher is showing what s/he thinks to the whole class.
12	Did students give their prior experiences or explain their ideas related to the content?	This is rated on whether students are given chance to explain the experiences that they have from either the previous lesson or their daily life that are related to the concepts that they are going to learn in a lesson
13	Did students come up with their own predictions/suggestions for concepts/theories/rules/methods etc. in the lesson?	This is rated on how students express their thoughts on what they think about the concepts/theories/rules they are going to learn. Are students given chance to make suggestions/predictions for theories/concepts/rules/ definitions/methods before they carry out the activity that leads to the development of the concepts.
14	Did students discuss the difference in their own predictions/suggestions?	This is rated according to how the students explain their suggestions /predictions for rules/methods/definitions that they make before they do the activity/experiment.

15	Did students verify their predictions/suggestions on their own?	This is rated by looking at whether the students conduct an activity to verify their suggestions/predictions on their own.
16	Did students present their own observations/results of their activities?	This is rated on how students present and explain their results to others clearly.
17	Did students discuss the differences in their observations/results of their activities?	This is rated on how the students discuss the results found from their activities. Are students given chance to compare their findings/results and does it assist them in understanding the concepts?
18	Did the teacher summarise the activities by giving clear explanation?	This is rated on how the teacher summarises the students' findings from the activities, how the teacher handles or correct students' misconceptions.
19	Did students evaluate the lesson?	This is rated on whether students are given chance to rate the lesson: This could be done by asking what they have learnt in the lesson, which areas did the students understand and which areas were more challenging.
Experiments (i.e. Activities to Verify the Predictions/Suggestions of the Students)		
20	Was an experiment conducted?	This is rated on whether an appropriate experiment was conducted. It should be noted that experiment could be conducted even in Maths lessons (This is where students predict/suggest and verify.
21	Did students deduce theories/concepts from the experiment?	This rated on whether students are able to deduce theories/concepts from the experiment.
22	Did the teacher relate experiments to theories/concepts clearly?	This is rated on how the teacher bridges the experiment to the concept/theory.
Improvisation		
23	Did the teacher simplify methods for activities, in consideration of efficient resource use?	This is rated on how the teacher puts effort to simplify methods or Teaching & Learning materials used in the lesson. It rates how efficient the teacher uses the methods and resources. Eg. Use of chemicals in smaller quantities.

24	Did the teacher utilise materials available in students' local environment?	This rates the teaching and learning using locally available resources (TALULAR) - these are the materials that students interact with in daily life.
25	Did the teacher use improvised equipment /materials for activities?	This rates the use of materials when conventional materials are not available, use of conventional equipment for purposes they were not intended.
Planning		
26	Did the teacher prepare a lesson plan?	This checks the availability of a lesson plan.
27	Was the lesson presentation well organised (not in a haphazard way)?	This rates the flow of the lesson from introduction, development of the lesson to conclusion.
28	Did the teacher prepare appropriate materials for students' use?	This rates the materials used, can they assist to achieve the objectives, are they appropriate for a particular level of students, are they safe for students, do they attract students interest?
Seeing		
29	Was the teacher paying attention to the progress of students during class work?	This rates on how the teacher checks on the students' learning. This could be by asking questions, guiding students individually, in groups or pairs as they are carrying out the activities.
30	Was the teacher keeping good eye contact?	This rates on how the teacher checks the behaviour of each student in a lesson, to involve all students.
31	Did the teacher invite questions from students in the course of the lesson?	This rates on how often the teacher gives opportunity to students to ask questions at every step in the lesson.
32	Did the teacher ask questions to check the level of students' understanding?	This rate on the type of questions that the teacher asks to check students' understanding. Does the teacher ask questions in the course of the lesson (Formative evaluation) and after the lesson (summative evaluation)
Improving		
33	Did the teacher rephrase questions /instructions where necessary?	This checks on whether the teacher makes efforts to improve on the instruction/questions/methods/procedure to make students understand in the lesson.

34	Did the teacher give further guidance to students on activities?	This is rated on how a teacher helps groups, class and individuals to understand what they are supposed to do in the activities.
35	Did the teacher adjust the lesson where necessary?	This is rated on how the teacher changes some of the components of the lesson or the whole lesson altogether with the aim of making students understand.
36	Was the teacher able to indicate some points to improve?	This rates the quality of the teacher's self-evaluation that can assist in improving the lesson.
General Comments:		

Appendix 5: ASEI/PDSI lesson plan template

School	:		Date:
Class	:		Time:
Subject	:		
Core element	:		
Topic	:		
Lesson topic	:		
Rationale	:		
Success criteria:			
Prerequisite knowledge:			
Teaching, learning, and assessment resources:			
Teachers Activity		Learners activities and expected responses	Learning points
Introduction			
Development:			
Step 1:			
Step 2:			
etc.			
Conclusion			
Evaluation			

Appendix 6: Unimproved interview guide 1

Planning stage

1. What time of the school year or term do you plan your work?
2. Are there any plans that you do on daily basis?
3. What information helps you plan your work?
4. What materials do you need when planning?
5. Do you plan alone or in groups? If you plan alone, why?
6. Do you have adequate time to plan? If not, why not?
7. What documents are produced from your planning?
8. Do you include learner activities in the planning? If yes, what are they? If not, why not?
9. Do you include improvisation in your planning when conventional materials are not adequate? If yes, give examples? If not, why not?
10. Who supervises your planning and how often are you supervised?
11. Do you record your work after implementation?
12. What challenges do you encounter as you plan?
13. Do you include self-evaluation or reflection in your record of work after implementation?

Implementation and reflection

1. Do you always follow your plan when teaching? If not always, why not?
2. Do you check learners' understanding of your lesson? If yes, how do you get it and how do you use it? If not, why not?
3. Do learners seem to enjoy your lesson?
4. How do you involve learners in lesson activities?
5. Do learners participate in activities of your lesson? Explain.
6. After teaching, do you evaluate your lesson? If yes, how do you evaluate it and how do you use this information? If not, why not?
7. What challenges do you encounter as you teach?
8. How do you deal with the challenges in (7) above?
9. Who supervises your lesson implementation and how do they do it (observe lessons or just check records or both)? How often is it done?
10. Do you reflect on the lesson together and discuss way forward or they simply tell you what to do? How useful is the supervision?
11. Do you allow your colleagues to observe your lessons? If yes, how often? And explain the type of feedback and how you use it.
12. How do you compare the quality of your lesson before SMASSE training and after training (ASEI/PDSI lesson)? Do you think you could do better than you are doing? If yes, which areas would you improve and how?
13. Are there any challenges that may be hindering your practicing ASEI/PDSI? Explain.

Appendix 7: Improved interview guide 1

Planning stage

1. What time of the school year or term do you plan your work?
2. What information helps you plan your work?
3. What materials do you need when planning?
4. Do you plan alone or in groups? If you plan alone, why?
5. Do you have adequate time to plan? If not, why not?
6. What documents are produced from your planning?
7. Do you include learner activities in the planning? If yes, what are they? If not, why not?
8. Do you include improvisation in your planning when conventional materials are not adequate? If yes, give examples? If not, why not?
9. What challenges do you encounter as you plan?
10. Is your plan checked by any authority in the school before implementation? If yes, who checks and what comments do they give?

Implementation and reflection

1. Do you always follow your plan when teaching? If not always, why not?
2. Do you check learners' understanding of your lesson? If yes, how do you get it and how do you use it? If not, why not?
3. Do learners participate in activities of your lesson? Explain.
4. After teaching, do you evaluate your lesson? If yes, how do you evaluate it and how do you use this information? If not, why not?
5. Do you record your work after implementation?
6. Do you include self-evaluation or reflection in your record of the work that you have done after implementation?
7. What challenges do you encounter as you teach?
8. How do you deal with the challenges in (7) above?
9. Are your lessons supervised?
10. Who supervises your lesson implementation and how do they do it (observe lessons or just check records or both)? How often is it done?
11. Do you reflect on the lesson together with the supervisor and discuss way forward or they simply tell you what to do? How useful is the supervision?
12. Do you allow your colleagues to observe your lessons? If yes, how often? And explain the type of feedback and how you use it.
13. How do you compare the quality of your lesson before SMASSE training and after training (ASEI/PDSI lesson)? Do you think you could do better than you are doing? If yes, which areas would you improve and how?
14. Are there any challenges that may be hindering your practicing of ASEI/PDSI? Explain.

Appendix 8: Consent form for participating teachers

Title of study: An investigation of how teachers implement SMASSE principles of ASEI through the PDSI approach in mathematics lessons.

Researcher: Ida Talent Kamoto (student, master of education, Curriculum and Teaching Studies, Mathematics Education).

The purpose of the study is to investigate the implementation of SMASSE principles of ASEI through PDSI approach in mathematics lessons. It will focus on how teachers plan and deliver ASEI/PDSI lessons and also on how they reflect on their lessons in order to improve their practice.

I am conducting this research in partial fulfilment of the requirements for my Master of Education studies. The information I get from the research will be used to write my thesis. I, humbly request you to participate in the study. I also request that you allow me to record interviews and lesson observations.

Procedure: I would like to interview you at the beginning of the study and then involve you in a Mathematics Community of Practice where you will plan together, observe each other's lessons and critique them together for improvement of successive lessons.

Risks: There are no potential risks in this project and I will try as much as possible to minimise any discomfort that you may feel. Besides, all the information that you may give will be kept confidentially and your names will neither be disclosed nor associated with the research findings in any way. The interview and lesson observation recordings will be destroyed at the end of the study.

Benefits: Although there are no direct benefits from this study, our working together in a community of practice will improve your skills in the teaching practice as you may become a better self-reflective teacher.

Freedom to withdraw: Your participation in this study is entirely voluntary. If you may wish not to participate, please say so. You may ask any questions before or during the time of conducting the study.

After reading through the information above with full knowledge of the nature of the study, if you have decided to take part in the study, please sign this consent form and keep one copy.

PARTICIPANT'S SIGNATURE:

PARTICIPANT'S SIGNATURE:

PARTICIPANT'S SIGNATURE:

PARTICIPANT'S SIGNATURE:

PARTICIPANT'S SIGNATURE:

Appendix 9: Teacher A, interview 1

Interviewer: This interview is conducted in order to find out how you plan, implement and improve your lessons. I encourage you to explain as much as you can. If a question sounds ambiguous, just say it sounds ambiguous and you don't understand it so that I can rephrase it.

Teacher A: Mmh.

Interviewer: Now what time of the school year or school term do you plan your work?

Teacher A: Mmh mmh most of the times, mmh, maybe.... whenever am not in class I do prepare for the lesson.

Interviewer: Not for schemes and records of work?

Teacher A: As for schemes and records of work the planning is, uuh, during the holiday

Interviewer: Aaah! during the holidays, okay.

Teacher A: But sometimes it continues up to even we have already started the what? ... the term. Mmh, we continue writing the le.. the schemes of work.

Interviewer: Ok, so what information helps you to do the planning, to write the schemes and records of work and the lesson plan?

Teacher A: The ability of the students ...

Interviewer: Mmh

Teacher A: Though sometimes it's difficult to to to know their ability .. because, maybe they are coming from the other class which you don't know, maybe before they have written their JCE (Junior Certificate Examinations) and you are beginning in form three, so you don't know how they were performing in form two. So their ability sometimes becomes a problem in the planning, you just meet the challenges as you are already teachingeeh. But the ability of the students matters most.

Interviewer: So what materials do you need when you're planning?

Teacher A: During the planning we need the .. Schemes .. the books.

Interviewer: Scheme templates .. you're the one who produces the schemes

Teacher A: Yes .. uh huuu! That is aaah pupil's book sometimes the teacher's guide is supposed to be there and maybe also think of the teaching and learning materials.

Interviewer: Okay. Do you plan alone or you plan in groups?

Teacher A: Most of the times as for me I do plan alone.

Interviewer: You plan alone.

Teacher A: Whenever I have met a problem that's when I consult.

Interviewer: Okay. Do you have adequate time to plan? Whether you're planning lesson plan or schemes and records of work .. do you think you have adequate time?

Teacher A: Mmh, anyway...

Interviewer: (giggles).

Teacher A: I would say maybe we have the pla... we have adequate time if at all there couldn't be any other Because, aah, there are a lot that wait for you that you need to...

Interviewer: To accomplish.

Teacher A: Mmh, at home there are so many things that are waiting for you to do. Here at school there are also other things that just emerge you need also to solve them. So these other things also need to be accommodated in the planning .. in the time planning. But had it been that it was only time for planning it's enough.

Interviewer: Truthfully speaking, Madame, do you really write your lesson plan every morning?

Teacher A: Actually I don't really write the lesson plan as it was supposed to be but still when am going into the class I have something.

Interviewer: Some lesson notes.

Teacher A: Yes, of how my lesson should be.

Interviewer: Okay.

Teacher A: And this lesson notes is similar to what I always learn during SMASSE. That is, if it is on mathematics I try as much as possible to include the activities involving the what

(choir)..... the learners.

Teacher A: I try as much as possible

Interviewer: For example?

Teacher A: Mmmmmmmmmnh whenever there is an exercise that is So show as an example first of all not giving the individual straight the individual what ... exercise or activity uh uh! I first of all give them as a group work or pair work because I feel like the students or the pupils cannot get or cannot learn much from only the teacher sometimes they learn as they are.....

Interviewer: As a group

Teacher A: Together in a group because so one can grasp the concept whilst the other one hasn't grasped it from the teacher. So when you have given them the exercise whether in pairs or as a group they can teach each other ... the one who has failed to grasp the concept from the teacher can grasp it from a friend. Maybe it could be again simpler so that whenever he or she is alone doing the exercise can do better.

Interviewer: Okay. Aah, its very interesting Madam. Is your planning checked by anybody?

Teacher A: Noooo!

Interviewer: They don't look at your schemes of work?

Teacher A: The schemes of work are checked.

Interviewer: Aah, okay, but not the lesson plan?

Teacher A: Not the lesson notes. But if at all I...have beeeeen, asked to observe my lesson I welcome them

Interviewer: Okay now when they check the schemes and records of work what type of feedback do they give you?

Teacher A: Uuuuuhm most of the timeee maybe with how the schemes should be like, maybe go and have some corrections.

Interviewer: Some corrections.

Teacher A: But as of now we are used to the template.

Interviewer: Okay ... now when you are doing your planning and you are in the classroom do you really follow your plan?

Teacher A: Yes, exactly, I follow.

Interviewer: To the dot?

Teacher A: I try as much as possible to follow it.

Interviewer: Don't you find yourself that you over planned or under planned?

Teacher A: Yes, sometimes I do over plan. When I do over plan, that means my lesson I try as much as possible .. I try as much as possible to fix it somewhere so that at least I should come up with overall of the pupils of how they have performed on that particular whaat ...

(Choir).... Lesson.

Interviewer: Okay. Do you check learners' understanding during your lesson?

Teacher A: Yes.

Interviewer: How do you do that?

Teacher A: Whenever I ask a question ... they have to respond .. in such a way that I feel that it's okay. If it is not... I correct them in the process and sometimes there are others who are somehow dormant eeh? So I try as much as possible to involve each and everybody in my question AND see if each one is understanding if I feel like that someone is not with you I use some mechanism to involve them ... and sometimes actually when I give them exercise I do mark each and every exercise.

Interviewer: So you are able to detect whether they understood. Okay, now, (clears throat) as you are teaching, do you evaluate your lesson?

Teacher A: (silence)

Interviewer: Evaluate the delivery of your lesson?

Teacher A: Yes.

Interviewer: Mmh mmh.

Teacher A: I do again through the comments ... and again through also ... their responses.

Interviewer: Their responses And how do you use that information?

Teacher A: In the end after each and every lesson.. I said that I try as much as possible to give them something to do. If I fail to evaluate during the lesson, after maybe time and I have given them some exercise, a certain exercise, if it is during the lesson I do mark in the same what .. lesson ... esp. whenever ...first of... I have said that ... I first give them as a group work. With the group work I try as much as possible to mark in the same what .. lesson. And if at all there is a problem I do revision...in the same lesson. So as per individual when I will be getting out of the classroom after giving the group work I feel like most of them have understood .. but on individual basis it's then maybe I do after lessons.

Interviewer: After lessons. Okay. Then after you have implemented the lesson do you normally record that you have taught a particular lesson and then probably do you include the evaluation as well? I have taught the lesson it was like this...?

Teacher A: Yeah, that is especially in the schemes of work.

Interviewer: Okay, Do you have any challenges as you teach?

Teacher A: Yes the challenges are there. Some of the pupils have got a negative attitude on mathematics. Even if you try as much as possible to involve them, you feel like whenever you are teaching they come up with other things to disturb you as well as their friends. So sometimes they annoy you (giggles).

Interviewer: No! Don't get annoyed. (giggles as well).

Teacher A: No! No! But I try as much as possible , maybe after the lesson, someone was misbehaving somewhere, I just call them to discuss.

Interviewer: Okay. Are your lessons normally supervised?

Teacher A: Mmmh, not really.

Interviewer: Not necessarily.

Teacher A: Not necessarily.

Interviewer: So we can't talk about who supervises them. But do you normally allow your colleagues to observe your lessons?

Teacher A: Yes, mmh, that's why I try as much as possible whenever I have a problem I ask friends what should I do. Can you assist me?

Interviewer: Okay. Let's try to sort of summarise: How do you compare the quality of your lessons before you were trained by SMASSE and after you got ASEI/PDSI from SMASSE? How do you compare the quality of your lessons?

Teacher A: It has improved, because before SMASSE it was teacher-centred: I, myself speaking, telling them everything (laughs). But as of now, after the SMASSE, and also learning how some other topics... because other topics are also... it's a challenge for us to tackle, for us to... the information to teach the what?... the pupils so that they should understand. So after SMASSE we know that ohoo! This is the way how I should teach this particular lesson.

Interviewer: Mmmh.

Teacher A: So I try as much as possible to involve, the involvement of the pupils I learnt.

Interviewer: From SMASSE.

Teacher A: Even though I don't do, write the lesson plan as it was, they do, but re aon my notes I try as much as possible to give those activities to students.

Interviewer: Thank you. Are there any challenges, general now, that are actually hindering you from practicing ASEI/PDSI?

Teacher A: (silence).

Interviewer: Because every time we do a thing we normally want to improve to the best, eti?

Teacher A: Mmh, mmh.

Interviewer: So there are issues that may be hindering you. What do you think are things that are hindering you from practicing ASEI/PDSI in the classroom, generally whether it's in the classroom or it's from the administration or from Government, whichever angle?

Teacher A: Mmh! (giggles). Anyway, the challenges are supposed to be there especially on the planning.

Interviewer: Planning.

Teacher A: Planning. Because I do fail to plan this lesson plan, eti? As they, from the template as it is supposed to be. That's why I just opt on the lesson notes.

Interviewer: What about the template, is it not there?

Teacher A: No, It's there.

Interviewer: It's there but it's a bit complicated?

Teacher A: No, time! I feel like it needs a lot of time. I don't even have enough time to plan because there are other things which just come up.

Interviewer: (Sighs). Any other things you may think of?

Teacher A: Mmh, noo.

Interviewer: Thank you very much for offering me this interview. I don't take your time for granted. Thank you.

Appendix 10: Teacher B, interview 1

Interviewer: This interview is conducted in order to find out how you plan, implement and improve your lessons. I encourage you to explain as much as you can. If a question sounds ambiguous, just say it sounds ambiguous and you don't understand it so that I can rephrase it. Uuh! So, what time of the school year or school term do you normally plan?

Teacher B: (looks unsure)

Interviewer: Mukamapanga planning yanu, kaya ma lesson plan kaya chani (when you do your planning, whether lesson plans or whatever)?

Teacher B: Mmh

Interviewer: Mmapanga thawi iti of the year kapena of the term (what time of the year or of the term do you do that)?

Teacher B: Infact planning ili pawilili (in fact planning is in two dimensions).

Interviewer: Mmh.

Teacher B: We have the planning of the scheme, because the scheme itself is a plan and then we plan as lesson

Interviewer: Mmh

Teacher B: So for the scheme we plan before.

Interviewer: Mmh.

Teacher B: While a lesson you plan before but then you plan that what am .. what am I going to teach tomorrow?

Interviewer: So like daily eti (not so)?

Teacher B: Uuh uuh daily.

Interviewer: Okay, what information helps you do your planning?

Teacher B: Mmh normally .. basically I should say information from books but we are planning with insufficient books especially for the new syllabus, that's the only problem.

Interviewer: Mmh. Okay. Do you plan alone or you plan in groups?

Teacher B: Usually I plan alone.

Interviewer: Mmh, why do you plan alone any special reason?

Teacher B: as of now there is a special reason. Uuh, the first reason is, uuh, the subject teacher. As I am like here at this school, ineyo ndine ndekha amene ndili ngati wa masamu (I am the only mathematics teacher)

Interviewer: Mmh, you are alone therefore you can't make a group of one person (laughs).

Teacher B: And my friend is teaching form three just because I am overloaded. Mmh, komano not kuti ndingapite kwa iwowo kukawauza kuti (But then I cannot go to him and ask him) can you please help me to plan on this topic because that's the only hiccup on planning

Interviewer: Because people are overloaded.

Teacher B: Eheeh!

Interviewer: Mmh, so in that case do you have adequate time to plan?

Teacher B: Mmh nooo!

Interviewer: (giggles) So u teach without planning?

Teacher B: No, we squeeze our time .. we are looking at adequate time but..

Interviewer: But barely manage to plan.

Teacher B: We don't have adequate time but I plan .. am going to teach this let me see what am I going to do? How am I going to start it and then where ...

Interviewer: le-le-le let's be frank okay? Do you really write lesson plans for every day's lesson?

Teacher B: No.

Interviewer: No because of this overloaded and inadequate time?

Teacher B: Yes

Interviewer: Now now this community of practice we are starting, we want to improve, okay, we need to write lesson plans...

Teacher B: Yah we need to .. aah, you know they are helpful.

Interviewer: (giggles) Yeah ..okay, uuuuhm, so after you have done your planning what type of document do you produce? Maybe apart from schemes what else do you produce after planning

Teacher B: A lesson plan?

Interviewer: A lesson plan, okay. Do you include learners' activities as you are planning? During the planning stage ?

Teacher B: Yees that's during the pla.. yah we do ..

Interviewer: What type? Like the ones we saw today?

Teacher B: Yeah, like the ones you saw today that students would be doing something.

Interviewer: Mmh. Do you include improvisation in your planning?

Teacher B: Yeah.

Interviewer: Aah...

Teacher B: I will give an an .. example , a small chart like that one (points at a chart on the wall)

Interviewer: An improvised chart

Teacher B: And then in form two there is this topic of where we have got .. we are supposed to find area of a pyramid

Interviewer: Areas of nets of diagrams... mmh mmh

Teacher B: Yeah, now .. for a pyramid maybe some students they don't know what is a pyramid

Interviewer: Mmh mmh, so you first show them ?

Teacher B: Show them .. yeah so I created one as a pyramid and I show them this is a pyramid so I use this improvisation method.

Interviewer: So what challenges do you encounter as you plan?

Teacher B: The very first problem is that one of books... the other one is time so people were .. uum am saying this as general cry for everybody so people were suggesting that if possible the government.. whether the government or at school level we can agree to produce a skeleton of lesson plan so that we can be filling that tomorrow am going to do this .you just write in that. instead of writing the same thing, that is: lesson, class, pupils, what, what, ... so it's like time consuming.

Interviewer: Is your plan checked by anybody? As you have done your planning schemes and lesson plans .. do people check?

Teacher B: Yes they check ..

Interviewer: Who checks

Teacher B: The deputy .. first the HOD then it go to the deputy

Interviewer: Uumh ummh ... Okay. I think that's all for planning .. under implementation there are also a few questions...

Teacher B: Okay.

Interviewer: When you have done the planning, in the class room situation, do you always follow the plan to the dot..

Teacher B: Yeah, sometimes we do , sometimes we don't and the good thing about planning is where you know that I have missed the point this is not what I have planned but then sometimes we don't follow. It happens because of the response of the students, you may plan something that you are going to do this. Maybe the students, so you might happen to go, are blank on something that you want to achieve. So you start to revise that thing. So you might happen to go astray for the sake of bring the students the point where you want them.

Interviewer: Do you check learners understanding of the lesson as you teach?

Teacher B: Yes.

Interviewer: How?

Teacher B: By asking them questions , giving them exercise

Interviewer: Mmh.

Teacher B: Or when I mark, when I see the response, did they get what I have said

Interviewer: Umh, do learner participate in the activities of your lessons?

Teacher B: they do participate,

Interviewer: they do participate, how do you involve them?

Teacher B: By giving them activities.

Interviewer: Yes, when you have given them activities, like they were in group there, how do you make sure that every one of them is participating?

Teacher B: Usually I do, I may give them an activity on groups,

Interviewer: Umh,

Teacher B: But then as you said, some learners may choose to stay idle,

Interviewer: Umh

Teacher B: So with them I usually tell them if you are idle you are the ones to present to the deputy, so it's like they are forced to participate to know what is happening.

Interviewer: Mmh after teaching do you evaluate your lesson?

Teacher B: Yeah, I do ...

Interviewer: How do you evaluate?

Teacher B: I do evaluate by looking at .. as I said the response from the students

Interviewer: And how do u use that information?

Teacher B: To either proceed on the teaching going to other lesson or going back

Interviewer: Oka. Do you record your work after implementation?

Teacher B: Sometimes.

Interviewer: Sometimes not.

Chorus: not all the times.

Interviewer: Where do you record? In the lesson plan or in the schemes of work?

Teacher B: In the schemes of work.

Interviewer: Do you include, uuh, self-evaluation or reflection in this record? You evaluate the lesson but do you include self-evaluation of what was happening about you and how ?

Teacher B: Noo.

Interviewer: You don't include that? So you just look at whether learners understood or not? But then isn't self-evaluation important?

Teacher B: Yeah.

Interviewer: It is important

Teacher B: It is important unlike taking them as the students are failures .. because you can say they are failures because they don't want or.. yeah, they are failures but then the real thing you failed the methodology or how did I do?

(Chorus) We need to evaluate ourselves.

Interviewer: Okay. What challenges do you encounter as you teach normally.

Teacher B: There are so many challenges

Interviewer: So many challenges ...

Teacher B: So many, the very first one it's the loading of the period

Interviewer: Mmh, a lot of load..

Teacher B: As you know, then the class is so full...so myself am teaching three classes, form 1, form 2 and form 4

Interviewer: Mathematics ? That's 21 periods?

Teacher B: Not 21..

Interviewer: 42!?

Teacher B: Yeah.

(both giggle)

Interviewer: Do they fit on the timetable ?

Teacher B: The they they nooo! ..now the school internal arrangement .. they made internal arrangements by taking them say let us make these classes. So they made other classes .. so that is the very first challenge .. the second challenge insufficient books as I said ... the other one .. in teaching team teaching is very important but then you teach when you have friends

Interviewer: But then you are all alone!

Teacher B: Yeah

Interviewer: It's not easy .. so I think this community practice is going to help okay .. just a few more .. are your lessons supervised?

Teacher B: Mmh, no ..

Interviewer: So I can't ask you who supervises them .. and I can't ask how you reflect on the lesson. Do you allow your colleagues to see your lessons?

Teacher B: Yeah, I do allow.

Interviewer: What type of feedback do they give to you? After they have seen your lesson?

Teacher B: Because they are..... so they don't say much.. just the same as you are mathematics teacher and then you are assessing physics and chemistry.

Interviewer: Physics is better maybe history (laughs).

Teacher B: So they are telling you to evaluate humanities .. to say can you see this paper .. is this paper correct or in its order and you say, yeah, it is in order .. so you just sign everything.

Interviewer: How do you compare the quality of your lesson before the time you were trained by SMASSE and after you were trained by SMASSE, how do you compare the quality of your lessons?

Teacher B: Uuh you know for me... I see some improvement ..so many improvement in me .. as you know as I said that I am not a teacher by professional but SMASSE ...

Interviewer: What qualification do you possess?

Teacher B: Teacher B: I am having Bachelor's degree in Economics.

Interviewer: Ooh ooh, now I get it you're an economist

Teacher B: Yeah.

Interviewer: So because of that???

Teacher B: Because of that am gaining a lot because when I go to SMASSE and after coming back I try to put in what I get from there then I see some improvements. I tell you the year, the very year ,... the year I was very serious with SMASSE ... two students managed to get A in mathematics

Interviewer: Mmh?

Teacher B: And that was an improvement to me .. I say this is wonderful!

Interviewer: With a CDSS!

Teacher B: Yeah with a CDSS I had two who got As and 6 who got Bs and some with Cs and I said, aah, this is improvement and this is improvement specially from SMASSE.

Interviewer: So it was learner centred that at least you were involving them??

Teacher B: Yeah yeah, you know as we were discussing that learning should be something discovery .. students should discover what they are doing not telling them to discover but they should discover on their own you tell them or you just guide them that the ,, can you do this can you do this... afterwards they tell you the feedback from what they were doing .. if they discover it's very difficult for the learner to forget unlike when you teach them When you teach them they easily forget.

Interviewer: Mmh, your right, okay, now maybe the last question: What would you site as challenges that are maybe hindering you from practicing the ASEI/PDSI that you would want you to be practicing?

Teacher B: Nooo (shrugs)

Interviewer: I don't think this is your maximum .. you would want to improve, not so?

Teacher B: Yees.

Interviewer: But what is hindering you from reaching where you want to be in terms of..... ASEI/PDSI?

Teacher B: Uuh, usually I can say it's the systems its self, teaching .. teaching system, mmh, national wide Malawi. You know as a teacher .. a teacher is not taken as someone who is very vital to the economy of Malawi. The importance of the teacher, they don't see the importance of the teacher

Interviewer: Mmh .

Teacher B: Instead they take a teacher as somebody ... that is why you may happen to be a teacher you depend on your own salary .. it means when you don't have anything to do if you are getting fifty thousand kwacha per month you have to starve or use the fifty thousand kwacha.

Interviewer: For everything else ... so we are talking in terms of salaries, we are not motivated?

Teacher B: Yes, we are not motivated .. but maybe the salaries can be the same as other departments. In those departments people have got, the the they go for workshops .. so they get something and for them to achieve what they want, it's easy and for us to achieve the PDSI it's not easy because it needs you to be motivated, it needs your time. So the time is not there because you are thinking of your family issues.

Interviewer: Your thinking of the situation at home.

Teacher B: And maybe at home you have got nothing and somebody is telling you I want you to teach this... and you can't concentrate .. as a result you don't practice .

Interviewer: Okay, Sir, I thank you very much for granting me this interview I don't take this for granted. Thank you.

Appendix 11: Teacher C, interview 1

Interviewer: You are welcome to this short interview. I would like to understand from you how you are planning, implementing your lessons in the classroom and how you evaluate your own lessons. So, maybe I should say, in the planning part, do you plan with friends or you plan alone?

Teacher C: Aah, I plan alone.

Interviewer: Why do you plan alone? Is there any special reason?

Teacher C: Not necessarily having a special reason but may be because I plan out of the school campus, at home. Sometimes I plan when other people are also busy. So I usually plan alone and it seems it is a practice that everybody plans alone.

Interviewer: When you plan, what type of documents do you come up with?

Teacher C: We have schemes of work, lesson plans, sometimes tests when we want to administer and also teaching and learning materials.

Interviewer: Do you normally include learners' activities in your planning?

Teacher C: Sure!

Interviewer: Just an example?

Teacher C: Sometimes just an exercise which will take us to the concept which we want the students to grasp. And sometimes there are games and other puzzles and the like.

Interviewer: Do you also maybe use improvisation when conventional materials are not available?

Teacher C: Yes, and that is most of the times. You know teaching materials are scarce, because of that we always go for improvisation.

Interviewer: May you give an example?

Teacher C: Of improvisation?

Interviewer: Yes.

Teacher C: Aah, we are looking at the topic of probability. We would like to make assumption which is very concrete. We might come up with a lot of leaves, tree leaves of different kinds. Then we try grouping them from the small to the biggest one and see how many are in that line.

Interviewer: And then work out probability problems. Okay. And after you have done the implementation, you have taught the lesson, do you normally record what you have taught?

Teacher C: (Silence)

Interviewer: The work that you have done in the classroom, do you normally record it somewhere?

Teacher C: Yes. We have, on the lesson plan there is a part which we call the self-evaluation. And on self-evaluation we really look at what are the strengths of the lesson and what are the challenges. If at all there is another point in the course which was not really delivered home the way we wanted it, we also indicate such that when coming up with, when we fill the work done, we should also go back to the lesson plan and see... (inaudible)

Interviewer: Are you normally supervised whenever you are doing your planning or you are implementing your planning in the classroom? Are you supervised?

Teacher C: Sometimes when implementing but not planning, nobody has ever come in to supervise.

Interviewer: So you are supervised in classroom when teaching?

Teacher C: Yes.

Interviewer: What type of supervision? They watch your lesson or they just look at your lesson plan?

Teacher C: It can be both. Look at lesson plan and also observe the lesson.

Interviewer: How frequent is this? Maybe after a term?

Teacher C: In fact it depends on the length of the term. They plan in such a way that every month we should be supervised twice.

Interviewer: But does it really happen that way?

Teacher C: Sometimes (Both laugh)

Interviewer: Now when you are supervised, like in a classroom you are teaching and you are supervised, how is the feedback given to you? Do you sit together and evaluate the lesson or they simply tell you this is wrong do it this way? How is the feedback coming to you?

Teacher C: Most of the time we sit together, not necessarily to evaluate the lesson but being told where you have done good and where you had challenges where you need to improve. It is like a clinical type of supervision.

Interviewer: How useful do you find this type of supervision?

Teacher C: It's very useful because on daily basis we learn. So as someone is supervising you, you also see some of the grey areas which on your own you would not see. So it is very important.

Interviewer: Now let us take an overall, a summary, sort of. After you graduated, you were teaching. Then SMASSE came in and you were trained and you have ASEI/PDSI in

you. Now that you have ASEI/PDSI in you, how do you compare the quality of your lessons before ASEI and after ASEI?

Teacher C: Yah, after having the ASEI with me, most of my lessons are effective. And when planning I make it a point that at least there should be some activities for the students.

Interviewer: But let's be very very frank, I am also a teacher...

Teacher C: Yes?

Interviewer: Do you really write lesson plans every day?

Teacher C: Every teaching day, I do.

Interviewer: Okay?

Teacher C: Yes.

Interviewer: Then you are a rare treat because most of us don't write.

Teacher C: Yah, but maybe it's, maybe the nature of our school. It is a must put down by the head teacher that everybody must write lesson plans.

Interviewer: Okay.

Teacher C: And every lesson plan should be checked.

Interviewer: Mmmh, so your planning is checked, in this case?

Teacher C: Yes.

Interviewer: Through looking at the lesson plan?

Teacher C: Yes.

Interviewer: Yah, Thanks a lot for allowing me to have this interview with you.

Teacher C: Thank you.

Appendix 12: Teacher D, interview 1

Interviewer: Welcome, Sir, to this short interview. This interview is conducted in order to find out how you plan, implement and improve your lessons. I encourage you to explain as much as you can. If a question sounds ambiguous, just say it sounds ambiguous and you don't understand it so that I can rephrase it. To begin with, what time of the school year do you normally do your planning?

Teacher D: Planning?

Interviewer: Yes, like planning lesson plans, schemes of work and all that..

Teacher D: We plan sch.. (hesitates) schemes are planned during the holiday time. Lesson plans they are planned before, before lessons

Interviewer: Before classes. That means on daily basis?

Teacher D: On daily basis

Interviewer: Ok. What type of information helps you plan? Like when you are planning schemes and records of work, what information do you normally need?

Teacher D: We need syllabus, mmmm text books, calendar, school calendar,

Interviewer: And probably calendar of events too?

Teacher D: Yes.

Interviewer: Thank you very much. Do you plan alone or you plan in groups?

Teacher D: I plan alone just because we are few teachers of mathematics.

Interviewer: So you don't have a partner as such?

Teacher D: Yes

Interviewer: But you wish you planned with a friend?

Teacher D: Yah, it's necessary.

Interviewer: Why do you think it's necessary?

Teacher D: You can share some of the problems

Interviewer: Sharing problems, sharing ideas, etc?

Teacher D: Yes.

Interviewer: Aaa what documents do you produce from planning?

Teacher D: We may produce schemes of work, mmmm, teaching and learning materials, mmm, probably text book.

Interviewer: Ok. Do you include learner activities in the planning?

Teacher D: Yes. Like in mathematics you can give a problem and the learners to do in pairs. Why do we say in pairs? They have to share. Maybe some of them are slow learners, they have not captured the example and the like. So they share knowledge on their own. After that you can make them to demonstrate like solving a problem

Interviewer: Like exposing the ideas

Teacher D: Yes, exposing their ideas.

Interviewer: Ok. So those are some of the activities. Aaa, do you include any improvisation in case where you don't have sufficient conventional materials?

Teacher D: Yes. In maths, yes.

Interviewer: For example?

Teacher D: You can, maybe it's the, (pauses), let us take for example you are teaching circles, you are there to improvise circles like using papers and the like.

Interviewer: Or using a string

Teacher D: A string, yes, yes.

Interviewer: Well, what challenges do you normally encounter as you do your planning?

Teacher D: Challenges, maybe, it's, since we are lacking teachers, work load is too much.

Interviewer: So to plan it becomes a problem

Teacher D: So at times it becomes a problem

Interviewer: But then when you look at the advantages of planning...

Teacher D: Yah, at times there is conditional. Yah. There are some activity that can make you fail to plan, probably at school level. you plan maybe there are some other activities. As such, you find that maybe you have planned but you have not taught because of other activities. Let us take for instance; today they are saying we are going for head counting, which means some lessons will not be taught. As a result, my schemes will be behind.

Interviewer: Hmmm! That's all on planning. Maybe let's go to implementation, just a few more questions. After you have done the planning, do you normally follow the plan as you teach?

Teacher D: Yah, we follow the plan by using schemes of work

Interviewer: Ok

Teacher D: To direct where to go.

Interviewer: Not necessarily the lesson plan?

Teacher D: The lesson plan you extract a lesson from the schemes of work

Interviewer: Okay. At the moment, do you seriously write lesson plans?

Teacher D: Eh! (Both laugh), lesson plans is a challenge, is a challenge, is a challenge.

Interviewer: We don't write lesson plans?

Teacher D: Eee! At times we don't write. (Both laugh)

Interviewer: Sometimes we write?

Teacher D: Yes

Interviewer: Most times we don't?

Teacher D: Yes.

Interviewer: So during the time you write lesson plans, do you normally follow the lesson plan in classroom?

Teacher D: Yes

Interviewer: So how do you differentiate a lesson that you have used a lesson plan and the one that you did not have a lesson plan?

Teacher D: Now, the one, the flow of ideas where you have not planned, at least, maybe, they can't be in a proper...

Interviewer: Flow

Teacher D: Eee. ...flow of ideas, Yeah. You can maybe over plan or under plan.

Interviewer: Aah. Do you normally check understanding of your lesson by your learners as you teach?

Teacher D: Yes, by asking, by giving them exercise you see whether they are following. If you see half of the class they have got a problem or three quarters of the class you see they have just...(shrugs). Soon after the lesson you have to evaluate, an exercise and the like.

Interviewer: Okay. After teaching, do you evaluate your lesson?

Teacher D: Yes, by giving them an exercise

Interviewer: Okay. Do you evaluate it alone or with friends?

Teacher D: Alone.

Interviewer: As you said you do not have partners around?

Teacher D: Yes. My partner is overloaded so I cannot even involve him. (both laugh)

Interviewer: Yeah, That is understandable

Teacher D: He is teaching form 1, form 2 and form 4 and we have a double stream

Interviewer: Eish! That is really overloading. It's not easy.

Teacher D: Not easy.

Interviewer: Do you record your work after you have implemented in the classroom?

Teacher D: In a... (hesitates)

Interviewer: Recording to say, "I have taught this lesson"

Teacher D: In a... using the scheme.

Interviewer: You use the schemes and records of work?

Teacher D: Yes.

Interviewer: Where you record you have taught?

Teacher D: Mmh. (not with much strength)

Interviewer: So, the evaluation part of the lesson, is it recorded in the same or is recorded separately?

Teacher D: (still hesitates)

Interviewer: Evaluation of the lesson, I have taught and it went this way.

Teacher D: Yeah, (hesitates), in a, in a work done.

Interviewer: In the schemes?

Teacher D: Yeah.

Interviewer: Now this self-evaluation that you write, how do you use that information?

Teacher D: When you say, "Self-evaluation?"

Interviewer: When I say, "Self-evaluation" I mean whether the lesson was well-taught or not so well-taught.

Teacher D: I can see by the exercise which I give, do they really, do they really, are they really understood?

Interviewer: By the performance?

Teacher D: Performance.

Interviewer: So after that, how do you use that information?

Teacher D: Mmmh, (hesitates)

Interviewer: If you find that they understand or they don't understand, how do you use that information?

Teacher D: If they have not understood then you need more practice

Interviewer: But then looking at the long syllabus..

Teacher D: Now what happens, it depends with the ability of the learners. I cannot go, be matching with my planning. Sometimes I can be behind just to catch up the learners. But if I say I have to rush, they will not understand.

Interviewer: Because of the ability of the learners. (sighs). So the challenges that you encounter are those of ability, eh?

Teacher D: Yeah, and lack of interest, yeah, negative attitude towards mathematics.

Interviewer: Mmmh, are your lessons supervised, (pause), at times as a teacher?

Teacher D: Aaa, by..(hesitates)

Interviewer: Anybody outside, in the school?

Teacher D: Yeah, they can be supervised if they want to supervise.

Interviewer: But the frequency is low?

Teacher D: Very low.

Interviewer: Like in the past four years, how many times have you been supervised?

Teacher D: Once a term by the Secondary Education Methods Advisors.

Interviewer: Oooh! I could spend 4 or 5 years without being supervised.

Teacher D: No, with us we are along the road.

Interviewer: Ooh! And it's a new school.

Teacher D: No. it's not new but they do come (laughter)

Interviewer: Now when they supervise you, do they go into the classroom to see the lesson or they just look at the documents?

Teacher D: They look at the lesson and also look at the documents.

Interviewer: Now, after you have been supervised, how do they give you the feedback? What type of feedback, I should say?

Teacher D: After the end, then they summarise. They call us as a group.

Interviewer: They don't deal with individuals?

Teacher D: They after, soon after the lesson they have to call you as an individual.

Interviewer: I am interested on that one.

Teacher D: Yeah, as individual. After that they will come up as a whole. So soon after the lesson they will have to call you and analyse how the lesson went.

Interviewer: Now, as an individual, when they call you, do they actually evaluate the lesson with you or they simply say this was wrong, do it this way?

Teacher D: They do evaluate with the teacher, only that the supervision is too rare.

Interviewer: Okay. So, and then do you allow colleagues to observe your lesson? Your colleagues within?

Teacher D: Yeah, if they are... (hesitates and smiles)

Interviewer: Let's say the truth (laughter).

Teacher D: Mmmh, aaa, in fact we could allow our colleagues to supervise us but...

Interviewer: But they are too busy.

Teacher D: No! No! No! In science we are not enough. Because, me, I cannot go and supervise history.

Interviewer: You will not know what to see.

Teacher D: Yeah, you see? Now the time to supervise...

Interviewer: But you can see some ASEI in history!

Teacher D: Aah, very rarely.

Interviewer: Very rarely. Of course it's tough for one to supervise a different subject that you don't even know.

Teacher D: If I have a maths teacher is also busy. Which means when I am in class is also in class, he is also busy somewhere.

Interviewer: Yes, so tough. So this is all to do with understaffing and the like?

Teacher D: Yes, understaffing.

Interviewer: Okay, let's talk as, as overall: How do you compare the quality of your lesson before you were trained by SMASSE and after you have been trained by SMASSE? How do you compare the quality of your lessons?

Teacher D: In fact, you know, Zomba was a pilot for SMASSE so I have been in it for long.

Interviewer: Ooh!

Teacher D: Yes, so when I went to college, in fact my, when we were having the peer teaching, the, my friends really enjoyed my lessons because, me I was applying what/..SMASSE already.

Interviewer: Already, mmh?

Teacher D: Already, yes. So they enjoyed my lessons.

Interviewer: So in this case, how do you compare their lessons without SMASSE and your lessons with SMASSE?

Teacher D: Yeah, the problem is the, the one with, without SMASSE, were too much talking, no activity for learners and the like.

Interviewer: Mmh, like teacher- centred?

Teacher D: Eyah! Teacher-centred.

Interviewer: Ohoo! While in your case you were actually practicing learner-centred.

Teacher D: Yes.

Interviewer: Now, in this case, do you feel you could improve? Because we all aim higher, don't we?

Teacher D: Yes.

Interviewer: You were better than your friends, but now at the moment, do you think you can improve?

Teacher D: Yes, I can improve.

Interviewer: Which areas would you think would need improvement in the lesson?

Teacher D: Yeah, but there are some conditions which can make me not to improve, mmh, and improve.

Interviewer: What are these conditions? I am very interested in them.

Teacher D: Conditions are, you see, as I have said that too much overloading which means at times I can fail to plan.

Interviewer: Mmh, just because of too much work.

Teacher D: Mmh, as a result, I cannot improve. If there are some chances of training more teachers of science they have to.

Interviewer: Okay, what other conditions would you want to be improved?

Teacher D: Aah, teaching and learning materials. They are not there so it becomes a challenge. There are some other, maybe you want them learners to be in groups, then you find out that you don't have enough materials. And in maths, you can even improvise a text book?

Interviewer: No! You can't. Okay. Thanks a lot for allowing me to have this interview with you.

Teacher D: Thank you.

Appendix 13: Teacher E, interview 1

Interviewer: You are very welcome to this short interview. This interview is conducted in order to find out how you plan, implement and Improve your lessons. I encourage you to explain as much as you can. If a question sounds ambiguous, just say it sounds ambiguous and you don't understand it so that I can rephrase it.

Teacher E: Mmmh

Interviewer: Firstly, what time of the year do you normally plan your work?

Teacher E: (Silence).

Interviewer: Like you are preparing to go into your classroom, what time of the year or what time of the term do you plan?

Teacher E: For schemes and records of work I do plan when the, the first term or the term begins

Interviewer: When term begins?

Teacher E: Mmmh

Interviewer: That's at the beginning of the term?

Teacher E: Yeah

Interviewer: Okey

Teacher E: And for the lesson plan I do plan in the morning

Interviewer: Every morning?

Teacher E: Every morning.

Interviewer: Eeeh! You write lesson plans every morning?

Teacher E: No planning doesn't mean writing.

Interviewer: Eyaaah, okay, I understand that one now... So you plan, and after planning, what do you produce, just lesson notes?

Teacher E: Eyaah, sometimes I produce lesson notes and sometimes no.

Interviewer: You just put it in your head?

Teacher E: Eheee, I just put in my head.

Interviewer: Okay, okay. Now what information helps you to plan?

Teacher E: I have got the syllabus. I have got the schemes and records of work, the books...

Interviewer: Okay, do you plan alone or you plan In groups?

Teacher E: I plan alone

Interviewer: Why do you plan alone.. any specific reason for that ?

Teacher E: Because am the one teaching the subject so I plan alone but if am not comfortable somewhere I have got a challenge I do ask my fellow teachers..

Interviewer: Okay, aaah, do you think you have got adequate time to plan? Whether daily or at the beginning of the term as you put it..

Teacher E: Sometimes I don't have adequate time but usually I have time to plan

Interviewer: When you don't have adequate time what is the cause for that?

Teacher E: I juts rush to the classroom and teach!

Interviewer: Eish! Now when you are planning do you include learners' activities in the planning?

Teacher E: Yes of course, I include learners' activities, but if I see that I don't have time maybe I have got a single period I don't include learners activities but just include exercises.

Interviewer: Exercices.

Teacher E: Yeah.

Interviewer: Do you include any improvisation in your planning when conventional materials are not sufficient?

Teacher E: Yes

Interviewer: Like? For example?

Teacher E: Aah, aah, like I can draw triangles, figures, on charts and in the classroom I can use tins, I can use threads .. yeah.

Interviewer: Okay .. what challenge do you encounter as you plan?

Teacher E: I have got a lot of challenges. The first challenge is lack of materials.

Interviewer: Lack of materials.

Teacher E: Yeah, for example, we have got the form one, we are starting a new syllabus, we don't have enough books for learners so we are using old books, eeeeh! We pick exercises from those old books and share them with learners.

Interviewer: Mmmh. It's a challenge. Okay, is your plan checked by anybody?

Teacher E: Noo.

Interviewer: Nobody checks?

Teacher E: Only the schemes of work are checked by head of academics.

Interviewer: How often do they check your schemes of work?

Teacher E: Fortnightly.

Interviewer: Okay, I think that's sufficient for planning. Let's go to the implementation part. When you have done your planning and you are in the classroom, do you always follow your plan as you teach?

Teacher E: Yes, I do follow the plan. But sometimes, because, I, hmm, I, I am teaching and some of my learners can come with something that can disturb my plan. So sometimes I switch off from theee... what I planned to theee...what I can do

Interviewer: To what the students are demanding.

Teacher E: ...are demanding, yes.

Interviewer: In terms of their knowledge.

Teacher E: Yeah.

Interviewer: Okay, do you check your learners' understanding of your lesson as the lesson is going on?

Teacher E: Yes. I do check by letting them to ask questions. I can allow questions.

Interviewer: Now, how do you use that information?

Teacher E: (silence)

Interviewer: When you have asked the learners, you have asked questions to the learners, how do you use that information?

Teacher E: I can see if my learners are following or they have got challenges and I can help them.

Interviewer: That's a good one. Do learners participate in activities of your lessons if you prepare activities for them?

Teacher E: Yes, they do.

Interviewer: How do you make them participate?

Teacher E: I encourage them to discuss in groups or in pairs. And I check by moving around, seeing what they are doing.

Interviewer: So, it's mostly group work, eeh?

Teacher E: Sometimes pair work, sometimes group work.

Interviewer: Okay, then after teaching, do you evaluate your lesson as a whole? After you have done your teaching?

Teacher E: Yes, I evaluate. Sometimes I can do it, aah, according to, aah, looking back to the exercises that I have given my learners. If they have done well, I can say that my lesson was good.

Interviewer: Okay. Then how do you use that information?

Teacher E: I use this information to revise, either to revise or not.

Interviewer: Or to go ahead.

Teacher E: Yeah

Interviewer: Okay. Then after you have done the implementation, you have taught the lesson, do you normally record that you have taught the lesson?

Teacher E: I do record it in the schemes and records of work.

Interviewer: And when you record, do you include self-evaluation to say, I think I should have done better this way, I should have done this, or how the lesson was? Do you include that in the schemes and records of work?

Teacher E: Eeh! There I cannot say (giggles), but maybe you have to check what I have written in my, (not sure what to say) in maths column.

Interviewer: Okay. What challenges do you encounter as you teach?

Teacher E: The only challenge is that the pace I can move is not the same as the pace my learners are moving.

Interviewer: You want to move faster and ...

Teacher E: Yeah, and if I want to move very slow, some of the learners can push me to go forward. But the second challenge is that my learners, mmh, they are, mmh, what can I say? Form ones, only few are above average.

Interviewer: Most of them are....

Teacher E: Below average. And another challenge is that from our feeder schools, e are receiving a lot of learners from one school.

Interviewer: Mmh?

Teacher E: Eeeh.

Interviewer: So it is like you are transferring that school to here. So if there was a problem with that crop and the problem is transferred here.

Teacher E: Eheee! We are receiving a lot of learners from Nsalabani than Milare and others. For eample, we can get 35 from Nsalabani and 2 from Milare. So to control those

from Nsalabani it's a challenge. They think they are the best. They don't want to hear from somebody.

Interviewer: They are overconfident.

Teacher E: Yeah, and that is a big challenge.

Interviewer: (sighs) That's too bad. Then how do you deal with such a challenge?

Teacher E: (both giggle) I involve other teachers to help.

Interviewer: Okay. Are your lessons supervised?

Teacher E: At school level, no. But we have planned to have lesson supervision at departmental level by heads of department. ...(inaudible)...we do that.

Interviewer: You do or you are planning to do?

Teacher E: We are planning to do.

Interviewer: You are planning to do. Okay. Do you allow your colleagues to observe, just colleagues not as supervisors but colleagues to observe your lessons?

Teacher E: Aah, no.

Interviewer: No. Okay. Now let's just sum it up: How do you compare the quality of your lessons before you were given ASEI/PDSI and after you have been given ASEI/PDSI? How do you compare the quality of your lessons in the classroom?

Teacher E: The quality has improved.

Interviewer: Okay. In terms of what?

Teacher E: In terms of aybe, aah, aah, intro..., aah, (more hesitation), activities.

Interviewer: For the students?

Teacher E: For the students. I do give activities. But that time I had no ASEI, I didn't give my learners any activities.

Interviewer: So it was like 'chalk and talk'?

Teacher E: Only 'chalk and talk', 'chalk and talk' then exercises.

Interviewer: So you feel now, you feel that is much better that the students can now participate?

Teacher E: Yeah.

Interviewer: Now, generally, as the last question, are there any challenges that you feel although you have improved from Pre-ASEI to Post-ASEI period in your life, are there any challenges that are hindering ypu from practicing ASEI/PDSI in the classroom?

Teacher E: (silence)

Interviewer: Any general challenges that you feel, “I think *ineyo ndikulephera chifukwa cha izi, izi, izi* (I am failing because of this, this, this)?

Teacher E: (silence) , (both giggle)

Interviewer: Whether academic whatsoever?

Teacher E: Hmmm, (laughs) *palibe* (nothing)

Interviewer: (giggles) You feel it’s okay?

Teacher E: I don’t fail because of challenges. If I fail to do ASEI/PS, aah, PD...SI lessons, it is just because of maybe I am busy, Yeah.

Interviewer: (Sighs), Okay, Madam, thank you very much for offering me this interview. I don’t take this for granted.

Teacher E: Thank you.

Appendix 14: Second interview guide

This second interview guide intends to find information during intervention so as to know what support teachers need in order to practice ASEI/PDSI as intended by SMASSE INSET Malawi.

PLANNING

1. Describe the way you are planning in the Community of Practice (CoP). How different is it from the planning before CoP? Any advantages of the current planning over the planning before CoP?
2. Before CoP, most of you were not writing lesson plans but now everybody is writing lesson plans. How are you managing it now? What is compelling you to do so?
3. Describe the quality of your lesson plans now compared to the period before CoP.

IMPLEMENTATION

4. One of the problems you had before was that lesson plan were difficult to follow when teaching. Describe your situation now regarding lesson implementation.
5. How useful do you find the lesson plan as you teach?

EVALUATION AND IMPROVEMENT

6. Do you see any difference between the evaluation you did before CoP and the evaluation you are doing now? Explain.
7. How do you understand by 'self-evaluation'?
8. How useful is it to critique your own lesson? Were you comfortable to do that before? Explain.
9. How useful is it to have your lesson critiqued by your colleagues?
10. How does it help you to be a reflective teacher?
11. What do you think have been your benefits from the CoP?

KNOWLEDGE OF ASEI/PDSI

12. What do you understand by 'Improvisation' in ASEI/PDSI? How useful is it?
13. Do you think it is fair to expect improvisation in every lesson? Explain.
14. In ASEI, what do you understand by Experiment in the context of mathematics? Do you think it is fair to expect experiments to be conducted in every lesson? Explain.
15. What do you know about ASEI/PDSI Checklist? Do you think it is a good tool to use to observe mathematics lessons? Explain.

SUMMARY

16. What support do you think a teacher needs in order to practice ASEI/PDSI as intended by SMASSE INSET Malawi?

DOCUMENT ANALYSIS

- Involved examination of ASEI/PDSI checklist, its interpretation document, ASEI/PDSI lesson plan and the compendium of training manuals from 2004 to 2013
- The aim was to find out why teachers seemed to have limited knowledge of ASEI/PDSI despite numerous trainings

Appendix 15: Teacher A, interview 2.

Interviewer: You are welcome to this short interview. It is intended to find out how you are planning, implementing, evaluating and improving on your lesson delivery in the Community of Practice. This information will help us to know what support teachers need in order to practice ASEI/PDSI as it is intended by SMASSE INSET Malawi. It has several sections: planning, implementation evaluation and improvement then knowledge of ASEI/PDSI itself. So under planning can you describe the way you are planning now in the CoP?

Teacher A: the way of planning is that we are in a group from all the 3 schools. We come together we make the lesson plan. First of all we divide the term or all the work that is supposed to be done in a term, all the topics. And those topics are also shared to the individuals so that each and every one should make the lesson plans from them. So we make them together or first of all individually at home then after making the lesson plans we have a day where we share the lesson plans. We critique or maybe correcting some other places where there is need for additions or subtraction so that we come up with one. After that then the lesson plans are photocopied and shared to the schools especially to the teachers who are taking the classes especially the form ones.

Interviewer: now how different is this from the planning you did previously before CoP?

Teacher A: before CoP these lesson plans were prepared by the individual person who was taking the particular class so it was somehow a problem for him or her to make all the lesson plans. It was somehow tiresome because in this CoP we are managing to plan all the lessons for the whole term other than if they were supposed to be done by an individual or prepared by an individual not all the lesson plans may you plan.

Interviewer: Mmh, okay, so that's an advantage isn't it?

Teacher A: Yees, and in addition to that maybe is that it is not always that the lesson, the planning of the lesson plans are maybe 100% thus, they have got some problems which need support from other people so we do share. That's the advantage.

Interviewer: Ooh! That's a good one. Now before CoP most of you were not writing lesson plans

Teacher A: It's true

Interviewer: But now everybody is writing lesson plans. How are you managing this?

Teacher A: We are managing. It depends; you need to plan again the time. Of course you are supposed to teach at the same time. You need to plan the time so that you should at least find time for planning, for making the lesson plans. So in your planning or every day planning you need to at least spare time for those lessons which you need to plan and prepare how you are going to present or how someone is going to present them in the class

Interviewer: Now... in this case you have sustained preparation of lesson plans from the beginning of the year, okay? This is the third term you have been planning in the CoP for all the three terms now. What is compelling you to do that?

Teacher A: Uuumh, on this one I think it's just a matter of you need to put much effort on that I should say the mindset, okay. It's something that has to do about the mindset. It's part of your work. So as it is part of your work you need to take it into heart again as well as the pupils for you to teach properly or for the learners to learn properly. You are supposed to plan. So it has to be in the heart that I should present the lesson or I should teach properly. And again as the pupils should learn what is really supposed to be done in the particular lesson. So you are supposed to plan. As such it must be something that has to be in the body that is in the mind as well as part of the mind, part of you, the planning that is.

Interviewer: Mmmh, okay, under implementation one of the problems u had before was that lesson plans were very difficult to follow in the classroom. I remember before, you said sometimes I under plan and sometimes I over plan. So you go into the classroom you don't follow your lesson plan this and that. Now this time around how can you describe the way you are teaching using the lesson plan?

Teacher A: Using the lesson plans since as I have already said that these ones are written by individuals then we come together ... so in the criticing we look at the plan someone has done .. if we still feel like its .. there are some information which are missing there is an addition to that. If maybe he is over planning there is some sort of maybe other topics or other concepts are reduced, so with the CoP there is a lot that the teacher gains for the benefit of the students.

Interviewer: mmmmmh that's very interesting .. uuuh how useful do you find the lesson plan as you teach in the classroom?

Teacher A: the lesson plan is very useful because it guides you how you can present or maybe how you can explain the concept to the understanding of the pupils. Because if you don't have a lesson plan maybe you can be out of the topic but this lesson plan brings you in to the track so that by the end of the you are there to see that the pupils have at least managed to grasp what you intended to.

Interviewer: on evaluation and improvement, do you see any difference between the evaluation you are doing now and the evaluation you did before CoP?

Teacher A: yes there is a difference in such a way that on evaluation when you come together each and every one feels we share how the lessons were presented and in the presentation of these how the lessons were presented you feel that somewhere when I was teaching I was maybe... the information I dint present the information deeply to my students. So in so doing you at least add or else maybe you are behind you need to have makeups so that at least these students should not be very far away from the students of the other schools in the CoP

Interviewer: and how do you understand by self-evaluation in ASEI/PDSI?

Teacher A: self-evaluation is where you... you evaluate or you see how your presentation maybe explanations of the concepts to the pupils were like depending on the response of the students especially on maybe the exercise you gave them after explaining the concept. So you evaluate in such a way that if there is need for additions that means you are supposed to have the make ups. If it is not necessary then you proceed with the ... what you planned to teach the pupils that is.

Interviewer: did you do evaluation in fact?

Teacher A: of course but not always as it is this CoP.

Interviewer: what made you not to evaluate your lessons before CoP ?

Teacher A: with COP sometimes its forcing you to evaluate so that you should have something to share with your friends and at the same time in the sharing you also get something as you share to your friends. So you are forced to.

Interviewer: so how does this help you to be a reflective teacher? Just a minute, I have skipped a very important question before this one. Now how useful do you think it is to critique your own lesson, because the self-evaluation we are talking about here that is what critiquing is. So how useful is it for you to critique your own lesson that you have taught?

Teacher A: yeah. It's important to critique your own lesson because it's not always that you will be presenting it maybe as it is supposed to be. You will make some errors so it's important because each and every time you make a mistake or maybe you under planned, maybe in the explanation you didn't explain much better such that the pupils did not understand the concept you need to revisit again the lesson seeing where the points... were not presented well to the pupils. Then go back to teach them or else have the make ups as I already said or maybe revisions after seeing that maybe my lesson didn't go on well.

Interviewer: Now, before COP were you comfortable to do that?

Teacher A: Come again?

Interviewer: Before COP were you comfortable to critique your own lesson?

Teacher A: Noo!

Interviewer: Why not?

Teacher A: Aaah! No because it was something like... not always okay. But sometimes I could, but not always. But which is different as now with COP you are forced to.

Interviewer: So how useful is it to have your lesson critiqued by colleagues?

Teacher A: It's very useful because on your own when you are working as you are planning you feel like you have emptied everything. In such a way that the pupils will

understand but once your friends critique it and brings in other ideas which need to be added to your lesson so that maybe the pupils should at least grasp the real thing in that.

Interviewer: Ooh! That's interesting. How does this help you to be a reflective teacher?

Teacher A: It has helped to be a reflective teacher because again in the planning as it is we have to be using the resources which are around and again we should be pupil centred, try as much as possible that you make some activities which must be pupil centred... I don't know can you come again?

Interviewer: I said this, critiquing of your own lesson and critiquing of your lesson by colleagues, how do these two processes help you to be a reflective teacher?

Teacher A: You can be a reflective teacher because you learn from those critics especially whereby a colleague brings in other ideas, maybe activities which can be given to the pupils so that they should understand the concept because on your own maybe you have few activities or even no activities which the pupils can do in the lesson so that they should understand the concept but when it is critiqued by a colleague that one assists.

Interviewer: Ok, So what do you think have been your benefits from the CoP?

Teacher A: Uuh, benefited because I have learnt much from it in such a way that in my planning, as you are planning, you have to think critically or widely thinking of the activities to present the lesson so that the pupils should understand and again the way of presenting also has assisted me such that you impart the knowledge. At the same time you make the students to be somehow maybe very resourceful or else the concept they should know that the concepts they have the others will be used maybe in the future.

Interviewer: Under knowledge of ASEI/PDSI what do you understand by improvisation in ASEI/PDSI?

Teacher A: In ASEI/PDSI improvisation that is to have to use the resources that are around not only depending on those that are somehow...anyway, there are some other concepts that it is difficult for pupils to understand. So with ASEI/PDSI you have to think widely of the activities and those activities forces you maybe to have other things to use the resources that are around. For example, maybe you can use counters and all those counters there are several things which you can use which are around. So improvisation you ... these counters you improvise or you take the resources ... you use much of the resources that are around.

Interviewer: Do you think it is fair then to expect improvisation in every lesson of mathematics?

Teacher A: Of course, but sometimes it fails in others. For example, there are other concepts maybe in subjects of the formula, there are other symbols which you cannot improvise. So there it is when the teacher somehow is entangled but there again, with maybe this CoP, we do share how someone can improvise or can use or can teach that using the improvisation methods.

Interviewer: Ok, and again, in ASEI/PDSI what do you understand by the word experiment in the context of mathematics?

Teacher A: The experiment that is involved with activities so that the activities are learner-centred. So you give the activities so that the learner on their own should discover some of the things so as much it is something like an experiment to them. Because these activities you are ...you involve the pupils at the same time they discover on their own. It is something like to them it's an experiment so with mathematics the...an experiment are these activities which can come like this are very important.

Interviewer: Now, in this case, as in improvisation, is it fair to expect an experiment to be done in every mathematics lesson?

Teacher A: Of course!

Interviewer: You would feel it's fair that every mathematics lesson must have an experiment?

Teacher A: No!...not really.

Interviewer: Why not?

Teacher A: Because....(Phone buzzing, she is allowed to take the call) After call: Can you come again?

Interviewer: I said in this case you have explained an experiment in mathematics, so I am saying, in this case is it fair that every mathematics lesson must have an experiment?

Teacher A: Maybe, I should say so. I feel like the practice you give to the pupils are also something like an experiment.

Interviewer: Are you trying to say activities are the same as experiments?

Teacher A: No!

Interviewer: How different are they?

Teacher A: In the practice, they also discover something because as a teacher when you give practice of a concept you also maybe, give them something so that it should assist them to the other concept. So it is also something like an experiment to them.

Interviewer: Think about a situation where for example, we give an exercise with known procedures in a group for students to do as an activity, would that be called an experiment?

Teacher A: No! If it is known I don't think it is an experiment.

Interviewer: So, would we expect every lesson to have an experiment, maybe we should think about it?

Teacher A: Yah.

Interviewer: Alright. What do you know about ASEI/PDSI Checklist?

Teacher A: As for this one...it is where....I have forgotten.

Interviewer: Ok...In this case would you say it is a good tool to use to observe mathematics lessons if you have forgotten it?

Teacher A: It is good!

Interviewer: Aaaah, You have forgotten it then how do you know it's good? Would you be comfortable yourself to use it to observe a lesson?

Teacher A: Yes, Yah, Yah. I have remembered...You are saying ASEI/PDSI Checklist? It's very important because that checklist is divided according to how the observer sees on someone who is presenting. That checklist, once it is done it reflects how the presentation was like and again at the same time it can also assist the teacher presenting. If this one was or is or is told that this is how you performed that one can assist him or her to change maybe the remedies somewhere, the methods and there are several things maybe the materials in the lesson.

Interviewer: Ok. The last question is, what support do you think a teacher needs in order to practice ASEI/PDSI as it is intended by SMASSE INSET Malawi?

Teacher A: I think the teacher needs to be assisted the way we have done with the community work with the lesson plans planning because students do not enjoy much when you give them a problem to solve in groups using already known method, they like the issues of argument. It is not easy to find good activities when you plan alone. Of course the teacher can manage but to the extent that the use of resources and again it should be learner centred at the same time the activities...the type of activities especially on this one activities needs to be shared. It does not mean that the teacher on his or her own can have all the activities. Therefore, these should to be shared as a community as we are doing because a teacher alone cannot have everything to be presented or to be given to the pupils so that they should understand. That is what I feel like.

Interviewer: Ooh, Ok, Thanks a lot. That's the end of our second interview. I thank you very much for granting me this opportunity to conduct this interview.

Appendix 16: Teacher B, interview 2

Interviewer: You are welcome to this short interview. It is intended to find out how you are planning, implementing, evaluating and improving on your lesson delivery in the Community of Practice. This information will help us to know what support teachers need in order to practice ASEI/PDSI as it is intended by SMASSE INSET Malawi. It has several sections: planning, implementation evaluation and improvement then knowledge of ASEI/PDSI itself. So, under planning, can you describe the way you are planning now in the CoP?

Teacher B: Especially lesson planning?

Interviewer: Any planning whether lesson planning.

Teacher B: We are planning in different ways. We have schemes and we have got lesson plans, where on schemes we plan for the whole term and lesson plans we plan for the lesson to be taught for that day. And this is very helpful because it is like we are trying to move on a certain channel unlike when you didn't plan. If you didn't plan it's very difficult for you to know what you are going to deliver especially to the students. But when you plan, then you know that I will start from this step and I will make sure that after lesson then I have to evaluate myself to see whether the students grasped the information, the concept itself. If yes, then I have to continue and if not, I have to repeat or revise the topic. Yes.

Interviewer: How different is this planning in the CoP compared to the planning you did before the CoP?

Teacher B: Aaa.. There is a very big difference especially when we are planning in this CoP. It's like we are trying to have different views from different people especially when we are criticising the lesson plans. After each and every individual has planned on his or her own then after we meet. After meeting we start to look at these lesson plans. If there is any additional information we put in that and if there are some information to remove we remove them. So this makes the lesson plan to be more relevant compared to a lesson plan which we used to plan before this CoP.

Interviewer: Ok, you have stated a few advantages of planning over that already. But maybe you have more advantaged of this type of planning over the old planning?

Teacher B: Yah, More advantages are there. As I said it's like we are trying to... it's something which will deliver, will make students to understand very well. And then the other thing is when we plan in this system of CoP it's like we have developed something that is total different from what some teachers they cannot, they don't plan, I should say like that. They don't plan and they just go in class sometimes, ok, I am going to teach this lesson. Ok, this is what I know. So what they deliver is different from what we plan here. Ahaah! And in addition to this you know we have that, that SMASSE, not this one, not this CoP but that SMASSE, SMASSE emphasises that teachers plan, but not all teachers will go and plan for activities in class. So there is a difference, yah.

Interviewer: Ok, thank you. Before CoP most of you were not writing lesson plans as you put it. But now everyone in this CoP is writing lesson plans. How are you managing it?

Teacher B: we are trying to manage like we are told that you should go and plan, something which we were not used to. It's like we think it's something very difficult. But when you are two or three, you are encouraging each other that can we do this. Then it now becomes something easier for us. That's how we are doing this. But then when we are told you are supposed to plan we think something. It's like we have been added a certain task.

Interviewer: But basically, how are you managing it in terms of time because we used to say that...that first interview, you remember? We used to say we don't have time to plan that's why we don't plan?

Teacher B: Yes.

Interviewer: Where are we getting the time this time around?

Teacher B: In life we have got so many times. God gave us time. We are supposed just to plan as you are saying. We are supposed to plan that this time I will do this, this time I will do this, this time I will do this. If we say I cannot plan it's like each and every time we are using it with a certain activity which is not true. Yah, but then I think it's laziness that lead to say because of time I cannot plan. But I have seen that people can plan. People can plan and they can deliver.

Interviewer: Aah. Thanks a lot. Can you try to describe the quality of your lesson plans now compared to the period before CoP, maybe some details inside the lesson plan?

Teacher B: Especially for this time when you plan on your own. When you plan on your own it's like you just plan. Nobody will critique you. You say this is the best. But then on the community maybe you can plan something which is not student-centred. When you go to the group as CoP they say, no! Let us make this lesson plan to be student-centred. So, a student-centred lesson plan has got more basics in mathematics compared to the lesson plan which is not student-centred. So, I can compare these two as this is the very best compared to the...those which we used to plan.

Interviewer: Now, one of the problems you had before was that lesson plans were difficult to follow when teaching in the classroom. Now, describe your situation at present.

Teacher B: We are practicing this lesson planning before going in class. Now with this it is no more difficult to follow the lesson plan. You are the one who is planning. You know the materials to be used. And now if you know the materials to be used you are supposed to follow that, ok, I will do this, I will do this, I will do this. You should know that something which you are doing on your own it's good compared to something which you are doing but then you don't know what you want to do. Yah, so here I just want to put emphasis on lesson planning with CoP and lesson planning which we used to practice, to do previously. On previously we were just planning. So you plan because someone told you to go and plan. Now when you are told just to go and plan, you don't know what you are going to plan, just want to give someone a document that this teacher planned. But this time it's like you have taught that you should plan in this way. This plan should be student centred. It should be like this like this like this. So after looking the results from

the students, we have seen that this is marvelous. This is good and we are supposed to use this method.

Interviewer: Ok?

Teacher B: Yes.

Interviewer: So how useful do you find this lesson planning as you teach in class?

Teacher B: They are very helpful especially to the students and to the teacher. To the students it is very easy for them to grasp the concept. And to the teachers it is not time consuming because if you have planned and you know where you want to go, it's very easy for you to go through those channels compared to if you didn't plan. If you didn't plan you go to, maybe you want to teach An example you want to teach something concerning maybe coordinates. Maybe the first concept you want to teach students is that identify a point on a number line or on a Cartesian plane. So if you didn't plan, maybe before identifying... aaa before putting in this concept maybe you may come up, and say, no, ok, can you calculate gradient of this line, because you do not know what to do. But then, if you planned, it's when you know that at this time I will ask students to do this, I will ask students to do this, I will ask students to do this. Thereafter, it's when you overlook that, ok, did I meet what I wanted? If yes, you proceed. If not, you go back. Yes.

Interviewer: So I should assume that this time around there is no over planning or under planning?

Teacher B: Yes, we are in a channel. Yes.

Interviewer: Under evaluation and improvement, do you see any difference between the evaluation you did before CoP and the evaluation you are doing now?

Teacher B: Yah, so many improvements. Improvement in terms of how we are now lesson planning. We have improved in lesson planning, improvements in performance of students, improvements even students in grasping the knowledge itself.

Interviewer: But this one, sorry to cut you short, this one is focusing on only evaluation.

Teacher B: After evaluating the lesson?

Interviewer: It says, do you see any difference between the evaluation you did before CoP and the evaluation you are doing now?

Teacher B: Before CoP, the evaluation was there in the.. in the schemes of work where after a lesson we evaluate the whole topic. But then this is lesson planning and then at the end of lesson planning you have to evaluate. So there are some improvements in evaluation after lesson you now evaluate; did the students get the concept? Did I teach well? Did I deliver? If yes, I have to proceed. If the answer is no, I should not proceed! I should go back, yah.

Interviewer: That's very interesting. How do you understand by the word self-evaluation in ASEI/PDSI?

Teacher B: Self-evaluation simply refers to after delivering what you have planned, you have to sit down and the first, you can evaluate self by marking. You mark on the classroom. Then you check; did what I wanted to deliver really delivered? If yes, it's when you say, ok, I have met the target. But if no, then it means you didn't. So, self-evaluation simply means looking at the way you have delivered the concept, if you delivered the concept as it was then it means you have met the target. But if you delivered differently, you say, ok, I think here I lost the concept. I was supposed to do this. If I did it this way, maybe I would do this. It's like you are evaluating yourself. Yah.

Interviewer: Now how useful is it to critique your own lesson, because what you have been describing here is like you are critiquing your own lesson?

Teacher B: Yah.

Interviewer: How useful is it to critique your own lesson?

Teacher B: It's very useful because you look at the mistakes. Any human...a human person...a human can make a mistake. Now if you say this is good, I cannot critique myself, then it's a lie. You are supposed to critique so that you make something so that it will be good.

Interviewer: Were you comfortable to do that before?

Teacher B: No!

Interviewer: Why not?

Teacher B: Because we were thinking that after the lesson... after the whole topic, it is when I will evaluate myself. Then it's very difficult because a certain topic can be taught in two weeks. Now, after a topic you go and evaluate. You seem to cheat. You say, ok, I taught well. But then maybe the very first day, students didn't get the concept. Yah.

Interviewer: Ok, so how useful is it to have your lesson critiqued by your colleagues?

Teacher B: Again it's very useful because no man is an island. You have to ask views from different people. You ask people that I did this, can you add more or can you subtract some? And if people do this they are doing for the betterment of the lesson, for you to have a lesson plan which you will comfortably teach. Yah.

Interviewer: I will take you back a bit, just a single step.

Teacher B: Ok.

Interviewer: What made you not to evaluate your lesson before CoP?

Teacher B: Not to evaluate a lesson?

Interviewer: Yah, you were evaluating a topic.

Teacher B: Yah, a topic.

Interviewer: What made you not to evaluate your lesson before CoP?

Teacher B: You know it's like something which is in the syllabus. It's like we were told that when planning your scheme you have to do this at the end of the scheme. So teachers were not going in class with a lesson plan. They were going in class with a scheme.

Interviewer: Ohoo?

Teacher B: Yah. And they were going there with lesson notes. I can just say, ok, I will teach students an example for calculating commission. So these students will come up with this. After this, ok, I will give them this. You go out, you have taught. But now this time you are planning: I will do this, I will do this, I will do this and students will do this, will do this, will do this. At the end you look at the outcome from the students and from the lesson itself. Did the lesson bring a good out...the necessities that I wanted in this lesson? If yes, that's why I am saying, proceed. Previously we had this evaluation at the end of the topic. This time it's good we are having it in a lesson plan. So this time I should say, it's something which is recommendable.

Interviewer: Aah, thanks a lot. How does this help you to be a reflective teacher, then?

Teacher B: After evaluation you reflect whether you have met the target or not. Yah. So it is really making a teacher to be self-reflector: that, ok, did I do what I wanted? Yah.

Interviewer: That's interesting. So to sum up on evaluation and improvement, what do you think have been your benefits from the CoP?

Teacher B: Benefits, you know I am a teacher. It's my role to deliver, and I should make those people who get what I am delivering to have a step up. Now, for them to have this step up more, I am supposed to deliver what is needed to them. Now I should say, I have gained a lot because I am delivering what they need most compared to what I was delivering previously.

Interviewer: Thanks a lot. The last part: knowledge of ASEI/PDSI. What do you understand by improvisation in ASEI/PDSI?

Teacher B: improvisation simply refers to not all materials which are there to be used in a lesson are readily available. Some materials are very scarce. Now because they are very scarce, you cannot say, ok, I will ban this lesson because I do not have materials. You are supposed to improvise to bring in some that will at least tackle this topic. A student will get the concept. That's the whole meaning of improvisation, to improvise where necessary with materials, with whatever you need. Yes.

Interviewer: Ok, Do you think it is fair to expect improvisation in every lesson?

Teacher B: It is fair, I should say, it is fair because a lesson, a lesson itself should be more creative. Students should do, should have activities to be done in the lesson. So if you don't improvise in a lesson, most of the time, maybe you will have some difficulties in that lesson. Because if you say, I should not just bring everything in each and every

lesson some materials to....it's like you want to stay away from this concept of improvisation. But then, to make this lesson to be proper, you are supposed to improvise whatever you need in that lesson.

Interviewer: Ok, aah, what do you understand by experiment in the context of mathematics? In ASEI/PDSI, one of the principles is experiments, ok?

Teacher B: Ok.

Interviewer: What do you understand by experiment in the context of mathematics?

Teacher B: Experiments in mathematics?

Interviewer: Yes.

Teacher B: Aah, mathematics is something practical. It's something which you practice each and every day. And experiment tackles something which is practical. We want to see the outcome from the unknown or from something....from the hypothesis. You want to answer the hypothesis. So in mathematics, experiment simply refers to you want to experiment, you want to practice to find out the result from some problems. Yah.

Interviewer: Ok, do you actually experiment in your lessons every day?

Teacher B: Not every day.

Interviewer: Why not?

Teacher B: Some topics need experiment and some topics they don't.

Interviewer: So in this case, is it fair to expect experiment in every lesson?

Teacher B: No. Some lessons they expect some experiments because they are supposed to. Maybe, let us take an example of the topic of mensuration in form two, you want to teach something concerning maybe, a mixture, you can experiment this. I mix these kilograms of sugar with these kilograms of flour so that I make a mixture of this. So students can come up and look at this. But maybe it is very difficult to experiment on example of Algebra, mmmh? Agebra, where you are teaching maybe, factorisation, eeeh? It is difficult. Yah.

Interviewer: Ok, now what do you know about ASEI/PDSI Checklist?

Teacher B: Ok, Checklist, it's like the same as the self-evaluation thing that you look at the steps you are supposed to follow, that did the lesson, was the lesson student centred lesson? Was the teacher using a lesson plan? Was the teacher using schemes? If yes, yes, yes, it means you have made your lesson to be ok, fine. And the Checklist is good even to the teacher himself. After teaching you can take a checklist and tick, was this lesson student centred? You can say No, the same as self-evaluation after a lesson.

Interviewer: Ok, So do you think you would use it to observe a mathematics lesson? Is it a good tool for observing a mathematics lesson?

Teacher B: Really, it's a good tool.

Interviewer: Despite having the elements where you don't expect experiments?

Teacher B: Yah.

Interviewer: Where you don't expect improvisation somewhere?

Teacher B: Yah, because if there is no experiment you jump that question you go to another question.

Interviewer: Ok, the last question, what support do you think a teacher needs in order to practice ASEI/PDSI as it I intended by SMASSE INSET Malawi?

Teacher B: Currently I am looking at something. People need to be provided with this, what we call lesson plan. An example of scheme, people drafted a scheme. This is a sample of scheme to be used. And in a scheme there is week, date, work done etc. So the same with lesson plan, we are supposed to have a template just for the teacher to fill in. Teachers also need books and other teaching materials.

Interviewer: Ooh, Okay, Thanks a lot. That's the end of our second interview. I thank you very much for granting us this interview. Teacher B: Thanks.

Appendix 17: Teacher C, interview 2

Interviewer: You are welcome to this short interview. It is intended to find out how you are planning, implementing, evaluating and improving on your lesson delivery in the Community of Practice. This information will help us to know what support teachers need in order to practice ASEI/PDSI as it is intended by SMASSE INSET Malawi. It has several sections: planning, implementation evaluation and improvement then knowledge of ASEI/PDSI itself. So, under planning, can you describe the way you are planning now in the CoP?

Teacher C: Yes, aah, our planning in most cases we look at aaa, making of the aaa, writing of the schemes of work. We also come together and try to plan the lessons together whereby we write the lesson plans and look at the methods of disseminating those lesson plans. And we also look at what are the materials that we can use in our lesson for in order to make them very effective.

Interviewer: Is this any different from the planning you did before CoP?

Teacher C: Yes for sure! It is because in the past we could write the lesson plans but it was an individual lesson plan. This time around we are coming together as a group and come up with one consolidated, maybe schemes of work which is going to be used in all the other three schools. Even if we are coming up with the lesson plan it is the lesson plan which is also used in all the other schools. So there is a difference.

Interviewer: Before CoP, most of you were not writing lesson plans, but now everybody is writing lesson plans. How are you managing it?

Teacher C: In fact as of now, we can say we are used to that, right? We still find time to come up with the lesson plan and it is not alsoI mean we are used to that.

Interviewer: You find time? Is there any specific mechanism you have devised to manage time?

Teacher C: In fact, maybe we have an advantage that we meet fortnightly to write the lesson plans, critique them and consolidate them. Maybe that is the advantage of how we are coming up with it.

Interviewer: Aah, describe the quality of your lesson plan now compared to the period before CoP...I wish you went deep into the lesson plan.

Teacher C: Yes, in fact the lesson plan as of now they are first of all, detailed and they are also trying to look at all alternative ways of teaching because we are doing it as a Community not as an individual. So we try to incorporate concepts from all the other teachers who are trying to critique it and bring something which is a consolidated and good one.

Interviewer: Now, one of the problems you had before was that lesson plans were difficult to follow in class. People were saying , I over plan, I under plan. Can you describe the situation now regarding lesson implementation?

Teacher C: Yah, there is no under planning in most cases. We are able to follow it because we really try to cope each lesson plan with the activities. So the bringing in of the activities in our lessons makes the lesson plans just to be as exact as intended. So we don't have that problem.

Interviewer: So, How useful do you find these lesson plans as you teach?

Teacher C: They are really useful because they can also have the alternative way of approaching some concepts in the lesson because I am saying we are coming up with a lesson plan which is from three schools. So it is from all that knowledge from the three schools and all the teachers from these schools. So you have alternatives of doing it.

Interviewer: Aaah, on evaluation and improvement, do you see any difference between the evaluation that you did before and the evaluation you are doing now?

Teacher C: Yes, in the past when we came to an evaluation.... We could just look at if the lesson has been taught. So we could just say, the lesson has been taught. But this time around we are able to see which areas were not successful when taught. So there is a difference.

Interviewer: How do you understand by the word self-evaluation in ASEI/PDSI?

Teacher C: Self-evaluation is simply saying I try to look at what are the merits of your lesson and the demerits of your lesson. And then you take the demerits trying to improve on them for the future lessons so we are really improving.

Interviewer: So how useful is it to critique your own lesson in this case, because what you have said is like critiquing your own lesson...How useful is it to critique one's own lesson?

Teacher C: It is very important because aaa, next time you have You present the lesson in a better way than before as you know that in teaching there is always time for improvement.

Interviewer: Were you comfortable to critique your own lesson before?

Teacher C: Before? No!

Interviewer: Why not?

Teacher C: In fact I could just take as whatsoever I have come up with as the final and good say. I did not even have dare to say, aaa, how have I done it and the like.

Interviewer: Ok, that is very interesting. How useful is it to have your lesson critiqued by colleagues?

Teacher C: It is really useful because in that way you also try to incorporate the knowledge from others. Their input in the lesson is so important. You have an input from them because as they are critiquing they are also suggesting some good ways of doing it.

Interviewer: So how does it help you to be a reflective teacher, this self-critiquing and critiquing by your colleagues, how does it help you to be a reflective teacher?

Teacher C: It helps a lot because you are able to see that whatsoever you have done on your own, it is not final. You can also have another alternative as you are getting from the other teachers. So it is really helpful.

Interviewer: What do you think have been your benefits from the CoP so far?

Teacher C: Yes, we have gained some knowledge and some of the method of teaching as well as having some activities which I never thought of before.

Interviewer: Ok, Thanks a lot...under knowledge of ASEI/PDSI, what do you understand by improvisation in ASEI/PDSI?

Teacher C: Yah, we are looking at the improvisation in the ASEI/PDSI, we are looking at trying to come up with the alternative ways of doing things whereby you don't have the materials. Let's take in mathematics, I want to use maybe the dice in the probability and I don't have the dice or whatsoever I can as well try to bring in something which can look like a dice and have the point to everybody follow.

Interviewer: Do you think it is fair then, to expect improvisation in every lesson of mathematics?

Teacher C: Yah, it is, because for the students who need to understand the concepts and also just to look at mathematics as not difficult, there is need for that. There is need to improvise.

Interviewer: In ASEI/PDSI, what do you understand by experiment in the context of mathematics?

Teacher C: When we are looking at experiments, in the context of experiments, we are saying in each lesson which we are trying to bring about, there should be something which the students can do with their hands. They can really experience it being taking place. Not necessarily having mathematics as a computation and the like. But they should also... something that they can do with their own hands

Interviewer: Then in this case, do you expect experiments in...do you feel it is fair to expect experiments in every lesson of mathematics?

Teacher C: Yes, it is, because you are not looking at the experiments which are fully fledged, but you are looking at activities that you can do in a lesson.

Interviewer: So when we...the ASEI/PDSI Checklist, it has experiment and activities. So in this case, as you are putting it, could we say they are the same?

Teacher C: No!

Interviewer: How different are they?

Teacher C: Experiments is where the students are able to do something just concerning the concept while an activity you are trying to give them some of the things they can do maybe as a group. Then.... Whereby in the end they are so discovering the other concepts. So experiment you are just looking at the hands on activity rather where an activity can be where students are using their ...but the two are the same.

Interviewer: Ok, What do you know about ASEI/PDSI Checklist?

Teacher C: Yah, I look at it as being a checklist or the list of each things that are supposed to be taking place in an effective lesson, so to speak.

Interviewer: Do you think it is a good tool to be used to observe mathematics lessons?

Teacher C: It is!

Interviewer: Why?

Teacher C: Because it is... we are looking at whatsoever is supposed to be in that mathematics lesson...yah, like the experiments, activities, feedback, improvisation and the like. So these things are really important.

Interviewer: Ok. In summary, what support do you think a teacher needs in order to practice ASEI/PDSI as intended by SMASSE INSET Malawi?

Teacher C: Again?

Interviewer: Ok. In summary, what support do you think a teacher needs in order to practice ASEI/PDSI as intended by SMASSE INSET Malawi?

Teacher C: Yes, apart from maybe the trainings which are really taking place by the SMASSE people there is also need to put inside the CoP whereby maybe the teachers could be meeting now and then trying to come up with the lesson plan, trying to critique the lesson plan or sometimes critique the lesson on their own such that they can easily see how they should be then in the classrooms.

Interviewer: Ooh, Okay, Thanks a lot. That's the end of our second interview. I thank you very much for granting us this interview.

Appendix 18: Teacher D, interview 2

Interviewer: You are welcome to this short interview. It is intended to find out how you are planning, implementing, evaluating and improving on your lesson delivery in the Community of Practice. This information will help us to know what support teachers need in order to practice ASEI/PDSI as it is intended by SMASSE INSET Malawi. It has several sections: planning, implementation evaluation and improvement then knowledge of ASEI/PDSI itself. So, under planning, can you describe the way you are planning now in the CoP?

Teacher D: Yah, when we were planning we do share, critique the lesson plan, while previously we had to write, no any critiquing. So which means the lesson plan which we are producing now they are improved lesson plans which when we implement to our learners they really help us a lot.

Interviewer: Before CoP, most of you were not writing lesson plans, ok?

Teacher D: Yah.

Interviewer: But now everybody is writing lesson plans, how are you managing this?

Teacher D: Aaa we are managing. We are being encouraged by our CoP. In fact that's why we are used now to write the lesson plan and using the lesson plan and it has helped us a lot in order to follow up the lesson so that maybe if I am backward I have to make sure I march with my friends.

Interviewer: But specifically in terms of time, because we used to say, we don't have the time to write the lesson plan, where are we getting the time this time around?

Teacher D: Since we are planning over the weekend, we have enough time and we are dedicated to that time, while when we were planning individually, we have to plan at our own time and pace. So sometimes we were not planning during the weekends, yah.

Interviewer: Ok, I think you have already taken the one of comparing the quality of the lesson plans, but I would want you to go deep into the lesson plan, extract some of the qualities that are making the lesson plan now better than the previous one.

Teacher D: Now, since we.... The lesson plan we are planning involve learners' activities so which means PDSI is inside while the previous lessons we not dwelling very much on PDSI. We were just planning not even bothering PDSI.

Interviewer: Ok, On implementation, one of the problems that you had before was that lesson plans were difficult to follow while in class, right? You said, I usually under plan or over plan like that...can you describe your situation at present?

Teacher D: Yah, It depends to the level of understanding of the learners. At times you do plan here but you find out that maybe the learners are failing to capture the lesson. Those are there to happen, yes.

Interviewer: How useful do you find the lesson plans as you teach?

Teacher D: Yah, you follow the plan and the flow of the lesson goes on the plan as you plan you...there is order then when you are planning.

Interviewer: On evaluation and improvement, do you see any difference between evaluation in the past and the evaluation you are doing now?

Teacher D: Yah, Because now you have to evaluate how the lesson have been...it's very important.... Compared to previously maybe you had to plan no evaluation.

Interviewer: How do you understand by the word self-evaluation in ASEI/PDSI?

Teacher D: Self-evaluation that is a self-criticism whether have you achieved the goal. Are the learner achieved the intended outcome. If they have failed where should I repeat so that maybe I can capture the learners?

Interviewer: Is it happening in your CoP?

Teacher D: Yes, it is happening.

Interviewer: How useful is it to critique your own lesson as you have said?

Teacher D: Yah, it is useful, because you can ask the learners which part they were facing problems, which part should I review with them. Should I reteach? That's very necessary.

Interviewer: Were you comfortable to do that before, to critique your own lesson?

Teacher D: In fact we were not even...since we were not planning, I don't think...Yah, we were not planning so we didn't see anything to evaluate.

Interviewer: Ok, how useful is it to have your lesson critiqued by colleagues?

Teacher D: Yah, it is useful because they add in the shortfalls I have forgotten or which is not necessary. We are able to critique to say what about if you do it like this so that maybe you can achieve your outcome.

Interviewer: Ok, so how helpful is...how does it help you to be a reflective teacher...this critiquing, your self-critiquing or critiquing from colleagues, how does it help you to be a reflective teacher?

Teacher D: Yes, it helps to try to be reflexible to accept to change and as a result you improve.

Interviewer: So overall, what do you think have been your benefits from CoP?

Teacher D: we are able to come up with a good lesson plan that may achievement.

Interviewer: The last but one, knowledge of ASEI/PDSI, what do you understand by improvisation in ASEI/PDSI?

Teacher D: Improvisation means you have to improvise using the local available resources. Maybe we have conventional materials and improvisation you can use local available resources. Yah.

Interviewer: how do you think...now do you think it is fair to expect improvisation in every lesson in mathematics?

Teacher D: yeah it can it depends to the lesson.

Interviewer: it depends to the lesson? Its mathematics and you are an expert in mathematics!

Teacher D: it depends

Interviewer: you are not so sure? Eeeh?

Teacher D: yeah it depends

Interviewer: in ASEI/PDSI what do you understand by experiment in the context of mathematics?

Teacher D: experiment... I think its practice.

Interviewer: practicing like for example?

Teacher D: Practicing maybe you can give them a problem they will have to do in groups. Yeah, practicing while when other experimenting. If you go to other fields we have to do experiments, hands on activities... but in mathematics there are also hands on activities as they do the exercise together those are hands on activities

Interviewer: so is it fair then in this case as you have said to expect experiments to be done in every lesson in mathematics?

Teacher D: Yeah it can be done it depends

Interviewer: you are not so sure again. What do you know about ASEI/PDSI checklist?

Teacher D: ASEI/PDSI checklist yeah I know it's the check list which you have to access whether you have achieved all the steps in the lesson plan.

Interviewer: do you think it is a good tool to use to observe a mathematics lesson? Are you comfortable with it yourself?

Teacher D: yes because it really guides.

Interviewer: in summary what support do you think a teacher needs in order for them to practice ASEI/PDSI as it is intended by SMASSE INSET Malawi?

Teacher D: Teaching and learning materials to be there yeah!

Interviewer: Any other things?

Teacher D: Aaah! At least to plan together yeah! So that you can be easily be critiqued to come up with a good lesson plan. That is we have to plan together.

Interviewer: Ooh, Okay, Thanks a lot. That's the end of our second interview. I thank you very much for granting us this interview.

Appendix 19: Teacher E, interview 2

Interviewer: You are welcome to this short interview. It is intended to find out how you are planning, implementing, evaluating and improving on your lesson delivery in the Community of Practice. This information will help us to know what support teachers need in order to practice ASEI/PDSI as it is intended by SMASSE INSET Malawi. It has several sections: planning, implementation evaluation and improvement then knowledge of ASEI/PDSI itself. So under planning can you describe the way you are planning now in the CoP?

Teacher E: We sit together and plan the lesson.

Interviewer: Interviewer: can you describe how..

Teacher E: we plan lesson, after planning we discuss, after discussing then we can implement

Interviewer: ok. How different is it from the planning before CoP?

Teacher E: mmm aaa an individual was planning by him or herself not on a group. That is the difference.

Interviewer: Any advantages of the current planning over the planning before CoP?

Teacher E: Yes there a lot of improvements. When we are planning together

Interviewer: Before CoP, most of you were not writing lesson plans but now everybody is writing lesson plans. How are you managing it now? What is compelling you to do so?

Teacher E: (Both. Laugh). It has been a rule now that we have to write lesson plan.

Interviewer: Ok. Describe the quality of your lesson plans now compared to the period before CoP.

Teacher E: Now I am writing different lesson plans

Interviewer: You don't want to take us into the lesson plan so that we can have a feel of the kind of lesson plan?

Teacher E: It has everything. Learners activity. Teachers activity. I now include everything on a lesson other than the sketch that I did

Interviewer: Okay, One of the problems you had before was that lesson plans were difficult to follow when teaching. Describe your situation now regarding lesson implementation.

Teacher E: Sometimes there is over planning. You cannot run away from that because of the levels of the learners sometimes they catch up well sometimes they are left behind. But the way we are using the lesson plans is inclusive as the planning has also improved.

Interviewer: Aaa thank you very much. How useful do you find the lesson plan as you teach?

Teacher E: Aah the learners can follow the lesson easily as you are teaching. When I was planning alone sometimes I left learners behind as I ran from here, there, yeah

Interviewer: Okay in evaluation and implementation, do you see any difference between the evaluation you did before CoP and the evaluation you are doing now?

Teacher E: Yes I can see it. The difference is that as I am planning I also think of the learners and when I am evaluating it is the actual thing I have done in class rather than just to say the lesson went like that without any improvement in it. We just write what we want

Interviewer: Wow. That's very interesting . How do you understand by the word 'self-evaluation'?

Teacher E: It's the way you evaluate yourself how the lesson was, was it good ? How have you delivered it? Have the learners. Have you achieved the specific objective ? Or success criteria? You evaluate yourself the way you have done in class

Interviewer: How useful is it to critique your own lesson?

Teacher E: It is very important because in each and every lesson there is room for improvement so when you are critiquing yourself you can see where to improve and what to do

Interviewer: Were you comfortable to do this before?

Teacher E: Yes I was comfortable but sometimes I did not do it.

Interviewer: What made you not to do it ?

Teacher E: Sometimes I can miss some points when I am evaluating my lesson so my colleagues can help me to critique my lesson where they have seen that I have to improve they can tell me.

Interviewer: How does this help you to be a reflective teacher

Teacher E: Because this is a two way process you give info and you get info from the learners so if you are just teaching without being critiqued or critiquing yourself you cannot know or the feedback from your learners can be different. You can think that the learners are in the same channel as you and you can think that everything is fine, in true sense learners are not with you. So when critique someone can reflect on these learners

Interviewer: Okay, What do you understand by 'Improvisation' in ASEI/PDSI?

Teacher E: It is the way whereby you have to improvise T/L aids which are not found in the school or you cannot buy.

Interviewer: Do you think it is fair to expect improvisation in every lesson?

Teacher E: No it is not fair because sometimes you cannot improvise e.g. if you are teaching a topic on construction. How can you improvise . Because you need a ruler

which must be there a protractor. Sometimes you can improvise a protractor and pair of compass but they cannot work as real protractor can work. So you do not improvise each and every topic

Interviewer: In ASEI, what do you understand by Experiment in the context of mathematics

Teacher E: Hmmm experiments in maths sometimes is difficult to be found or mmmm as the topics are straight forward. Someone has already done the investigation we are doing the delivering. So we cannot investigate or we cannot experiment.

Interviewer: So do you think it is fair to expect experiments in every lesson?

Teacher E: No. It is not fair some of the lessons will not need experiments. E.g. if you are doing sequences and patterns you cannot experiment. But sometimes when you are doing angles you can do experiments

Interviewer: What do you know about A/P check list

Teacher E: It is a form whereby if you are observing somebody you have to use as he or she is teaching

Interviewer: Do you think it is a good tool?

Teacher E: Yeah it is good.

Interviewer: But you said we cannot expect experiment and improvisation in every lesson, so is it a fair tool?

Teacher E: where you think maths cannot apply you have to skip that part and go to the next part.

Interviewer: What support do you think a teacher needs in order to practice ASEI/PDSI as intended by SMASSE INSET Malawi?

Teacher E: Hmm...the need for supervision and support so that we can know if we are doing it right or not.

Interviewer: Thank you very much for offering me your precious time.

Appendix 20: Lesson critiquing session 1

Teacher C: I welcome you all to this important session where we want to critically analyse the lesson we just observed and also critically analyse our work to date.

Let us begin with the one that taught the lesson. How do you look at your lesson?

Teacher F: My lesson was just as good as I had prepared but only problem was time. The learners were tired because they were coming from a lesson in the field. They seemed to be participating at least 90%. I was able to encourage the learners to participate. But of course some could have just been on lookers. So I gave individual work at the end

Teacher C: Can we have comments from others?

Teacher D: you need to give chance to the other groups to present their work. Only one group presented

Owner: you are right but time was a limiting factor actually I modified the lesson because if everybody had to present there would be a lot of repetitions.

Teacher C: It seems learners were left in suspense because there was no proper summary of all the group work. We should have planned with what we expected from learners in mind so as to still conclude the group work despite not getting all groups to present.

Teacher D: Or maybe divide the board to a, b, c and so on, so that groups write their information simultaneously. It saves time.

Teacher B: The lesson was squeezed to 40 minutes. I think it should have been an 80 minute lesson. It would be perfect unlike this one. However, learners managed to grasp the concepts and the response was very good.

Teacher E: The teacher seemed to enjoy the lesson and it was very good. Only that the groups had many learners. Others were not participating. The group work should have been corrected before individual work to prevent errors which can be carried over.

Teacher C: Any other comments?

Teacher A: If the case is like this with the type of students at this school that the lesson was supposed to be longer than 40 minutes what would have happened with learners in my school?

Teacher F: We need to adjust really for example, I added more questions because I don't like to spoon feed them. You have to add 40 minutes to be two periods. I added another question there to cater for the fast learners as well. We need to find different ways of questioning so that we cater for all abilities of our learners.

Teacher C: Thank you for the lesson well done. We have learnt a lot.

Appendix 21: Lesson critiquing session 2

Teacher C: Welcome ladies and gentlemen. But let us start with him as usual. Sir, how was your lesson?

Teacher B: the lesson was good introduction, development and grasping of concepts. I can rate it on average because there were some problems on materials preparation and time management. I would give myself 80%.

Teacher F: Learners were involved, very good. Time management: he was supposed to attend more learners. Had it been that all learners were in pairs, it would have eased his work. The teacher should have given a chance to other learners to correct their fellow learners who gave a wrong answer on the board instead of him doing it for the learners. We should also try to refrain from typing errors such as / and also per at the same time. It confuses learners. The rest of the lesson was good.

Teacher C: More opinions?

Teacher E: The lesson was good and objective were obtained. But you should have explained more on the second question as it had different answers from the learners. Another thing is that you should let the learners ask questions. I also think some of the questions in the conclusion should be in the introduction. For example, another name for income tax.

Teacher F: Of course adding them to the introduction is better but actually omitting them from the conclusion may not be very good because we want the learners to know what they have done. I don't know how others feel

Teacher C: Yes to put them in the introduction was good but if you wanted them to be in the conclusion then they were supposed to come from the students.

Teacher C: Okay. Any other comments?

Teacher A: I need to be assisted here. The table of tax rates was K6000 free . The learners were able to deduct that. Now after the deduction the remaining was K9000 . Then the next one was what?

All respond: K12000.

Teacher A: So after they subtract the 6000 free from 15000 the remaining was what ?

All : K9000.

Teacher A: So was this supposed to be deducted? Because I feel like it hasn't reached the range of K12000.

Teacher C: It is the next amount of money up to K12000 has to be deducted at 15%. Even if it was only K50 remaining it would have been deducted.

Teacher A: It has to be deducted? Ok .

Teacher C: Any other comments?

I noticed that learners were using chorus answers. I think this can be minimised. I observed that there was more time on a single task. For example, question 1, if they had worked in pairs it would have taken them about 5minutes but not up to 10 minutes. Now before the learners presented their work you said everybody had done their work well. There was only one that did not do the work right. What did you do to that one?

Teacher B: For those who made errors I assisted them individually.

Teacher C: Alright. I had this suggestion to say whenever we give group or personal work we should expect mistakes students are going to make. But we should use those mistakes to teach our concept. I think you could have used that one in the whole class to clear the misconceptions because there may be others who were just forced by the group to accept answers from their friends. But thanks a lot for a nice lesson.

Finally let us encourage our learners to acquire calculators. I know it is not easy according to our catchment area here but just try. We also need to be careful when we write on the chalk board so that letters or numbers are clear. For example a 600 looked like a coo. Let us try to improve in all angles.

All : Yes yes. (Laugh)

Teacher C: Thank you very much. Let us stop here for the day

Appendix 22: Lesson critiquing session 3

Teacher C: Welcome to this brief meeting where we want to share our experiences with each other while critiquing the lesson we have just observed. Let us start with the one that taught the lesson; how do you look at your lesson?

Teacher E: We have improved now. It is because of writing lesson plans. The only thing I can say is that I had few learners because of the issue of school reports. Another thing is that form ones are still learning. Their English is not good. So it is not easy for them to understand unlike those that are in cities they are used to English. Here they are used to Yao language.

Teacher C: But they are still doing it! You manage and I enjoyed your lesson. Let us not despair yet. They learn slowly. How do the others look at the lesson?

Teacher F: The lesson was good though I found it on the way.

Teacher C: You did not miss much.

Teacher F: Ok. The weakness I noticed was that you did not visit all the groups you arranged. I feel the ten minutes allocated to group work should have been used to see how each group is participating. And they discussed less than five minutes. And when presenting on the board, they need to be talking to their friends not just copying from note book to chalkboard silently. I also feel if a learner presents a wrong answer and a colleague tries to correct, they must not erase the wrong answer and correct it but they must write their own so that all are able to see where it went wrong. Again, as you did not mark the group work, and only some groups presented, it may be that some learners may not even be on track in the neglected groups. So visiting groups and marking is good to clear where learners have misconceptions.

Teacher C: It is very encouraging that learners are now sharing ideas and I noticed that they are participating actively. There was also good flow of the lesson. You did not show that you were at a loss. All the time you knew what to do. I loved it very much. And when the class exercise was done, you concluded the lesson at least by asking the learners what they have learnt. The learners were able to say what they learnt. But one important issue: sometimes we get used to certain words and we use them normally like the way you used the word “sum”. Sum means adding. So when you say, “Solve this sum...”, learners may think of adding. That is why they always think of adding. You remember the problem on tax? They added everything when it was not necessary.

Teacher F: I feel some short questions on the chart can be copied down as long as they are not too long. They had more time to do it. Again you were gender sensitive. That is good.

Teacher C: Ok. So let us all try to put to use these ideas we are sharing here as we teach.
Thank you very much. We end here today.