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Is Changing Teaching Practice the Mission Impossible?

A Case Study of Continuing Professional Development for Primary School Teachers in Senegal

Thesis submitted for the Degree of Doctor of Education

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Doctor of Education

Is Changing Teaching Practice the Mission Impossible? : A Case Study of Continuing Professional Development for Primary School Teachers in Senegal

Summary

Takeshi Miyazaki

This thesis reports on research into a Continuing Professional Development (CPD) programme in Senegal: Strengthening Mathematics, Science, and Technologies in Education Project (*Projet de Renforcement de l'Enseignement des Mathématiques, des Sciences et de la Technologie*, or PREMST). The literature review reveals very few examples of CPD changing teaching practices of teachers especially in Sub-Saharan Africa. However in this case, large-scale official project evaluations claim that some positive changes seem to have occurred, but give few details about the nature of the changes or how they have been brought about. This research seeks to understand the complexities of pedagogical change that teachers have gone through as a result of their participation in the CPD programmes through a more detailed investigation.

The research examines the cases of five teachers in three schools that stakeholders claim to have gone through positive changes in the last three years. The research methods include focus-group discussions, lesson observation, and interviews before and after lessons. Lesson observation was aided by video and audio recording engaging with particular actions in the lesson observed. This process allowed me to understand how teachers reflected upon their own teaching and pupils' learning.

The research finds that PREMST helped teachers envision how teaching should be conducted, by providing a structured approach to conduct a lesson. A visible change has been brought about in the classroom because the way training is conducted is well-integrated in the learning mechanism of teachers. However, the change in teaching practice has not necessarily brought a positive change in the learning of pupils. Apparent emphasis on group work has changed the modality of lessons, but it has not changed how teachers think about teaching.

Given the difficulties involved in pedagogical change, emphasising specific skills may have been the necessary and practical first step, but changing these teaching practices is not enough. The research found that teachers still paid little attention to the learning of individual pupils. Teachers have changed their practices in terms of teaching methods used in the classroom, but the change in pedagogy has remained minimal because they have not understood the underlying premise of the new pedagogy. Unless they realise that their present manner of teaching does not enable the learning of pupils in a sufficient manner, their change is likely to remain at the level of teaching methods, not the pedagogy which incorporates the theories of learning and assumptions behind the practices.

A key outcome of the research was to identify the next step for PREMST, namely to redirect the focus of teachers from the teaching procedures to the learning of pupils, by asking them to pay attention to what pupils say or write during the lesson. The thesis concludes by describing how this is being achieved through a shift in focus on classroom practice, through a training model based on lesson study.

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List of abbreviations

ASEI	Activity, Student, Experimentation, and Improvisation
BAC	*Baccalauréat* (High School Graduation Certificate)
BFEM	*Brevet de Fin d'Etudes Moyennes* (Middle School Graduation Certificate)
CAP	*Certificat d'Aptitude Professionnelle* (Professional Aptitude Certificate)
CEAP	*Certificat Elémentaire Aptitude Professionnelle* (Professional Aptitude Elementary Certificate)
CEB	*Curriculum de l'Education de Base* (Curriculum of Basic Education)
Cellule	*Cellule d'Animation Pédagogique* (Cluster-based training)
CFEE	*Certificat de Fin d'Etudes Elémentaires*(Elementary School Graduation Certificate)
CIDA	Canadian International Development Agency
CPD	Continuing Professional Development
CRFPE	*Centre Régional de Formation de Personnels de l'Education* (Regional Training Centre of Personnel of Education)
EFA	Education for All
EFI	*Ecole de Formation des Instituteurs* (Teacher Training School)
FDC	*Formation Diplômante Continuée* (Diploma-giving in-service training)
FGD	Focus Group Discussion
Guide	*Guide Pédagogique de Curriculum de l'Education de Base* (Pedagogical Guide of Curriculum of Basic Education)
IA	*Inspection d'Académie* (Regional Inspectorate)
IDEN	*Inspection Départementale de l'Education Nationale* (Departmental Inspectorate)
INSET	In-Service Education and Training
JICA	Japan International Cooperation Agency
MDG	Millennium Development Goals
PCK	Pedagogical Content Knowledge
PDEF	*Programme Décennal de l'Education et de la* Formation (Decennial Programme of Education and Training)
PRF	*Pôle Régional de Formation* (Regional Training Unit)
PREMST	*Projet de Renforcement de l'Enseignement des Mathématiques, des Sciences et de la Technologie* (Strengthening Mathematics, Science, and Technologies in Education Project)

List of abbreviations for transcripts

T	*Teacher*
b	*Boy*
g	*Girl*
Ps	*Pupils*

Chapter 1: Introduction

1.1. Background

The importance of teachers for the quality provision of education is widely recognised, but teacher development is a relatively neglected area in Sub-Saharan Africa not least because neither Education for All (EFA) nor Millennium Development Goals (MDG) foreground teacher education issues (Lewin & Stuart 2003; Villegas-Reimers & Reimers 1996; Alexander 2008b; Leu 2005; Anderson 2002; Moon 2007). To meet the global commitment to achieve universal education, many African countries have directed their resources towards increasing school enrolment (UNESCO, 2000). Although the education policies of many countries emphasise the importance of educational quality, the rhetoric is often not matched by the necessary resources to assure quality education. Indeed, many researchers point out the problems of teaching in Sub-Saharan Africa, exemplified by rote-teaching and passive learning by students (Akyeampong et al. 2006; Rowell 1995; Tabulawa 1997).

The supply of teachers represents one of the greatest challenges for African countries in order to attain universal education (Binns & Wrightson 2006; Dembélé & Miaro-II 2003). Many African countries have attempted to meet the increasing demand for teachers by reducing the duration of pre-service training (Verspoor, 2003; Craig, 1998; Mattson, 2006). Within this context, the stages after entering the teaching profession have become important for teachers to develop their capacities (van Graan et al., 2006; UNESCO, 2004). The only education available to most teachers after entering the profession, however, has been in-service education and training (INSET), typically provided in the form of workshops or short courses (Villegas-Reimers, 2003). INSET has been heavily criticised for its ineffectiveness, too often not having demonstrated much discernible effects in terms of teaching practices of teachers trained (Leu, 2004; MacNeil, 2004; Guskey, 2000; Darling-Hammond et al., 2009; Knamiller et al., 1999; Beeby, 1980). The critics have called for a paradigm shift in teacher development, which goes beyond the traditional pre-service and in-service training dichotomy, and instead emphasised the critical importance of the "continuum of teacher learning" (Schwille & Dembélé, 2007, p.29; Feiman-Nemser, 2001; Craig, 1998; OECD, 2005;

Day & Sachs, 2005a; Joyce & Calhoun, 2010; Avalos, 2000; Mattson, 2006). To emphasise the shift of concept, the appellation of INSET is now replaced by Continuing Professional Development (CPD). CPD is now used in many policy documents in Sub-Saharan Africa (Miyazaki, 2011).

Although the concept of the continuum of teacher learning is high on ideals, its realisation is elusive in practice. Schwille & Dembélé (2007, p.123) suggest that "no one has been able to implement the new paradigm to satisfaction on a widespread, national basis." In contrast to the generally positive stories by donor agencies that aim to show the impact of their intervention, the academic literature is full of caveats that may make CPD ineffective and provides little evidence of success. For a practitioner who works on CPD, the bleak picture from the existing literature is disheartening. I, by no means, deny the critical importance of analysis of the errors made in the past, but the lack of living cases of CPD that have actually helped teachers learn how to teach better makes it difficult for practitioners to envision what it looks like having a functioning CPD based on the continuum of teacher learning.

My professional and academic interest lies in teacher development in Sub-Saharan Africa, as I have worked for a project on CPD for primary school teachers in Senegal, called Strengthening Mathematics, Science, and Technologies in Education Project (*Projet de Renforcement de l'Enseignement des Mathématiques, des Sciences et de la Technologie*, or PREMST) since its planning stages in 2007. CPD has been recently given a growing attention in Senegal partly because the Ministry of Education is in the process of promoting pedagogical transformation, by implementing nationwide a new Curriculum, or *Curriculum de l'Education de Base* (CEB). Four years after the initiation of PREMST, I had observed over 40 lessons before starting this research and already had a general idea about how teachers conducted a lesson and how they changed their teaching practice. Various evaluation reports showed some promising results. Positive changes seemed to have happened, but it was not clear what changes had actually occurred or how the changes had been brought about, partly because the existing project evaluations dedicated much of their time to collecting quantifiable data, which did not capture these kinds of detail. The research reported in this thesis was conceived as an attempt to understand the complexity of the processes that teachers had

gone through as they aspired to improve their teaching practices. This research consists of a case study of five teachers who are thought to have improved teaching practices at least to some degree as a result of participating in the CPD programmes.

1.2. Research Questions

It is clear from the literature that changing teaching practices of teachers is very difficult, and there are many challenges in CPD. Analysing the difficulties has its own merit, but the pictures depicted in the existing literature are too negative for the practitioners to be relevant at the field level. On the one hand, as a practitioner who works on CPD, recent experience in Senegal gives me a glimmer of hope in that there seems to have been a genuine positive change. On the other, as a researcher, provided with the gloomy prediction that can be readily made from the literature review, the results of project evaluations seem to me overly optimistic. Now, as a doctoral researcher, I would like to find whether positive change in teaching practice really exists; and, if so, how the change has been brought about. As Akyeampong et al. (2011) point out, there is a dearth of studies offering a critical but positive description of the practices of teachers in the challenging contexts of low income countries. For this reason, in this research I deliberately sought to investigate teachers who were seen as successful by those responsible for their professional development. Understanding how the pedagogical practices of these teachers have been changed potentially contributes to the active knowledge that is useful for field practitioners.

This research is guided by the principal research question:

How have the teaching practices of teachers who are recognised as successful changed as a result of participating in the PREMST CPD programme?

This question is specified by the following sub-set of questions:

- How do these teachers represent their understandings of their practice of teaching?

- How have these understandings changed?

- To what extent do the pedagogical changes realised in the classroom help pupils learn better?

1.3. Summary of the Research

This research is organised in nine chapters after this introduction. Chapter 2 reviews the existing literature on teacher development in Sub-Saharan Africa. Chapter 3 analyses the teacher development in Senegal with a focus on the two CPD programmes that this research investigates – PREMST and CEB. Chapter 4 explains the methodology of this research, by elucidating my position as a researcher, the research design, the ethical considerations, and the limitations of the present research. The context under which the teacher-participants operate is also discussed. Chapter 5 investigates how the teacher-participants understand pedagogy, by relating their learning process to the CPD programmes. Chapter 6 examines how they apply the theory into the practice in the classroom. Chapter 7 attempts to connect the findings of the two previous chapters to the CPD programmes to find its effect on the teaching practice. Chapter 8 provides the conclusions, discusses the policy implication, and identifies needs for further study. Finally, the Postscript Chapter provides the account of how my learning from this thesis started being applied to the Project activities.

Chapter 2: Teacher Development in Sub-Saharan Africa

This chapter reviews the literature on teacher development with a focus on primary education in Sub-Saharan Africa. As a part of requirement for the Professional Doctorate, I developed a Critical Analytical Study on teacher development, which includes the case studies of Kenya, Namibia, Senegal and Japan (Miyazaki, 2011). The literature review is summarised and recontextualised in this chapter according to the relevance to the thesis.

This chapter consists of eight sections. The first section defines some of key terminologies used in the research. The second section establishes the rationale of CPD. The third section reviews the concept of CPD, paying particular attention to the underlying theoretical foundations. The fourth section problematises current trends in CPD. The fifth section examines pedagogy in relation to Beeby's (1966) stages of educational development. The sixth section reveals the discrepancy in the practice compared to the espoused theory, by analysing the underlying difficulties. The seventh section describes the experience of Namibia that attempts to change the pedagogical practice of teachers to illuminate the depth of difficulties in teacher development. Finally, the eighth section, as the conclusion of the literature review, examines the challenges faced by CPD in Sub-Saharan Africa.

2.1. Definition of Terminology

Several terms related to CPD are found in the literature. The non-exhaustive list includes in-service training, INSET, teacher development, professional development, and teacher learning (Craig, 1998). These terms have overlapping meanings and are defined differently in different literature. Numerous publications are rarely mutually informing and are often contradictory to each other partly because they are written from diverse perspectives, starting with their own assumptions (Bolam & McMahon, 2005). The current chapter attempts to elucidate conceptual grounds of different perspectives.

Since the early 2000s, the continuum of teacher learning has become increasingly accepted among the researchers as a way forward to improving teacher development (Villegas-Reimers, 2003; Schwille & Dembélé, 2007; Day & Sachs,

2005b). This view entails two major characteristics. First, the professional development of teachers should be a continuous process that goes beyond a mere provision of occasional training. Second, it should be a long-term process which continues until the end of teachers' career. This view distinguishes professional development from a traditional mode of teacher training. Taking this perspective and borrowing the definitions of OECD (1998) and Stuart et al. (2009), this research uses the following working definition of the terms:

In-service education and training (INSET) refers to specific learning courses or activities organised for practising teachers. It is often referred to as in-service training. Although INSET sometimes emphasises aspects of education in a broader sense than in-service training, this research uses them interchangeably.

Continuing Professional Development (CPD) refers to career-long learning activities that include not only formal courses but also personal study and informal learning. *Teacher development* is a similar term, but CPD refers specifically to the period after which teachers began to work as teachers.

Teacher learning is sometimes used to describe a general process or objective rather than specific activities.

In the analysis of CPD, pedagogy is one of the key concepts that should be clarified in relation to teaching. Pedagogy and teaching are often used interchangeably, pedagogy inferring sometimes little more than "teaching methods" (Alexander, 2001a, p.512). In contrast, Alexander distinguishes pedagogy from teaching, by defining the former as a wider concept that includes teaching but also incorporates its contingent, and often tacit, theories of learning and assumptions, which derive from contexts. Considering the importance of the theories of learning behind the teaching practices, this research adopts the above as the working definition of pedagogy.

2.2. Rationale for Continuing Professional Development

The importance of teacher development is increasingly recognised as there is a broad consensus that teacher quality is one of the most important elements affecting

student learning (UNESCO, 2004; OECD, 2005; Darling-Hammond, 1999). Despite the importance given to it, professional development is notorious for being ineffective. Many authors argue that conventional forms of professional development are too detached from reality to have meaningful impact in the classroom level (Leu, 2004; Mattson, 2006). However, other research shows that, when successfully implemented, professional development in some contexts can have a positive impact on teachers and on student learning, and it also contributes to the successful educational reforms (Cordingley et al., 2003; Villegas-Reimers, 2003). Guskey (2000) argues that professional development is an absolutely necessary but not sufficient ingredient for bringing about educational improvement (Hargreaves 1994).

When it comes to teacher development, much of the focus has been given to initial teacher education until recently, but some research claims the importance of CPD (OECD, 2005; Craig & Perraton, 2002). This is justified on several grounds. First, it is not realistic to anticipate that teachers should be equipped with the necessary knowledge and skills after just initial teacher education (Guskey, 2000). Second, Lewin and Stuart (2003, p.115) point out that the lack of support in the first years after entering the teaching profession would result in the "washout" of what was learned in initial teacher training. Third, the knowledge base of teaching is rapidly expanding in the present rapidly-changing world; teachers must keep up with it (Guskey, 2000). Fourth, CPD is an indispensable component of any educational reform because teachers must be objects as well as subjects of change (Fullan, 2001). Fifth, CPD encourages the self-development of teachers, by responding to the needs at the local level (Eraut, 1995a). Sixth, it is essential to recognise the importance of informal learning throughout teachers' career although the government policies tend to focus on formal learning opportunities (Knight, 2002; Schwille & Dembélé, 2007). Joyce & Calhoun (2010) point out that formal arrangements can induce informal learning, by creating a favourable learning environment. Finally, a sustained provision of high-quality CPD helps to keep the motivation of teachers high; thereby, it encourages experienced teachers to remain in the profession (OECD, 2009). Thus, teacher development is now viewed as a career-long learning process, initial teacher education providing just a foundation for ongoing learning.

2.3. Conceptualising Continuing Professional Development

There are so many ways of conceptualising CPD, and several authors call for the necessity of a conceptual framework, by proposing an original one (Bolam & McMahon, 2005; Kennedy, 2005). The diversity of activities that are considered as CPD makes it practically impossible to conceptualise CPD in a way all can agree on, but for the purpose of this research, it is important to conceptualise CPD based on different theories of teacher learning underlying the models. According to Stuart et al. (2009), there are three major traditions in theories of learning: 1) behaviourism, 2) constructivism, and 3) social constructivism. Compounding the conceptualisation of CPD models based on the theories of learning is the fact that these theories are relevant not only for the professional learning of teachers but also for the learning of pupils. These theories are used somewhat differently in these two cases, but the following summarises how these theories are used as a foundation of different CPD models.

Behaviourist theory has been greatly influential and is thought to have laid a foundation for a "science of teaching" (Stuart et al., 2009, p.30). Its main tenets are:

- Learners are not intrinsically motivated or able to construct meaning for themselves;

- Human behaviour can be predicted and controlled through reward and punishment;

- Cognition is based on the shaping of behaviour;

- Deductive and didactic pedagogies, such as graded tasks, rote learning and memorization are helpful.

(UNESCO, 2004, p.33)

A major CPD model based on behaviourist theory is the applied science model. This model is concerned with teacher behaviour rather than thinking, leading to the emphasis on specific skills like the writing of lesson plans (Stuart et al., 2009). Hence, the goal of this CPD model is "to train teachers to behave in particular ways, not to exercise their judgement (Zeichner & Tabachnick, 1999, p.215)." It assumes that once teachers acquire behaviours associated with knowledge or skills, they can apply them in the classroom. This model is widespread in the world, and several authors point out that

it is a dominant CPD model in Sub-Saharan Africa (Christie et al., 2005; Lewin & Stuart, 2003).

This model may be suitable for acquiring basic techniques or routines especially for novice teachers, but many authors criticise it, most notably Schon (1983), who calls it the "technical rationality" model. First, the positivist assumptions underlying this model oversimplify the complexities of the real world. Behaviourist theory has its roots in positivist epistemology, a position adhered by natural science, which assumes that one can find an objective reality apart from the individual and social context (Usher, 1996; Lewin & Stuart, 2003). Under the positivist assumptions, knowledge can be transmitted, and its application is considered as a matter of technique or routine. Second, this model fails to take account of how teachers work in practice (Eraut, 1995b). When teachers acquire scientific knowledge and attempt to apply it in the classroom, they would require situational knowledge that allows them individual judgement based on the context as well as received knowledge (Stuart et al., 2009). The importance of situational knowledge is stressed by Shulman (1986, p.9 emphasis original) from another angle, by introducing the concept of Pedagogical Content Knowledge (PCK), "the dimension of subject-matter knowledge *for teaching*" that bridges between subject-matter knowledge per se and general pedagogical knowledge. Shulman (1987; 2002) argues that PCK is necessary for teachers to transform their understanding of subject-matter into pedagogical representation to others, in contrast to behaviourist theory, which assumes that subject matter knowledge in itself is sufficient for teaching content and that practical aspects of teaching can be learned on the job (Zeichner & Tabachnick, 1999).

Stuart et al. (2009, p.9) argue that this "applied science" model can even "disempower" teachers because this model does not build on the existing capacities of teachers and instead views teachers as deficient in particular capacities (Thair & Treagust 2003). This model has led to a separation of theory and practice, where researchers produce theory and present it to teachers, whose role is to apply it in the classroom. It regards teachers as technicians who deliver the curriculum, disregarding the need for teachers to be responsive to the needs of students (Lewin & Stuart, 2003; Timperley, 2008). The implementation strategies tend to assume the compliance and

commitment of teachers, but being passive implementers of a programme prescribed by researchers hardly provides a condition that motivates teachers (Lewin, 1990). Disappointing results of the applied science model led to the emergence of another model – a model premised on reflective practice.

Both cognitive and constructivist theories of learning have many variants, but what is common is their stress on the importance of knowledge learned through experience and practice although they do not deny the virtue of scientific knowledge. The major concern of this group of theories is internal thinking processes. This is a sharp contrast to behaviourist theory, which focuses on observable human behaviour. This contrast derives from the difference in the underlying epistemology. Constructivist theory assumes that knowledge is not fixed but fluid as individuals constantly produce their own knowledge in a unique manner (Dunne et al., 2005). Since knowledge is not fixed, it cannot simply be transmitted to learners, but learners construct it as they learn through the interaction between thought and experience (Stuart et al., 2009).

A major CPD model influenced by constructivist theory is the reflective practitioner model. This model distinguishes two types of knowledge teachers require: received knowledge and situational knowledge (Stuart et al., 2009). On the one hand, received knowledge comes from outside, exemplified by concrete facts or theories produced by researchers. On the other, situational knowledge derives from one's own experience. What is the most important in this model is that teachers must integrate these two types of knowledge, and to do so requires teachers to reflect upon their own experience in the light of received knowledge (Stuart et al., 2009). The emphasis is given to facilitate teachers to develop their own knowledge based on their experience, and less emphasis is accorded to specific skills.

The concept of a teacher learning continuum is based on constructivist theory (Villegas-Reimers, 2003). According to constructivism, knowledge is not transmitted to teachers, but teachers actively create new knowledge based on situational knowledge derived from their own experience. Therefore, learning is a continuous and long-term process, which goes beyond a set of training courses. More importantly, learning must take place in their particular setting in order for teachers to be able to absorb new knowledge and to apply in their classroom.

Social constructivist theory, drawn from the theories of Vygotsky (1978), regards the process of learning as a social practice, rather than an individual one, while accepting some tenets of constructivist theory (UNESCO 2004). Its key difference from constructivist theory is its insistence that knowledge is created through social interaction and a shared rather than an individual experience; knowledge is developed "by the dialectical interplay of many minds, not just one mind" (Goodman, 1986, p.87). Vygotsky (1978, p.86) explains an essential feature of learning as the creation of "Zone of Proximal Development," defined as the distance between the actual and potential development levels of learners. It is in this very zone where one can help the learning processes going on in the minds of learners (Haenen et al., 2003). In other words, one can help learners do what they cannot do on their own, by giving various support, or "scaffolding," such us engaging them in activities (Wood et al., 1976, p.90). This theory also asserts that culture, language and other aspects of the social environment greatly influence learning throughout life (Stuart et al., 2009).

The CPD models based on social constructivist theory embrace the importance of collegiality, encouraging the sharing of experiences. An example is a group model, where teachers reflect on their experience, by sharing understanding with other teachers in a group (Rock & Wilson, 2005). The Community of Practice model can be regarded as a variant of group model although it is based on a particular theory of learning originally proposed by Lave & Wenger (1991) – situated learning theory. Like social constructivism, situated learning theory emphasises the social influence in the process of learning, but what distinguishes this theory is that it positions the community of practice as the context in which an individual develops the practices and identities appropriate to that community (Handley et al., 2006). Communities of practice are defined as the "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger, 2006). For Wenger (1999), learning is not just about constructing one's knowledge, but it is a process of constructing one's identity through changing forms of participation in the communities of practice.

Communities of practice do not automatically produce a favourable learning environment. For example, they can serve to perpetuate dominant discourses of the

community in an uncritical manner (Wenger, 1999). Hence, the issue of power is critical in order for the communities of practice to function as an effective CPD framework (Kennedy, 2005). According to Wenger (1999, p.81), within communities, "negotiating a joint enterprise gives rise to relations of mutual accountability among those involved." Therefore, under certain conditions, the communities can serve as a powerful site of transformation, where individual knowledge and practice are enhanced through collective endeavour (Kennedy, 2005).

The Community of Practice model is increasingly used as a mode of CPD delivery, as it is viewed as an effective way of engaging teachers in improving their teaching and providing appropriate support conductive to their working conditions (Lieberman & Miller, 2001; Darling-Hammond & Bransford, 2005). This model aims at creating the culture of learning in a community where teachers belong (e.g. school) even though the use of the terminology, the community of practice, is not always explicit.

2.4. Problematising Continuing Professional Development

Given the diversity of CPD, it might be thought difficult to find the common characteristics of effective CPD. In actuality, there is a broad consensus on what effective CPD looks like (Schwille & Dembélé, 2007). Many researchers (OECD, 2005; Darling-Hammond et al., 2009; Guskey, 1995; Timperley, 2008; Craig, 1998; Desimone et al., 2002) have identified the characteristics of effective CPD, and these can be summarised as the following:

- focusing on clearly articulated priorities;

- conducted in school settings, teachers assuming active roles, choosing goals and activities for themselves;

- linked to school-wide efforts, build on collegial relationships among teachers;

- providing teachers with opportunities of active learning, by connecting learning to the practices ;

- providing continuing follow-up and support to teachers in the classroom level;

- organised as a long-term learning process.

These suggest that effective CPD is largely premised on social constructivist theory and embodies the continuum of teacher learning. First, CPD must provide

teachers with opportunities for reflecting upon their own practices in their learning process, a key feature of the reflective practitioner model. Second, there must be elements of collaboration in the school level in order to sustain the learning process. Collegiality is the core to the social constructivist model. Third, CPD must be an ongoing learning process, not a set of events. Finally, CPD must be viewed as a long-term process that continues throughout teachers' careers. Although these can be considered as common characteristics of effective CPD, Guskey (1995, p.117) argues that there is no "one right answer," but it is necessary to identify "the optimal mix," the assortment of professional development processes that work best in a particular setting.

There have been numerous attempts to establish a CPD programme based on the principle of the continuum of teacher learning all over the world. What these programmes aim for seems often aligned with the characteristics of effective CPD listed above, but their implementation faces major challenges, as the issue of teacher development is intricately related to pedagogical transformation.

Many researches of Sub-Saharan Africa point out the prevalence of traditional teaching, which supports teacher dominance over learners, leading to rote-learning and the stifling of critical thinking (Rowell, 1995). As an antidote to traditional teaching, the current dominant pedagogy *espoused* by educational reform in Sub-Saharan Africa is based on constructivism or social constructivism, often represented as progressive pedagogy or learner-centred pedagogy (Chisholm & Leyendecker, 2008; Christie et al., 2005; Altinyelken, 2010). Learner-centred pedagogy has also been promoted with the aim of democratising society, endorsed by certain international organisations (Tabulawa, 2003). There are many variants in these pedagogies, but some of their common features include attention to the child as an active learner, inquiry-based learning, locally-relevant curricula, diversified and formative assessments, and teacher reflection to improve practice (Vavrus et al., 2011).

Pedagogies based on constructivism or social constructivism at the level of pupil learning have their critics. They are first criticised for having demonstrated relatively little evidence of their effectiveness despite the great rhetorical appeal (Abadzi, 2006; Gauthier & Dembélé, 2004). The pedagogies required are much more complex than direct transmission mode of teaching, and their effectiveness depends highly on the

knowledge and skills of teachers involved (Barron & Darling-Hammond, 2010). In other words, even in the context of industrialised countries, their implementation faces major challenges. Second, the assumption that students are passive learners in teacher-centred teaching may not hold true in many cases. Observing lessons in Botswana, Fuller & Snyder (1991) found that students were not necessarily passive even in teacher-centred teaching. It can be inferred that even if traditional teaching is broadly based on behaviourist theory, it rarely conforms to the ideal type of the technical rationality model, where students are treated as mere passive recipients of knowledge. Lastly, some researchers even argue that teacher-centred methods, in which teachers actively teach, as opposed to facilitate, may be more effective for some topics that are harder for pupils to discover on their own such as algebra (Klahr & Nigam, 2004).

The literature on attempts to transform teachers' pedagogy in developing countries points to these difficulties. Barrett (2007, p.275) concludes that many initiatives "have fallen short of their ambitious aspirations to transform teachers' practice…or have produced mixed results" (see also Brodie et al. 2002; Saito et al. 2008; Mattson & Harley 2003; McGrath 2008; Tabulawa 1998). In particular, research in Africa suggests that traditional teaching practices represented by rote teaching established during the colonial period are so deeply embedded that other teaching methods introduced by training disappear with time even if they are initially adopted (Akyeampong et al. 2006; Chisholm & Leyendecker 2008). The next two sections examine the challenges of CPD in transforming the pedagogy of teachers in Sub-Saharan Africa from two different perspectives.

2.5. Pedagogy and the Stages of Educational Development

Some authors argue that the reason why CPD in Sub-Saharan Africa has not been successful may be a mismatch between the current condition of African countries and progressive pedagogy. More than forty years ago, Beeby (1966; 1980) conceptualised the development of education systems in four stages, and it was later refined by Verspoor & Leno (1986). The characteristics of four stages are marked as 1) unskilled, 2) mechanical, 3) routine, and 4) professional. At the unskilled stage, teachers understand subject content poorly and are poorly motivated. The pedagogy of this stage is characterised by demand for rote-learning, and pupils spend most of the time listening

to teachers and copying from the blackboard. At the mechanical stage, teachers demonstrate a modest level of mastery of subject content and follow the curriculum and textbooks strictly. At the third and fourth stages, teachers begin to work as reflective practitioners, who develop their teaching practices autonomously, by selecting the best methods that would help pupils best learn in the context under which they operate.

The terminologies may have been evolved over time; teacher-centred style exemplified by rote-teaching is today contrasted with learner-centred teaching, but the trajectory is often the same (Barrett, 2007). In this view, the development of pedagogy is incremental, and it is not possible to skip from stage one or two to stage four, where teachers adopt a progressive teaching approach (Harvey, 1999). Verspoor & Leno (1986, p.13) argue that an appropriate content of training must be determined according to the level of teachers in the education system; it is unrealistic "to expect teachers at the "unskilled" stage to make effective use of training or instructional materials designed for teachers who are in the "professionalism" stage". Inspired by this view, several authors question the relevance of progressive pedagogies, associated with the stage four, in Sub-Saharan Africa, whose teaching remains largely in the stage one or two (Johnson, Hodges, et al., 2000; Johnson, Monk, et al., 2000; O'Sullivan, 2004; Knamiller et al., 1999; Shaeffer, 1990).

It should be noted that Beeby conceptualised the stages of education system, not the stages of teacher development in particular. If progressive pedagogy is not appropriate for teachers in the first stage, it is not necessarily because of the lack of capacity on the part of teachers, but also because of the lack of conditions that allow teachers to apply a new approach. A progressive approach assumes basic education conditions which most industrialised countries take for granted, but they are not easily met in most resource-poor countries (Robinson, 2002; Guthrie, 1990; Kunje, 2002). For example, in situations where students have no book or other learning materials, a teacher would face difficulties in applying any pedagogy other than rote teaching (Heyneman, 1984). These necessary conditions refer not only to materials but also other factors. In particular, progressive pedagogy presupposes a relatively small class size, but a classroom with over a hundred pupils is not uncommon in Sub-Saharan Africa (O'Donoghue, 1994; Altinyelken, 2010). Trying to conduct, for instance, group work

regardless of the classroom conditions could do more harm than good to student learning (Vavrus, 2009). Furthermore, disseminating progressive pedagogy requires a regular follow-up system at the school level, but few African countries have sufficient financial and human resources to do so. Asking teachers to change the practices by way of training without changing these conditions is likely to produce disappointing results.

2.6. Theory and Practice

The rhetoric of most initiatives on teacher development is broadly based on social constructivist theory. This makes sense because most initiatives advocate progressive pedagogy based on social constructivism to promote the learning of pupils. In theory, it is ideal to have a coherent theoretical base between the CPD model and the kind of pedagogy that the CPD programme advocates, but doing so in practice is found difficult. Several researchers point out that, despite its aspiration to promote progressive pedagogy, the actual practices observed in CPD programmes of Sub-Saharan Africa are mostly based on behaviourist theory (Lewin & Stuart, 2003; Stuart & Kunje, 2000). For example, Pryor and Stuart (1997) find that trainee teachers are taught about student-centred learning through transmission style lectures in some African countries.[1] In other words, the CPD programmes like this are premised on a different theory of learning – behaviourist theory – from the theory of learning that they are promoting for students – constructivist theory.

Tabulawa (1997) explains the reason for the persistence of traditional teaching from the cultural perspective. In traditional societies, knowledge is considered something fixed, rather than something to be questioned and developed; hence it can be transmitted to others. These positivist assumptions, which are so deep-rooted in the minds of teachers, are incompatible with a learner-centred pedagogy, which is based on constructivism and presupposes certain western assumptions like a situational view of knowledge and professional autonomy (O'Sullivan, 2002; Rowell, 1995). Thus, changing the transmission style of teaching to a learner-centred one requires a

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[1] Also, see the Namibian case in Section 2.7.

fundamental change of teachers in their view of the nature of knowledge and of how learning takes place (Tabulawa, 1997).

Despite its importance, the epistemological shift underlying the pedagogical renewal has been largely neglected (Lewin & Stuart, 2003; Vavrus & Bartlett, 2012). A learner-centred pedagogy is often presented as a set of techniques like group work. Research in Africa identifies that teachers are often assessed by the assessment tools that define "a universal set of 'excellent' teaching practices" (Vavrus, 2009, p.307). This makes grading uniform and relatively easy, but such an evaluation tool is based on the behaviourist assumptions that pedagogy can be evaluated through observable behaviours. This is hardly an appropriate manner of evaluating teachers who are expected to become reflective practitioners. Without the change in belief, teachers only change pedagogy at a superficial level, resulting in the failure of pedagogical innovation to take root (Borko & Putnam, 1995).

Several research projects in Africa have found that, in promoting progressive teaching methods, teachers demonstrated themselves capable of adopting the "form," the superficial features of teaching methods like group work without understanding how the pedagogy is supposed to help achieving lesson objectives (Brodie et al., 2002, p.542; Barrett, 2007; Mattson & Harley, 2003; Leyendecker et al., 2008). True, it can be argued that the adoption of "form" alone constitutes an improvement, and it may well be true that this is the necessary first step before starting to understand the reasons why the new method may promote learning. Nonetheless, if teachers do not understand the new pedagogy in "substance," it is unlikely to take root (Brodie et al., 2002, p.542). The challenge in introducing new pedagogy is thus not necessarily to change teachers' practices in the short-term, but to sustain the changes.

My earlier research argues that pedagogical practice is not as simple as it can be described in a linear model, progressing from a teacher-centred to a learner-centred approach (Miyazaki, 2010). Even if teachers only adopted the "form," it does not necessarily indicate their lack of understanding, but it might simply indicate that they attempted to practise a learner-centred approach in a way that they thought was helpful for the pupils in their context. This is another area where this research intends to investigate in the sample schools.

2.7. Case of Namibia

The epistemological shift is found very difficult to achieve even if the government made an explicit effort to do so, as the case of Namibia illustrates. The Namibian Government fundamentally transformed the education system after its independence in 1990 from a content-based one premised on behaviourist theory to a learner-centred one premised on social constructivist theory (Zeichner & Tabachnick, 1999). Despite its promising start, by the early 2000s, various evaluations point out the difficulties faced by teachers in practising learner-centred teaching, resulting in the persistence of rote-teaching (NIED, 2003; van Graan et al., 2005).

Their difficulties reveal a dilemma about how to promote progressive pedagogy. On the one hand, it is found extremely difficult to maintain the consistency in the documents and training sessions. Although the theoretical foundation was coherent in the policy documents, other supporting documents that facilitate its implementation like curricula, textbooks, and examinations are not consistently based on learner-centred principles (NIED, 2003). Echoing the contradiction in the documents, many of the training courses provided seemed to be based on behaviourism (NIED, 2003). On the other hand, when reflective practice was unmistakably promoted in training sessions, teachers found it difficult to connect the theories written in the reading materials to the practices in the classroom. Reflective practice turned out difficult to acquire for Namibian teachers, who had not been exposed to critical thinking before (Pomuti, 2005).

These disappointing results, along with the international pressure, led the Government to shift the direction of the reform by 2007 towards more standards-based and behaviourist approaches, emphasising the performance assessment and accountability (van Graan et al., 2006; Zeichner & Ndimande, 2008). The recent policy shift points to the depth of difficulties faced by African countries to adopt a progressive approach. One possible interpretation of the decade-long Namibian experience is that a progressive approach may be incompatible with the culture and resources of African countries. Verspoor and Leno (1986) might argue that progressive pedagogy is not appropriate for the stage of education system in which Namibia is situated. The Namibian case also appears to show that a reflective practitioner model proves to be too complicated to implement in a country, where the traditional assumption of knowledge

as something fixed is persistent. The learner-centred approach, no matter how well articulated in the policies, was understood differently by teacher educators, let alone teachers, because the barrier to overcome the epistemological shift was exceedingly high; as a consequence, the reform brought a significant confusion among teachers (NIED, 2003). However, Zeichner & Ndimande (2008) argue for a different interpretation; the result has just begun to emerge in the classroom level albeit at a slow level. They find that what teachers practise is an "adaptive" version of learner-centred approach, "a hybrid of teacher-centered and learner-centered methods that takes into account teachers' working conditions" (p.337). According to them, the hybrid model of teaching, albeit different from what the official policy wishes to promote, represents a positive step towards learner-centred education.

Observing the discrepancy between the theory and the practice, some authors calls for an alternative to social constructivist model. O'Sullivan (2004, p.599) warns that it is impractical to ask Namibian teachers to adopt social constructivist teaching under the current condition, but, instead of abandoning it, she proposes an "adaptive" version that may promote learner-centred education in the long term (See also Vavrus's (2009) notion of contingent constructivism in Tanzania.) For instance, when she introduced specific skills that helped teachers ensure effective learning of students, she found that the lessons as well as the performance of a small sample of students improved. Her "adaptive" approach seems based on behaviourist assumptions because of the emphasis on skills, but it is used to make the learner-centred approach more accessible to teachers.

The Namibian case shows that it is extremely difficult to change the pedagogical practices of teachers. The traditional perception of knowledge as something fixed is a huge barrier to reform that is based on social constructivism. The top-down approach adopted in Namibia has introduced the social constructivist model without taking into account the classroom realities, resulting in confusing teachers (O'Sullivan, 2004). A more flexible approach adapting to the needs of practising teachers was necessary for helping teachers improve their teaching. The challenges are further compounded by the donor-dependencies, a common characteristic of almost all African countries. Since donor agencies often have unreasonably high expectations in the short-term, any reform

may be undone unless it can show a quick result; it risks undermining the long-term development (Samoff, 1999).

2.8. Challenge of Establishing Effective CPD

The above literature review examined what would make CPD successful in Sub-Saharan Africa. It found that there was a broad consensus on what a successful CPD should look like: school-based, built on collegiality, focused on learning related to classroom practices, and organised as a continuous and long-term learning process. In other words, it is premised on social constructivist theory and based on the principle of the continuum of teacher learning.

Although many countries aim for establishing a CPD programme just like the one described above, most of them struggle in its implementation. The problem is not that there is disagreement about what constitutes a good CPD programme but rather about how to implement one (MacNeil, 2004). The multiple challenges for establishing CPD based on the principle of the continuum of teacher learning in Sub-Saharan Africa are identified. First, a CPD model based on social constructivism is found tremendously difficult to implement in a country, where the traditional perception of knowledge contradicts its underlying epistemological assumptions. Namibia's case illuminates the difficulties of implementing CPD based on social constructivism even when its efforts are supported by the well-articulated policy and the serious commitment of the government. Second, establishing a continuous learning model remains elusive because of the constraint on human and financial resources. Few African countries can afford to provide an effective follow-up system at the school-level. Third, a viability of a long-term learning model is questionable in a country where most CPD programmes have been supported by external donors.

Looking from another perspective, the literature questions the appropriateness of learner-centred pedagogy in Sub-Saharan Africa. First, most African classrooms do not satisfy adequate conditions that allow effective implementation of progressive pedagogy. Teachers often face difficulties in applying what they learned in a CPD programme because their classroom is often overcrowded, or they do not have textbooks and other

teaching materials. Second, progressive pedagogy may be incompatible with the existing culture in many African countries.

Despite the current preoccupation with progressive pedagogy by African governments, dichotomising between teacher-centred and learner-centred pedagogy is not helpful in improving teaching because different approaches coexist in the practice of teachers (Torrance & Pryor 1998; Alexander 2006). Bernstein (2000) uses the concepts of framing to analyse the interaction between teachers and pupils as a kind of power relations. This analytical framework opens up the possibility of understanding teacher-centred or learner-centred practices as a matter of degree, rather than the two opposing approaches. Furthermore, pedagogy is so complex that it cannot be simply described in a linear progression model from teacher-centred to learner-centred (Sugrue, 1997). Because of the complexities, a flexible model of social constructivist teaching contingent on their context may be a way forward to finding an appropriate pedagogy in Sub-Saharan Africa.

It is true that the rhetoric of continuum has not been matched by the existing practices of CPD in Sub-Saharan Africa. On the one hand, it indicates the limitation of the top-down approach, characterising most of the current large-scale efforts. The efforts initiated from above tend to make the programme approach prescriptive, teachers being marginalised in its process. It is indisputable that the implementation strategies of most existing programmes require a great deal of improvement. On the other hand, it cannot be emphasised enough that the aspiration to realise a CPD programme based on the principle of continuum must be regarded as a really long-term process. No matter how serious the commitment of the government is, it is difficult to ensure coherence between policy and practice in the short-term when a new effort is introduced. If a CPD programme is initiated with external support, which is the case in most of Sub-Saharan Africa, both African countries and donor agencies must be patient enough for CPD to become well-embedded as the establishment of an effective CPD requires more time than most project duration allows. In the current climate represented by EFA and MDGs, visible results are sought in a relatively short time frame, but if we are truly serious about establishing an effective CPD, it is necessary to take a long-term vision.

Chapter 3: Primary Education and Teacher Development in Senegal

This Chapter describes the current situation of teacher development in Senegal. The first section provides a brief description on the structure of the primary education system and the current situation. The second section describes the teacher development system with a focus on the period after the introduction of volunteer teachers in 1995. The third and fourth sections describe the two CPD programmes – PREMST and CEB. The final section analyses the relationship between the two programmes.

3.1. Situation of Primary Education

Senegal's education system is modelled on that of France. As the first French colony in Africa, Senegal has had a privileged position with France over 300 years (Rideout & Bagayoko, 1994). In much of Sub-Saharan Africa, the impetus of education reforms after independence came from the desire to break from its colonial past, but Senegal is unique in that it achieved independence while maintaining a close and amicable relationship with its former coloniser (Rideout & Bagayoko, 1994). Senegal has not attempted the kind of education reforms seen elsewhere in Africa at the time of independence and maintained the French curriculum only with slight modifications (Vavrus et al., 2011). Moreover, the constitution promulgated in 1963 declared French as the official language, shaping its language of instruction policy (Rideout & Bagayoko, 1994). Thus, the education system introduced during the French colonial period in the nineteenth century still has an important influence in the current education system.

The education system of Senegal is structured on a 6-4-3 year of primary, middle, and secondary education. At the end of each cycle, students sit the final examination to obtain the school diploma: C*ertificat de Fin d'Etudes Elémentaires,* (CFEE) for primary, *Brevet de Fin d'Etudes Moyennes* (BFEM) for middle, and *Baccalauréat* (BAC) for secondary education. Compulsory education has been nominally ten years since 2004, covering primary and middle education, but its

application confronts the difficulties, evidenced by the low gross enrolment of middle school at 56.4% in 2012 (MEN, 2012)[2].

The Ministry of Education has the decentralised structures in 14 regions. *Inspection d'Académie* (IA) coordinates the activities between different structures of education at the regional level. *Ecole de Formation d'Instituteurs* (EFI) functioned as an initial teacher education college, and *Pôle Regional de Formation* (PRF) was in charge of CPD programmes, but these two structures were merged into the *Centre Régional de Formation de Personels de l'Education* (CRFPE) in 2011[3] with the aim of establishing a teacher development system that seamlessly connects initial teacher education to CPD. 14 IAs are divided into a total of 54 *Inspections Départementales de l'Education Nationale* (IDEN),[4] which are in charge of daily management of schools in each department. Their duties include the implementation of CPD programmes for primary school teachers as well as its follow-up at the school level.

The Government of Senegal has given a priority to basic education in the past decade to achieve Education for All, particularly universal access to primary education (*République du Sénégal* 2006). The Ministry of Education provided a policy orientation, by elaborating an education Sector-wide Approach called, *Programme Décennal de l'Enseignement et de la Formation* (PDEF). The increase in the gross enrolment rate of primary school has been impressive in the last decade, rising from 65.5% in 1999 to 92.5% in 2009 (MEPEMSLN 2009a; MENETFP 2000). In contrast, it is widely agreed that the quality of education remains poor today (République du Sénégal, 2000; Niane, 2004; DeStefano et al., 2009). The completion rate of primary school remains low at 65.6% in 2012 although the progress from a decade ago is significant (MEN, 2012).[5] International tests like PASEC show that the performance of pupils is very weak, especially in mathematics, and that the performance has not been improved since 1996 (CONFEMEN, 1997; JICA & IDCJ, 2012; Chinapah, 2003; Diagne, 2012).

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[2] The expansion of compulsory education is stipulated in the *loi 2004-37* of 15 December 2004.

[3] *Décret n° 2011- 625* of 11 May 2011.

[4] The appellation of IDEN was changed to *Inspection de l'Education et de la Formation* (IEF) in 2012 (*décret n° 2012-1276* of 13 November 2012). Since the change was effectuated after the field study, this study uses the appellation of IDEN.

[5] The completion rate was only 46.8% in 2002 (MEN, 2012).

3.2. Teacher Development

During the rapid expansion of primary education, Senegal managed to reduce the student/teacher ratio from 51 to 37; indeed, the number of teachers more than doubled in a decade from 19,667 in 1999 to 47,865 in 2009 (MEPEMSLN 2009b; MENETFP 2000). This was done by introducing the volunteer teacher system in 1995 as a low-cost alternative to civil servant teachers (Teuw, 2001). Whereas previously the duration of pre-service training was four years, the reform drastically cut it to three months. The new system permitted the Government to recruit a larger number of teachers every year with its limited resources because volunteer teachers started from a much lower salary level than civil servant teachers. As the experimentation brought positive results, the system was formalised in 2000 with the establishment of EFI in each region (Diagne, 2012). EFI trained the student-teachers with the minimum academic qualification of BFEM for five months.

The majority of student-teachers was admitted to EFI through the entrance examination, consisting only of the French written test despite the fact all primary school teachers teach all subjects. Because of the short duration of training, those who completed EFI are considered unqualified until they acquire one of the professional qualifications, *Certificat Elementaire Aptitude Professionelle* (CEAP) or *Certificat d'Aptitude Pedagogique* (CAP). In order to get either of the qualifications, teachers have to pass two phases of the examination: 1) the written test and 2) the practicum test, which consists of demonstrating a lesson in front of the inspectors. The consequence is the increasing emergence of unqualified teachers − 53.8% in 2008 (MEPEM, 2008b). The quality of teachers is further aggravated by another mode of recruitment, called *quota sécuritaire*, which gives the Office of the Minister a discretion to select anybody who submitted the application to enter EFI without going through the entrance examination (Mbaye et al., 2011).

Studies suggest that rote teaching is pre-dominant, and teachers tend to "give little autonomy or initiatives to the learners" (PREMST, 2007, p.1). Teachers have problems in the mastery of subject content, especially in mathematics and science (DeStefano et al., 2009). In spite of this, the course work at the EFI does not include subject contents owing to its short course duration. Although no formal study was

conducted, the low quality of teaching was widely attributed to the emergence of unqualified teachers, and the Government began to take a number of measures to raise the quality of teachers since 2007. The first part of the measures is to overhaul the recruitment and initial teacher education system. First, the duration of EFI was expanded. EFI is supposed to be a nine-month programme since 2009 although various administrative constraints preclude the actual duration from being more than six months in reality (JICA & IDCJ, 2012). Second, the system of *quota sécuritaire* was formally abolished in 2010 (Diagne, 2012). Third, the entrance examination for other subjects including mathematics and science were reinstituted from 2011.[6] Fourth, the minimum academic requirement for the entrance to EFI was raised from BFEM to BAC from 2011.

The second part of the measures is to requalify the existing unqualified teachers. The Ministry initiated in 2007 with the support of the Canadian International Development Agency (CIDA), an In-Service Training Diploma, or *Formation Diplomante Continuée* (FDC), for volunteer and contractual teachers. FDC is a transitory measure to increase the number of qualified teachers rapidly, by allowing 17,500 non-qualified teachers to take the teacher qualification examinations after its completion by 2013 (CONFEMEN, 2007). Thanks to these efforts, the ratio of unqualified teachers started decreasing from 53.8% in 2008 to 46.0% in 2012 (MEN, 2012).

Besides FDC, CPD programmes had only been organised on ad-hoc bases, mostly supported by donor agencies, and none of those efforts have proved sustainable beyond the project duration (Niane, 2004). The evaluation of PDEF noted that there was a lack of synergy in the organisation of teacher development, as EFI, PRF, and IDEN functioned without an effective coordination mechanism in each region (Diagne, 2012). These scattered efforts have been inefficient, having demonstrated little impact (CONFEMEN, 2007).

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[6] The administration of the examination has also been changed and centralised to ensure the rigidity of the examination. The former decentralised system witnessed a number of fraud cases (Diagne, 2012).

Under this context, the Ministry recently initiated two CPD programmes that aim at improving the teaching practices of teachers. The first one is PREMST, which started in three pilot regions in December 2007 with the support of Japan International Cooperation Agency (JICA). The second is the initiation of the CEB, which began to be carried out nationwide progressively from October 2009. Both programmes are still on-going at the time of writing this thesis.

3.3. PREMST as a New CPD Model

3.3.1. First phase of PREMST

The objective of PREMST is to strengthen the capacity of primary school teachers by improving their pedagogical practices in mathematics and science (PREMST, 2007). In order to maximise its sustainability, the Ministry wanted to make the most of the existing institution of *Cellules d'Animation Pédagogique* (*Cellules*). All teachers are required by decree to participate in a meeting for in-service training based on a cluster of schools for four-hours every month without the payment of a per-diem (République du Sénégal, 1979). However, the effectiveness of the *Cellules* was recognised as limited because its function had relied almost entirely on the personal initiatives of the organising heads, who were given no financial or technical support to organise training (Ba et al., 2005).

PREMST chose a hybrid model of cascade and cluster training as a mode of delivery to countermeasure the weakness of *Cellule*. Cluster training was deemed appropriate as a cost-effective means to respond to teachers' needs in the locality, but there was an acute constraint in the human resources available within each *Cellule*. Therefore, the option taken was to develop local trainers, who were selected from competent teachers or head teachers[7] in each IDEN. They were trained through cascade training; in return, they function as facilitators of *Cellules* in their locality. By training local trainers, PREMST brought a structured curriculum of training, replacing the

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[7] Many of the local trainers are selected from the members of *Cellule*. A trainer is dispatched from outside, where inspectors finds no suitable person within a *Cellule*.

traditional sessions, called *Cellule Classique*.[8] 11 National Trainers first trained 50 Regional Trainers, who in turn trained 345 Local Trainers, and the training eventually targeted all primary school teachers of the target regions through *Cellule* sessions (PREMST, 2007).

The needs assessment conducted by PREMST showed a very low mastery level of teachers on subject content in mathematics and science. In the small test consisting of the six-grade level questions conducted to a sample of 644 teachers, only 13% among them got at least 75% of questions correct (PREMST, 2008a). The project had initially intended to focus on the pedagogical improvement, but this result led the project to shift its strategy to address the subject knowledge issues at the same time as the pedagogical issues. Based on its results, the National Trainers, consisting of the inspectors in the Ministry and different regional offices attached to the Ministry, developed a guideline of skills, which clarified the areas of competence where teachers required improvement. Six areas of competence were identified; curriculum, pedagogy, teaching materials, and subject content of mathematics, science, and technology. The Project used National Trainers, in collaboration with Regional Trainers, to develop 15 modules in order to make improvements in these specific areas of competence. During the three years between 2009 and 2012, approximately 80% of 13,500 teachers in the target regions participated in a total of 15 sessions of the *Cellules* to study these modules (PREMST2, 2012e).

Although not made explicit, the lesson that PREMST promotes is based on social constructivist theory and is adapted from work done by JICA in other countries. It introduces a learner-centred pedagogy called Activity, Student, Experimentation, and Improvisation (ASEI), which embraces four characteristics: 1) action-oriented, 2) learner-centred, 3) experimentation-based, and 4) involving improvisation (PREMST, 2009a). The ASEI is depicted as an approach to bring a "pedagogical paradigm shift"

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[8] *Cellule* and *Cellule Classique* represent essentially the same framework of cluster-based training, but teachers often distinguish between C*ellule Classique* and *Cellule* PREMST.

and to help teachers reflect on teaching strategies so as to improve teaching and learning (PREMST, 2009a, p.6).[9]

PREMST as a CPD model also seems based on social constructivist theory though again this is not made explicit. Central to the PREMST training are exchanges of view with colleagues. Instead of giving answers, training aims to stimulate discussions among colleagues to produce their own answers. Therefore, the modules are distributed at the end of the training for the review only. If they were distributed in advance, it might allow teachers to prepare for the training, but it might also diminish the dynamism of discussions if everyone tried to recite the "answers" written in the modules.[10] My observation as the Technical Advisor of PREMST confirms that *Cellule* sessions are generally participative, teachers enthusiastically discuss their points of view not only in group work but also in plenary sessions.

The results of internal and external evaluations have been encouraging as summarised in the following points:

- *Cellules* where PREMST has been running have been revitalised, attracting a greater participation of teachers compared with those outside the pilot where there has been much absenteeism;

- PREMST has been appreciated by all levels of stakeholders, particularly teachers;

- Lesson observation found that teachers had begun to change their teaching practices, by making lessons more activity-oriented.

(JICA & MEPEMSLN 2010; Gaye 2010; PREMST 2011a)

The shortcomings in the project design were also noted. Among these was a separation between theory and practice. *Cellule* sessions provided theoretical foundations, and teachers prepared a lesson plan in group work, but its application in the classroom was left to the initiative of individual teachers. The great majority of teachers admitted facing difficulties in applying what they learned in the classroom (PREMST, 2011a). The situation was exacerbated by the lack of a follow-up

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[9] Most of PREMST project documents are written in French. I translated it into English in case of direct quote.

[10] See Appendix II for the description of PREMST training in detail.

mechanism. Although PREMST added training for head teachers since 2010, this alone would be far from adequate for the follow-up mechanism to function because the problem of insufficient support at school level is one of the most serious weaknesses, not of PREMST in particular, but of the entire Senegalese education system (Niane & Robert, 2007).

Existing evaluations, including my own, found that although teachers were good at adapting the "form" of the ASEI approach, they perceived little difference in the approach they had known and the ASEI approach, suggesting that teachers had limited understanding of the "substance" of different approaches (Mbaye et al., 2011; Miyazaki, 2010). Still, the same evaluation (Mbaye et al., 2011) noted that PREMST contributed to the effective use of group work by some teachers. It can be inferred that at least some teachers managed to improve their teaching.

3.3.2. Second phase of PREMST

At the end of the first phase of PREMST in 2011, the Ministry decided to evolve the Project towards its second phase in two ways: 1) its expansion nationwide and 2) the introduction of a lesson-study model of training. First, it was decided that the module-based training, successfully implemented in the pilot regions, should be expanded to all regions. Second, after completing all modules, it was proposed that training be changed from one provided by trainers in school to the one that was organised by the school initiatives (PREMST, 2011b). In the evaluations, teachers stated that PREMST would be more effective if module-based sessions were followed by the existing practice of *prestation*, where a teacher prepares and demonstrates a lesson to discuss pedagogical issues with the colleagues (PREMST, 2011a). Inspired by the idea of the National Trainers who learned lesson study during the training in Japan, it was decided that a new model of cluster-based training be conceived, by combining some of the distinctive features of lesson study with the existing practice of *prestation*.

The Japanese lesson study is a kind of collaborative action research that teachers conduct in school regularly, by examining a few research lessons over the year with the aim of improving these lessons (Hiebert et al., 2002). Yoshida & Fernandez (2004, p.8-10) describe the process of lesson study in six steps: 1) teachers collaboratively plan a

lesson; 2) one of the teachers in the group teaches the designed lesson to his/her students while other teachers observe it; 3) the group comes together to reflect on the lesson observed; 4) the group revises the lesson plan after the discussion; 5) another member of the group teaches the lesson according to the revised lesson plan; and 6) teachers come together again to discuss their reaction to the second version of the lesson.

From the Japanese lesson study, PREMST has decided to take the characteristics of collaboration in particular. The *prestation* was often regarded as an evaluation of the teacher who conducted a lesson in front of everyone. All too often, only those who must go through a CAP practicum test, a teacher qualification, were interested (PREMST2, 2012b). In the newly proposed model, teachers are asked to collaborate throughout; the theme of the study is decided collectively, a group of teachers collaboratively prepare a lesson, a teacher demonstrates a lesson to others, and teachers discuss together to improve the lesson observed.

Lesson study has many challenges if it is to be implemented effectively, and its attempted adoption in other countries has so far brought mixed results. In short, the procedural aspects of lesson study are easy to adopt, but meaningful learning does not come automatically when teachers adopt the structure of lesson study. From the viewpoint of Verspoor & Leno (1986), lesson study seems to be appropriate for countries which are at Beeby's (1966) professional stage, but not for those at the unskilled or mechanical stages. Indeed, several authors describe the difficulties of adopting lesson study in developing countries like Vietnam, Indonesia, and South Africa (Saito et al., 2008; Saito et al., 2006; Ono & Ferreira, 2010). Nonetheless, the advantage of Senegal is that in the *prestation* they have cultivated a similar practice for the last few decades, albeit in a less structured manner. The implementation of the new model has only started in 2012, and no formal evaluation has yet been conducted, but the supervision by the National Trainers as well as myself suggests that teachers are motivated to working together to improve the lesson presented in the lesson-study sessions. It is positive that teachers do not hesitate to say their opinion, either positive or negative, about the lesson and provide suggestion to improve it even though the quality of discussion has yet to improve. The training inspired by lesson study may function as a kind of follow-up mechanism and lay a foundation for a continuous CPD model.

3.4. CEB: CPD as an Implementation Mechanism

The Ministry has, for long, been aware of the problems of the curriculum, defined in the decree 79-1165, which has been in effect since 1979, because of its content-based nature (MEPEM, 2008a). There have been several attempts to produce a new curriculum, but for one reason or another, these have not gone further than the pilot stages (JICA & IDCJ, 2012). The most recent effort, CEB, was started in 1996 with the support of CIDA and began to be expanded nation-wide from 2009 (CONFEMEN, 2007).

CEB adopts a competency-based approach which is explicitly informed by two theories of learning: constructivism and social constructivism (MEPEM, 2008a). CEB was developed around a set of competences with which pupils should be equipped. It promotes a pedagogy of integration that allows pupils to mobilise and coordinate their knowledge to solve the complex problems that they encounter; thereby, rending school learning more relevant to their life (MEPEM, 2008a). This pedagogy requires teachers to use a fundamentally different set of teaching methods, by placing pupils at the centre of the lesson. CEB encompasses not only the objectives and the programme content, but also methodology, assessment strategies, manuals and support materials (DeStefano et al., 2009). New textbooks are planned to be developed, but this has been delayed for administrative reasons, and teachers continue to operate with the old textbooks (Toure, 2012).

CEB is not only the new curriculum but a CPD programme to introduce it to teachers and teach them how to use it. CEB was introduced to all six years of primary education from 2009. CEB has developed a total of 62 documents and materials, including the Pedagogical Guides (hereafter the Guide), and workbooks for each subject like mathematics or science (JICA & IDCJ, 2012). One-week intensive training started in 2009 to share these documents, and with the gradual expansion scheme, all teachers are supposed to have received the training by the end of 2012. In addition, refresher courses of a few days were offered every year until 2012. No evaluation has been conducted on CEB, but it is reported that respondents who had undergone the training talked of satisfaction in the quality of training (DeStefano et al., 2009).

3.5. Two CPD Programmes and their Relationships

PREMST and CEB are supposed to be complementary. CEB provides a broad orientation of the way teachers are supposed to think about their teaching. Then, PREMST, with the introduction of the ASEI approach, is supposed to help teachers practise the pedagogies that CEB promotes. In reality, there are mixed reports about the co-existence of PREMST and CEB. On the one hand, many teachers recognise that the two have common goals, aiming to transform their teaching practice to a learner-centred one. On the other, some teachers are reported to be confused because it appears that the Ministry is imposing two different pedagogies at the same time. It was repeatedly pointed out in different evaluations as well as the review sessions of PREMST that the harmonisation of the two programmes was necessary to avoid the confusion of teachers (Gaye, 2010).

The two programmes use different terminologies and a different format of lesson plan even though they are not contradictory to each other. For example, PREMST proposes to organise all lessons on mathematics and science in four phases: introduction, development, conclusion, and assessment. In contrast, CEB says that the structure depends on the lesson, and the terminologies used in the Guide include: presentation of situation, research, debate and validation, synthesis, and assessment. The module of ASEI-PDSI explains that the difference of these terminologies is insignificant, but the terminologies have been kept. Only in January 2013, during the workshop between PREMST and CEB, was it decided that PREMST would renounce the use of its own particular terminologies to harmonise with CEB. However, the perspectives of teachers with regard to the co-existence of the two programmes have not been documented. This research investigates how teachers understand these two CPD programmes, by elucidating the viewpoints of the teacher-participants, though the focus remains mainly on PREMST. The analysis of their understandings shall be done not just by asking their viewpoints but also by examining the actual practice of what they claim to do in the observed lessons, as the next chapter sets out.

Chapter 4: Methodology and Methods

This Chapter describes the methodology and the methods employed for this research. The first section locates this research in a framework of case study. The second section describes how the cases were selected. The third section explains the research methods. The fourth section describes how the data was analysed. The fifth section establishes my positionality as a researcher. The sixth and seventh sections reflect upon the ethical issues and its implication on the research. The eighth section clarifies the limitations of the research. Finally, the ninth section explains the context under which the research has been conducted, by providing the description of participating schools, teachers and pupils.

4.1. Case Study

Leonard (2001) distinguishes between academic, applied, and activist researches. I locate this research in the realm of activist research in that it aims to change the practice, by understanding the phenomenon better. As a practitioner, the purpose of this research is to change the course of actions taken by PREMST to improve the pedagogical practices of teachers further, by understanding the pedagogical change that teachers are supposed to have experienced. To do so requires examining what changes have already been attained and what other changes are still necessary to improve teaching further. At the same time, as doctoral research, the purpose of the research is not limited to the practical purpose but to contribute to the knowledge, by producing a much-needed analytical but positive account of what is happening in the classrooms of Sub-Saharan Africa.

The literature review showed that changing the teaching practices of teachers was extremely challenging to the extent that it seemed almost a mission impossible in the context of Sub-Saharan Africa. In contrast, the project evaluations of PREMST provided much more optimistic accounts of the phenomenon than what the existing literature would allow. This triggered a question of why there was such a knowledge gap between these two. Untangling these seemingly contradictory findings is the key to

understanding the nature of change that was supposed to have occurred in the teaching practices of teachers.

This background set me to start from what already exists - the existing evaluations of PREMST. They had collected the viewpoints of a large number of teachers by way of questionnaires and collected the data of systematic observation, by using a standard lesson observation sheet explained in Section 7.6.2. The quantitative research helped us find a generalised picture about what teachers thought, but it was not helpful to find in any depth how teachers related the training to their teaching. Similarly, the quantitative research showed the improvement of the teaching practices in terms of score, defined by the indicators of the lesson observation sheet, but they said little about in what ways the teaching practices had been actually changed. The qualitative questions that would be needed to answer these kinds of details are difficult to generalise for the entire population of those who received training because teachers operate in their particular context, and how they fit in what they learn in the training depends on the context under which they operate. Teaching is a complex activity, "where teachers attempt to achieve desirable outcomes within specific contexts (Akyeampong et al., 2006, p.159)." Generalising teacher thinking reduces the importance of how individual contexts and teacher backgrounds interact, resulting in an over simplification of otherwise complex matters.

Having identified the limitations of the existing project evaluations, what was needed was a different approach – qualitative research to investigate the nature of the teaching practices of teachers who had participated in PREMST. This principal research question oriented me to investigate how some of the teachers understood pedagogy and how their understanding was related to their teaching practices. This required understanding the phenomenon as a context-specific reality, leading me to choose the case study method as a research strategy.

The definition of a case study is contentious. Ragin and Becker (1992, p.2) argue that "every (social scientific) study is a case study because it is an analysis of social phenomena specific to time and place." I adopt the following definition by Yin (2008, p.17):

(T)he case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context; especially when the boundaries between phenomenon and context are not clearly evident.

In this sense, the pedagogical change experienced by teachers who participated in the PREMST programme can be considered as a contemporary phenomenon to be studied. The boundary of the phenomenon is not clear, as teachers are necessarily influenced by many factors other than PREMST. The pedagogical change is a complex phenomenon which highly depends on the individual contexts. A case study method is most suited to investigating how some of the teachers experienced the CPD programmes and changed their practices based on what they learned because it allows me to gain an in-depth understanding of the cases in their particular contexts by employing multiple data collection methods (Creswell, 2007).

This study employs a multiple case study design with five cases, where each case is the pedagogical change of a teacher who is said to have gone through some degree of positive pedagogical transformation as a result of his/her participation in the PREMST CPD programme. Stake (2005) distinguishes between three types of case study: 1) intrinsic, 2) instrumental, and 3) collective. Each of the five cases constitutes an instrumental case study in that it aims to provide insight into the particular issue of pedagogical approaches and understandings of a teacher following engagement with PREMST and to investigate the generalisations that derive from the previous evaluation studies. Together the five cases are a collective case study, consisting of five teachers, in the hope that understanding multiple cases will lead to better understanding of the phenomenon, a pedagogical change experienced by teachers who participated in the PREMST CPD Programme (Stake, 2005).

4.2. Selection of Cases

The selection of cases is central to the research design. The purpose of the research is to understand the complexities of the nature of the pedagogical change that teachers have gone through. Since I wanted to analyse the change that had occurred, I needed to seek teachers who had actually changed their teaching practices. To maximise the possibility that I could identify various aspects of pedagogical change, I selected the

teachers who were seen as successful by the PREMST trainers. It should be noted that although it is important to find teachers who have improved their teaching practice, the criteria for teacher selection are different from those that might be used for identifying the best teachers.

The selection of cases proceeded in several phases. First, I created a long list of schools where teachers had experienced positive changes. Having worked in Senegal for more than four years, I was in the fortunate position of having a wealth of connections to different stakeholders in the Ministry of Education. The criteria that I shared with various informants were the following:

- The teacher had participated in training of both PREMST and CEB;

- The head teacher thought that the teacher had improved pedagogical practices in the last three years;

- The teacher thought that their improvement in pedagogical practices was related to the above-mentioned training;

- Both the teacher and the head teacher agreed to participate in the research without any financial compensation;

- Preferably, the head teacher had remained in his/her post for the last five years.

After informal contact with various informants, a list of 21 schools with the name of teachers was created. The list was shortened by cross-checking with the opinions of different people as well as with the secondary data. I selected 10 schools and visited all of them to have an interview with their head teacher. During the first encounter, I explained about the research with the aid of an Information Sheet and asked if the school was interested in participating in the research. All of the schools that I visited said yes without hesitation. Then, I posed some questions to see if the school really fitted the criteria and selected three schools from them. Later, one school decided

to drop out[11] and was replaced by one of the back-up schools.

In each school, I asked the head teacher to select three teachers who best matched the criteria. One school selected three teachers as planned. In another school, where there were only two other teachers besides the head teacher, both teachers withdrew from the research after the Focus Group Discussion (FGD). In the replacement school, the head teacher proposed two teachers, but one teacher declined to participate when I explained the conditions of participation. In all three cases of withdrawal, I did not ask the reason, but they said that they felt uncomfortable with conducting a lesson in front of video-camera.

4.3. Research Methods

Creswell (2007) classifies the source of data for qualitative research in the following four forms: documents, interviews, observations, and audiovisual materials. Taking advantage of the strength of the case study method that allows a wide array of data collection from multiple sources (Yin, 2008), I chose the research methods in a way that allowed me to use all these forms of data, by conducting document analysis, focus group discussion (FGD), individual interviews, and lesson observation. I started the research by examining the relevant documents to better understand the contexts under which teachers operate. The documents included government policy documents, documents produced by PREMST and CEB, and the evaluation reports of PREMST.[12] Although I was already familiar with most of these documents, I reviewed them more critically by drawing on the critical discourse analysis approach (Fairclough, 2003).

The fieldwork was conducted between November 2011 and November 2012 in six phases: 1) rapport building, 2) FGD, 3) interview, 4) lesson observation followed by

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[11] I did not ask the reason when this school dropped out, but the following explains a probable reason. When I explained about my research to a group of teachers before starting FGD, one teacher openly hesitated, citing the extra amount of work required, and others were apparently influenced by his reluctance. I judged that it would be wise to suspend the session and asked the head teacher to talk with teachers if they would still like to continue. Later, partly because the head teacher had been transferred to another school, the interim head teacher informed me of their withdrawal.

[12] CEB has not yet conducted a formal evaluation, as of 2013.

an interview, 5) forensic interview, and 6) feedback session. Following the advice of Yin (2008), I used the logic of replication, in which the same processes were replicated for each of the five teacher-participants. Originally, I wanted to visit each school once a month between November 2011 and April 2012, but there were two major interruptions. First, there was the presidential election, where the security conditions were significantly aggravated, obliging me to suspend the fieldwork between January and March 2012. I resumed the fieldwork between April and June 2012. Since Senegal entered a long vacation period after June, I waited until November 2012 to share the provisional results with the teacher-participants.

I had initially expected to conduct FGD in all schools, but this turned out difficult. On the one hand, the head teachers said that they could not allow many teachers to be absent simultaneously during the school hours because it would deprive pupils of their learning time. On the other, they did not want to arrange this kind of meeting after school-hours. After all, in one school, the head teacher arranged three quasi-FGDs with two teachers each, which constitutes all the FGD data that I was able to collect for this research. The FGDs that I had conducted served at least two purposes. First, FGD gave me additional time and opportunity for rapport building with teachers in this school. Second, the discussions generated in FGD gave me a better idea about what to ask in the individual interviews.

Sequential, individual interviews were conducted with each teacher-participant in three phases: 1) interview before lesson observation, 2) interview immediately after lesson observation, and 3) forensic interview. Sampson (2004) recommends the use of a pilot test to refine research instruments and adapt the procedures. The mini-research that I had conducted (Miyazaki, 2010) as a part of the requirement for the Professional Doctorate acted as a pilot and shaped the way that I prepared for them. For example, it alerted me to the ways in which they talked about teaching and therefore helped me to frame my questions in ways that were comprehensible to them. Most importantly, I learned the importance of letting teachers talk even when they deviated from the question that I asked, as I had obtained the most interesting data in this pilot study when teachers had started elaborating their thought without being constrained by the questions

that I prepared. This proved to be so also in the interviews which formed part of the research reported in this thesis.

Qualitative interviews allow me to understand experiences and reconstruct events in which that I did not participate (Rubin & Rubin, 1995). Qualitative interviews may involve subjectivity on the part of interviewer (Cohen et al., 2007). The very subjectivity is the integral part of this research because I attempt to reconstruct the experiences of teacher-participants from their perspectives in this research, and interviews allow the interviewer and interviewee to "construct some version of the world" through interaction (Silverman, 1995, p.90). Understanding the thinking process of teachers is the key to understanding why they have or have not changed their practice. As Dunne et al. (2005, p.33) argue, "sensitivity and empathy of the researcher are highly significant to the outcomes" of the research. Hence, as much as I could, I tried to engage actively in the interview to make it as close as possible to a conversation to encourage teachers to speak freely, whilst also being aware that it was a conversation that I wished to steer in the direction of my research interest (Kvale, 1996).

The first interview was conducted before the lesson observation to understand how the teacher-participants learned to teach and how they understood the pedagogy that they espoused. This was semi-structured, using an interview schedule, but in practice it was close to unstructured, as I did not follow the schedule strictly, especially when teachers started developing interesting ideas (Bryman, 2008). I listened carefully when they had a lot to say even when their answer deviated from my questions. The unstructured nature of interview obliged me to make many analyses and methodological decisions on the spot, which according to Kvale's (1996) guide to interview research is one of the signs of a good interview. This meant that I could not ask all of the questions prepared even after significantly exceeding the time initially allowed. However the flexible nature of the interviews gave the teacher-participants more control in the proceedings and gave me better ideas about what they valued than if I had strictly followed the set of questions that I had prepared. It enabled me to "verify … [my] interpretation of the subject's answers in the course of the interview (Kvale, 1996, p.145)." There were inevitably some questions that I wished I had asked, but I managed

to make up for these questions later, by conducting a series of interviews with the same participant over the course of the research.

The second interview was conducted immediately after the lesson observation to ask chiefly about their impression about the lesson that they had just conducted. This interview was unstructured because I wanted to understand how they evaluated their lesson in their own manner. The second interview was instrumental in preparing the forensic interview because I was more interested in what they had not mentioned than what they had had, as Section 6.5. shows.

Finally, in contrast to the generic nature of the second interview, a forensic interview was conducted six weeks after the lesson observation to clarify some of the specific issues that came out of the research data. The term forensic interviews was adopted as their purpose was similar to those which take place in judicial settings: to look back at an event and establish the interviewee's perspective on what happened, their actions and motivations. A similar approach was adopted by the Teacher Preparation in Africa project (Akyeampong et al. 2011). It involved watching the video with the teacher and discussing the particular parts of the lesson that I found interesting. One of the principal reasons to film the lesson was to make the discussion of the lesson more interactive and concrete. Watching their own lesson in film itself was a revealing experience, and it functioned as a catalyst for their reflection. I asked questions of a similar nature during the interview before the lesson observation, but what was crucially different at this occasion was the concreteness of the events that had taken place. This process allowed me to understand better how they actually understood pedagogy. Although I wanted to understand how they understood pedagogy, I kept reminding the teacher-participants as well as myself that this research was not done to evaluate their level of understanding on pedagogy but to understand how the teachers reflected upon their own teaching and pupils' learning. For that reason, particular attention was accorded to the perspectives of teachers on their lesson. Conducting interviews in three sequences before and after they conducted a lesson permitted me to triangulate their responses, as is shown in Chapter 6.

Lesson observation along with the forensic interview was the core to this research because it allows me to understand what teacher-participants said in relation to

their classroom context. I had spent much time in observing lessons both in classrooms and with videos as the Technical Advisor of PREMST. Since I started my doctoral study, I had reflected on how the research observation should be conducted, as opposed to what I had done in the professional setting. As a part of the requirement of the Professional Doctorate, I conducted a critique of an article that used systematic observation (Hardman et al., 2009) and discussed the limitations of this way of observation, which tends to disregard the meanings of behaviours (Miyazaki, 2009, See also Aspinwall, 1992; Evertson & Holley, 1981; Stubbs & Delamont, 1976 for the critique of systematic observation). In designing my subsequent research, I therefore decided that it was important to discuss with teachers their intention when I interpreted their pedagogical acts. In the end, I decided not only to observe lessons but also use the lesson film to conduct a forensic interview as explained above because understanding the thinking process of the teachers when they taught in the classroom was central to the notion of going beyond the observable practices. I followed the ethnographic tradition of lesson observation, whereby the researcher takes an "open-ended and relatively unstructured" approach while (s)he compiles field notes and recordings (Delamont & Hamilton, 1984, p.18). However, as Dunne et al. (2005) point out, what is observable depends on what the observer is disposed to see. The way lessons were analysed will be discussed in detail in the next section.

During the lesson observation, I took the role of participant observer, but the nature of my participation was what Spradley (1980) calls passive, not intervening in the lesson proceedings, as I wanted to observe "ordinary" lessons as much as possible. Teachers were given a week's notice of the visit for lesson observation. I am fully aware that this would affect the outcome of the observation because it allowed teachers to prepare better and therefore to demonstrate a good lesson, and the presence of the video camera as well as myself would alter the way teachers and pupils behave. In Malawi, for example, Kunje (2002, p.316) found that after in-service training teachers used group work, but "they are most inclined to use them when they are confronted by other teachers or supervisors." All of the teacher-participants in this research conducted group work in the lesson observed, but that does not indicate that they do it every day. They may have felt it necessary to prepare for group work because I came to observe their lesson and because that is a lesson format advocated by PREMST. Indeed, one of the

participants told me later that this was so, and others also apparently prepared a lesson well. The observation of lessons this way may not have revealed how teachers conduct a typical lesson, but it permitted me to observe what the lesson looked like when teachers were allowed to prepare. Hence, the observed lesson gave me a clue as to what kind of lesson they aspired to and how they understood the application of the learned pedagogy in the classroom.

Complying with the advice of Altricher et al. (1993), this research used two audio-visual sources of information to obtain permanent records of observation. The first was the videos, with a microphone pinned to the teacher, to observe how pupils interacted with each other and how teachers interacted with pupils. The video camera was mostly fixed during the whole-class lesson, but it was focused on one group close to it during group work to observe closely how pupils interacted to each other. The second source was a microphone, which was installed in the middle of the group that was filmed. The microphone was of high quality so that it was able to capture virtually everything that all pupils in the group could hear. Nevertheless, in both recorded and non-recorded groups, pupils often talked in a hushed voice, which was impossible to capture on a microphone. It was clear that most of these hushed voices were directed at someone in particular, not at the whole group, and they could not be heard by many of the pupils in the same group, either. Therefore, the talk that was captured in the microphone can be said to represent a group discussion. The data collected by the microphone brought a crucial impact in my analysis of group work, as is discussed in Chapter 6 and 7.

The last visit was conducted in November 2012 to share the findings with the teacher-participants as well as the head teachers. There were three main objectives. First, from the ethical point of view, I hoped that the findings of the research were useful for them. Second, I hoped to receive feedback from the teacher-participants with regard to my initial interpretation. Third, this gave me the final opportunity to ask supplementary questions. Originally, I had planned to organise a small workshop in each school, but I decided against it mainly because I felt that the findings were much more negative than the teacher-participants had anticipated, and sharing the findings in front of their

colleagues might risk embarrassing them. By giving feedback individually, I was able to make comments on particular practices that each had conducted.

Finally, besides the processes that I had gone through with the teacher-participants, I employed two other methods to supplement the information that concerns the contexts under which the teachers-participants operated. The first was the interview with the head teachers to get their viewpoints. Initially, I had planned to talk with trainers, but two of the head teachers in the selected schools happened to be the local trainers of PREMST, so I asked them the relevant questions, instead of arranging another interview. The second one is the observation of a session of *Cellule* and *Cellule Interne*. I had already observed a number of these sessions as the Technical Advisor of PREMST, but I wanted to observe the sessions of the sample schools. Owing to the time constraint, I was able to visit only one session of *Cellule* and *Cellule Interne* respectively. All the visits to schools and *Cellules* were done as a researcher without being accompanied by the inspectors.

4.4. Data Analysis

FGDs and interviews were all recorded with the explicit permission of the participants and later transcribed by transcribers for the detailed analysis. The data of all FGDs and interviews were processed in NVivo v.9 to facilitate the reorganisation of data by the common themes emerged. The findings were first written down chronologically for each session, by listening to the recorded interviews. Johnson et al. (2000) insist upon the importance of understanding how teachers learned to teach before rushing into helping teachers behave differently. Understanding the reasons behind the current teaching practices is crucial to understand how teachers relate what they learned in training to their teaching. I paid particular attention to the processes by which teachers had said they had learned how to teach. The data were interpreted by considering the individual contexts of the teachers interviewed, as I assume that the research involves an act of constructing the reality, which has different meanings for different individuals.

The lessons were analysed in three phases. The first phase was the writing of my initial impression in the form of a journal. I have kept the journal throughout this research, but I found that the journal was especially useful immediately after the lesson observation. Writing the journal helped me generate many questions about the lessons observed and the intentions of teachers, enriching the possibility of further analysis in the later phases. The initial and informal analysis of lessons was reviewed many times later to allow me to identify the aspects that I had initially failed to notice. This way, the analysis of lesson observation evolved through the second and third phases.

The second phase was the analysis with a view to identifying the discussion topics during the forensic interview. The observed lessons were transcribed for detailed analysis. Both the transcript and the visual data of lessons were analysed in conjunction with the lesson plans prepared by teachers and the documents distributed by PREMST and CEB. Following the technique used by Torrance and Pryor (1998), I analysed the lesson in the form of a double-column presentation table, where the left column was kept for the transcript and I wrote my comments or interpretation on the right column.[13] This way of analysis carries strong theoretical implications; the researcher is complicit in the production of texts, by "justifying the editorial function of the selection that had been taking place in turning the action to data (Dunne et al., 2005, p.56)." This means that my identity as a researcher becomes central to the way I produce the data from the observation. Selecting this way of analysing data is consonant with my positionality described in Section 4.5. In other words, I take the position that the neutrality of observation is unattainable because the very act of observation is loaded with the world views that a researcher carries with them (Dunne et al., 2005). The purpose of lesson observation was not to analyse lessons objectively but "to offer accounts whose plausibility the reader can assess (Dunne et al., p71)."

I drew on the critical events technique proposed by Wragg (1999), based on the critical incidents technique developed by Flanagan (1954), to select the scenes that I would like to share with the teacher-participants. Initially, I had hoped to learn from good practices of the teachers recommended by the local authorities. That is, I looked for specific pedagogical practices that were illustrative of what PREMST asked teachers

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[13] See Transcript 1 for an example.

to do or other salient aspects of teaching strategies. As my analysis progressed, however, I was forced to change the strategy because I had not been able to identify as many good practices as I had expected. Instead, I picked out the actions where teachers attempted to practise what PREMST asked them to do and decided to ask them about their intention. In this sense, the prescriptions provided by PREMST/CEB served as a starting point in the analysis of lesson observation (Walker & Adelman, 1976), but I made conscious efforts to observe a lesson as a whole, rather than a series of pedagogical acts. In addition, where teachers mentioned some interesting practices during the interview before the lesson observation, I paid particular attention to find how they performed the practices that they had claimed to do.

In addition to the discussions between the teacher and pupils, I also attempted to analyse other aspects of lessons. For example, Alexander (2001b) points out that the existing literature tends to focus on classroom discussion, but teachers' monitoring is also a common and important form of interaction between teachers and pupils. He argues that monitoring tends to be regarded as a relatively "homogeneous" activity, but his lesson observation in five countries showed that monitoring is "a much more variegated activity than this (Alexander, 2001b, pp.408, 409)."

Finally, the lessons were analysed again after the forensic interviews. The visual data were valuable during this phase because I was able to verify, to some extent, how what teachers had stated in the interviews had fitted in the actual lesson proceedings, as shown in the analysis of Chapter 6. During this phase, the documents produced by PREMST and CEB were analysed in detail in relation to the pedagogical practices highlighted in the interviews, as reported in Chapter 7.

In the presentation of the analysis of lessons, I followed the tradition of whole-lesson discourse analysis by Mehan (1979), Torrance and Pryor (1998), Alexander (2001b), and Sutherland (2010). Ideally, I wanted to present the entire lesson proceedings to avoid the question of sample bias, but the word limit means that I had to limit the number of transcripts cited. To mitigate this problem, following the work of Alexander (2001b, p.439), I made sure that the extracts were long enough to allow readers to understand them "as coherent acts of teaching, not merely as disembedded instances of pedagogical talk." To allow readers to evaluate my analysis, I included the

detailed description of lesson proceedings in the presentation. Furthermore, the summary of all observed lessons is attached in Appendix I.

The language is an important element that produces data. I conducted all FGD and interviews in French, my third language and the second language for all teacher-participants. Although my French is fluent enough in the professional setting, I am not confident enough to catch subtle nuances implicit in the language. Similarly, although Senegalese teachers are generally comfortable in talking in French, they may resort to "safe talk," by using familiar vocabularies learned in initial teacher education or CPD without really understanding what they mean (Chick, 1997, p.36). Drawing upon the aforementioned critical discourse analysis, the language used by teachers and pupils was carefully analysed. In particular, I made sure to bear in mind that the same text might have multiple interpretations, depending on different perspectives: 1) how it was produced, 2) the text itself, and 3) how it was received or interpreted (Fairclough, 2003). Therefore, I paid close attention to how teachers spoke or how the documents produced by PREMST or CEB were interpreted by teachers.

All observed lessons were held in French. I translated all scripts appeared in this thesis into English. Pupils are supposed to talk in French in group work, and the interviews confirmed that none of the teacher-participants explicitly permitted pupils to talk in Wolof, a local language, during group work. Nonetheless, it is common that teachers acquiesce in the use of the mother tongue during group work in Senegal. In this research, all but one teacher let pupils talk in Wolof. The data from the microphone shows that pupils indeed talked in Wolof all the time in group work except when they read something written in French. The Wolof scripts were translated into French by a Senegalese translator, and I further translated them into English. The words spoken in Wolof are written in italic in the scripts. Also, some abbreviations are used in the scripts. T stands for a teacher, and Ps stand for pupils. When the name of a pupil appears for the first time, their sex is specified by 'b' for a boy and 'g' for a girl.

4.5. Positionality

An insider researcher operates in a complex environment where there are sometimes tensions between professional and academic practices; this means that it is essential for an insider researcher to clarify their position and be conscious of its implication throughout the process of the research (Drake & Heath, 2010). My challenge in this research was to adopt an identity as a researcher whereas I normally work as the Technical Advisor of PREMST. One strategy would have been to collect data in as neutral a manner as possible. This way of collecting and analysing the data is based on a positivist stance, where research "aims to produce knowledge of an independent and objective reality" (Dunne et al., 2005). It might permit me to quantify and generalise the findings with the help of statistical analysis, but it ignores the important power relations that exist between the researcher and the participants. I acknowledge the power asymmetry inherent in any interview, where an interviewer seeks understanding and the interviewee serves as a means for the interviewers' knowledge interest (Kvale, 2006). I take the position where the neutrality of researcher is impossible in research because the very presence of a researcher cannot fail to affect the ways teachers respond in times of interviews or lesson observation. For example, Akyeampong (1997) finds that "research in West Africa, as elsewhere, often shows that respondents provide the answer they think the questioner is looking for" (cited in Akyeampong et al. 2006, p.164). For this study, the problem of power relations is even more pronounced due to my involvement in PREMST. Unless I had hidden my identity, teachers would have had to talk to me, knowing that I work with all those who work for PREMST. Teachers could easily feel too shy to reveal their thoughts and feelings, particularly negative ones, if I had attempted to be neutral and to keep a distance from them during the fieldwork. Claiming the neutrality of the findings under these conditions is untenable.

Instead, I have attempted to reconstruct the experiences of five relatively successful cases with teachers. In doing so, this research is informed by social constructivism, the worldview explained in Section 2.3. If they had thought that this research was about an evaluation, they might have tried to recite textbook answers as if to satisfy the inspectors. In contrast, what I wanted to find was how teachers understood

what they had learned in the CPD programmes and how this was translated into their practice. I took pains with building amiable relationships with the teacher-participants . Also significant here is the fact that the teachers knew that they were being approached, not as random sample of those who had participated in PREMST, but as teachers who had been judged by those involved in the programme as being the most successful.

This approach does not mean that I managed to neutralise my influence on the effects of the research, but it means that my position as a researcher as well as a practitioner is complicit in the results of the research. No matter how I behaved, the fact that I normally work for PREMST would have some significance to the teacher-participants. For example, for the ethical and practical reasons, I gained access to all participating schools through the IDENs. This has an implication in itself, as I became an official guest for them introduced by the local authorities; hence, they may have felt obliged to treat me in a certain manner. The sensitive question of my identity means that I treated the ethical consideration carefully. I describe the procedural aspects of ethical issues in the next section and the consequences of the ethical issues involved in this research in Section 4.7.

4.6. Ethical Issues

Ethical concerns were dealt with in an explicit manner, by conforming to the Standards and Guidelines on Research Ethics of the University of Sussex. I first obtained the written permission from the Ministry of Education and JICA for the research after explaining the objectives and methods of the research in a letter. Then, at the beginning of fieldwork, I revealed my professional identity to the head teachers as well as teachers. At the same time, I told that this research was not an evaluation, but, as a doctoral student of the University of Sussex in the United Kingdom, I wanted to understand in depth the experiences of some teachers who had improved their teaching in the last few years. I only started the fieldwork where I received the explicit permission. I also made sure that the participants understood that they could withdraw from the research at any time if they wish. At times, I reminded the teacher-participants that they had been selected because they were reputed as being successful teachers. I

used the information sheet for the briefing, but I did not ask them to sign a consent form because signing for giving permission is not a culturally established custom in Senegal. I could have insisted upon their signature, but I decided against it because it might frighten teachers, thus negatively affecting the relationship with them. More importantly, I found it unethical to oblige teachers to go through an unpleasant experience for the convenience of the researcher.

In the FGD, I made sure that the teachers understood that what they said in the sessions would be only used for the purpose of this study and remain confidential. That includes that teachers among themselves agreed to keep the confidentiality of the comments of their colleagues. For the purpose of confidentiality of their identity to the general readers, the names of teachers, pupils, schools, and villages appearing in the thesis are all fictionalised. All FGD and individual interviews were recorded with their explicit permission. I made sure that the transcriber, who also acted as a translator from Wolof into French, understood the importance of ethical issues involved in the research, and the non-disclosure of confidential issues constituted a part of the contract.

Primary school teachers in Senegal are in general used to showing their lessons to outsiders. Existing projects, including PREMST, routinely videotape their lessons for different purposes. Nevertheless, I asked the permission for videotaping and recording from both the teachers and their head teacher. I had also considered acquiring the permission from pupils' parents for the videotaping, but, knowing the prevailing cultural practices in Senegal, I decided against it. First, the focus of the research is on teachers. The interaction between the teacher and pupils is an important aspect of lesson, but its analysis does not usually involve personally sensitive issues. Second, there is no custom of seeking permission for videotaping in Senegal. Many parents may not understand what videotaping means. Even if I bring the video camera and show an example of film, they might not understand the implication of their child being filmed. From my professional experience, parents tend to be receptive to the request of visitors, and they would probably not hesitate to give permission, but it is not clear whether it would truly represent the understanding of the ethical issues involved. Trying to collect permission this way just to satisfy the ethical requirement of the university seemed to

me more unethical than not asking their permission. Instead, I explained about the videotaping to the pupils before the lesson and asked their oral permission.

The last aspect of ethical concern is that of information sharing. I find it essential that I share my analysis of data and receive the feedback from the teacher-participants, the Ministry representatives, and JICA officials. As mentioned earlier, the initial findings were shared with the teacher-participants individually. In addition, the results were shared on three occasions with the Ministry. First, I shared my preliminary findings with the PREMST National Trainers in August 2012 to get their general feedback. I chose this timing because this was the period when the PREMST team was finalising the modules to be implemented in the academic year 2012/2013, and some of my recommendations were taken into account in the revised modules. Second, I shared the final findings to the expanded PREMST team in July 2013 when the project conducted an internal review in view of finalising the CPD model to expand on the national scale. Finally, I made the presentation to the authorities of the Ministry, including the Director of Elementary Education and all 14 IA in August 2013 at the time of the Steering Committee of PREMST in view of reorienting its activities according to the recommendations given in this research. Lastly, I shared the findings with the officials in the JICA Headquarters in two occasions in October 2012 and October 2013 in the hope that the findings would have some influence on the course of their future actions. The final draft was produced in English, but a summary paper and PowerPoint presentation was produced in French so that the stakeholders could read them for their own benefit.

4.7. Ethical Implications on the Research

The previous section described the procedural aspects of ethics, but this is not the whole of the ethical issues, as a researcher inevitably encounters various ethical dilemmas in the field and how (s)he responds to them has an implication to the outcome of the research (Guillemin & Gillam, 2004). This section describes how I reflected on sensitive ethical issues, especially relating to my relationships with the teacher-participants.

As far as the teacher-participants were concerned, they might not reveal their negative feelings towards PREMST, or they might even suspect the possibility of a hidden agenda if they did not feel comfortable enough during the research (Drake & Heath, 2010). As already mentioned, I began from the position of choosing teachers who were seen as successful and so were in a position of relative strength as far as PREMST was concerned. I attempted to build on this, by developing an amiable relationship with them, as described in Section 4.5. As the school visit was repeated, I felt that the teacher-participants looked more and more comfortable about talking with me. Moreover, asking them similar questions several times in a different manner over the course of the fieldwork gave them a possibility to clarify what they meant what they had said in the previous session and also permitted me to triangulate the meanings of their answers from different sequences of interviews.

I reflected on the effects on the research whenever there was some issue related to the human relationships arose because power relations had important implications on the research (Dunne et al., 2005). For example, when two teachers withdrew from the research after FGD, I was first concerned that I had not succeeded in making them comfortable enough to continue participating. At the same time, I judged that this incident could be interpreted as a demonstration of my presenting myself as a mere researcher, who had little power, as opposed to the Technical Advisor, who would have a significant influence over the inspectors. I was taken aback when I met their withdrawal because, in the professional setting, I was used to teachers never objecting whatever I asked, including the permission to film their lesson. This episode made me realise that, in the professional setting, teachers appeared willing to comply partly because they felt having little choice.

The power relations affect both sides of communication. My identity as a weak-positioned researcher, especially after two teachers withdrew in the early stage, may have affected the way I communicated with teachers. These two teachers seemed to have regarded my interview as a kind of oral test about their knowledge on pedagogy, although it was not my intention at all. After their withdrawal, I was perhaps too careful not to pose the type of questions teachers seemed unable to answer. For example, although I wanted to ask them about formative assessment, it was apparent that they

knew little about it, and I did not want to frighten them, by introducing a difficult terminology. As a consequence, I directly asked about it only with Ablaye, who had referred to it first. The same was true about how they assessed the learning of individual pupils. I wanted to ask them in detail to what extent they had paid attention to the learning of particular pupils, but I could not push further after receiving a few responses that did not really correspond to my question.

I also faced the ethical dilemma when I found that the findings of the research were more negative than I had initially expected. As I explained before, I hoped to learn from good practices, by selecting only several teachers who were recommended by the IDENs, and I stressed to the teacher-participants that they were selected on the basis of their good reputation. It would be unsurprising if the teacher-participants had expected generally positive depiction of their pedagogical practices after I presented my research this way. Providing an honest but critical report of their practice may hurt them, but not giving my honest interpretation would be unethical. The sensitive nature of these findings made me wonder why even supposedly good teachers could not practise what PREMST asked them to do. This reflection enabled me to direct my attention to what PREMST actually says, in relation to the actual practices of teachers as discussed in Chapter 7, rather than simply adhering to the analysis of the practices observed. When I shared my preliminary findings to the teacher-participants, they appreciated the fact that my research not only analysed their lessons but also recognised the difficult environment in which they operated. Reflection like this continued throughout the research not just to assure the integrity in the research ethics but also to gain the credibility of the story, as these kinds of dilemmas are inevitable in insider research.

4.8. Limitation of Research

It is important that I acknowledge how my particular position as a practitioner-researcher might affect the results of the research (Creswell, 2007). As discussed above, I found that the existing literature on pedagogical change was too pessimistic to be relevant for the practitioners. My motivation to conduct this research derived from the needs of the practitioners for a critical, but more positive analysis of classroom practices,

as Akyeampong et al. (2011) suggest. This position has an important implication on the result of the research because I deliberately sought positive aspects of pedagogical practices that others could learn from. This does not mean that I refrained from any criticism, but I recognise that the purpose of the research is not to evaluate pedagogical practices objectively but to understand pedagogical practices better to change the course of actions taken by PREMST.

The limitations inherent in the insider research compelled me to select the research methods carefully to allow me to conduct a triangulation of data from different methods and from different sources. Triangulation is understood and used differently by many authors, but, in this research, by drawing on the concept of completeness, I used triangulation not to confirm the existing data but to offer a deeper and more comprehensive picture, by corroborating evidence from two or more sources (Tobin & Begley, 2004). Triangulation is criticised as being two-dimensional and limited as a concept to grasp a complex social world, and the concept of crystallization is proposed by some authors (Janesick, 2003; Richardson & St. Pierre, 2005). Although I sympathise with this new concept, which allows for infinite angles of approach, how it is operationalised as a workable technique is not yet clarified. Instead, I used the triangulation to obtain a more complete picture of a complex phenomenon, rather than looking solely at three sides of a fixed point (Tobin & Begley, 2004).

In addition to the above limitation inherent to the insider research, I recognised at least three limitations of this research from its outset. First, the research would have been more interesting if the same teachers were followed over the years since the inception of PREMST. Since this research only captures a snapshot four years after PREMST was initiated, when teachers claimed a certain pedagogical change, this research could not verify if the observed practice really constituted the actual change compared to the practice of four years ago. Second, I observed only a lesson for each teacher whereas the learning of pupils continues beyond the lesson period. Croft (2002) points out that studies that only observe lessons may miss other sites of individual help, assuming that little attempt is made to provide for individual learning needs. Considering this limitation, I have acknowledged in my analysis whenever teacher-participants referred to a routine they claimed to practise even if this research could not

verify the practice. Third, this research did not investigate how trainers actually conducted training. This was because PREMST changed the modality of training from the module-based one to the lesson study by the time I conducted the field study; hence it was no longer possible to observe the kind of training teacher-participants had gone through. I attempted to overcome this limitation, by drawing upon my professional experiences especially of working with the National Trainers.

4.9. Context of Study

4.9.1. Profile of participating schools

All of the three selected schools are public primary schools. Two of them house a complete primary cycle from the first to sixth grades, whereas the last one only has three classrooms. The former two schools are well-equipped for Senegalese primary schools. Both of them have functioning latrines, a drinking water source, and the school fence, whereas the national average for these infrastructures is 60.8%, 53.6%, and 34.6% respectively (MEN, 2012). The last school is close to a national average, as even though they have latrines, they have neither water source nor a wall. All of the schools use permanent classrooms, made with bricks and metal roofs, except one temporary shed used by School Moussa DIOP.

School Moussa DIOP is a large school, situated just outside Louga town. It has 12 classes with over 500 pupils. It has four Arabic medium teachers in addition to 12 teachers. Maba, its head teacher, is *déchargé*, a full-time head teacher, and has been in this function for over twenty years. He also works as a Local Trainer of PREMST since its inception . He facilitates the *Cellule* of this school with another Local Trainer. This school conducts *Cellule Interne* at least once a month with his initiative.

School Adama FALL is a large school in Kebemer Department. Although its location is rural, it is situated in a relatively accessible area. It has 13 classes with more than 400 pupils. It has two Arabic teachers and 15 teachers. Papa, its head teacher, is *déchargé* and has been in this function for 9 years. He also works as a Local Trainer of PREMST since 2008, but he is not a trainer of the *Cellule* to which his school belongs.

This school also organises *Cellule Interne*, but its periodicity is not regular, at most a few times a year.

School Alioune FAYE is a small school in a rural setting not far Kebemer town. It has three classes and approximately 80 pupils. It has one Arab teacher in addition to three teachers. Ibrahima, its head teacher, is *non-déchargé,*[14] a part-time head teacher who must teach a class just like other teachers besides having various responsibilities as a head teacher. He is in charge of the fifth grade and is selected as one of the teacher-participants. This school also organises *Cellule Interne*, but only a few times a year.

4.9.2. Profiles of teacher-participants

The five teacher-participants have a better academic as well as professional background, compared to the national average. Four of them have BAC although the necessary qualification for primary school teacher was BFEM until 2011. The ratio of teachers who have BAC or better academic qualification is 42.8% in the national level (MEN, 2012). Four of the teacher-participants have a professional qualification, either CEAP or CAP, whereas only 66.6% of Senegalese primary school teachers hold one (MEN, 2012).

They have 6 to 12 years of teaching experiences, so they are not newly recruited teachers, but none of them are old enough to have received a prolonged period of initial teacher education, which existed before the introduction of the system of volunteer teachers in 1995. All of them have regularly participated in PREMST training since 2008 and participated in at least one session of CEB training. The profiles of the five teacher-participants are summarised in the table below.

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[14] A *non-déchargé* head teacher is usually assigned in the schools with from three to eleven classrooms.

Table 4.1.: Profiles of five teacher-participants

Name of teacher	Alima	Aminata	Ablaye	Ibrahima	Boubacar
Name of school	Moussa Diop			Alioune Faye	Adama Fall
Sex	Female	Female	Male	Male	Male
Grade	2nd	4th	5th	5th	5th
Seniority (years of teaching experience)	8 years	6 years	8 years	10 years	12 years
Academic qualification	BAC	BFEM	BAC	BAC	BAC
Professional Qualification	CEAP	CEAP candidate[15]	CAP	CAP	CAP
Employment status	Contractual	Contractual	Contractual	Civil servant	Civil servant
Initial teacher education	EFI (6 months)	EFI (6 months)	EFI (6 months)	3 months (summer training)	EFI (8 months)

4.9.3. Classes

Senegal manages to keep the class size relatively low at 36 pupils per class on average (MEN, 2012). Five classes selected for this research included between 17 and 51 pupils. None of the selected classes were either double shifts or multi-grade, although School Alioune FAYE contained one multi-grade class. All classrooms of the teacher-participants included at least one blackboard and enough supply of chalk. Table-benches, or *table-banc*, usually shared between two or three pupils were sufficiently available in all classes. School Moussa DIOP and School Adama FALL had a good stock of teaching materials, including those prepared by teachers. The former even had enough geometry kits to distribute one for all pupils in a classroom, which Boubacar took advantage of in the lesson observed. Teachers told in the interviews that pupils had adequate textbooks after a large distribution in 2010, but I could not verify it during the lesson observation because none of the teachers used a textbook during the lesson. All pupils had a slate and chalks. It appears that pupils had several notebooks although pupils never bothered to put their notebooks on their table in two of the lessons.

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[15] One is called a CEAP (or CAP) candidate when one passes the written exam. The qualification is conferred after passing the practicum test.

Teachers generally do not have paper at their disposal although paper was distributed in Boubacar's lesson.

I observed a lesson of each of the five teacher-participants. There were two science lessons and three mathematics lessons in three different grades. The table below gives a summary of the lessons observed.

Table 4.2.: Summary of five lessons observed

Teacher	Alima	Aminata	Ablaye	Ibrahima	Boubacar
School	Moussa DIOP			Alioune Faye	Adama Fall
Grade	2nd	4th	5th	5th	5th
Number of pupils	51	42	30	17	26
Duration planned (min.)	60	30	30	60	60
Actual duration (min.)	103	48	67	94	115
Subject	Mathematics	Science	Science	Mathematics	Mathematics
Theme	Numbers from 80 to 83	Lantern	Respiration	Problem solving on equal sharing	Cylinder

4.9.4. Pupils

This research did not investigate the background of pupils in the selected classes in particular, but my observation suggests that the following characteristics of pupils in the area are applied in the case of these pupils. First, the *lingua franca* is Wolof while the language of instruction is French from the first grade. Almost all pupils in this area speak Wolof as their native language, and a small minority who speak another language generally speak Wolof without problem. The discussions in group work of the observed lessons show that all audible discussions among the pupils were held in Wolof, except when they read something written in French. During the lesson observation, four of the teacher-participants also spoke Wolof on a few occasions. Second, age group varies within a single class. Although I did not ask the question directly, the interviews revealed that some teachers felt it as a difficulty. For instance, Alima, who teaches the second grade, told that Awa always had a difficulty in following her lesson because she was only five years old.

Chapter 5: Teachers' Understanding of Pedagogy

Teacher-participants said that they had learned to teach during their career through taking different opportunities for professional development. CEB/PREMST brought the supposedly new pedagogy, and teachers understood it in their own manner to apply it in their classroom. This chapter brings together data on how they have learned how to teach and how the CPD programmes are related to their learning process. Based on the interviews, this chapter examines how the teacher-participants understand the pedagogy they espouse. It is divided into three sections: 1) learning process of teaching, 2) relevance of CPD programmes, and 3) teachers' understanding of pedagogy.

5.1. Learning Process of Teaching

All teacher-participants said that they were now comfortable with how they taught, but that had not been the case from the beginning of their career. The training at the EFI had paved a way for them to get started with teaching, but all said that its duration, from three to eight months, was far too short to get them ready for teaching at the end of initial teacher education.

I asked them how they had learned to teach in their career after they became a teacher. The findings of these interviews echo that of my earlier research, in which I had interviews with three teachers in Louga region. This identified that teachers had developed their capacity mainly through three forms of pedagogical support: 1) mentoring by head teachers, 2) *Cellules Internes*, and 3) cluster-based *Cellules* (Miyazaki, 2010). All of the five teacher-participants said that these three means were significant for them. First, all but Ibrahima, who was the head teacher himself, referred to various support given by their head teacher: checking the lesson plans every day, giving feedback on them, and observing the lessons to provide feedback. Second, *Cellules Internes* are the school-based training that some head teachers conduct on their own initiative. Although organising them is not compulsory, all of them said that their school had a *Cellule Interne*. What was commonly practised in these sessions was *prestation* described in Chapter 3. The third form of support teachers receive is the

Cellule Classique. All five teachers confirmed that they had regularly attended them since the beginning of their career. Just like *Cellules Internes*, the most common modality of training in *Cellule Classique* was *prestation*.

With regard to other forms of pedagogical support, teacher-participants could name none. None of them had received any training on pedagogy or subject content besides CEB and PREMST. Furthermore, none of them have ever benefited from an inspector's on-site support in school. Lastly, although they did not acknowledge it as support, all of them enjoyed having informal exchanges with their colleagues over various pedagogical issues.

Besides the pedagogical support they received at school, individual learning constituted an important means of learning to teach for the teacher-participants. One method was through document research. All teacher-participants said that they habitually referred to the official documents like textbooks, the Guide and training modules for preparing a lesson. Ablaye said that he often sought supplementary information in the encyclopaedia or the internet to gain a clear understanding of the subject. Second, and more important, was learning by doing. All of them mentioned that when they had learned something new in training or in documents, they tried to apply it in their lesson. Ablaye clarified how he had improved his practice. When he had tried something, he reflected on it whether it had worked well. When he thought it had, he would continue the practice.

This individual learning depends on the personal initiative of teachers, but the above-mentioned supports turned out the key to motivating teachers to attempt to do something new and sustain it once it is tried. First, *prestation* provided a valuable opportunity for teachers to get a new idea about how to conduct a lesson. It was common for teachers to get an idea of a lesson from the lesson observed in *prestation*. What they read in a module may not be concrete enough or easily applicable in the context of their classroom, but what they observed in the classroom of their colleague was a lot easier to adopt. For instance, Aminata said that the lesson conducted for this research was inspired by the lesson she had observed last year in her *Cellule Classique*. Second, the head teacher functioned as a catalyst for teachers to share ideas with other colleagues. Ablaye said when the head teacher observed his lesson and appreciated it,

he felt confident that the practice he had tried out worked. Then, his word encouraged him not only to continue the practice but also to share it with his colleagues, often by demonstrating it in *Cellules Internes*. Third, having an opportunity to demonstrate a lesson to their colleagues motivated teachers to try out something new. For example, Ablaye claimed that he had come up with the idea of homework given to pupils as a preparation of group work, and the practice is now adopted by his colleagues because he shared the idea with them in *Cellule Interne*. The lesson that I observed in the *Cellule Interne* of his school used this practice, and I got the impression that all teachers in this school were familiar with it while I had never observed such a practice in other schools. Ablaye may not be the originator of this practice, but even if he is not, his comment indicates that *Cellules Internes* provide a platform where he can share his idea to his colleagues; thereby, motivating him to seek innovation.

In the interviews, the connection between collective learning and individual learning was clear in School Moussa DIOP. Where the three types of support mentioned above functioned well, it encouraged each teacher to learn and to experiment individually. The active participation of teachers in turns revitalised the sessions of *prestation* in *Cellule* or *Cellules Internes*. Thus, these two factors - collective learning and individual learning - were mutually reinforcing in promoting the learning of teachers.

5.2. Relevance of CPD

Considering the three types of support as well as the individual learning examined above, PREMST was found to be well integrated into the learning process of teachers. Its training as well as the modules provided teachers with plenty of ideas about something new to try out in a lesson. Aminata, Alima and Ablaye said that PREMST clarified how to prepare a lesson, by showing how different phases of lesson should be organised. All teacher-participants said that they referred to the relevant modules to prepare a lesson. Where the three types of supports functioned well, PREMST had become a valuable source for teachers to get fresh ideas about teaching.

When I asked for some example of their application of what they learned in PREMST, three teachers gave some examples. Alima said that she had made some teaching materials like number-counters or abacuses. Ibrahima explained how teachers started conducting lessons on the drawing of geometric figures whereas they had rarely done so before. According to him, many teachers did not know how to draw geometric figures with a compass, resulting in hardly any teaching of geometric drawing. When the PREMST training showed how to do it, many teachers felt equipped to teach it. Boubacar, who also talked about geometry, clarified why the training on geometry was a timely input. Before the introduction of CEB, geometry was about the calculation of different parts of geometric figures like the circumference. Teachers rarely taught geometric drawing partly because it had never appeared in the CFEE exam for decades. Now, CEB has created an independent topic called, Geometric Activities, which is dedicated specifically to geometric drawing. Without the PREMST training, many teachers would have had difficulty adjusting to the curricular change.

Other responses about what they had attempted were relatively vague. On the one hand, all of them insisted on the importance of placing pupils at the centre of lessons and of a teacher being a facilitator, but, their description of the learner-centred approach was theoretical. For instance, Ibrahima said that pupils would feel that they were responsible for their own learning, by becoming the central actor in the class, but it was unclear what it meant in the classroom. On the other hand, they were quite comfortable with explaining how the lesson should be conducted according to the ASEI approach from the viewpoints of procedures, by citing different phases of a lesson or different steps in group work. Thus, teachers were able to explain their teaching practices in terms of procedures, but from the interviews, it was unclear how they related the pedagogical change to the subject content in the actual lessons. This is expanded on the next chapter, with reference to the observation on how they actually applied the change in their classroom.

5.3. Teachers' Understanding of Pedagogy

CEB/PREMST encourage teachers to adopt a pedagogy based on the learner-centred approach, replacing the traditional teacher-centred one. However, the difference between the approach the teacher-participants said they used to use and the supposedly new approach was not made clear in the interviews with them. All of them had plenty to say about the shift in philosophy, placing the pupils in the centre of learning. Ablaye even used the word, "rupture," many times in the interviews to stress the change. However, at other times during the interviews, they also said that their approach had not really changed besides the terminologies brought by CEB/PREMST. This section examines how the teacher-participants understand different pedagogies, particularly the one they espouse today.

The pedagogy brought by PREMST, represented by the ASEI approach, was understood by the teacher-participants to have defined how to organise a lesson. All said that an ASEI lesson should be organised in the order of four phases: introduction, development, conclusion and assessment. Then, the key was to organise an activity involving pupils during the development phase. Four of them said that their lesson on mathematics and sciences now always included group work. Four of them also regarded the justification of the lesson as an important contribution of PREMST. The ASEI approach asks teachers to explain to pupils why the lesson is relevant to their life at the beginning of lesson. Both of the head teachers in the sample schools thought that justifying a lesson brought a major impact on the motivation of pupils.

Their understanding of the pedagogy brought by CEB was more theoretical. All of them explained well that, in the CEB, lessons aimed at installing different competences according to the pillars defined for each subject in the Guide. In the words of Alima, "the learner must be able to integrate a set of knowledge (*savoir*), life-skills (*savoir-être*), and know-how (*savoir-faire*) to solve a situation problem in everyday life." However, when I asked them how they applied it in their lesson, they were quick to point out the lack of necessary documents and materials as a major difficulty to conduct a lesson properly. CEB produced many documents, but some of the key documents like workbooks were only distributed to teachers. All of them said that they now followed

CEB, but it was not clear how they applied it in their lesson under this constraint, and this will be examined in the observation of lessons in the next chapter.

According to Alima, what was the biggest change after the introduction of CEB for the teachers of the early grades was the weekly schedule, which was divided into 17 topics for the second grade. That is, pupils are taught 17 different topics every week. For example, mathematics now consists of four different topics: numeracy, measurement, geometry, and problem solving. Although five hours are allocated for mathematics every week, this curricular change means that pupils have only two hours for numeracy and one hour each for three other topics each week. She said that it was unreasonable to introduce so many topics to early grade pupils, who should learn French first. As the weekly schedule was not among the issues that I had planned to discuss, I did not ask her to elaborate further, but I can imagine that pupils would have difficulties in remembering what they learned in the previous week if they had to learn 17 different topics in a week. Having an excessive number of topics in weekly schedule was not new for the upper grades of primary school, and the introduction of new curriculum represented a precious opportunity to examine the appropriate number of topics to learn every week. Instead of grasping this opportunity, CEB seems to have aggravated the problem for the lower grades. Investigating the optimal weekly schedule is out of scope of this research, but it potentially has a larger consequence in the learning of pupils than any positive change that pedagogical renewal could bring.

Before this research, as the Technical Advisor of PREMST, I was often told that some teachers were confused with the two approaches introduced by PREMST and CEB, but, for the teacher-participants, who understood both programmes, the cohabitation of the two programmes represented a positive complementarity. Different terminologies brought by the two programmes did not bother them because they understood that what was important was not the usage of particular terminologies. CEB asks teachers to teach differently, but it does not show how to do so in a sufficiently concrete manner, as in the example explained later in Section 6.1.2. In contrast, PREMST shows how to conduct lessons in an explicit manner, by employing a particular approach – ASEI. This does not say that PREMST provides all the necessary

specifics, as is examined in Chapter 7, but it helps teachers practise what CEB asks them to do.

The findings have shown that the teacher-participants understood the difference of philosophies that underlay the curriculum of 1979 and CEB/PREMST, but their understanding on how the new approach was applied in the actual lesson was unclear except the procedural aspects. For example, while they all said that pupils should be active learners, what it meant in practice seemed to be a mere introduction of activities. As far as the understanding of teacher-participants goes, teachers should first let pupils conduct an activity by themselves, then, they should only intervene as a facilitator to complement the necessary information. How they described their lesson was remarkably similar, but what that meant in practice needs to be re-examined, by observing their lessons in the next chapter.

Chapter 6: Change in Pedagogical Practices

This chapter examines how teachers attempt to teach lessons in a new format after the introduction of PREMST/CEB. In some cases, they still cling to practices that they have been used to using, and at other times, they struggle to make sense of the new practices that they find hard to operationalise. Although this was not longitudinal research with observations taken over a long period of time, I have used the term change for three reasons: first, the teachers themselves talked about the change in their practice; second, on the basis of extensive observation of teaching in Senegal as part of my professional role, it seemed to me that the observations here showed significant differences from the accepted norm; third, the teachers were selected on the basis that their involvement in CPD had indeed changed their practice. This chapter examines the changes in five aspects: 1) structure of lessons, 2) interaction between the teacher and the pupils, 3) attention to weaker pupils, 4) group work, and 5) teaching and learning. The connection between the CPD programmes and the change in their teaching practice shall be explored in more depth in Chapter 7.

6.1. Structure of Lessons

6.1.1. Change in the structure

The most visible change in the five observed lessons was that the lesson was structured in a particular manner. All five teacher-participants used the same lesson plan format called, the *fiche ASEI*, or the ASEI plan, and followed it without much deviation. The examination of their *fiche ASEI,* followed by my direct lesson observation, confirms that it helped teachers structure a lesson. All five lesson plans specified a lesson objective. Defining the lesson objective provided them with the orientation of the lesson. Nonetheless, the positive impact of specifying the lesson objective was limited owing to the ambiguous instruction of CEB, as explained later.

The articulation of different phases of lesson has long been a major difficulty for teachers. For example, since mental arithmetic is obligatory in mathematics lessons, many teachers start a lesson with it even if the content of lesson to follow is geometry

(Mbaye et al., 2011). From my professional experiences, I have observed more than a few lessons where teachers have brought forward several different topics in a lesson. In contrast, all observed lessons were well structured around a lesson objective. This made it easy for me to follow the lesson, and probably so was the case for the pupils.

Another notable aspect was that teachers aspired to connect the lesson to the life of pupils. To be precise, connecting the learning to everyday reality was not exactly new, as the old textbooks also used such examples, but teachers made more explicit efforts to make the connection after the introduction of CEB. In teaching a cylinder, Boubacar asked pupils to tell the objects whose shape was a cylinder. When pupils competed to answer the objects they knew, the interaction stimulated the curiosity of pupils to learn about it. In teaching the number 80 to Grade 2 pupils, Alima used a variety of materials from pebbles to twigs to show that the principle of numbers applies to different objects that they use in their daily life. In all lessons, teachers apparently thought about how to relate the lesson to pupils' life to stir their interest. PREMST emphasises the importance of justifying the lesson, by showing why pupils should learn the content of today's lesson. In a similar vein, CEB insists upon creating the learning situation so that pupils can relate the learning to their life outside school. The two projects use different terminologies, but teachers understood that both talked about the same thing.

Related to this, the third aspect was what Alima and Ablaye called, "concretising" the learning of pupils. In order to help pupils relate the learning to their life, all of the teacher-participants not only created a learning situation but also made it more concrete, by bringing simple materials to the lesson. Ablaye asked two of his pupils to come up front to demonstrate respiration, by asking them to inhale and exhale. Ibrahima used coins and asked pupils to demonstrate how to share six coins of 100 francs equally among three pupils as a way of introducing the theme of the lesson. Alima not only used materials for the arithmetic lesson but also fabricated materials with pupils to allow them to get familiar with the materials.

Finally, all five teachers organised group work. Ibrahima said that, before PREMST, he almost never organised group work in mathematics, but it has now become the main mode of lessons. Four of the teachers interviewed gave such an importance to group work to the extent that they said they conducted it in every lesson

on mathematics and science. Indeed, the lesson observation found that group work was the core to these lessons. Because of the particular importance given to group work, this issue will be discussed later in detail.

6.1.2. Focus of lessons

These changes represent a considerable improvement, but there remains a major challenge in the time management. The actual duration of all five lessons observed far exceeded the duration planned, as shown on Table 2 in Chapter 4. None of their lesson plans indicated time allocation for each part of the lesson. Investigating the reasons behind the prolonged duration of lessons revealed a greater problem than mere time management. Conducting an activity, especially group work, consumes a lot of lesson time. A typical activity involving group work consists of six steps: 1) explanation of instruction by the teacher, 2) individual work, 3) group work, 4) writing the answer on the board by each group, 5) group presentation, and 6) follow-up by the teacher. Although some of the teachers omitted one or two of the above steps to save time, it can be easily imagined that going through these steps requires a significant amount of time if the activities are to be meaningful. Two activities were conducted in all three mathematics lessons, but they were overambitious for a 60-minute lesson. In the two science lessons, only one activity was planned, but these lessons were planned for 30 minutes only, which gave teachers a huge time constraint.

It is now necessary to examine why the content of the lessons was overambitious for the time available. When a lesson covers an extensive issue, it indicates that the lesson is not focused enough. In other words, the lesson objective is not specific enough. Here, teachers were faced with two problems. First, teachers referred to the Guide, which defined the specific objective of each sub-theme, but the objectives written on the Guide were often not specific enough to be an objective of one lesson. For example, the objective of Aminata's lesson was "to use a technological object – a lantern," which was nearly identical with the one written in the Guide. At a glance, it looks specific, but being able to use a lantern consists of many elements like identifying different parts, understanding the function of the parts, understanding the procedure of using a lantern,

taking the safety measures, and actually using a lantern. Covering all of these in a 30-minute lesson is not realistic, and the lesson needs to focus on a particular aspect.

The lesson objectives of all five observed lessons were almost the same as the specific objectives written on the Guide. From the interviews, the teacher-participants were found to believe that a specific objective should be used as a lesson objective. The intention of CEB is not explained in the Guide, and the relations between these two have not been well considered by its authors. During the workshop in which I participated in January 2013, when I pointed out the confusion faced by many teachers, a representative of CEB said that they recognised that specific objectives were not operational enough to be a lesson objective, and that they were in the process of revising the Guide to redress this issue.

The second problem, which is related to the previous one, was overambitious curricular demand. The Guide asks teachers to cover a theme in a very limited time, especially in science. For example, teachers are asked to cover respiration, the theme of Ablaye's lesson, in just two lessons. The unrealistic expectation compels teachers to cover extensive issues in a lesson.

6.2. Interaction between Teachers and Pupils

6.2.1. Participation of pupils in the lesson

The teacher-participants claimed that the role of teachers in the classroom had changed after the introduction of PREMST/CEB. In their understanding, teachers should first let pupils explore and discover something. They would only intervene to give complementary elements to the responses given by the pupils. This is what they said they aspired to do in all classroom situations. It should be noted that all of them were confident about how to handle the pupils, and my observation confirms that they could take their authority for granted. It made it easier for them to try to change their role in the classroom, compared to the teachers who struggle to control the pupils.

The teacher-participants gave ample time for pupils to work on the assignments provided. Pupils in Boubacar's class spent the majority of class time for working on

trying to construct a cylinder either in individual work or group work. In addition, teachers resorted to various strategies to motivate pupils. Praising a pupil who gave a correct answer and asking everyone to applaud at the end of group work were common. Ibrahima used the applause as an assessment system. For example, when a group provided a complete answer, he asked pupils to clap five times with him. Another group who gave only a partial answer were given the clap twice, and so on. This served to motivate pupils to do well in group work.

Other strategies that appeared a mere ritual actually served to keep the attention of pupils. Teachers routinely asked pupils, "Did you understand?" before advancing. It is hard to imagine that pupils would dare say no in a Senegalese classroom although Ablaye claimed that they sometimes did. If this is an act of assessment, it may be a waste of time, but if this is interpreted as an act of getting attention of pupils, the strategy is sensible in that virtually all pupils are obliged to utter a word, albeit simply, "Yes." In a similar vein, a common strategy was to let pupils complete a sentence. Aminata even uttered a half of the last word when no pupil found what she wanted them to say. Completing a sentence served to keep the attention of pupils, and pupils were visibly enjoying themselves not least because it was an easy way for them to participate in the lesson.

The result was the enthusiastic participation of pupils. To be fair, from my professional experiences, I am aware that pupils in Senegalese primary school are, in general, motivated and eager to participate in the lesson, but the active participation is often limited to several pupils, leaving others behind. In contrast, in the observed lessons, teachers made efforts to make sure that everyone participates; hence, a greater number of pupils actively participated.

6.2.2. Participation and learning

It may well be true that, in the observed lessons, pupils were more motivated and participated actively, but whether these changes led to better learning is another matter. Indeed, many of the changed practices seemed to remain too superficial to help their learning. Teachers interacted with pupils, by posing many questions, but the majority of

questions posed to pupils in the whole class could be answered in one word or two, and these were not the type of questions that challenged pupils to think. During the five observed lessons, there was only one occasion where pupils' response consisted of more than five words, except when pupils simply recited a memorized sentence.

Observing the lessons more closely, however, it was noted that teachers posed some interesting questions that required thinking on the part of pupils. The way teachers used these questions did not serve well in promoting the learning of pupils, however. First, all but one teachers had little patience for giving pupils time to think. In the four observed lessons, the maximum waiting time for a question was four seconds, the majority being between two and three seconds. The second problem is that teachers rarely gave meaningful feedback when pupils gave an answer other than that which they had expected.

The following example of a science lesson illustrates a missed learning opportunity. In the following transcript of the lesson on lanterns, Aminata posed an interesting question, by showing that there are holes on the upper part of a lantern.

Transcript 1. : Aminata's lesson		
	Interaction	Comments
T	Holes! Very well. You see the holes? What are the use of these holes? Hm!	6 pupils raised a hand immediately, and T designated one of them, by pointing him.
Mamadou (b)	Leaving smoke!	His French was grammatically incorrect, but what he wanted to say was understandable.
T	To remove the smoke. Very good! Why again?	
T	What are the use of these holes? Aha!	T waited for less than 2 seconds, and decided to repeat the question. Then, 2 pupils raised a hand, and T designated one of them, by pointing him.
Lamine (b)	Must clear the smoke.	
T	To clear the smoke. Again, why? Aha? Another!	T waited for 4 seconds. 3 pupils raised a hand, and T designated one of them, by saying, "another."
Ousmane (b)	To protect	

T	To protect the glass, no -. So these holes are used to clear the smoke -. But it also serves to ventilate. When the lamp -. When there's no hole, there will be no combustion, there is no combustion when there is no holes, these holes, so they are -. These are used to aerate and bring the air for combustion…	When Ousmane failed to give the correct answer, she decided to explain everything herself. Her explanation continued further. It is difficult for observers to judge to what extent pupils understood what she had explained, as she did not verify whether they understood what she had said.

The question that Aminata posed was a thought-provoking one. Interesting questions like this require more than a few seconds to think before pupils could form an answer with their own words, but she only waited for the maximum of four seconds. Aminata knew that there were two answers to this question. Some pupils got the first answer immediately partly because she had already given the answer indirectly just before this interaction. In contrast, pupils had no clue about the second answer, at least in this short time period. After all, before pupils had had enough time to think about the question, she answered the question in details. As Black and Wiliam (1998a, p.7) point out, the consequence of the practice of not waiting for pupils' response is that it forms a particular expectation of pupils about the interaction with the teacher; "pupils don't even try to think out a response."

The next example from Alima's lesson illustrates another dimension of waiting time. She waited for seven seconds when she posed an open question after groups drew their answer on the blackboard and presented it, as in the following transcript:

Transcript 2. : Alima's lesson

	Interaction	Comments
T	Now, you see the productions. Observe different productions that are on the blackboard to see if you have any comments to make. You have any comments?	This was a very open question. First, no one raised a hand. When T waited for 7 seconds, one pupil raised a hand.
T	Yes, Astou ! It's about what group?	
Astou (g)	Pigeons	Each group has a name like "pigeons."
T	Pigeons, yes here?	
Astou	(not clear)	

T	You should not put signs. You agree with her?	The response of Astou was inaudible, but T somehow understood what she had said and rephrased it for the class.
Ps	No!	Pupils meant that you should not put signs.
T	Well! Do not put a sign here. Also there. When you write symbols, you should put signs. Any other comments?	
T	Yes, Pape! About the group "crab"?	Immediately, one pupil raised a hand. After this, pupils started raising a hand, and a similar interaction was repeated for three turns.

When Alima posed this question, I first thought that it was a matter of courtesy before moving on, but by the time she waited more than a few seconds, I understood that she meant that it was a question to be answered, but I still had no clue what kind of comments she was expecting of. In this particular case, her patience was rewarded because one pupil finally understood her intention. Her question was simply asking if pupils found any error in the production of different groups. When one cycle of interaction was completed, at least some pupils had understood the meaning of her question and started answering. Another time, her patience might have ended up being a waste of time if no pupil had understood her intention. This example shows that when a question is open, it is necessary to make sure that pupils understand what the teacher is asking.

In a similar vein, if Aminata had increased the waiting time in the lantern lesson above, she might have wasted time. In the interview, she said that pupils did not know the second answer and that she was obliged to answer herself. In a way, she is right. During the interaction, the great majority of pupils remained silent throughout. Simply waiting would not have helped because pupils had no clue. In that case, she could have conducted what Torrance and Pryor (2001, p.617) call "divergent assessment" to help them get closer to the answer. When I was observing her lesson, I was interested in finding why Ousmane thought that the holes might help protecting the lantern. Examining his thinking might have opened up discussion, by stimulating the reflection of other pupils. This would make the interaction more meaningful and could have acted as a scaffolding to help pupils unlock the situation.

It should be also noted that although all teacher-participants recognised their role as a facilitator, the interactions between the teacher and pupils in the whole-class teaching, as in the transcripts 1 and 2, were in a traditional question-and-answer format, in which the teacher was firmly in control of any interaction. Indeed, these are the characteristics found in practically all interactions during the whole-class teaching in all observed lessons. In other words, even if teachers were conscious about their facilitating role, that seemed applied only at some part of the lesson. Considering the importance of this point, this issue shall be re-examined in Chapter 7.

6.3. Attention to Weaker Pupils

6.3.1. Giving attention to the weaker pupils

All teacher-participants talked about helping weaker pupils. Besides group work, which, according to them, was one of the mechanisms for helping weaker pupils, two of the observed lessons showed explicit efforts of teachers to help weaker pupils during the lesson. Ibrahima and Alima gave extra time for the pupils who had not got the correct answer to catch up at the end of each individual work episode. The time afforded was just a couple of seconds in both classes, so pupils could do little more than copy the correct answer. Worse, pupils used the slate and erased the answer soon after; hence, they would be unable to look it back later. When I pointed this out, Ibrahima and Alima politely nodded, but Aminata, who claimed to do the same practice, defended it, by saying that this was only the initial phase of correction, and that she normally asked pupils to make the same correction in their notebook later at the end of the lesson. Although the scope of this research does not allow me to verify how she actually practises it, her response shows that teachers are conscious about helping out weaker pupils outside the lesson. If the practices like this are done well, it would give a rare opportunity for pupils to look back their previous work.

6.3.2. Errors and weaker pupils

One of the PREMST modules is dedicated to error analysis, in which teachers are encouraged to identify the reasons behind the errors committed by pupils in order to promote their learning. Alima and Ibrahima drew explicit attention to the errors of pupils in the whole class. However, interestingly, both of them thought that they picked the errors to help these weaker pupils understand better, rather than using these errors to deepen the learning of all pupils in the classroom.

In the introduction phase of the lesson on problem solving, Ibrahima gave the question, "Mother gave Nafi 9800 francs to pay for the meat that costs 1400 francs per kg. How many kg of meat can she buy?" After the individual work, all pupils raised their slate, and he checked all the answers. Then, he worked on this question in the whole class as in the transcript 3.

Transcript 3: Ibrahima's lesson

	Interaction	Comments
T	Who will show the answer ?	2 pupils raised a hand, but T decided immediately he would pick someone.
	Someone who didn't get it right -. Cheikh on the blackboard quickly! Fast!	Among 17 pupils, 11 pupils had not got it right, and T chose Cheikh without particular reason among these 11 pupils. Chiekh raised and went to the blackboard.
T	How many kilogrammes of meat can she buy?	T repeated the question while Cheikh started writing down his answer on the blackboard.
T	(To Chiekh) You do the operation! 9800 -. (To all pupils) Do you agree?	Cheikh started writing, "9800 x 1400 =."
Ps	No !	
T	Cheikh! He has 9800 francs. He wants to buy meat that costs 1400 francs per kilogram. How many kilogrammes can you buy? He multiplies!	
T	Hurry up!	When Cheikh realised that multiplying was not correct, he started dividing instead.

The intention of Ibrahima to draw attention to the error was admirable, but this strategy did not help promoting the learning of pupils. The main problem was that he did not choose the error to draw attention strategically. Ibrahima did not ask Chiekh

why he had multiplied. When I asked him in the interview why he thought Cheikh had multiplied, he said that Cheikh had simply been confused. If that was the case, there was little reason to share his mistake to other pupils. Indeed, Ibrahima said that the reason why he had asked him to write the answer to the blackboard was to help **one** of the weaker pupils who had not got it right. One could argue that there was nothing wrong with helping one particular pupil in the whole class, but if that was his intention, he could have simply intervened during the individual work when he had plenty of time to do so. Instead, during the individual work, he only checked to see whether everyone was working. This mathematical question was difficult for the majority of pupils, so there were probably different answers among them. He could have used the time during the individual work to identify the error that he would like to draw attention to the whole class. If Ibrahima had chosen a type of error that was common to many pupils, by showing how they might have been misled, it might have helped the learning of other pupils in the class.

This episode indicates the difficulties of using error analysis in the classroom. Giving attention to an error without having a strategy on how to use it as a learning tool would not help the learning of pupils. On the contrary, this particular incident seems to have ended up humiliating the very pupil that Ibrahima had intended to help. The way Alima drew attention of the errors of two pupils during her lesson was also similar in that her otherwise well-meaning pedagogical act only maximised the humiliation of these pupils.

6.4. Group Work

PREMST gives much emphasis on group work to the extent it develops a module dedicated to group management. Partly because of these efforts, all teacher-participants understood and was able to explain the rationale of group work well. Ablaye articulated it, by explaining the concept of cognitive conflict:

> Cognitive conflict, that is to say, the pupil knows one thing, another has another vision of the thing, another has another understanding of the thing, and the pupils will ... for example, someone says "this is it," and another says "well, I don't

agree." This is it. This is to create interaction, interactive teaching (Ablaye, FGD.)

In all observed lessons, teachers organised group work in a way that followed the principles that were noted in the module. First, teachers gave a question or questions to discuss in group and repeated to make sure that pupils understood the instruction before starting group work. The instructions were clear in all group work observed. Second, they clearly understood that group work was more than just a seating arrangement. Pupils were repeatedly reminded to work together. Third, the number of pupils in each group was controlled between six and eight pupils except in Aminata's lesson. The seats were also arranged before the lesson started so as not to lose time during the lesson just to form groups. Fourth, each group was asked to designate the chairperson, the secretary, and the presenter at the beginning of group work. It was clear that pupils were used to making this arrangement. Fifth, all of them were conscious about the importance of mixing pupils of different ability in each group. They recognised group work as one of the effective strategies to help weaker pupils. Four of them explicitly talked about how good pupils could help weaker ones in group work. Aminata even said that weaker pupils could understand better if their classmate, rather than the teacher, explained because they were in the same level of understanding. Sixth, after group work started, all of them monitored to check if all pupils understood what they were supposed to do, by going around the classroom. Finally, three of them gave time for individual work before group work, and another said that she normally did it even though she had not done so in the observed lesson. Ablaye said that pupils should confront the question individually first to enable them to exchange the opinions. Ibrahima said that individual work would oblige pupils to feel responsible to solve the question themselves before going into group work. Alima said that she normally used individual work to check who got it right and who had difficulties. They clearly understood the rationale of combining individual work with group work.

Despite these positive aspects, group work in these lessons did not necessarily help pupils learn better. Observation of the lessons suggests that there are two particular issues that need to be addressed if group work is to be an effective tool for learning: 1) the kind of tasks to be conducted in group work and 2) the quality of pupils' discussions. This section analyses the group work of each lesson from these two viewpoints.

6.4.1. Type of assignment in group work

All of the group assignments except the one given by Aminata were directly related to the lesson objective. This is a positive element, but it is not sufficient to ensure that the assignments help pupils learn better. This sub-section examines the appropriateness of group work assignments in the five lessons observed. The analysis in this sub-section is solely based on the nature of assignment without considering how group work actually unfolded.

6.4.1.1. Alima's lesson

The first example is Alima's mathematics lesson whose objective was that pupils learn the numbers from 80 to 83 :

Assignment 1:
First group work
<u>Context (Question)</u> : You have 79 marbles. You play and you win one marble, how many marbles do you have now?

<u>Instructions (for the tasks):</u>
    – Form (count) all of the marbles you have.
    – Draw all of the marbles.
    – Give the number of marbles you have.
  Note 1: T distributes different materials like sticks and pebbles to groups.

Second group work

<u>Context (Question)</u> :
You have 80 marbles. You play and you win one (or two or three) marble(s), how many marbles do you have now?
    Note 2: There are three different questions according to the different number of marbles added. Two groups are assigned for each question.
    Note 3: The instruction is the same as the first group work.

Pupils were asked to conduct two tasks; first, counting the marbles that were distributed to them; and second, drawing the marbles on their individual slate. Both tasks were mechanical ones and required virtually no discussion. These were more suited to individual work. The second assignment was almost identical to the first one.

6.4.1.2. Aminata's lesson

The second example is Aminata's lesson whose objective was that pupils learn to use a lantern:

Assignment 2:

Instruction:
- Observe different parts of lantern.
- Write down what each part is called.

The question simply asked pupils if they knew the name of different parts of lantern, so answering this question required little thinking on the part of pupils; hence, there was little to discuss. When I challenged Aminata about this in the interview, she said,

> as this is the experimental study, we only facilitate the work (of pupils). So, it is up to them to discover different parts, and when they are in groups, when one pupil knows (a part), and when another doesn't, one will help another (Aminata, forensic interview).

She may not be wrong about what she said if the objective of the lesson was only to learn the names of different parts, but she intended to show how the different parts of lantern function to enable pupils to use a lantern in this lesson. Indeed, in the latter part of the lesson, she posed a much more interesting question, "What is the use of these holes?" as shown in Section 6.2.2. After the group work, she did not have time to elaborate on this question and quickly answered everything herself, but the lesson would have been more interesting if she had used the latter question in group work.

6.4.1.3. Ibrahima's lesson

The third example is the lesson whose objective was that pupils learn to solve the situation problem on equal sharing. Ibrahima conducted two activities involving group work, and the assignments in both were simply to ask pupils to solve a problem-solving question in groups as the following:

> **Assignment 3:**
>
> Instruction of the first group work:
>
> To prepare doughnuts on April 9 during the Easter holidays, Rama and his friend shared the following expenses: 775F for flour, 360F for sugar, 450F for eggs, and 225F for butter. How much should each pay?
>
> Instruction of the second group work:
>
> Three brothers are to share the inheritance of their father who died on February 15, 2012. The property left includes a house estimated 200,000F, 160,800F worth of equipment and land worth 560,800F. Abdou, the eldest son aged 41, takes the land, and Demba, his younger brother, takes the house and equipment. Find the amount that Abdou and Demba must give to their little brother, who is only 7 years old so as to make his share equal.

The first question was a closed one, having just one correct answer. If the question could be solved in several different ways, there would be more room for discussion, but this question was not. In contrast, the second question was very complex, especially in terms of French, even though the question was still a closed one. In addition, the context of inheritance might be difficult for the pupils to understand although the example of inheritance was cited from the textbook. Conversely, it would be interesting to see how pupils would attempt to understand the question in group.

6.4.1.4. Ablaye's lesson

The fourth example is Ablaye's lesson whose objective was that pupils learn to identify the organs of the respiratory system and cite its characteristics. Unlike other teachers, he gave the questions as homework. Pupils were told to ask somebody they knew for the answer of the following questions:

> **Assignment 4:**
>
> Questions
>   1. What are the organs of the respiratory system?
>   2. What are the phases of the respiratory movement?
>   3. Explain O_2 and CO_2.

Asking pupils to conduct an interview was an interesting idea, but the type of questions selected was disappointing. These questions asked pupils if they knew the

particular received knowledge. These questions did not demand them to think in order to answer. Indeed, although pupils were supposed to ask somebody about these questions, the first two questions could be easily answered if pupils looked at their textbook. The chemical symbols asked in the third question are beyond the primary school programme, and this question could be considered an open and very challenging question. In practice, however, most pupils would take it to find what these abbreviations stand for. Therefore, if pupils did homework, all that pupils would discuss in group work might be to decide who got the right answer. Again, there was not much to discuss.

6.4.1.5. Boubacar's lesson

The last example is Boubacar's lesson whose objective was that pupils learn to construct a cylinder. He distributed a model of paper cylinder that he constructed to each group and gave the following assignment:

> **Assignment 5:**
> Instruction :
> Try to construct a cylinder like the one that was distributed.

Boubacar explained that this was an exploratory group work, whereby pupils could grope for a way of constructing a cylinder by themselves first. Because of the model distributed, pupils would only try to imitate it, but Boubacar said that it would be too difficult for pupils to try out something without seeing a sample like the one he distributed. This assignment has the potential to make group work interesting and is appropriate, as pupils have plenty to think about in order to construct a cylinder correctly.

Until this point, I have analysed the appropriateness of assignment for group work without considering how group work actually unfolded. When I challenged Alima and Aminata immediately after the lesson that the questions they gave would stimulate little discussion in groups, they said that they were confident that pupils had conducted

a good discussion. At that time, I was not clear why they thought that pupils discussed well because neither of them cited any evidence, but their confidence motivated me to find what pupils actually discussed in group work.

6.4.2. Inside group work

No matter how group work is planned, how it is enacted during the lesson is what is important for the learning of pupils. This sub-section examines the actual accomplishment of the group work discussed above.

6.4.2.1. Alima's lesson

The group work was preceded by the explanation of the instructions. The first task was conducted with two or three pupils who shared the same bench, as the number of small materials like marbles were limited to one set per bench. The second task, representing the answer, by drawing 80 marbles, was first conducted individually. Although Alima did not explicitly state it, everyone understood that it was individual work, as pupils quietly started drawing on their slate individually. Two minutes later, group work started. Alima first asked each group to nominate the president and checked it. The time given to group work was just two and a half minutes, but the group filmed, consisting of seven boys, spent one minute just to form a group as they had to gather around one bench.

During the lesson, I walked around different groups and noticed that there was little discussion. The film observation confirms my observation, as pupils were busy finishing drawing what they had started. Incorporating group work into this lesson appears to have affected little change besides the seating arrangement. In the microphone, the following is all conversations that were captured:

Transcript 4: Discussion during the first group work
Badara (b)   *Moussa, Moussa, look what I did, is it good?*
Moussa (b)   *Yes. It's good.*
(Inaudible…)

Moussa	*Madam said to show it with bottle tops, and, he, he shows it with sticks. Each group must do something different, and the other group will do with sticks.*

The time allocated to group work was so short that it could only be symbolic, but a small exchange between Badara and Moussa in this group seems to capture the essence of what Alima expected pupils to do in the group. Indeed, during the second group, where they were asked to represent 82, pupils in this group acted in much the same way, and the only audible conversation was where Badara asked others three times if his answer was good.

When I asked Alima how the filmed group functioned, by showing the filmed lesson, she answered:

> The president leads the work. The president of the group. For this group, there is the president here (by pointing the pupil on the screen), he will lead the work, how? Each pupil shows what he did, after that they will take one production to show on the blackboard (Alima, forensic interview).

Alima was in effect asking pupils to select the best answer in each group before the reporter writes it on the blackboard. If that was what the group work intended to achieve, the short time allocated would be understandable, and this group achieved what was expected of them. Indeed, all groups wrote the right answer on the board besides some minor points. After the group work, a reporter from each of six groups wrote the answer on the board and presented it to the whole class. Then, Alima followed up each answer. All groups had the answer right, so she spent most of the time for correcting minor details as in Transcript 2.

During the second group work, Alima told pupils to help weaker ones. As she stated in the interview, helping weaker pupils was one of the principal reasons for her to conduct group work. During the lesson observation, I looked around the answers of different pupils, and I found that most of pupils got the right answer. In a crowded classroom, it is easy to copy the answer of the neighbour to pretend like having got it right, but I found that some pupils had not drawn the figure correctly. For example, I saw Adama drawing seven masses of 10 marbles, instead of eight, to represent 80. It looked obvious that he had miscounted in the eyes of others, but he did not notice it.

Even after the correct answer was written on the board, he might not notice his mistake unless it was pointed out by someone. In that sense, this group work would give him an occasion to check his answer with the classmates. Some pupils like Badara were eager to get the approval of others to make sure that they got the right answer. Nevertheless, it is not clear how well the mechanism of helping weaker pupils really functioned. The mistake of Adama was never corrected by anybody in this lesson either during the group work or afterwards. Given that most pupils concentrated on finishing their individual work during the group work, it is not surprising that weaker ones were not helped.

Alima said in the interview that she gave time for individual work before group work to assess who got it right and who had difficulties, but her practice in the observed lesson did not show the practice she professed to do. During the individual work, she did circulate around the classroom but mostly to see if pupils were working. The purpose of her activity during group work was therefore surveillance rather than instruction. My direct observation tells that she did not try to look at the answers of individual pupils. It may have been difficult to verify the answer of all 51 pupils in other lessons, but since there were so few pupils who hadn't got it right in this lesson, it would not have been difficult for her to find pupils like Adama who needed her help.

Thus, Alima's group work seemed to serve two purposes; first, making sure that all groups get a decent answer on the board; and second, helping weaker pupils. The first one seems to have been achieved, but the fact that all groups manage to write the right answer on the board does not indicate all pupils understood the question, as is explained in the example of Ibrahima later. For the latter, all Alima did to help weaker pupils was to ask pupils to do so, and that was not sufficient for this mechanism to function.

6.4.2.2. Aminata's lesson

After a brief introduction, Aminata distributed a lantern to each group and asked pupils to discuss in groups the questions in the assignment. Since there were only four lanterns, the class was divided into four groups, each group consisting of more than 10 pupils. Twelve pupils gathered around the lantern in the filmed group. Three pupils

started writing an answer on their slate, and others watched. Aminata told pupils to discuss together while going around different groups. There appeared to be some talking in the group, but, because of a relatively large size of the group, some pupils even struggled to see anything, let alone participate. The microphone captured the short conversation in transcript 5.

Transcript 5: Discussion during group work	
Amadou (b)	*You tell me what this part is called, and I write on the slate.* … (1 minute)
Alioune (b)	(Taking the slate of Fatou,) *Let me see. You wrote* the control knob, the frame, the grid and the glass.
Fatou (g)	*That, it's called* the control knob.
Alioune	*Is it* la châssis *or* le châssis *?*
Amadou	*How do you say that?*
Alioune	(Reading his own slate,) The frame, the grid, the glass, the control knob, and the cover. … (45 seconds)
Alioune	(Reading his own slate), The frame -, the frame -, the grid, the glass -, the knob… … (1 minute)
Karim (b)	*Leave it to me to go to the blackboard. Give me the slate. I'll go to the blackboard.*

Amadou wanted to work together in the beginning, but others preferred to work individually. Fatou and Alioune seemed to know the answer and started writing on their slate, so others simply watched. Interestingly, girls gathered around Fatou while boys gathered around Alioune as if these two pupils represented their gender-based team. It is not clear how they decided whose answer to take, as there was no audible exchange about it, but it looked that the gender of the presenter was crucial to decide whose answer was valued. In the end, Karim took the slate of Alioune to copy it on the blackboard. The answer that Karim had written on the board included all six parts of lantern, including the cover and the reservoir, but the audible conversation above does not permit me to discern whether the group contributed to the answer or Alioune simply continued to write the answer on his own.

In this group work, there were some inaudible conversation, which seemed to consist of reading what was written on the slate. At least, Amadou, Alioune and Fatou were participating in the group work, but others appeared to be free-riders, who

pretended to participate, by simply watching. Unlike Alima, Aminata did not ask pupils to work individually before going into the group work. The consequence was that a few cleverer pupils started writing the answer quickly before others had any idea about the question. When some pupils started writing, others found little reason to continue. Indeed, El Hadji in the group started writing something on the slate in the beginning, then he quickly erased it and started watching the work of Alioune as soon as he found Alioune knew better than he did. Perhaps, these free-riders were indeed eager to learn, by watching the work of others, but it is difficult to say how they were learning as they neither said nor wrote anything.

All four groups wrote their answer on the board and presented it afterwards. There was only one group which managed to cite all of the six parts, but, Aminata did not go over their work. Instead, she showed a lantern and asked pupils different parts of lantern. The lesson could have been started like this without group work, but in the interviews both before and after the lesson, she said that she now conducted group work in every lesson. The fact that she conducted group work even if she did not use the answers of groups indicates that she feels obliged to conduct group work no matter what lesson is. Three caveats emerged from this group work. First, 12 pupils in one group were too many to allow the participation of each. Second, partly because group work was not preceded by individual work, many pupils could not contribute at all to the group products. Third, group work should be connected to the rest of the lesson if it is to be productive.

6.4.2.3. Ibrahima's lesson

For the first group work, Ibrahima first explained the question and asked pupils to solve it individually first. Then, group work was conducted in three groups, each consisting of six to seven pupils. The group in the middle gathered and appeared to work in group, but two other groups mostly worked individually. There were occasional individual exchanges, but there was little group discussion in the group filmed. When they talked, they spoke in a hushed voice; hence, little conversation was captured in the microphone. After the groups wrote the answer on the board, Ibrahima followed it up directly without group presentation. He said in the interview that he was obliged to omit

the presentation by pupils to save time. For this assignment, all three groups have got the same correct answer, so all he did was to correct some French grammar and to explain the answer.

Considering how it unfolded, group work seemed to have been unnecessary for this question. When all three groups wrote down the identical answer on the board, Ibrahima found little to add. He could have saved time if he only used individual work. More importantly, when all groups got the correct answer, teachers could easily get a false reassurance as if everyone got it right. Indeed, Ibrahima said in the interview after the lesson that everyone had got the first question right without any problem. In reality, it is not clear if everyone got it right as just one pupil could give the answer for the whole group. In this case, individual work would have been better suited to identify who have difficulties. He used individual work before group work, but he did not take advantage of it, by looking around the tables to see the varied answers of individual pupils.

In the second group work, Ibrahima said that pupils struggled because the question was so complicated to the extent that many pupils struggled to understand what the question was asking. After eight minutes of individual work followed by six minutes of group work, no group found the answer. There were a lot more discussions this time because the question required a lot of thinking just to understand the question. The following excerpt from the group discussion illustrates how pupils were discussing to solve the question.

Transcript 6: Discussion during the second group work	
Oumar (b)	*The amount Abdou has -.*
Khady (f)	*We must divide by 2, I think.*
Oumar	*The amount Abdou and Demba have -.*
Assane (b)	*The sum of Abdou and the sum of Demba -. Each must have one part. We must take it and divide it by 7.*
Khady	*No, no, we should not divide by 7. We must make another division.*

In the interview, Ibrahima was disappointed that the second group work did not function as well as he had expected, but the above discussion indicates that there was some collective learning in the group precisely because the question was difficult and

because no one got the answer. In the first group work, at least one pupil in each group had found how to solve the question before group work started. There was little need for discussion when someone in the group had the answer, and others were happy to watch someone writing the answer for their group. In contrast, when nobody got the answer, everyone in the group was compelled to work together, which led to some genuine discussion. In addition, realising the difficulties faced by his pupils, Ibrahima paid attention to the work of pupils during the individual as well as group work this time while he did not bother looking around the classroom during the first group work. Thus, the second group work functioned better as a mechanism of learning.

Having said that, the second group work was not as effective as it should have been. Ibrahima gave a very similar question to the pupils as an assessment question just after the lesson, but the majority could not get it right. The major reason for the disappointing result derives from the fact that the level of French in the question was too high for the actual level of pupils. This is not the fault of Ibrahima, as one can find similar, or even more difficult, questions in the textbook and the Guide. Assuming that the level of pupils in his class is not particularly lower than the national average, it indicates that the curriculum does not take into account of the French level of pupils. Other researches, including one in Senegal, support that pupils have difficulties in learning problem solving skills in a foreign language (Mbaye et al., 2011; Alidou & Brock-Utne, 2011a).

Two caveats emerged from this lesson. First, teachers should introduce group work only where it is effective. Individual work, combined with individualised follow-up, may be more effective and time-efficient for relatively simple mathematics questions. Second, group work would function better when nobody in a group had a definitive answer. For a closed question, if someone got the answer during individual work, group work might not function because others would be happy to copy their answer. In contrast, if pupils did not find the answer to copy, they would feel obliged to work together, leading to some collective learning.

6.4.2.4. Ablaye's lesson

Ablaye first checked that all pupils had done homework in their notebook. Then, he asked pupils to exchange the notebook in their group to compare their answers, and group work started. In the filmed group, there were six girls and two boys. For the first minute, pupils exchanged notebooks and started reading the answer of others. Subsequently, all of them started discussing together, by forming literally a group together. From the video, they appeared absorbed in some intense discussion for four minutes. The intense discussion was almost entirely conducted in a hushed voice.

One minute into the group work, Ablaye asked pupils to speak French and repeated it three times. This had an adverse effect for my research because it resulted in pupils speaking in Wolof in an even lower voice, instead of speaking French. Hence, it is nearly impossible to establish the script of all discussions, but the transcript 7, consisting of all audible conversations captured during the four-minute discussion in the filmed group, gives a general idea about what was happening in this group.

Transcript 7: Discussion during group work	
Amy (g)	*Ah, look at the work I did.*
Aissatou (g)	*I think it is good.*
Penda (g)	*I do not see my exercises. Where are the exercises?*
Rokhaya (g)	*We were asked to form a group.*
Amy	*Ah, be careful, you're going to drop the phone (microphone)*
Aissatou	*There're mistakes in your work. Questions ... questions is plural we must put an S.*
Amy	*Whoever goes to the table is going to add an S.*
Aissatou	*You, you move too much. You'll end up dropping the machine (microphone).*
Amy	*You've got to change the pen. Yours does not write very well.*
Aissatou	*Be careful!. You dropped it!*
Modou (b)	*We take the notebook of Penda -. We've got to read to be able to the board to write -.*
Aissatou	*Eh, Amy, be careful! Look at what you do.*
Penda	*But, we take the notebook of whom?*
Amy	*We take the notebook of Penda.*
Penda	*Yes. We've got to read. We must read to be able to go to the board to write -.*
Penda	The bodies of breathing apparatus are : behind the mouth, trachea, nose, lungs -.
Penda	The movement of respiration is : inspiration and expiration -. Breathing allows us to provide the body with oxygen CO_2 -, essential to life -.

Penda	Aissatou, *the writing is not readable. What is it?*
Aissatou	…to get rid of…
Penda	and to get rid of carbon dioxide, CO2 that it produces -.
Modou	*Ah, Penda, There are O2 and CO2. We need to write CO2.*
Penda	*We've got to distinguish and separate them and share, it is O2 and CO2.*
Alassane (b)	*We've got to correct and write CO2.*
Cherif (b)	*No, nothing must change, we've got to leave it like that.*
Aissatou	*Sokhna wrote it correctly so we can leave it like this.*
Penda	*The writing is correct.*
Aissatou	*Me, I can only read my writing. I got a problem with the writing of others.*

Pupils discussed the issues that they were supposed to, but the content of discussion was not as exciting as I had hoped. What seemed to be happening in this group was that pupils had first tried to identify the best answer, and then, they read it aloud to see if the selected answer was good. The captured conversation talked mostly about non-science issues like the French grammar and the spelling. Towards the end of the group work, however, something interesting happened. Penda was apparently confused between O_2 and CO_2, and this triggered an interesting discussion as others were forced to think about the difference between the two. The confusion of Penda precipitated the group members to think about the question, and they tried to solve it collectively although the nature of talk was mostly what Mercer (1995) calls disputational, which is characterised by individualised decision-making, rather than exploring a solution collaboratively. Perhaps, Penda simply read O_2 as CO_2 by mistake, but this does not change the fact that her error prompted a discussion in the group.

Going back to the nature of assignment, the type of discussion in which pupils were engaged is exactly what was predicted in the previous sub-section – pupils simply tried to find who got the right answer. The nature of conversation shows that this group work did not induce what Ablaye called cognitive conflict. Nonetheless, the motivation of pupils manifested in the intense discussion shows that this is a type of discussions with which pupils enjoy. And, more importantly, there was some collective learning, at least when one of the group members got confused about the question. Therefore, the choice of questions may have been suitable for the context of this particular classroom, although the type of questions hardly inspired the metacognition of the pupils.

After the groups wrote the answer on the board and presented it, Ablaye went over each answer. Although there was little involvement of pupils, his explanation was clear, and he elicited to what extent each group got the expected answers. Again, if one looks through the lens of social constructivism, his way of following up the group work may not be appropriate, but if pupils were expecting to find what they got right and what not, the way he followed up the group work makes sense.

This analysis reveals an insight into the difficulties of conducting group work as PREMST prescribes. The espoused theory of learning for Abalye is social constructivism, but the way he organised group work may not be premised on the same theory of learning, and arguably, this may be appropriate in his present context. This point will be discussed in the next chapter because at least a part of the reasons for his seemingly epistemological confusion derives not just from his lack of understanding of pedagogy but from the dilemma with which he is faced in his teaching environment.

6.4.2.5. Boubacar's lesson

Pupils were seated in four groups, each consisting of between six and eight pupils. He first gave an introduction of a cylinder, by asking the examples of cylinder that they could find at home. Then, Boubacar distributed a paper cylinder that he constructed to each group and asked each group to construct one cylinder collaboratively. His instruction was clear, but all groups started constructing more than one cylinder. In the filmed group, three girls and three boys worked together. Two boys and two girls started constructing a cylinder, and two others watched. As the time passed, however, one boy and one girl continued the work as if there had been two gender-based teams within the group. There appeared some exchange between pupils in the group, but they were more consumed with the manual work because cutting and gluing paper was a hard task for them.

The group work lasted for 23 minutes, and the following conversation shows how the filmed group started out during its first minute:

| **Transcript 8: Discussion during group work** |
| Cherif (b)   *Me, I can do it ! We've got to fold the paper.* |

Yacine (g)	*Teacher did it like this.*
Marie (g)	*We've got to let Cherif do it like that while we all watch.*
Cherif	*Eh, I can do it.*
Marie	*You see here, you've got to draw the lines and then afterwards you cut.*
Yacine	*Me, too. I can do it! Afterwards you cut it out.*
Cherif	*What you have cut is not enough. The teacher didn't do it like that.*
Marie	*Cherif is going to draw and I'm going to cut it out.*

The above interaction shows that at least three pupils started out with the intention of working together. The interaction continued in a similar fashion throughout the group work, and there was little substantive conversation about how to construct a cylinder. A lack of substantive conversation can be easily predicted because the assignment was not to discuss how to construct a cylinder but actually to try to construct one collaboratively. In the process of construction, there were many small exchanges like the following:

Transcript 9: Discussion during group work

Yacine	*Let me see what you did.*
Bineta (g)	*Me, I can't make a good cylinder.*
Yacine	*The way you have cut the paper is not good.*

Pupils were thinking about how to do it better when they compared their production with the model or with the production of their neighbour. The fact that pupils were absorbed in the work indicates that pupils were very motivated. It may have been difficult to induce the same level of motivation if the assignment consisted only of discussion. In that sense, this group work was a sensible way of starting a lesson.

That said, Boubacar was unable to make the most of this exploratory nature of the group work in the follow-up session. Boubacar asked each group to submit one cylinder, which three groups did it. Then, he asked pupils, "Which one is the production which is at least acceptable?" Pupils said "Group 4." Boubacar asked Kine, the group reporter, to explain how they constructed their cylinder. As Kine struggled to explain apparently because of her insufficient level of French, Boubacar helped her explain how she constructed the cylinder, by asking questions that she could answer in one word. After she managed to utter the three key words, "two," "circle," and "rectangle," Boubacar explained that a cylinder consisted of two circles and one rectangle. Subsequently, he asked pupils why other productions were not good, but he immediately

answered the question himself in order to move on to the next step. If the group work was of exploratory nature, he should have given pupils time to think back about what they had done and what had not gone well.

During the rest of the lesson, Boubacar demonstrated the step-by-step procedure of constructing a cylinder and asked pupils to follow what he did. He said in the interview that the objective of the lesson – learning how to construct a cylinder - was denoted in the Guide, and that he needed to teach it because pupils would be tested on that. His interpretation of CEB shows the difficulties of using the Curriculum in a way that helps the learning of pupils. The specific objectives are defined by the authorities in the Guide, and teachers often copy them as the lesson objective without understanding what may be the logic behind them. To take the example of this lesson, the lesson objective may be to learn to construct a cylinder, but another question to ask is whether constructing a cylinder is the objective in itself, or it is the means to learn about a cylinder. Presumably, the authors of CEB assumed that being able to construct a cylinder requires significant knowledge about the characteristics of a cylinder, but teachers who copy the objective from the Guide may not have the same understanding. In this lesson, for example, Boubacar explained that the length of a rectangle had to be equal to the circumference of the two circles when writing the pattern of a cylinder, but he did not show why this was the case. When he simply explained these characteristics, at best, pupils would memorise them so that they could construct a cylinder correctly, but, in most cases, either they would fail to understand what he explained, or they would forget these characteristics soon after the lesson, especially because Boubacar did not write these important characteristics anywhere on the blackboard. Indeed, my direct observation during the last phase of the lesson confirms that the patterns drawn by many pupils did not conform to the above rule. In this lesson, group work itself might have been appropriate, but he failed to connect what pupils had done during group work to the remainder of the lesson. Consequently, the group work did not function as an effective means of inducing the learning of pupils.

6.5. Teaching and Learning

6.5.1. Teachers' understanding about the learning of pupils

In the interview immediately after the lesson, I asked the teacher-participants about their impression of the lesson conducted. I was unclear about how well pupils understood the lessons from my direct observation, so I was interested in finding out how the teacher-participants assessed it. In the interviews, all of them were confident that pupils understood the lesson, but none of them referred to any concrete incidents that allowed me to infer about the learning of pupils except the example of Ablaye shown below. All of them explained the intention of their pedagogical acts well, but almost everything that they said was about the aspects that they could have said even before the lesson. Indeed, four of them often used the future tense or use the word, must, in the interview immediately after the lesson as if they were talking about a hypothetical lesson. The only exception was when they talked about the time management.

Ablaye was the only one who gave some piece of evidence about how he assessed pupils' understanding. In his lesson, after group work, he gave a presentation of supplementary information on respiration for 13 minutes with little involvement of pupils. The content of the lecture far exceeded what was expected of pupils in the preceding group work, so it would not be surprising if many of his pupils had difficulties in keeping up with his lecture. I wondered if his lecture was too long and too detailed and asked him how he understood whether his pupils were able to follow his lecture. He first said that group work showed that all groups understood the basics. Then, he referred to the scene where, after his brief explanation on the inspiration, he asked a pupil to come up the front to demonstrate inspiration:

> when it comes to respiratory movement, when I took a pupil, the pupil mimicked, the pupil attempted inhaling ... to concretise in the classroom. I quickly realised that others understood as inspiration (Ablaye, interview after the lesson).

The film shows that when he first asked a volunteer to show the act of inspiration, nobody raised a hand. He asked again, by demonstrating inspiration himself. Then, three pupils raised a hand, and a girl demonstrated inspiration in front of the class. No recognisable reaction of pupils was identified except that all continued to listen

attentively. In this part of the lesson, he was not simply telling how to inhale, but he explained how the mechanism of inspiration functioned, by the air going through the nasal cavity to the two lungs. I could not understand why he thought pupils understood the lesson in this episode. The fact that nobody initially raised a hand seemed to demonstrate that pupils did not understand it, and the girl simply mimicked what he had demonstrated. In the same interview, he kept stressing the importance of verifying the understanding of pupils during the lesson, and as is explained later, he is the only one who assessed it relatively well in the conclusion phase of the lesson, but the example he gave was not a convincing one.

6.5.2. Assessment of learning

During the forensic interview conducted six weeks later, I attempted to find how the teacher-participants assessed whether pupils understood the lesson, by asking specific questions on the lesson each conducted. For example, I asked how they assessed the understanding of individual pupils during group work. Even though my question meant to ask about the lesson filmed, all of their answers were again theoretical as if they were talking about a hypothetical group work, not the one filmed. Alima first answered how pupils should discuss in group work, so I asked her if she thought the filmed group had discussed as she described. She responded in the affirmative with confidence without referring to any evidence although, as shown above, my analysis indicated otherwise. I even tried to induce some stories about individual pupils in the interview with Aminata, by asking her who were the weaker pupils in her class. As she told the name of a pupil, I asked how he had behaved in the lesson filmed, but she explained how weaker pupils generally behaved during the lesson.

I also asked how they assessed whether other pupils understood the question when only one or two pupils raised a hand and gave the right answer. Aminata said that she would ask another pupil to respond differently. Ablaye said that if less than five pupils raised a hand, he knew that pupils did not understand it, so he would not designate anybody and instead rephrase the question so that pupils would understand it better. Both of them were supposed to have answered what they had done during the lesson filmed, but the films show that neither of them had practised what they said they

would when similar situations appeared. Ibrahima's response seems to reflect the reality better. He said that, ideally, he would rephrase the question to induce the response of other pupils, but he found it difficult to do it in practice even though he knows what should be done.

Teachers did conduct an assessment of the understanding of pupils at the conclusion phase of the lesson. In the following transcript, Ablaye developed a summary of the lesson.

Transcript 10: Ablaye's lesson

T	Carbon, notation?
Ps	CO2 !
T	CO2, Carbon dioxide, so by this time -, so we will see that breathing helps provide oxygen O2, which was noted, and I remind you that it is a scientific notation, it is noted like that -, essential to life and get rid of carbon dioxide called CO2, isn't it?
Ps	Yes !
T	Good! So now the air we breathe, the air we breathe go through where? Where? What do you call these organs there? Yes!
Coumba (g)	(Inaudible)
T	Yes !
Alpha (b)	(Inaudible)
T	Yes !
Sokhna (g)	(Inaudible)
T	Concentrate here -, so the air we breathe through where? What we call lungs and all that, what is it called? Yes!
Sokhna	The organ of the …
T	The organ of what system ?
Ps	Respiration.
T	Respiration. So, the air we breathe passes through the organs of the ...
Ps	Respiration.
T	Of the respiratory system -, go through the organs of the respiratory system -, so we can now say that we can mention what is -, so by what order are these organs, by order! Yes!
Yaya (b)	The nasal cavity
	(The exchange continues…)

This example shows that Ablaye attempted to assess how pupils understood the lesson. During the interaction, a fair number of pupils raised a hand for each question. When three pupils did not give the right answer, instead of answering the question himself, he decided to give them a hint, by naming lungs as an example of the organs. After the first part was unblocked, more and more pupils were able to participate in the

interaction. This practice allowed Ablaye to assess whether pupils understood the lesson at the conclusion of the lesson. The ASEI approach proposes this kind of assessment during the conclusion phase, by letting pupils construct the conclusion from what they have learned in the lesson (PREMST, 2009a). What Ablaye performed seems to represent what is expected of teachers to do. Among the five lessons observed, Aminata and Boubacar also conducted this practice with some involvement of pupils at the end of the lesson albeit spending less than two minutes.

It should be noted that, in Senegal, it is common that a teacher writes the summary of lesson in a few sentences on the blackboard at the end of the lesson, just as Ablaye did with the involvement of pupils. Pupils are usually asked to copy it on their notebook and to memorise it by the next lesson. This is exactly what Abalye did in this lesson. This lesson started with the revision of the previous lesson, which consisted of submitting a notebook to the teacher and reciting what they had memorised. This practice may appear rote-learning, but it is not necessarily considered against the ASEI approach. Volet (1999) argues that there are two forms of memorisation : 1) mechanical memorisation and (2) memorisation with understanding. If pupils contributed to the construction of the summary of lesson, memorising these phrases could help consolidate their understanding.

6.5.3. Formative nature of assessment

Both PREMST and CEB ask teachers to assess the understanding of pupils at the end of each lesson.[16] Teachers planned to conduct the assessment in their *fiche ASEI* for three mathematics lessons, but none of them could do it because they far exceeded the lesson time before reaching the assessment phase. Ibrahima's lesson reveals the problem of assessing pupils' understanding this way. During the interview after the lesson, he agreed to complete the lesson, by conducting the assessment phase immediately after the interview. When I asked him how many pupils would get the answer right, he was confident that more than half of the pupils would. The assessment question that he gave

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[16] It is generally understood by the teachers that they are not required to conduct the assessment at the end of the 30-minute lesson because of insufficient lesson time, so no assessment was planned for the two science lessons observed.

was very similar to that of the second group work, but 15 out of 17 pupils got the score of 4 or less in the grade scale of 0 – 10. Ibrahima was visibly disappointed and promised me that he would conduct a lesson later to remediate it. This example indicates that he was unable to assess the level of the understanding of pupils until conducting the formal assessment.

Indeed, what I could not identify in not just Ibrahima's lesson but any of the lessons observed was the formative nature of assessment. True, formative assessment may be so subtle that it may be difficult to observe, and teachers may not be able to explain how they do it if their practice is so internalised. Nonetheless, the findings above suggest that teachers have not paid enough attention to the understanding of individuals or groups of pupils until the conclusion phase of lesson. If formative assessment is done during the lesson, teachers can conceive and adjust the strategies of the subsequent phase of the lesson according to the needs of pupils. In contrast, in all five observed lessons, the interaction between the teacher and pupils remained at a predictable level, and there was little deviation from the lesson plan. In the example of Aminata's lesson described in Section 6.2.2., when a pupil said "to protect," a potentially powerful learning opportunity was not picked up as she chose to stay in the planned course of lesson and gave the correct answer herself. As Davis (1997, p.360) argues, when teachers have a correct answer in mind, the contribution of pupils have "virtually no effect on the prespecified trajectory of the lesson." When there was a deviation, the reason provided by the teacher-participants was always related to the time constraint.

When I shared the provisional result of this research to Maba, the head teacher of Moussa DIOP School, and told that none of the observed teachers paid attention to the learning of pupils, he agreed with me and said that teachers usually did not conduct formative assessment during the lesson. The findings support those of Mbaye et al. (2011) who found little evidence of application of formative assessment during their lesson observation despite its emphasis given by PREMST/CEB.

Chapter 7: Discussion: CPD Programmes and Pedagogical Change

In considering the findings of this research, it is important to bear in mind that the teacher-participants were selected from those were considered to have benefited most from the CPD programmes. The findings in the previous chapter revealed that although there were pedagogical changes, these remained superficial in many respects. This chapter examines the reasons for the disappointing findings, by analysing what CPD programmes offered to teachers. The content of training is inferred from the documents produced by PREMST or CEB, connecting them to what teachers had to say about the training in which they participated. This chapter is divided into six sections: 1) lesson structure, 2) interaction with pupils, 3) errors of pupils, 4) group work, 5) dilemmas faced by teachers, and 6) formative assessment.

7.1. Lesson structure

The module of ASEI-PDSI explains how teachers should prepare for a lesson in a particular structure. It also emphasises the importance of activities conducted by pupils themselves (PREMST, 2009a). The modules that treat subject contents, like fractions, contain an activity that asks teachers to prepare a *fiche ASEI* during the training sessions. This explains why all teacher-participants followed quite closely the lesson structure promoted by PREMST.

The said module also insists upon the importance of time management and suggests that the *fiche ASEI* include the indication of time allocated for each part of the lesson, but none of the teacher-participants wrote it in their *fiche ASEI*. Blaming teachers for bad time management is easy, but understanding the dilemma with which teachers are faced is necessary in order to improve their practice. As is examined in the previous chapter, one of the main reasons for exceeding the lesson time was that the lesson objectives were overambitious for the available time. The modules of PREMST do not talk specifically about how to determine the lesson objective. It may be an understandable omission on the part of PREMST, as PREMST started before CEB

scaled up nation-wide, and the confusion between specific objectives and lesson objectives may have been brought to the surface only recently. Even so, PREMST now can help the implementation of CEB, by taking account of such a difficulty as this one faced by teachers.

7.2. Interaction with pupils

Both PREMST and CEB stress the importance of pupils' reflection, but neither explains how teachers should lead the interaction or dialogue with the pupils in order to encourage their thinking. Teachers made efforts to interact with pupils, but the current practice of interaction as observed in the research neither encouraged their thinking nor helped their learning. The interaction remained superficial and did not function as a mechanism of formative assessment to promote the learning of pupils. It is one thing to give an autonomy to teachers after giving them a theoretical orientation, but it is quite another to give no indication of how to lead the supposedly new type of dialogue and ask them to practise it in their own manner. The modules of PREMST explain about learner-centred teaching, but their explanation on how to interact with pupils remains theoretical or vague. For example, when the module suggests, "(g)uide learners at every learning step," most teachers would not have a clear idea about how they should "guide" pupils in their lesson (PREMST, 2008b, p.21).

If teachers should give pupils time to think or give meaningful feedback to the unexpected answers of pupils, they need to be shown why and how they should do so. This is by no means easy to do, as work by various researchers in the industrialised countries found (Black & Wiliam, 1998a). For example, allowing longer wait time is found difficult for most teachers because the established habits are hard to break (Black et al., 2004). Similarly, teachers may understand that they should give feedback to pupils, but they need a lot of practices to come up with the kind of feedback that stimulates the thinking of pupils instantly every time pupils give a response. This is the issue that the CPD programme should address in the long-term, as changing the practice of interaction is a slow and gradual process.

The interaction that promotes the thinking of pupils is complicated by the fact that Senegal uses French as the medium of instruction. In the observed lessons, pupils appeared to follow lessons well enough, but they did not speak more than one word or two most of the time. On two occasions, when fifth-grade pupils were asked to explain something that requires more than a few words, they uttered something inaudible. This indicates that the level of their French was not high enough to state their opinion with their own words. The type of questions teachers pose often requires only a short answer, but teachers' choice of questions may be affected by the level of French of the pupils in the classroom. Indeed, this interpretation is supported by some researchers who argue that teachers are forced to resort to traditional teaching because pupils do not speak the language of instruction sufficiently (Alidou & Brock-Utne, 2011b; Hovens, 2002; Opoku-Amankwa, 2009). One of the reasons why, despite teachers' desire to use more interactive methods, the nature of interaction between the teacher and pupils was not changed may be the language barrier. Considering the actual level of pupils in French, social constructivist teaching, which requires pupils to state their opinions with their own words, may be almost impracticable, but neither PREMST nor CEB acknowledges the language of instruction as a problem to be dealt with. For example, code-switching could be used as a strategy to encourage pupils to speak and participate in discussion, but it is discouraged in Senegal and is only allowed to be used in ways which enable teachers to proceed with the lesson (Akyeampong et al., 2011). The introduction of CEB represents a missed opportunity because the language issues should have been explicitly discussed during the conception of the new curriculum.

7.3. Errors of pupils

PREMST stresses the importance of giving attention to the errors of pupils, by developing a module dedicated to this issue. The module on error analysis can potentially contribute to the improvement of pupils' learning as well as the teacher-pupil interaction if teachers begin to provide meaningful feedback when they encounter the errors of pupils (PREMST, 2010a). The theoretical foundation on this issue is well articulated in the module. Nonetheless, the module explains only how to analyse the

errors of pupils, and it does not continue how the analysis can be used to promote the learning of pupils in the classroom.[17] That is, the connection of the theory to the practice in the classroom is not elicited. Indeed, this is the point that I repeatedly pointed out to the PREMST National Trainers as its Technical Advisor, but the suggestion to include concrete examples was rejected as I was told that the application in the classroom would depend on the context, and a module could not deal with different contexts of individual teachers.

It may well be true that a single module of a four-hour training session should not be overambitious, but the research findings suggest that the teacher-participants failed to improve their practice mainly because their understanding on this issue was insufficient. The two teachers examined in the last chapter thought that the error of a pupil should be analysed and corrected to help the particular pupil who made the error and have not thought about the possibility that it can help the understanding of other pupils.

Even if teachers understand that an error can help the understanding of others, it would be unrealistic to expect that teachers find their way to use errors effectively. Teachers may understand in their mind that it is important to analyse an error of pupils, but doing it instantly in the class would be very difficult for those who have never tried it before. PREMST should acknowledge that teachers require a lot of practices to make the most of errors. Asking the pupil who gave the answer is an obvious first step, but none of the teacher-participants asked to elaborate the reason when a pupil responded in the observed lessons. Moreover, as we have seen, many pupils would be initially unable to state the reason clearly even if they are asked because they are not used to explaining it. Teachers need to help pupils developing their capacities to argue. In addition, as mentioned in Section 6.3, teachers should search for a particular error to be used in the whole class when they circulate around the classroom.

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[17] To be precise, although the module only cites the examples of analysis of errors, PREMST provided at least one concrete example in form of a cartoon poster, which depicts an example of a teacher who analyses the reason of an error of a pupil to promote the learning during the lesson. This story was conceived, based on the example cited in the module. All teachers of the target regions of PREMST, including the five teacher-participants of this thesis, are supposed to have received this poster.

7.4. Group Work

This research at the outset did not intend to focus on group work, but as the research progressed, I came to realise its critical importance because group work was the core of the lessons observed, just as the fact that group work did not function as well as anticipated was the core to the problems faced by teachers. Before the research, after more than four years of working as the Technical Advisor of PREMST, I thought that group work functioned reasonably well at least in the better lessons not least because pupils could discuss in their mother tongue. During the lesson observation, I felt that group work produced some interesting discussions in three of the five lessons observed. The subsequent findings of group discussions from the microphone shocked me because there was little discussion, as examined in the last chapter. It perplexed me and forced to me to reflect on this further. This section examines the challenges that remain for group work to function and what CPD programmes offer to teachers to overcome these challenges. The section is divided into three sub-sections: 1) challenges of group work, 2) CPD programmes and group work, and 3) group work as a part of a lesson.

7.4.1. Challenges of group work

In Section 7.2., I was tempted to conclude that the language of instruction should be changed to their mother tongue to permit a more meaningful interaction, but the findings of this research indicate that the reality is more complicated. If French was the major factor that hindered the communication, then, I would expect a lively discussion in group work, but that was not the case. Bunyi (1997) argues that switching the medium of instruction to the mother tongue is no panacea, by showing that the transmission model of teaching predominates in the Kenyan classrooms regardless of the language of instruction. Similar findings are reported in the francophone African countries, including Senegal (Maurer, 2010). Changing the medium of instruction is a sound idea, but this alone is unlikely to change the nature of interaction between the teacher and pupils.

A lack of discussion in group work reveals that there are at least three elements that hinder a discussion of pupils in the context of the Senegalese classrooms besides

the language barrier: 1) the nature of assignment, 2) the attitudes of pupils, and 3) the nature of monitoring by teachers. First, as examined in Section 6.4.1., the assignments are often not suitable for stimulating a discussion, by provoking the thinking of pupils. For instance, Aminata had a difficulty in understanding why the questions in her group work were not appropriate when I challenged her in the interview, so it is not surprising if she gives the type of questions where pupils have little to discuss for in other occasions of group work.

Second, the attitudes of pupils first need to change in order for them to discuss with each other. As is recognised by both CEB and PREMST, the traditional lessons in Senegal have not fostered the spirit of inquiry to the pupils. Instead, pupils are used to memorising something and reciting it. This background clarifies why, in group work, many of them were eager to show that they knew better than others and often simply read the answer of those who got the answer.

Third, teachers assume that pupils can and do conduct a good discussion in group work without actually verifying it. In the interviews with the teacher-participants, they raised three different objectives of monitoring during group work: 1) to make sure that everyone understands the instruction, 2) to make sure that everyone participates, and 3) to verify their answer if the group finished the task. Even though I pressed each of them to suggest another objective, none came up with one. These three objectives are good for making sure that group work proceeds at a superficial level but are not sufficient to ensure that pupils conduct a meaningful discussion. When I observed lessons in Senegal before this research, I was struck by the fact that teachers rarely tried to listen to what pupils said in groups. This is confirmed by the research findings, and that is explained by the fact that none of them thought that it was part of their role. Ibrahima said that he wanted to let pupils work out themselves, instead of his intervening. It indicates his insufficient understanding of the learner-centred approach. On the surface, his idea sounds reasonable, but his position is untenable unless pupils are already capable of conducting a good discussion without his guidance.

7.4.2. CPD programmes and group work

What the CPD programmes convey to teachers must be analysed, by taking account of these challenges in the Senegalese classrooms. The module on group management explains in details how to proceed with group work (PREMST, 2010b). This explains why all five teacher-participants were able to manage group work relatively well at a procedural level, but the findings showed that what the PREMST training brought to teachers was far from enough for group work to function as a learning mechanism of pupils. Indeed, what is missing in the module corresponds to what was missing in the practices of the teacher-participants.

First, in spite of the difficulties with which teacher are faced, the module gives no indication about the type of questions that are suitable for group work. From the interview with Aminata, it is clear that she understands that group work is a place for pupils to exchange their ideas, but her theoretical understanding is not enough for her to determine which questions are suitable for group work. Even if teachers understand that certain questions are better suited, coming up with a good question for every group activity is a daunting task. For example, I witnessed that Ablaye understood it well enough to be able to evaluate the appropriateness of group work assignments during a lesson-study session in *Cellule*. Nevertheless, his choice of assignment in the lesson observed as discussed in Section 6.4.1. was disappointing. Even a teacher with a good understanding of this issue struggles to select a good assignment in a given lesson, but neither CEB nor PREMST helps teachers on these practical matters. This is a sharp contrast to, say, the Japanese textbooks, which list a type of thought-provoking questions for each theme to help teachers prepare a lesson. Changing the textbooks this way would be very difficult in the short term, so this is where the CPD programmes could come in to help teachers, by providing some examples of group work assignment.

Second, the most glaring omission in this module is the failure to make clear about the importance of the quality of discussion. It is as if the module assumes that pupils are used to conducting a meaningful discussion without guidance as long as the procedural aspects are assured. If PREMST makes such an implicit assumption, it is no wonder that teachers assume the same. Various researches in the industrialised countries show that the quality of discussion in group work is often disappointing (See for

example the review by Kutnick et al. 2005). Pupils cannot be assumed to be naturally capable of purposeful discussion even in their native language, and it is rare that group work functions at its first attempt (Kutnick et al., 2005). Mercer (1995) argues that some ways of talking are of special educational value, by displaying three types of talk: disputational, cumulative, and exploratory. The last one, the kind of dialogue where pupils engage critically and constructively with each other's ideas, is rare because pupils are seldom taught ways of discussing collectively to construct knowledge or to solve problems collectively (Rojas-Drummond & Zapata, 2004). Moreover, the expectation of pupils must be changed in order to encourage exchanging the ideas with each other. Westgate and Corden (1993) argue that a discussion in group work is hampered when pupils believe that they are required to provide an assessable product, rather than engaging in the learning process.

Thus, pupils must first understand that the process of discussion itself is important, and then, they need to learn to communicate with each other. For example, Japan has a long tradition at least from the 1970s of developing pupils in a class as *gakushu shudan*, or a learning group, from the first grade (Takada, 2002).[18] It is widely recognised in Japan that developing *gakushu shudan* is a necessary condition for collective learning to occur, and some even say that it is the principal duty of the teachers (Toyoda, 2002).[19] Yet, it is very difficult for pupils to listen to others to form their opinions and to state their opinion to others. The process of the development of *gakushu shudan* involves a continuous interaction between the teacher and pupils, the teacher constantly reminding pupils of how to discuss with each other in the classroom. Since the efforts require a long-term approach, Japanese teachers are not trained on this in one-off training sessions, but their classroom practice is regularly scrutinized through lesson study throughout their career.

This research confirms that the quality of discussion of pupils even in a seemingly good group work activity is disappointing, but it is not surprising if

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[18] *Gakushu shudan* could be considered as a variant of community of practice explained in Chapter 3, although it had existed well before the situated learning theory was conceived.

[19] I brought this concept as an example of practice that promotes a favourable learning condition in group, but it is a concept that encompasses a larger context of learning, and it was not conceived to facilitate the functioning of group work in particular.

Senegalese pupils could not do better than those in the industrialised countries. Pupils must practise to discuss in order to raise the quality of discussion, but they have not been shown how to do so. This requires sustained help from teachers. Teachers also require capacity in many aspects such as in how to prepare pupils for explaining and listening, how to assess their talking, and how to give feedback (Mercer & Hodgkinson 2008; Galton et al. 2009; Alexander 2008). These are huge challenges faced by teachers if group work is to function, but "researchers have only begun to explore how teachers influence a group's dialogue" even in the industrialised countries (Webb, 2009, p.20). For example, various researches find that the intervention by a teacher in group work can undermine the very discussion that (s)he intends to help, and there is no clear answer to how a teacher should foster group discussion (Howe & Tolmie, 2003). This is the issue that PREMST has to address in the long-term, as the difficult context in Senegal means that teachers would require more guidance than that can be provided in a few training sessions.

Third, teachers should be engaged with the pupils during group work to make sure that a meaningful discussion occurs, but PREMST does not explain the instructional roles of teachers during group work. Group work as well as individual work provides a precious time for teachers to assess the learning of individual pupils and to think about the strategies of the subsequent phase of the lesson, but it is not recognised this way by the inspectors. In my professional experiences, I have witnessed that the inspectors, including the trainers of PREMST, habitually observed a lesson from behind and did not move around the classroom even during group work, although the PREMST trainers have recently begun to change their practice. It indicates that, just as the teacher-participants, their trainers do not recognise the importance of actually listening to the discussion of pupils or looking at the answers of individual pupils in groups. Teachers cannot be expected to conduct formative assessment during group work under this context.

7.4.3. Group work as a part of a lesson

Although pupils were visibly animated and motivated in group work of the lessons observed, it is not clear if this modality of teaching helps pupils learn better. The

teacher-participants thought that group work functioned because its procedural aspects were assured and because the production of groups was of acceptable quality. This interpretation misses the most important ingredient of the lesson – the learning of pupils. During group work, none of the teacher-participants attempted to grasp the different thinking of individual pupils, by listening to their discussion. This supports the conclusion of Mattson and Harley that teachers superficially adopt group work in South Africa, assuming that "once learners are in a group, participation and learning will occur automatically" (2003, p.293). It is now understandable why teachers had a tendency to think as if it were always preferable to conduct group work. To avoid such a misconception by teachers, the CPD programmes need to present group work not as the principal mode of lesson but one of the complimentary strategies of teaching.

The above analysis leads us to another important aspect of the lessons observed – the disjuncture of group work in the lesson. Teachers said that they included group work in the lesson as a way of letting pupils explore and discover something. Nevertheless, the way they used group work indicates their lack of understanding. The most obvious example was seen in Aminata's lesson, where group work and the rest of the lesson were separated to the point that group work could be deemed almost irrelevant. In other lessons, teachers followed up the answers produced by groups, but the feedback from teachers was little more than correcting the answers. The remainder of the lesson saw a huge leap from what had been achieved in group work, as will be discussed in the case of Ablaye's lesson in Section 7.5.1. Boubacar also failed to connect the learning of group work to the rest of the lesson although the way he had structured the lesson was appropriate in theory, as discussed in Section 6.4.2. In these two lessons, even though group work was designed to let pupils discover something on their own, what was followed was to present a set of predetermined knowledge. This discrepancy indicates that in spite of the exploratory nature of group work, what teachers valued in the lesson was not the thinking process of pupils, but the fact that particular received knowledge was given to pupils in the end.

Exploratory nature of the lessons was only seen during group work, if at all, in all of the observed lessons, and as soon as group work was finished, teachers reverted to a traditional style of whole-class teaching, where the interaction was tightly controlled

by the teacher. What is worse, the connection between the learning in group work and what was followed was not clear; thereby rendering group work almost meaningless. Analysing this from Bernstein's (2000) concept of framing, the presence of group work did not change the strength of framing because what happened in group work had no influence over the course of the lesson. In sum, all of the teacher-participants treated group work as a kind of special event that had only an obscure connection to the rest of the lesson. It is now understandable why the teacher-participants thought that group work had functioned because whatever happened in group work had little to do with the rest of the lesson for them.

7.5. Dilemmas Faced by Teachers

The research findings show that teachers worked in the environment where they were faced with multiple dilemmas. This section examines the difficult environment under which teachers operate, by analysing the two kinds of dilemmas faced by teachers: 1) the dilemma between the old curriculum of 1979 and CEB and 2) the existing dilemmas that CEB failed to resolve.

7.5.1. Dilemma between the old programme of 1979 and CEB

The curriculum of 1979 was a content-based programme, which emphasised the importance of received knowledge, rather than the capacity to think. CEB, which is based on the competency-based approach, emerged out of the recognition of insufficiency in the old programme. Somewhat strangely, CEB does not define its position in relation to the programme of 1979. On the one hand, it appears to be adopting a contrasting approach, by explicitly basing its premise on constructivism and social constructivism (MEPEM, 2008a). On the other hand, it is widely understood in the Ministry of Education that CEB does not replace the programme of 1979. Indeed, although CEB was disseminated nation-wide by 2012, there is no official document that stipulates the place of CEB in the national education system. This political uncertainty gives an ambiguity of the relationship between the two.

Teachers face a dilemma in the classroom because of the coexistence of the two. Active learning, promoted by CEB, requires a lot of reflection on the part of pupils, but the textbooks, developed for the old curriculum, remain the same and list many terms to cover in the lessons. Ablaye's lesson that started with group work followed by the 13-minute lecture epitomises the difficulties with which teachers are faced. During the lesson observation, his contrasting approaches between the group work and the following lecture perplexed me and made me wonder why he practised the two seemingly contradictory approaches. Later, looking over the textbook and the Guide, his dilemma was evident. CEB asks teachers to teach the theme of respiration just in two lessons, but the textbook expects pupils to be able to explain about the respiration, by using much terminology, including oxygen, carbon dioxide, respiratory system, nasal cavity, trachea, bronchial tubes, lungs, diaphragm, inspiration, and expiration (MEN, 1996). To promote active learning, he wanted to get pupils to explain as much as they could in the first part of the lesson, but as pupils did not raise much of the scientific terminology, he felt obliged to complement the information. Since the time accorded for this lesson is extremely limited, it is no wonder why he decided to lecture the rest. When I asked him about this dilemma, he said that the science programme was very ambitious for the lesson hours accorded. Employing the two contrasting approaches in one lesson was apparently a way of adapting himself to the dilemma created by the introduction of CEB.

The dilemma for teachers is exacerbated by the fact that tests remain linked to the curriculum of 1979 where reproduction of content is privileged; hence, the theory of learning is not coherent between the CEB and the examination system. Several researchers (Lewin & Stuart, 2003; Kelleghan & Greaney, 2003) argue that, in spite of the promotion of learner-centred pedagogy, student examinations in many African countries continue to assess the acquisition of student knowledge, rather than challenging students to reflect on their learning. In case of Senegal, there are two types of examinations in the primary level. First, CFEE, the end-of-primary examination, remains the same. Although the Government recently decided to conduct a reform in

2013[20], the nature of what will be implemented remains to be seen. Second, increasingly many IDENs began to implement the standardised test, or *evaluation standardisée*, to assess the performance of pupils (DeStefano et al., 2009). The "standardised" test is standardised only within an IDEN, and its questions are typically conceived by an ad-hoc committee consisting of selected head teachers within each IDEN. The test questions are supposed to correspond to the needs of assessing a set of pupil competences defined by CEB, but head teachers are not trained to develop test questions at all, let alone the type of questions that measure these new competences. Examining the quality of the standardised tests is outside the purview of this research, but a glance at several tests suggests that, although the way the questions are framed has changed, there is no significant change over the nature of questions. It is no wonder that teachers continue to feel obliged to transmit knowledge to pupils to deal with the needs of these tests.

7.5.2. Existing dilemmas that CEB failed to address

The introduction of CEB also represents a missed opportunity to address the two existing dilemmas with which teachers have been faced: 1) between the curriculum content and the level of pupils, and 2) between the language of instruction and the mother tongue. First, the new curriculum has not been developed, taking account of the actual level of pupils. The previous chapter demonstrated several examples, where teachers seemed to have prepared a lesson without considering the level of the pupils, but this was largely attributed to the dilemma created by the unrealistic expectation of the curriculum. For example, in Boubacar's lesson, pupils were supposed to learn how to construct a cylinder, a specific objective for the fifth grade defined in the Guide (MEPEM, 2008a). However, in the mathematics test that PREMST conducted for 2480 sixth-grade pupils in 2012, only 9% were able to draw a circle of a defined radius with a compass, and only one in four managed to draw a circle at all (PREMST2, 2012a). If most pupils in the sixth grade cannot draw a circle, it is unreasonably difficult for fifth-grade pupils to draw a pattern of a cylinder, let alone constructing a paper cylinder. The

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[20] In the decree 2013-738 of 7 June 2013, it was decided to reform CFEE, but the content of change has yet to be seen besides the subject names.

individual work at the beginning of the lesson demonstrated that most pupils in Boubacar's class were capable of writing a circle with a defined radius. That was quite a feat, which could not be accomplished in a few days, but his lesson indicates that this was not the sufficient prerequisite to conduct this lesson properly. Ablaye also cited the gap between the actual level and the expected level of pupils as one of the major difficulties. A detailed analysis of the curriculum is beyond the scope of this research, but the findings are in line with Prichett and Beatty's (2012) conclusion that one of the reasons for low student performance in Asia and Africa is that curricular pace is much faster the actual pace of learning.

Second, as explained in Section 7.2., the CEB has not addressed the issue of language of instruction. Teachers continue to operate in the environment where French poses as a major difficulty, as Alima highlighted during the interview. It is easy to understand why French is a stumbling block, by observing her lesson of the second grade. Pupils were supposed to learn the concept of the numbers, 80 and 81, in the lesson, but more than fifteen minutes during the lesson were dedicated to teach how to write 80 and 81 in French letters. What confused pupils was that 80, or *quatre-vingts,* required 's' at the end, but 's' must be removed for 81, or *quatre-vingt-et-un*. Teaching French spelling or grammar in a math lesson could easily confuse pupils and hinder their learning of mathematical concepts although she had no choice but to do so in the current setup of the curriculum. These two dilemmas are not the ones created by CEB, but the ones that it could have redressed. Since it did not seize this opportunity, teachers are forced to continue to work with these dilemmas.

7.6. Formative Assessment

What is crucially lacking in the practices of the teacher-participants was attention to the reaction of pupils. As discussed in Section 6.5., when I tried to get them to talk about how individual pupils behaved in the lesson observed, I could not make myself understood to any of them. When I asked about a particular pupil in the lesson observed, their answer was still theoretical as if the lesson had not yet been conducted. Ablaye said that groups giving the right answers was evidence that pupils understood

the lesson. The same was the case for Ibrahima and Alima, who thought that pupils solved the task without problem when they saw that all groups got the right answer. The interviews and the lesson observation indicate that, during group work, their attention was concentrated on the product of groups. When they drew attention to individuals, it was mostly for the surveillance. This reveals a critical aspect of their understanding about teaching. That is, teachers were interested in the products created by the groups, but not necessarily the learning process of pupils.

This section analyses how CPD programmes, especially the PREMST, influence the understanding of teachers about teaching from three fronts. The first is how CPD programmes ask teachers to assess pupils' learning during the lesson. The second is how the way CPD programmes evaluate a lesson influences the priorities of teachers in teaching. The third is how the National Trainers think about formative assessment. This section finishes, by showing the elements that can be learned from a living example of the practice of formative assessment in Japan.

7.6.1. CPD programmes and assessment of learning

PREMST developed a module on the assessment of competence. The module stresses the importance of assessing competence, as opposed to a simple acquisition of knowledge. It explains how to formulate the questions to assess the competence, how to evaluate the answers of pupils, and how to take measures of remediation (PREMST, 2009b). These are a set of skills required by CEB. Teachers are now asked to frame questions in a context in which a competence is required to be activated. The assessment is no longer about simply marking correct or incorrect, but teachers are required to give a score according to a set of assessment criteria. These are no doubt useful skills to implement CEB in the classroom. The way Alima and Ibrahima framed questions for group work conforms to the instruction of the module. Ibrahima assessed the answers, following a set of criteria. Nevertheless, as described in Section 6.5., even though Ibrahima followed the instruction of the module with regard to formulating the assessment questions and assessing the answers, the result at the assessment phase was not what he had expected. The fact that the assessment results surprised him is an indication of his lack of engagement with formative assessment.

The module in question refers to formative assessment as a type of assessment which it defines as the following:

> It allows (teachers) to observe the effect of learning situations. Formative assessment is a teaching/learning tool that gives information on strategies used in the process of teaching/learning (PREMST, 2009b, p.4).

There is no universally accepted definition of formative assessment, but the above is a good definition that can be used as a working definition for the sake of this research. Hargreaves (2005) found two distinctive conceptions of learning that underpin the understanding of formative assessment, by examining how teachers defined the terminology. According to this conceptualisation, formative assessment defined by PREMST can be categorised as an inquiry tool to improve teaching or learning, as opposed to assessment as a measurement of performance. Pryor and Crossouard (2010, p.266) identify four purposes of formative assessment: completing the task in hand, thinking about improvement, making sense of criteria and invoking learner identities. The formative assessment advocated by PREMST seems to aim for the first two purposes according to this classification.

In theory, how it is defined is critical to the practice of teachers because the definition is informed by a theory of learning, which defines how teachers think about teaching. In practice, the definition is hardly relevant in this case because the above module only defines the term without any further explanation and does not explain how this should be applied in the classroom. The Guide asks teachers to conduct formative assessment during the lesson, but it does not explain it in a concrete manner, either. If teachers did not pay attention to pupils activities, it is because they did not understand why they should do so. The CPD programmes have not provided the necessary support to help them practise formative assessment.

7.6.2. Evaluation of lessons and teaching practices

PREMST uses a standardised lesson observation sheet to evaluate a lesson.[21] This is a type of systematic observation procedures, in which the observer analyses

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[21] This sheet has been shared with teachers so as to help them clarify what to observe in the evaluation of lessons.

aspects of classroom activities "through the use of a predetermined set of categories" (McIntyre & Macleod, 1993, p.10). How lessons are evaluated informs us of the priorities of the project, which in turn affects the priorities of teachers. There are many versions of observation sheets over the course of five years, but all are relatively similar, listing approximately 30 indicators. In all versions, the majority of indicators are concerned about how the lesson was prepared and how it was taught. Few are concerned about how pupils have learned during the lesson. The indicators regarding pupils increased to nine in the latest version revised in 2011[22], but the majority of them are still concerned about how pupils participated in different parts of the lesson. True, these indicators are subject to the interpretation of users, and some may relate these indicators to the learning of pupils, but, on the contrary, a superficial interpretation of indicators may be more common in practice. To take the example of the indicator, "3.5. quality of products (produced by pupils)," this is directly concerned with the learning of pupils. In the lessons like those of Alima, Ibrahima, or Ablaye, where group work is preceded by individual work, it is important to look at the answers given by each pupil to assess their varied level of understanding, but all of them only looked at the product of groups, not of individuals. In this case, they would probably feel that they did well on this indicator as long as all group products were of good quality regardless of what individual pupils produced. Thus, insufficient understanding of indicators may be an exacerbating factor that promotes a superficial practice.

On the whole, the observation sheet stresses the details of the lesson, rather than examining what pupils learned. If the observation sheet symbolises the priorities of PREMST, there is little wonder that teachers are preoccupied with the procedural aspects of lessons. When teachers take pains with the details, it is easy to forget what is more important in the lesson – the learning of pupils. The observation sheet could also give the false impression to teachers as if pupils learned well as long as the aspects listed in the sheet were assured. If that is the case, teachers may not even find it necessary to look at how each pupil learns during the lesson.

The emphasis on detailed behaviours in the lesson observation reveals a discrepancy between the rhetoric and its practice. PREMST, as well as CEB, is

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[22] See Appendix IV.

premised on social constructivism, but, the methodology used for the evaluation of lesson is based on the behaviourist assumptions that learning is relatively straightforward response to the stimulus of teaching. PREMST recognises the thinking of pupils as a crucial learning process, but it does not explain how to take account of their thinking in the assessment of learning. True, the observation sheet cannot easily incorporate this aspect because the thinking as such is not observable. Conversely, even if the thinking is not directly observable, one could infer it, by looking at what pupils wrote or said. However, as in the above example of "quality of product," the indicators are too vague to be meaningful in order to assess the thinking.

In addition, the lesson evaluation is conducted solely by observing a lesson without discussing it with teachers. Stuart et al. (2009) stress the importance of evaluating teacher learning according to the underlying theory of learning. For example, if a CPD model is based on constructivist theory, teacher learning cannot be measured by simply observing teacher behaviour because reflection, which cannot be observed, is an integral part of teacher learning. Evaluating a lesson based on social constructivism without assessing the thinking of teachers signifies a methodological flaw.

The way PREMST evaluates a lesson encourages teachers to prepare and conduct a lesson in a particular manner. In contrast, it does not stress the importance of the thinking in the assessment of pupils' learning. As a consequence, teachers are preoccupied with whether they have taught the lesson "correctly" according to the ASEI approach, rather than taking care of the learning of pupils.

Finally, it should be noted that the attention to the pupils both individually and collectively is essential regardless of the theory of learning on which the teaching is based. The above argument is that teachers should pay greater attention to the thinking of pupils because thinking constitutes the central part of the learning process in constructivist teaching. Since the pedagogy that CEB/PREMST advocates is premised on constructivist teaching at least in rhetoric, this argument is valid. However, even if the teaching is premised on behaviourist theory, it is essential that teachers take care that each pupil understands every step of learning before progressing to the next steps.

7.6.3. Formative assessment – theory and practice

The module on the assessment of competence was revised in 2012 although it had not yet been shared with the teachers at the time of the field research. With my insistence as its Technical Advisor, the National Trainers of PREMST2 added an explanation of formative assessment as well as the examples of practice in the module with a view to connect the theory to the practice. The revised module articulates the theoretical foundation of formative assessment well, and different types of assessment are explained with some examples (PREMST2, 2012c). It is a clear improvement from the previous module, but the way it was modified gives us an insight about how the National Trainers understand formative assessment.

The revised module explains what formative assessment is by clarifying that formative assessment is an integral part of teaching (PREMST2, 2012c). In line with the tradition of Francophone research that broadened the concept of formative assessment, it explains the concept of regulation, which incorporates feedback and adaptation, by distinguishing three modalities of regulation presented by Allal (1979, 1988, cited on p.245, in Allal & Lopez 2005): interactive, retroactive, and proactive regulations. The examples depicted in the module, however, are unlikely to help teachers because many of them are not easily practicable. For instance, the module describes an example of self-assessment by pupils to assess their own learning. This is a good way of understanding the thinking of pupils, and some researchers (Black & Wiliam 1998b; Torrance & Pryor 1998) even argue that it is necessary in order for formative assessment to be productive. Nevertheless, self-assessment is very difficult to practise in the beginning because pupils often do not know what is expected of their learning and initially would have little idea what to write. In the context of Senegal, where pupils have difficulties in writing their opinion in French, the hurdle would be extraordinary. Most teachers would struggle to practise it in their classroom unless concrete guidance were given so as to develop the capacities of pupils little by little. Yet, the module describes this example as if pupils could readily give an appreciation of their learning if a teacher distributes a self-assessment sheet.

This example could be said to incorporate one of "the best practices" of formative assessment, but it may be too detached from the reality to be practised in the

classroom immediately. If the reality is too far apart from the context under which the best practice can be carried out, teachers need to be shown a way forward to realise the practice progressively. This example indicates that the National Trainers are also not clear about how the theory can be applied in the context of Senegalese classrooms.

7.6.4. Learning from the existing practice of formative assessment

Formative assessment sounds good in theory, but it is found to be very difficult to put it into practice in the actual lessons not only in Senegal but also in the industrialised countries. The review of formative assessment conducted by Black and Wiliam (1998a) shows how poor the existing practice of formative assessment was at the time they conducted the review. There is no easy way to improve its practice, but the improvement may be made feasible, by learning from a living example of the CPD programme that incorporates an aspect of formative assessment. A successful case is found in Japan.

Formative assessment is the core of the Japanese CPD programme even though it barely mentions formative assessment as such. Japanese teachers are constantly asked to perform a practice called, *mitori*, or look and grasp. Although *mitori* is a well-established practice, as far as I am aware, it is not academically conceptualised in the literature even in Japan. Accepting that there could be diverse interpretations of what it entails as the practice varies according to the locality, *mitori* can be said to be a concrete method of conducting formative assessment, by looking at each pupil carefully to attempt to understand the thinking of pupils. This practice permits the Japanese teachers to infer the varied level of understanding of individual pupils without conducting tests. Most novice teachers initially find it difficult to accord attention to every pupil in the classroom, so they often conduct *mitori*, by using a classroom map which shows the seat of every pupil. Teachers infer the thinking of pupils, by looking at the writing or product of each pupil and taking a note during individual work, for instance.[23] If they identify the common difficulties with which several pupils are faced, they conceive a

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[23] Strictly speaking, the particular practice of circulating in a classroom, often with a classroom map, is called *kikan shido*, or instruction at students' desk (Shimizu, 1999). *Mitori* is a broader concept that encompasses all practices of looking and grasping pupils, including k*ikan shido*.

strategy to be adopted for the next phase of the lesson based on this information. At the same time, they also look for pupils who have interesting ideas with a view to calling onto them in the subsequent whole-class discussion (Shimizu, 1999). Thus, *mitori* is not simply about looking and grasping but also thinking about the strategy of the next phase of lesson according to the information collected.

Mitori makes formative assessment more accessible to teachers, by showing a concrete way of doing it. Japanese teachers are trained to conduct *mitori* through the CPD programme as they are constantly reminded of how they performed it through lesson study, where the understanding or the thinking of particular pupils is often raised as an issue during the discussion sessions. As they gain experience, many stop using a classroom map and start cultivating their own way of conducting *mitori*. What is important is that the Japanese teachers recognise that they need to keep improving the practice throughout their career because there is no one correct way of doing it. The lesson study as a continuous model of CPD programme in Japan gives an appropriate platform whereby they keep reminding themselves of their practice.

When I shared the concept of *mitori* with the National Trainers of PREMST as its Technical Advisor, they mostly said that it was not possible to assess the learning of individual pupils in an overcrowded Senegalese classroom, though one of them said that teachers usually conducted this kind of practice, considering the difficult context under which they operate. If inspectors feel this way, teachers would probably feel the same. When I shared the findings of this research to the teacher-participants and pointed out that they had not paid attention to the learning of pupils, none defended themselves. They were perhaps too polite. It is difficult to say what they actually thought about my findings, but it is not surprising if they thought that what I pointed out was somebody else's problem, not theirs, because all of them circulated in the classroom and physically looked at pupils during the lesson. Since the practice is conducted at least at a superficial level, teachers may not feel it necessary to do more than what they already do. This is all the more so if they believe that a lesson can be conducted "correctly," by following a particular procedure without paying particular attention to the learning of pupils.

The practice of *mitori* is ingrained with the Japanese culture, and it would be difficult to be adopted in Senegal. My intention is not to advocate its adoption but to show that there are at least three elements that can be learned from this practice. First, teachers need to recognise that the current practice does not assess the learning of pupils in a satisfactory manner. As discussed above, since virtually all teachers physically look at pupils, it is easy to misunderstand as if they assessed the learning of pupils. My interviews revealed that the teacher-participants were not used to talking about individual pupils, and none of them showed the awareness that they should pay greater attention to pupils' learning. In contrast, Japanese teachers are constantly asked about the learning of particular pupils in lesson study, and it forces them to realise that they had not paid enough attention.

Second, for the assessment of learning to function formatively, the information collected must be used to improve learning (Black & Wiliam, 1998b). Another piece of evidence collected in this research regarding a lack of formative assessment is the rigidity of the pre-planned lesson plan; the observed lessons followed the lesson plan regardless of the reaction of pupils. In other words, even if teachers had assessed the learning of pupils, the assessment was not of formative nature. The fact that teachers did little but circulate around the classroom during the individual as well as group work shows that teachers do not know what to look and do not think about connecting the answers of pupils to the subsequent strategies of the lesson. If changing the course of lesson from the lesson plan is encouraged, teachers may give more attention to the actual needs of pupils.

Third, cultivating the practice of formative assessment requires a long-term effort. The practice of assessing the learning and connecting the information collected to the teaching cannot be explained as a set of skills or procedures; therefore, it cannot be dealt with in a one-off training session. Even in Japan, even though the importance of *mitori* is undisputed, there is no clear-cut answer to what to look or how to look at the pupils (Kusano & Shoji, 1996). Instead, the practice can only be improved gradually, by cultivating the practice of explaining about the learning of particular pupils and the subsequent teaching strategies.

Chapter 8: Conclusion

This research has examined how some of the teachers who are considered to be good practitioners have changed their teaching practice as a result of participating in the CPD programmes from three perspectives. The analysis was done on how teachers understood teaching, how they have applied the pedagogical change in the classroom, and finally how the CPD programmes have affected their understanding about teaching and their teaching practice. This concluding chapter first discusses the research questions and clarifies the claim to knowledge. The second section examines the policy implication of the findings in relation to the Ministry of Education as a whole and in relation to PREMST in particular. Finally, the third section provides a final reflection, upon finishing to write this thesis.

8.1. Teaching Methods and Pedagogy

8.1.1. Teachers' understanding of teaching

I have first analysed the first two sub-questions of this research: 1) how do these teachers represent their understandings of their practice of teaching?; and 2) how have these understandings changed? Teacher-participants were able to explain the shift in philosophy as a result of the introduction of PREMST/CEB, but their explanation on the application in the classroom was vague. In the interviews, their depiction about teaching was mostly about the procedures, as discussed in Chapter 5. They regarded the ASEI approach as a means of organising a lesson in a particular manner. Their account of lessons changed little even after they had conducted a lesson and talked about the very lesson they had conducted. In the interviews after the lesson, all of them were satisfied overall with the way the lesson had gone. On closer examination, most of their description was what could have been described before the lesson. The fact that teacher-participants thought that the lesson was a success without citing evidence about the learning of pupils indicates that they were more inclined to think about how the lesson was organised, rather than how the pupils learned.

The findings also revealed that teachers were interested in the products created by pupils, especially by groups, but not necessarily the learning process of pupils. They regarded teaching as something to be delivered to pupils, instead of something to be constructed through the interaction with pupils. This explains why they paid more attention to the results than the process of learning. Their understanding about teaching has not changed after they participated in CPD programmes. Hence, when a new approach like the ASEI was introduced, they felt confident to apply it as soon as they mastered the procedural aspects regardless of the actual learning of pupils.

8.1.2. Teaching practice and the learning of pupils

I have then analysed the third sub-question: to what extent do the pedagogical changes realised in the classroom help pupils learn better? The analysis in Chapter 6 has revealed that their teaching has been changed after the introduction of PREMST/CEB. The lessons were better structured around a lesson objective. Group work has become the principal mode of lesson. The behaviours of teachers have also been changed to some extent in that they made efforts to involve pupils. These changes seemed to motivate pupils, evidenced by the fact that pupils were enthusiastic about participating in the lesson. It should be repeated that the teacher-participants were selected from those who were considered good by the inspectors, and the lessons observed in this research were not typical ones but are likely to be well-prepared ones. Nonetheless, considering that teachers have gone through only 60 hours of PREMST training and 42 hours of CEB training over the course of last four years, what was attained for a relatively small input is not negligible.

At the same time, the findings showed that the changes that have been brought were not enough to achieve a substantially improved learning of pupils. The structure of lessons was standardised, but this did not always bring a better focus in the lesson. The observed lessons were overambitious in terms of the number of activities as well as the lesson objective. Teachers made efforts to interact with pupils, but the nature of the interaction was often too superficial to deepen the learning. They were conscious about helping weaker pupils but merely drawing attention to the errors of a pupil would not help the learning. Pupils participated in group work activities with enthusiasm, but the

analysis showed that even a seemingly functioning group work did not induce much discussion even though some collective learning was identified to take place. Moreover, what was attained in group work was not connected to the remainder of the lesson in a way that would help the learning of pupils. Finally, the main shortcoming was that teachers did not assess the learning in a productive manner. In each act of teaching practices, formative assessment was lacking, rendering the practice meaningless in terms of learning activities. In sum, the application of the new approach remains superficial because teachers applied the teaching practices as a set of procedures without taking into account the understanding of pupils. This supports the findings of Chapter 5, where teachers were found to understand teaching in terms of procedures.

8.1.3. Teaching methods and pedagogy

The above findings led me to question why teachers had changed the practice the way they had done. This brings me to examine the core research question: how have the teaching practices of teachers who are recognised as successful changed as a result of participating in the PREMST CPD programme? My central claim to knowledge is that the teacher-participants have changed their practices in terms of teaching methods used in the classroom, but that the change in pedagogy has remained minimal because they have not understood the underlying premise of the new pedagogy. They understood pedagogy in terms of the procedures carried out by teachers rather than as something that engaged the pupils in learning. For them, PREMST had introduced new procedures, which they were now delivering, rather than challenging them to pay greater attention to the learning of pupils through these different methods.

Chapter 7 showed that the teaching practices that have been changed and have not been changed correspond well with what the CPD programmes convey. Teachers have been able to make the most of training because the way training was conducted was well-integrated with their learning mechanism, as shown in Chapter 5. The emphasis of PREMST on a particular procedure to conduct a lesson means that teachers were clear about what to follow and had made a number of improvements in terms of organising a lesson. In contrast, many aspects of learner-centred teaching remain theoretical in the modules, and probably in the training, leaving the daunting task of

connecting the theory to the practice almost entirely to the teachers. When teachers only learned the theory, their understanding tended to be too shallow to bring meaningful change as is shown in the examples of error analysis or group work. Partly because of the weight given by PREMST, when they reflected upon teaching, their thinking tended to go towards the procedures, not the learning of pupils. It is only normal that teachers were more preoccupied with how they taught than how pupils learned during the lesson. That is, apparent emphasis on a particular modality of lesson, especially an eye-catching practice like group work, drew attention away from what is more important – learning of pupils – as if adopting a desired practice guaranteed desired teaching.

The case studies of the five teacher-participants elucidate the reason why there seems to be contrasting conclusions between the evaluations of PREMST and the literature review shown in Chapter 2. On the one hand, the case studies confirm that PREMST achieved what it had intended – changing the teaching practices of teachers. On the other hand, the findings with regard to the difficulties of changing their teaching practices echo what the literature review predicted. Indeed, the findings seem to support that teachers simply adopted "forms" of pedagogy, as other researchers in Sub-Saharan Africa point out. In conclusion, however, I argue that the reality is more complicated. What teachers appreciated the most from PREMST was that it gave a clear indication about specific skills or concrete ways of practising the new approach. Without these, teachers would not have been able even to try what they were asked to do. When teachers had understood and accepted a certain theory, they changed the aspects where they were shown what that meant in practice. In other words, given the difficulties involved in pedagogical change, giving accent to specific skills may have been the necessary and practical first step towards a greater change in the future.

This is similar to what Zeichner & Ndimande (2008) found in Namibia. Even though PREMST/CEB ask teachers to adopt social constructivist teaching, what teachers applied in the classroom was a kind of what O'Sullivan (2004, p.599) called an "adaptive" version. They struggled to make sense of the new practices whose underlying rationale they did not fully understand. Moreover, a gap between the theory and the practice was too great to be overcome by a personal initiative of individual teachers under the current condition. The CPD programmes, instead of helping teachers

to deal with the existing dilemmas, have ignored some of the crucial issues like the appropriateness of curriculum and the language of instruction. In effect, the CPD programmes are asking individual teachers to fill the gap themselves after receiving training. This thesis supports the conclusion of O'Sullivan (2004) and Vavrus (2009) that social constructivist pedagogy is almost impracticable in its pure form in the present context of Senegal. Teachers like Ablaye or Boubacar have not been able to practise exactly what PREMST/CEB asked them to do, but they thought about teaching in a context in which multiple dilemmas existed, and it could be argued that they used the mixture of pedagogies that they thought help the learning of pupils although the choice of pedagogies was not necessarily appropriate, as the previous chapter examined. Although the methodology of this research does not permit me to assess whether their adapted version of ASEI approach contributed to the improved learning of pupils, what they have demonstrated cannot be dismissed as a mere adoption of "forms" of pedagogy. Thus, this research contributes to filling the knowledge gap between the project evaluations by the practitioners and the existing literature by the academic researchers, by providing what Geertz (1973, p.6) calls, a "thick description" of teaching practices of teachers to show the nuanced understanding of the pedagogical change.

If pedagogical improvement with emphasis on specific skills is regarded as the first step, it proved effective at least for certain teachers. However, because of this emphasis, PREMST has not been able to challenge teachers to rethink the way they teach. This research supports Akyeampong et al. (2011, p.54) that found that teachers regarded PREMST as "providing good ideas which they could graft onto current practices rather than enabling them to reframe their teaching with greater focus on pupil learning." Unless they realise that their present manner of teaching does not enable the learning of pupils in a sufficient manner, their change is likely to remain at the level of teaching methods, not the pedagogy which incorporates the theories of learning and assumptions behind the practices. Going back to the purpose of the research, my other claim to knowledge is that this thesis identified the next step for PREMST, namely to redirect the focus of teachers from the teaching procedures to the learning of pupils, by asking them to pay attention to what pupils say or write during the lesson. This does not mean that PREMST should direct teachers to adopt social constructivist pedagogy, but it

means that it should encourage teachers to find their own "optimal mix" of pedagogies that meet the needs arisen from their context (Guskey, 1995, p.117).

The findings have wider implications than simply in the context of Senegal. As a collective case study of teachers who had undergone CPD aimed at transforming their teaching, it suggests that this may be fruitless unless it succeeds in changing the way they conceptualise pedagogy. As is examined in the literature review, many countries face similar challenges as they seek to transform teaching and learning. Some of these countries can learn from the experience of Senegal.

8.1.4. Methodological implication of evaluating pedagogical practices

This research also showed that the knowledge gap between the practitioners and the academic researchers derived from different research methods that each party favoured. Both accounts carried a reality viewed from a different standpoint. This case study showed how both of the seemingly contradictory accounts could be simultaneously "correct" because of the difference in the methodologies employed.

On the one hand, the project evaluations reported optimistic accounts of pedagogical change. These evaluations were mostly funded by JICA to evaluate the effectiveness of its intervention. Conducting the evaluations this way might affect the conclusion of the research because of the vested interests even if JICA does not wish to influence its outcome (Bryman, 2008). Such effects may appear not necessarily because of the bias of the evaluators but because of the choice of the evaluation methods. Even though JICA had not specified any particular evaluation methods, the nature of commissioned evaluations means that the evaluators are expected to measure the degree of effects as a result of the intervention, resulting in seeking quantifiable data. Systematic observation is appropriate to discover to what extent certain innovations in the teaching practices have been taken place because this method enables researchers to generalise the findings to the population as a whole with the aid of statistical analysis (McIntyre & Macleod, 1993). However, as discussed in Section 7.6.2. it has limitations as a means to evaluate pedagogical change. In short, the evaluations focused on the observable practices, but visible practices carry only a part of pedagogy. Alexander

(2008a) warns that defining pedagogical quality in terms of what can be measured quantifiably results in missing the large part of what pedagogy entails, and this research illuminated how this was actually the case. As this research demonstrated, the project evaluations overestimated the changes that had been taken place because its method measured mostly the observable practices of teaching, the procedures, without taking account of the learning of pupils.

On the other hand, the academic literature is extremely pessimistic about changing pedagogical practices for diverse reasons, as discussed in Chapter 2. There is a shortage of classroom-based research, especially that which uses lesson observation, in the context of developing countries (O'Sullivan, 2005). In the relatively few existing classroom-based research projects, the researchers usually combined interviews and lesson observation to triangulate the findings. Researchers point to the gap between the self-perception of the teachers on their own classroom practices and the perception of the observers; teachers tend to give an account of a more progressive approach than did the observation (Hardman et al. 2008; O'Sullivan 2001). These research accounts have brought important contributions to understanding what was happening in the classroom, but little research has been conducted to understand why teachers changed or did not change the teaching practices in the ways they did from the perspective of teachers. This results in too pessimistic an account of pedagogical change to be useful for the practitioners.

In this sense, this research contributes to the methodological innovation, by filling a gap between the two contrasting methodological approaches taken by the practitioners and the academic researchers. It not only combined the lesson observation with interviews to understand the teaching practices beyond what is observable but also synchronised these two methods by using a forensic interview. I had initially hoped that teachers might be able to interpret pedagogical practices differently from how I interpreted them. In actuality, I had a difficult time in getting the viewpoints of teachers even when I watched a particular scene of the lesson with them and asked about the particular practice shown in the film, as described in Section 6.5. This itself was a significant finding because it showed what teachers valued and therefore paid attention to – the procedural or technical aspects of lesson, was very different from what I valued

– the learning of pupils. In most existing classroom-based research, interviews are conducted separately from lesson observation before or after the lesson observation, and the researcher often finds the interviews least useful because what teachers said in the interviews does not correspond to what they actually did in the classroom (O'Sullivan, 2001). In contrast, this research shows that teachers may have said something different from what they actually did, not necessarily because they wanted to show off, but because they understood the questions differently. For example, when I asked them about group work, what I had always in mind was how pupils learned, but teachers tended to understand the questions in terms of procedures and answered accordingly. In other words, interviews might not produce helpful data if the interviews were conducted without noticing that the interviewer and the interviewee started from different assumptions. Watching particular parts of the lesson and discussing the pedagogical practices in a concrete fashion during the forensic interviews made me realise that teachers looked at their lesson differently. The synchronised process of the two methods – interview and lesson observation - allowed me to understand better how they understood pedagogy. Thus, this research demonstrated the potential of an innovative method to allow teachers to express their viewpoints in a different manner.

8.2. Policy Implications

8.2.1. Implication for the Ministry of Education

The research has identified several problems that the Ministry of Education should address in order to improve the quality of teaching because teachers operate in a difficult environment that no CPD programme can resolve by itself. First, the issues around the CEB require an urgent attention. The transition period from the old curriculum to the CEB means that some of the problems that were highlighted in this research are well recognised by the Ministry. Namely, the place of CEB in the education system should be defined in the official text; the Guide should be revised, based on the feedback from the teachers; the textbooks, the examination system, and the curriculum of initial teacher education should all be overhauled to make the whole curriculum coherent. Two other problems identified in this thesis may not be recognised as a

problem to be dealt with by the Ministry, but they are equally important. The first issue is the weekly schedule. Although the scope of this thesis did not allow me to analyse in detail, learning an excessive number of topics simultaneously is unlikely to be effective especially for the lower-grade pupils who first need to learn French. The second issue is the level of curriculum. The curriculum expectation is excessively high for the actual level of pupils. This thesis has shown how difficult it was to implement the programme required by the CEB even if teachers made serious efforts. As Pritchett & Beatty (2012) argue, the discrepancy between the level of pupils and the curricular pace produces an unproductive system. Both issues would be difficult to tackle, but they deserve the attention of the policy makers.

Second, the thesis has elucidated the difficulties of teaching in French. The findings have shown a vicious circle of pupils being unable to express themselves well enough in French to have meaningful dialogue and this compelled teachers to adjust the discourse, resulting in denying the opportunities for pupils to practise this kind of dialogue. Without resolving the issue of language, any curriculum or CPD programmes that aim at improving teaching will continue to be severely handicapped. This study suggests that French as the sole language of instruction should be reconsidered in favour of introduction of national languages. The latest education policy documents (République du Sénégal, 2013b; République du Sénégal, 2013a) acknowledge the necessity of exploring the possibilities of using the national languages for the lower grade and aim to develop a national language policy. This is a right step forward, but this thesis suggests that the problem of the language is not limited to the lower grade, but the level of French of upper-grade pupils is far from sufficient to permit meaningful dialogue. This study points to the necessity of using of national languages beyond the first three years of schooling, as is supported by other authors in Africa (Alidou & Brock-Utne, 2011a).

Diagne (2012) reports that experimentation in the use of national languages in primary school in Senegal has not gone beyond the pilot phase owing to the lack of political will and insufficient financial resources. This indicates a difficulty in changing the language of instruction. If changing the official language of instruction is too problematic, the Ministry should consider an alternative means of helping teachers in

the shorter-term. For example, code-switching could be encouraged as one of the teaching methods. Admittedly, allowing code-switching officially would certainly be controversial, but various studies, including some in Senegal (Heugh, 2011; Mbaye et al., 2011) find that teachers use it in reality even though official policies discourage its use. At the moment, they do it as an act of desperation to unblock the incomprehension of pupils, not as a teaching strategy that promotes learning. However, it has a potential to play an important role in improving the interaction between the teacher and pupils, by facilitating meaningful dialogue (Hardman et al., 2009; Alidou & Brock-Utne, 2011b). If the Ministry determines an alternative means of coping with the language issue, CPD programmes like PREMST could play an important role to help teachers use it.

8.2.2. Implications for PREMST

This thesis gives us two seemingly contrasting messages on the problems that PREMST needs to address in order to improve the quality of teaching beyond what was already achieved. On the one hand, it points to the necessity of more concrete guidance on two major aspects of teaching as teachers have difficulties in connecting the theory to the practice in the classroom. The first aspect is the guidance on the lesson preparation. Teachers may understand the importance of setting an appropriate lesson objective or providing an appropriate assignment for pupils, but as noted in Section 7.1., the Guide is not specific enough to permit teachers to understand the intention of the curriculum for each unit of learning. Developing quality textbooks, as currently planned, would help, but a supplementary handbook for each subject that explains in detail the objectives of each unit would be essential to help teachers better prepare the lessons. CPD programmes like PREMST could consider developing such handbooks and provide training so as to help teachers implement the curriculum better. The second is the guidance on group work. It is first necessary to change the way PREMST presents group work so that teachers may understand that the fact that pupils are engaged with the learning process is what is important in group work, not the fact that groups produce assessable products. Once teachers understand the principle behind group work better, PREMST should give more specific guidance to help them realise the better functioning of group, by showing them the roles of teachers in its development. More importantly,

PREMST should make clear to teachers that group work is only one of the many teaching strategies. Group work should only be employed when the assignment demands collective discussion or collaborative work. Stressing the importance of diversifying the teaching strategies according to the lesson objective, instead of relying on a particular teaching method, would help teachers understand that no single teaching method can be a panacea. Besides these two aspects, this thesis revealed that teachers needed more specific guidance on various pedagogical practices, including how to promote dialogue with pupils, how to use errors of pupils to help their learning, and how to conduct formative assessment.

The thesis showed that PREMST failed to provide a great deal of necessary guidance, but, paradoxically, it also shed light on the limitations of any prescriptive guidance that CPD programmes could offer. No matter how detailed guidance becomes, it can never be specific enough for the context of each teacher. This is most evident in the example of formative assessment, which cannot be explained as a set of techniques. Therefore, it is essential that each teacher learns to reflect on their teaching, by connecting the guidance to their practice. This thesis suggests the necessity for PREMST to show teachers what is meant by the learner-centred pedagogy differently. The current emphasis seems to reduce pedagogy to a mere set of particular teaching methods, leading teachers to think about teaching in terms of procedure, but the emphasis should be shifted from the procedural aspects to the learning of pupils.

A recently initiated lesson-study model of training gives a great opportunity for PREMST to shift its focus because lesson study, if implemented well, compels teachers to reflect upon their teaching practice. Although Verspoor and Leno (1986) may doubt that it would function in Senegal, this research showed that at least some teachers were capable of operating as reflective practitioners, trying to connect what they learned to their context, although their present manner of reflection tended to be focused on the procedures. What they need is concrete examples of application of theory in the context relevant to them. Encouragingly, the findings of Chapter 5 indicate that where the three types of support for teachers function, good practices could be disseminated among the teachers in the same school. In these functioning schools, having something concrete to try out gives teachers a motivation to improve their practice because of a prospect of

showing their efforts to their colleagues. A living example of formative assessment just like *mitori* in Japan would be extremely helpful for the Senegalese teachers. That means that identifying Senegalese teachers whose understanding and skills in formative assessment is good could become a powerful tool for improving the practice of their colleagues if they are given an opportunity to show and discuss their practice in the lesson-study sessions.

The two contrasting findings, the necessity of concrete guidance and the limitation of such guidance, are in the end not contradictory. This thesis revealed that the gap between the current guidance and the current practice was too large to be filled by any individual. Concrete guidance exemplified by the proposed handbooks above would help teachers fill the gap, but that alone is unlikely to be sufficient because many of them may not have clear enough understanding to be able to relate it to their own teaching. In that case, such handbooks could become a valuable tool if they are used for identifying the important points to discuss in the lesson-study sessions. Similarly, giving more specific guidance on other pedagogical practices would help giving a better focus in the discussions. In this way, PREMST should deal with these two contrasting problems simultaneously to meet the needs of teachers.

As stated in the introduction, there is a dearth of studies that analyse the teaching practices of teachers in the challenging contexts of lower-income countries. In this sense, the detailed analysis provided in this thesis can provide a significant contribution to the active knowledge that is useful for the practitioners. Indeed, what I have learned by writing this thesis is already in the process of being incorporated in the activities of PREMST2. As its Technical Advisor, I am in a fortunate position to have some influence on the course of actions taken by the Project. Not all issues can be dealt with in the short-term, but some of the above issues have already started being addressed, and the latest efforts of PREMST2 are described in detail in Postscript Chapter. The research concludes that the newly adopted model shows considerable potential to build on what has already achieved if it is organised in a way that gives an occasion for teachers to cultivate the practice of explaining about the learning of particular pupils and linking this to their teaching strategies.

8.3. Reflection

8.3.1. Reflection on methodological aspects

This research had many shortcomings not least because this endeavour turned out my own learning process in terms of assessing lessons in particular. In retrospect, I feel that I should have had paid more attention to three aspects. The first is what teachers used to do and how their old practices were integrated into their new practice. For example, the memorisation as a learning strategy, mentioned in Section 6.5.2., has a precarious status as a result of the introduction of PREMST/CEB, and this thesis only found that teachers mixed these old practices with the new ones. However, the mixture of different pedagogical strategies, even based on different premises, can be effective if it is applied strategically. Mayer (2004) insists upon the importance of having a good balance between discovery learning and systematic guidance. From my personal experience, Japanese teaching appears based on social constructivism, but it also stresses the importance of repetitive practices like drill exercises, premised on behaviourist assumptions. The coexistence of contrasting pedagogies seems to promote learning better in Japan whereas this thesis indicates otherwise in Senegal. This issue could have been better analysed if I had questioned how teachers regarded their old practice as a part of their current teaching strategies.

The second aspect that I could have explored more is teacher identity. Considering the specific focus on the particular CPD programmes and my available time, I had decided not to extend the scope of my research to teacher identity and had restricted myself only to ask about the roles of teachers. Nonetheless, with hindsight, I could have gone further to understand what it means to be a teacher for them. That could have permitted me to understand better, for instance, why teacher-participants had uncritically accepted the new teaching methods introduced by PREMST or the objectives set by the CEB.

These two aspects of limitations derive from the fact that the whole idea of this research started from what PREMST/CEB provided to teachers. Even though I had attempted to understand the viewpoints of teachers, my concern had always evolved around how teachers had changed as a result of participating in the CPD programmes,

as specified in my research question. This resulted in a somewhat restricted understanding of teachers viewpoints about teaching. The research might have brought further insights if I had explored teachers' understanding about teaching more freely without worrying about its relation to the CPD programmes.

The third aspect is the focus on pupils. This research did not take account of the viewpoints of pupils because of its focus on teachers. Also, from my professional experience, I had judged that it would be too difficult for me to gain meaningful perspectives of pupils because of the language barrier and my identity as a foreigner. Nevertheless, this resulted in my lack of attention to the intentions of pupils. This research concluded that teachers should pay more attention to the learning of pupils, by listening to what pupils say, but the fact that the research design omitted pupils implies that I had not given sufficient importance to what pupils have to say. No matter how difficult it might be, investigating how pupils perceived the purported change of pedagogical practice would have greatly enriched the findings of the research.

8.3.2. Reflection for Further Research

The research has illuminated the needs for further study in at least two areas. First, it has shed light on the importance of the dilemmas overlooked by PREMST/CEB – the language of instruction and the appropriateness of curriculum. The research has only unravelled the difficulties and provided no solution. Further research is necessary to investigate ways which might help teachers overcome these difficulties. Second, the research highlighted the critical importance of formative assessment as well as the attention to the pupils. It is expected that teachers find it difficult to discuss the pedagogical issues in a way that draws attention to the learning of individual pupils in the recently initiated lesson-study sessions. The challenge for PREMST is to redirect the orientation of discussions in these sessions from the superficial features of teaching to the learning process of pupils. Further research is necessary in the near future to assess whether this model of training can really contribute to the improvement of the learning of pupils.

9. Postscript: Challenge of PREMST

The activities of PREMST2 evolved at the same time as my research progressed. Changes may be attributed to the project activities that intended to develop the capacities of National Trainers during this period. However, the writing of this thesis and the conclusions of this research are also relevant, and I, as its Technical Advisor, had some influence on its realisation. This Postscript Chapter describes how PREMST2 attempts to address the challenge of developing a lesson-study model.

9.1. Objectives and Strategies of Training

During the first year of experimentation between January and June 2012, two cycles of lesson-study sessions have been conducted in the cluster-based training. The project's internal annual review showed that the new model received generally favourable opinions from teachers, but many difficulties were identified with regard to improving a lesson plan during a four-hour session (PREMST2, 2012d). The discussion after the lesson observation tended to be too scattered, and the propositions tended to be too theoretical or idealistic without considering the actual context of teaching. As a consequence, it was difficult to come up with a realisable proposition to improve the lesson observed at the end of the lesson-study session. It was clear that the way the discussion had been conducted would require an improvement.

In order to improve the lesson-study model, PREMST2, with the assistance of JICA, implemented a series of activities designed to develop the capacities of the National Trainers. The key event was the training on lesson study in which all National Trainers participated in October 2012 in Japan.[24] Unlike many one-off training sessions, this tailor-made training was conceived as a part of their long-term learning process. My Japanese colleague and I, the Japanese Experts hereafter, had set three main learning

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[24] The training was conducted from 18 October to 5 November 2012 with the cooperation of the University of Okayama. The National Trainers were accompanied by my Japanese colleague. I accompanied them for three days during my holidays in Japan.

objectives for the National Trainers.[25] That is, training aimed to improve the capacities of: 1) evaluating the lessons by way of lesson observation with a focus on the learning of pupils, 2) organising a discussion that focused on the learning of pupils, and 3) developing a systematic lesson plan on a unit of learning.[26]

A three-pronged strategy was conceived to achieve these objectives. First, we asked the National Trainers to conduct a complete cycle of lesson-study sessions themselves. Inspectors are, in general, reluctant to conduct a lesson in front of others although almost all of them were formerly experienced teachers. This was also the case for the National Trainers. We considered this to be among the largest barriers in improving the content of PREMST training because the National Trainers had often failed to consider the contexts under which teachers operated when they had developed modules, as in the example of the "best practice" of formative assessment in Section 7.6.3. The training in Japan functioned as a kind of incentive for them to do things they would normally not do. We hoped that the discussions on the lessons they conducted would give them an opportunity to realise the difficulties that they had not seen before.

Second, we asked the National Trainers to experiment with the kind of lessons that PREMST advocates. As this thesis elucidated, it is extremely difficult to realise the kind of lessons that PREMST asks teachers to conduct in Senegalese primary school. We wanted to see what kind of lessons is feasible in practice. During this process, we also stressed the importance of preparing a lesson as a part of a unit of learning. In Senegal, teachers usually plan every lesson as a stand-alone project. By looking at the *fiche ASEI*, there is no way that outsiders can find what pupils learned before and what they will learn next. If teachers prepare a lesson this way, it is unlikely that they systematically prepare a series of lessons. Under the present system, the lesson observation and the examination of the *fiche ASEI* do not permit us to assess to what extent the learning of pupils has been accumulated. This was the problem that we thought was necessary to address in order to improve teaching.

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[25] To be precise, the learning objectives have been determined in discussion with the National Trainers. However, since the Japanese Experts regarded the problems to be addressed differently from the National Trainers, this chapter reports the viewpoints of the Japanese Experts, by referring to the Japanese Experts as "we" and the National Trainers as "they."

[26] Internal training proposal submitted to the JICA Headquarter dated on 24 May 2012.

Accordingly, the National Trainers were asked to prepare a lesson plan according to the Japanese format, rather than the *fiche ASEI*. There are several crucial differences between the two. Whereas the *fiche ASEI* only explains how the teacher intends to conduct a lesson, the Japanese format is much more detailed; it analyses the content of the theme to be taught, identifies the difficulties with which the pupils in the class are faced, situates a given lesson as a part of a larger sequence of learning, and sets the assessment criteria for each phase of the lesson. Somewhat similarly, CEB attempts to facilitate the integration of different learning because, in the old curriculum, the learning sequence was not systematic, and pupils had difficulties in connecting their previous learning to the new learning. We hoped that developing a lesson plan based on CEB but according to the Japanese format would give an opportunity for the National Trainers to think about how CEB could actually be practised in the classroom.

Third, we asked the National Trainers to focus on the learning of pupils during the lesson observation. We were concerned that both the teachers and PREMST trainers tended not to pay enough attention to the understanding of pupils during the lesson observation, as this thesis illuminated. As a consequence, the learning of pupils, especially by referring to the learning process of particular pupils, seemed rarely raised in the lesson-study sessions. Nevertheless, the National Trainers did not regard it as a problem to be dealt with when we raised this issue. For that reason, we wanted to provide them with an opportunity to observe lessons differently.

9.2. Process of Training

Considering the above learning objectives and strategies, a series of activities were planned between June 2012 and March 2013 in three phases: 1) homework assignments, 2) training in Japan, and 3) follow-up. For the first phase, two sets of homework were assigned to the National Trainers: 1) conducting a complete cycle of lesson-study sessions among themselves, and 2) preparing a lesson plan according to the Japanese format. The second phase was designed to develop the capacities of the National Trainers on the lesson planning as well as lesson observation. Towards the end of the stay in Japan, they were given time to reflect on the assignments that they had

conducted. The lessons prepared and revised during the first and second phases were to be implemented by themselves after returning to Senegal during the third phase. Finally, at the end of these processes, they were to propose a plan to improve the Project activities.

The first phase started with experimenting with a whole cycle of the lesson-study sessions, which consisted of preparing a *fiche ASEI*, conducting the lesson followed by the discussion to propose a revised *fiche*, and conducting the second trial of the lesson followed by the subsequent discussion. At the end of the cycle, the National Trainers discussed the difficulties with which they had been faced during its implementation with a view to sharing this with the trainers in Japan. It was an enlightening experience because it forced them to realise how difficult it was to carry out what they asked teachers to do.

As for the second assignment, the National Trainers had a lot of difficulties when they attempted to develop a lesson plan. As this thesis revealed, CEB does not provide a concrete enough orientation to permit teachers to structure the sequence of teaching within a given unit. Moreover, as we had speculated, the National Trainers were found to be unused to planning a series of lessons in a systematic order. With some assistance, they managed to develop a lesson plan for the unit of the thermal expansion of air, liquids, and solids, for the fifth grade. This turned out a revealing experience for us as well because it gave us an insight about how the National Trainers thought about a lesson and how to go about it. For example, although all National Trainers clearly understood that it was important that pupils first enact their own hypothesis about a phenomenon during the lesson, they wanted to define how the experimentation would be conducted in detail. At least some of them had thought that the correct experimentation defined by the teacher should be conducted regardless of the hypotheses pupils proposed.

During the training in Japan, the National Trainers observed several lessons, including the lesson equivalent of what they had prepared, as well as the lesson-study sessions. It forced them to think about the difference between what they had prepared and what they observed. The conditions in Japanese schools are totally different from those in Senegal, but the observation of these lessons followed by discussions with the

Japanese trainers gave them ample ideas about what was missing in their lesson plan. It had been planned that the lesson plan was to be revised during the stay in Japan, but the time was not sufficient, and the work continued after returning to Senegal.

The National Trainers questioned some aspects of the Japanese lessons after their return. For example, some said that they had not seen that the Japanese teachers assessed the learning of pupils during the lesson. Others said that the exchange of opinions by pupils had sometimes looked too good to be true, even suspecting that pupils had been prepared to show the lesson to the foreign visitors. Therefore, in the follow-up workshop, I prepared a supplementary session to explain about *gakushu shudan* and *mitori*, described in Chapter 7, with the aim of deepening the understanding of the Japanese lessons that they had observed. These two concepts were found essential to comprehend how the Japanese teachers operated in the classroom, but the National Trainers did not understand them because these were not explicitly presented in the training.

Finally, the chief trainer in Japan visited Senegal for further follow-up in March 2013. During his nine-day visit, the National Trainers presented the revised lesson plan, which consisted of three successive lessons on thermal expansion. Three of them conducted these lessons to the same pupils for three consecutive days. The school was selected from those with a good academic standard, so pupils were capable of stating their opinion much more easily than those I had observed for this thesis. And, the number of pupils in the class used was only 26. These represent a significantly better condition than most Senegalese classrooms, but the pupils still struggled to keep up with the first lesson partly because they were not used to the kind of questions that required their reflection. At the end of the first lesson, I had thought that the kind of lesson PREMST advocates might not be realisable even in this better school, but my fear turned out groundless. The lessons progressively improved in the second and the third ones, as the pupils started to get used to the new style of lessons. For example, whereas the great majority of pupils could write nothing more than copying the question during the first lesson, they were able to write the varied answers in the third lesson. The pupils were visibly nervous during the first lesson, but at the end of the three lessons, some of them even asked the National Trainers to come back to conduct more

lessons. Each lesson was conducted by a different National Trainer, and the quality of lesson depended on the capacities and other personal traits of the teacher, but all agreed that the improvement was not attributed to the personal difference but to the evolution on the part of pupils in terms of capacities and expectations. They confronted the difficulties of implementing the kind of lessons that they advocate, but they felt that they were able to overcome much of it in three lessons under this particular condition. In this process, were they not only able to understand the importance of developing pupils as a group of learners, the concept similar to *gakushu shudan*, but also they found it realisable in a Senegalese classroom, by witnessing the markedly changed attitude of pupils that contributed to their better learning during these three lessons.

The way the National Trainers observed the lessons was also improved. Before conducting these lessons, some of them hesitated about attempting to observe pupils individually, as they thought that it might make it difficult to observe the lesson as a whole. After some persuasion, it was decided that each observer focuses on two pupils and takes a note of their learning – participation in the whole-class situation and group work, written responses during individual work, and attitudes during the lesson. The discussions after this "new" method of lesson observation were insightful because many of the National Trainers were able to relate the learning of the two pupils on whom they had focused to other aspects of the lesson; thereby, the discussions became concrete and specific to the lesson observed, in comparison with the discussions that I had had with the teacher-participants in this thesis. In other words, focusing on a few individuals may not have been crucial in itself, but this method enabled them to observe the learning of pupils better, by forcing them to observe the pupils more attentively. Although it was not made explicit in this exercise, it could be argued that each National Trainer performed a practice similar to *mitori* with a focus on two pupils.

9.3. Way Forward

These experiences are in the process of being reinvested into the CPD programmes at least in three ways: 1) the revision of the lesson-study model, 2) the creation of audio-visual aids, and 3) the experimentation of a longer-term model of

lesson study. First, it was decided that lesson study should have a focus in the discussion of the lesson observed. The revised module proposes that one aspect and three indicators to observe and to discuss should be selected in each lesson-study session. Initially, it was proposed that each cluster would decide a theme freely, but considering the difficulty of selecting an appropriate theme without an external resource person at the cluster level, it was decided that the focus of discussion should be selected from the lesson observation sheet that PREMST has used. My direct observation of the initial experimentation conducted among the Regional Trainers gave an encouraging sign because the focus on a particular aspect compelled them to discuss the issues that were often overlooked.

Second, the audio-visual aids were decided to be created to help teachers visualise what a good lesson-study session looks like. As this thesis argues, teachers need concrete examples in order for them to attempt to practise what they learned. The audio-visual aids intend to demonstrate examples of what is difficult to explain in the written module. For instance, teachers may have difficulties in understanding what it means by discussing the evidence of pupils' learning. In that case, the film could show the example of the observers going around the classroom to take a note of the learning of certain pupils during the lesson, followed by the discussion on this issue.

Third, an experimentation of another lesson-study model was initiated. The existing model is a short-term one, by allowing each cluster to complete a cycle of lesson study in a month. This model has a virtue of simplicity, which facilitates a relatively easy dissemination to a large number of clusters, but it is not suitable to deal with the type of problems that can only be solved in the longer-term. A school in Louga was selected to investigate the possibility of constructing a new model. Early signs indicate that the experimentation will require much fine-tuning. For example, the proposed theme by this school was "to improve the interaction between the pupils during group work." It was positive to find that teachers were not satisfied with how they had conducted group work, but it was evident that their preoccupation was, just like the teacher-participants of the thesis, about a particular teaching method, not what the pupils learn.

These initiatives have only been initiated recently, so it is difficult to predict how they will actually bring an improvement at the school level, but they give a glimmer of hope for the development of lesson study in Senegal. On the one hand, the above experience of the National Trainers indicates that the difficulties of realising interactive pedagogy that the Ministry advocates go very deep. The National Trainers struggled to implement what they asked teachers to do even under a relatively favourable teaching condition. Moreover, intensive learning opportunities provided to them are almost impossible to replicate to all teachers. On the other hand, it also shows that the significant pedagogical change is possible even if it requires a serious effort. During the above ordeal, the National Trainers were initially reluctant to practise what they were not used to doing, but once the process started, they realised that what they had done was not good enough. In return, the very realisation of their own insufficiency gave them a genuine motivation to improve. The transformation of pedagogical practice by the National Trainers in the nine-month period was remarkable compared to that of the five teacher-participants who appear in this thesis. The above experience indicates the importance of providing teachers with opportunities to reflect upon their practice. The lesson-study model proposed by PREMST has the potential to give teachers the same kind of opportunities in the long-term, by forcing them to think about the aspects that they normally do not. It is now the challenge of PREMST to orient teachers to give a focus to the learning of the pupils, rather than the teaching methods.

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Appendices

Appendix I: Summary of Lessons Observed

I.1. Lesson Conducted by Alima

Level: 2nd grade

Subject: Arithmetic

Theme: Numbers from 80 to 83

Duration :   60 minutes (planned), 103 minutes (actual)

Number of pupils: 51

Objective of lesson:

At the end of the lesson, learners should be capable of discovering the number from 80 to 83.

Phase	Time	Description
Introduction (Mental calculation	0:00 – 6:35 (6 min)	• T asks Ps a relatively simple question, and Ps write an answer to their slate. (individual work) • T stays on the front. • T asks a pupil to give the answer, and a pupil gave the correct one. • Another round like this was repeated for another question.
Mobilising the prerequisite	6:36 – 16:38 (10 min)	• T gives Ps two questions : 1) write 4, 20, and 70 in French letters, and 2) write the numbers before and after 78. • Ps write an answer to their slate. • T asks a pupil to draw each answer on the board.
Activity 1	16:39 – 42:32 (26 min)	Activity 1 consists of 6 sub-phases to solve the following question. Question: You have 79 marbles. You play and you win one marble, how many marbles do you have now? Instructions (for the tasks): Form (count) all of the marbles you have. Draw all of the marbles. Give the number of marbles you have. *Note: T distributes different materials like sticks and pebbles to different groups.*

Phase	Time	Description
Activity 1 (Continued)		<u>6 sub-phases</u>: 1) Explanation of the question (5 min) 2) Individual work (4 min) 3) Group work (3 min) 4) Writing down the production of group work on the board (6 min) 5) Presentation of group (3 min) 6) Follow-up by T in Plenary session (5 min)
Plenary session	42:33 - 59:14 (17 min)	• T asks 4 pupils to come front and count 80, using 4 different materials (3 min). • T asks a pupil to count 80, using a handmade abacus. T repeats it herself. (2 min.) • T asks pupils to write down 80 on their slate (5 min). • T asks pupils to write down 80 in French letter on their slate (5 min) • T asks pupils how to say 80th (1 min). • The end of the first part of the lesson.
Activity 2	59:14 – 1:23:32 (24 min)	Activity 2 follows the same procedure as Activity 1. Except that each group was given a hand-made meter and asked to show the answer with it. <u>Question</u>: You have 80 marbles. You add one marble, how many marbles do you have now? *Note: Different groups are assigned to a slightly different question, as the number of material added changes from one to two to three.* <u>6 sub-phases</u>: 1) Explanation of the question (3 min) 2) Individual work (4 min) 3) Group work (5 min) 4) Writing down the production of group work on the board (5 min) 5) Presentation of group (5 min) 6) Follow-up by T in Plenary session (2 min)
Plenary session	1:23:32 - 1:38:17 (15 min)	• T asks 5 pupils to come front and count 81, 82, or 83, using 5 different materials (5 min). • T asks pupils to write down 81, 82, or 83 on their slate (3 min). • T asks pupils to write down 81, 82, or 83 in French letter on their slate (7 min) • T asks pupils the order of numbers from 80 to 83. (1 min).
Evaluation	1:38:18 - 1:43:22 (5 min)	• Without conclusion, she proceeded to the evaluation question. • T asks Ps to rearrange to order of 4 numbers (82, 80, 83, 81) on their slate. • The end of the lesson.

I.2. Lesson conducted by Aminata

Level: 4th grade

Subject: Science

Theme: Lantern

Duration :   30 minutes (planned), 48 minutes (actual)

Number of pupils: 42

Objective of lesson: To use a technological object – a lantern.

Phase	Time	Description
Introduction	0:00 – 0:35 (1 min)	• T asks Ps what they do where there is a black-out. • Many pupils raised a hand, and one of them answered that "we use a lantern".

Activity	0:36 – 11:50 (11 min)	Activity 1 consists of 4 sub-phases to solve the following question.
		   Instruction:
		   1) Observe different parts of lantern.
		   2) Write down how each part is called.
		   Note: T initially asked groups to find the function of each part, but she dropped it before pupils started thinking about it.
		
		   4 sub-phases:
		   1) Explanation of the question (2 min)
		   2) Group work (4 min)
		   3) Writing down the production of group work on the board (3 min)
		   4) Presentation of group (3 min)

Plenary session (Identification of parts)	11:50 - 19:45 (8 min)	• T asks Ps different parts of lantern, and Ps answer. • For the grid, T asks Ps its function. • For the chassis, the grid, the control knob, and reservoir, T asks Ps their spell. T asks P to write them down on their slate.
Demonstration 1 (Functioning)	19:46 - 29:38 (10 min)	• T asks Ps how the lantern functions. • By giving several questions, she shows how to light a lantern. • At the same time, T demonstrates how to light a lantern.
Demonstration 2	29:39 – 46:50 (17 min)	• By showing the holes on the upper part of lantern, T asks Ps what the holes are for. • Since Ps couldn't give the satisfactory answer, T answers it. • After she answers, she demonstrates what happens if the holes are filled. • T faced a technical problem, as the holes couldn't be completely filled up, and she spent 15 minutes just to demonstrate it.
Conclusion	46:51 - 48:30 (2 min)	• T quickly asks pupils different parts of lantern as well as the procedure of lighting a lantern. • The end of the lesson.

I.3. Lesson conducted by Ibrahima

Level: 5th grade

Subject: Mathematics

Theme: Problem Solving on Equal Sharing

Duration :   60 minutes (planned), 91 minutes (actual)

Number of pupils: 17

Objective of lesson:

At the end of the lesson, pupils should be capable of solve the situation problem on equal sharing.

Phase	Time	Description
Revision of last lesson	3:33 – 7:20 (4 min)	• T recalls that the last lesson was about equal exchange, and asks Ps what it means. • Many pupils raise a hand, and a pupil responds. • T explains.
Mental calculation	7:21 – 18:06 (11 min)	• T gives two simple questions (one of which is related to today's theme) and Ps write down an answer on their slate. • For each question, T invites a pupil to write an answer on the board and corrects it.
Activity 1	18:07 – 22:03 (4 min)	• T gives a simple question, related to today's theme, and ask pupils to demonstrate the solution, by using the coins. • Pupils come front to solve
Activity 2	22:03 – 43:38 (22 min)	Activity 2 consists of solving the following question. Question: To prepare donuts on April 9 during the Easter holidays, Rama and his friend shared the following expenses: 775F for flour, 360F for sugar, 450F for eggs, and 225F for butter. How much should each pay? 5 sub-phases: 1) Explanation (4 min) 2) Individual work (4 min) 3) Group work (5 min) 4) Writing down the production of group work on the board (5 min) 5) Follow-up by teacher (4 min)

Phase	Time	Description
Activity 3	43:39 - 1:28:57 (45 min)	Activity 3 consists of solving the following question. <u>Question:</u> Three brothers are to share the inheritance of their father who died on February 15, 2012. The property left includes a house estimated 200,000F, 160,800F worth of equipment and land worth 560,800F. Abdou, the eldest son aged 41, takes land, and Demba, his younger brother, takes house and equipment. Find the amount that Abdou and Demba must give to their little brother, who is only 7 years old so as to his share may be equal. <u>5 sub-phases:</u> 1) Explanation (6 min) 2) Individual work (8 min) 3) Group work (6 min) 4) Writing down the production of group work on the board (9 min) 5) Follow-up by teacher (15 min)
Evaluation	1:28:58 - 1:34:01 (5 min)	• T gives Ps the evaluation question and explains the question. • T asks Ps to solve the question individually. • The end of the lesson *Note: T checked the answers of pupils on this question after the lesson.*

I.4. Lesson conducted by Ablaye

Level: 5th grade

Subject: Science

Theme: Respiration

Duration :   30 minutes (planned), 67 minutes (actual)

Number of pupils: 30

Objective of lesson: At the end of the lesson, pupils should be capable of identifying the organs of the respiratory system and cite its characteristics.

Phase	Time	Description
Introduction	0:00 – 8:32 (8 min)	• T asks 3 pupils to recite what they were asked to memorise at the end of last lesson, which was about five senses. • After each pupil recites the summary of last lesson, T asks others pupils if they have a question for him/her. • T asks pupils questions about five senses, by presenting a situation example.
Recalling the homework	8:33 – 15:02 (7 min)	• T explains what the homework, called "interview," was. • T recalls three questions given as a homework. • T asks Ps to open their notebook and checks if pupils did the homework.
Activity	15:03 – 43:58 (29 min)	Activity 1 consists of comparing the answers that each wrote on the following questions. Research questions 1) What are the organs of the respiratory system? 2) What are the phases of the respiratory movement? 3) Explain O_2 and CO_2. 4 sub-phases: 1) Group work (7 min) 2) Writing down the production of group work on the board (9 min) 3) Presentation of group (7 min) 4) Follow-up by teacher (6 min)
Lecture	43:59 - 56:55 (13 min)	• By using a poster, T gives complementary information about respiration. • This phase continues without much involvement of pupils, except when T asks a pupil to come front to show how he inhales and exhales.
Conclusion	56:56 - 67:36 (11 min)	• T asks Ps different questions to elaborate a summary sentence of the lesson. • With the involvement of pupils, T writes down the summary sentence on the board. • The end of the lesson

I.5. Lesson conducted by Boubacar

Level: 5th grade

Subject: Geometry in mathematics

Theme: Cylinder

Duration :   60 minutes (planned), 115 minutes (actual)

Number of pupils: 26

Objective of lesson: At the end of the lesson, learners should be capable of constructing and identifying a cylinder.

Phase	Time	Description
Revision of the last lesson	0:00 – 13:40 (14 min)	• T asks Ps to draw a rectangular parallelepiped (2 x 3 x 5 cm) in their notebook. (individual work) • T goes round looking and correct the answers of those who finish. • T asks one pupil to draw the answer on the blackboard. Another helps him since he couldn't draw it. • T summarises briefly how to draw it.
Mobilising the prerequisite	13:40 – 18:28 (5 min)	• T asks Ps to draw a circle whose radius is 2cm. • T asks one pupil to draw it on the board.
Impregnation (Introduction)	18:28 – 23:23 (5 min)	• T asks Ps questions about cylinders in daily life.
Activity 1 (Exploratory group work)	23:23 – 46:04 (23 min)	• T shows Ps a paper cylinder that he constructed. • T asks Ps to construct a cylinder in a group work.
Plenary session	46:04 – 49:42 (3 min)	• T asks which group constructed a cylinder to the acceptable level. • After the brief explanation of one chosen group on how they constructed their cylinder, T explains quickly why Ps couldn't construct a cylinder correctly.
Activity 2	49:42 - 59:45 (10 min)	• T asks each group to take apart the paper cylinder that T distributed. • T then explains quickly the characteristics of the net of a cylinder. • T asks each group to reconstruct a cylinder that Ps took apart.
Plenary session	59:45 - 1:02:29	• T explains quickly the difference between the net and the pattern with flaps.
Activity 3 (teacher-directed activity)	1:02:29 - 1:51:15 (49 min)	• T asks Ps to construct a cylinder in a group work again. • This time, it's supposed to be a group work, but each pupil is asked to construct a cylinder. • Also, this time, T shows each step how to construct a cylinder from drawing the net, adding tabs for sticking, cutting the pattern, to gluing the whole thing. • Although most pupils haven't finished, T decides that the rest of pupils should continue the work at home.
Conclusion	1:51:15 -1:55:01 (4 min)	• T asks Ps the procedures of constructing a cylinder.

Appendix II: Content of PREMST Training

This appendix supplements the description of PREMST training in Chapter 3, by providing some examples of what teachers go through in the training sessions. Teachers participate in a four-hour training session in their cluster every month from November to June each academic year. PREMST used five of these sessions every year from 2008/2009 to 2010/2011 to complete 15 modules in three years. All of the teacher-participants in this thesis said that they had participated in all of the 15 sessions of module-based training. From the beginning of the Phase 2 of the Project, the number of sessions that PREMST uses was reduced to three sessions per year. By the time I finished the field work, the teacher-participants participated in three lesson-study sessions, one of which was dedicated to the explanation of the procedures only.

Every training session has a similar structure. It starts with a pre-test, assessing the existing knowledge of teachers. Then, teachers participate in two or three group work activities. Each group work is followed by a plenary session, whereby trainers give feedback on the products of each group with the participation of teachers. In practice, taking account of the time constraint, two or three assignments are often given at a time. In that case, group activities continue up to two hours, followed by plenary sessions of all assignments together. The session is finished by conducting a post-test to assess what teachers have learned. The session is supposed to last for four hours, but in rural areas, teachers often organise lunch for themselves to allow them to stay until they finish the work; so some training sessions last more than five hours. At the end of each session, teachers receive a module, composed of 20-30 pages, for the review.

All of the modules produced by PREMST have been written by the National Trainers. The Japanese Experts have participated in the process of developing modules, but their role was that of advisory and never gave a direct input to the modules. Regional Trainers were also given opportunities to provide feedback. The drafts of modules were revised many times during the Project's internal reviews, which were organised after every cascade training and at the end of every academic year.

15 modules listed in Appendix III can be categorised in two types: 1) pedagogical issues and 2) subject contents. The modules on pedagogical issues explain

about various pedagogical practices from the ASEI approach to group management to error analysis. In contrast, the modules on subject content aim at strengthening the knowledge of teachers on subject content on mathematics and science, responding to the result of the needs assessment, as noted in Chapter 3.

In the modules on pedagogical issues, the activities are designed to challenge teachers to think about pedagogical issues to improve their own practice. The assignments are usually open questions so that teachers can freely discuss the issues. The following is some examples.

Examples of group work activity in modules on pedagogical issues

Example 1: Activity 3 of Module 5 Teaching Materials:

> Develop the proposed (teaching) materials from the technical sheets (distributed); provide the explanation on the pedagogical use of the materials (p.10).

Example 2: Activity 1 of Module 6 ASEI-PDSI:

> What should we do to make learners active in a teaching/learning situation? List some hindrances that could impede a good classroom practice (p.6).

Example 3: Activity 2 of Module 12 Group Management:

> Cite the principle and the advantages of group work (p.6).

The modules on subject content aim at enhancing the understanding of teachers on a particular topic on subject like fraction. Therefore, its content is a quick review of the topic, much like a supplementary textbook. The difficulty level varies, depending upon the modules, but most modules go beyond the primary school programmes on the assumptions that teachers should know better. Two or three activities are also given in these modules in view of group work, but the nature of activities is quite different because most of the assignments are academic exercises that can also be given to students in primary or middle school. Some questions are open, but others are closed. These modules do not show how teachers should present the topic to the pupils in the lesson, but some activities are related to the classroom practices, by asking teachers to propose experimentation or activities. The following is some examples.

Examples of group work activity in modules on subject content

Example 1: Activity 3 of Module 2: Construction of Geometric Figures:

    Construct a regular polygon of your choice (p.19).

Example 2: Activity 3 of Module 3: Microbe and Disease:

    Microbes are not all harmful. Some are useful. Based on your knowledge, cite examples of useful microbes (p.6).

Example 3: Activity 2 of Module 10 Sources of Energy:

    Based on your personal experiences, propose an experimentation on the production of energy (p.10).

    Finally, the last activity of each module intends to help teachers relate what they learned to their classroom practices, as in the following example:

Example of group work activity concerning the development of lesson plan

Activity 3 of Module 13 Fraction:

    By taking example on ASEI/PDSI lesson plan and principles, propose a lesson plan regarding the topic, addition and subtraction of fractions, for Grade 5. (p.19)

In other words, for each modules, teachers are asked to think about how this topic can be taught in their class, by preparing a *fiche* ASEI collaboratively. The trainers provide feedback on the proposed lesson plan at the plenary session. As mentioned in this thesis, the application of the lesson plan in the classroom relies almost entirely on the initiatives of individual teachers.

Appendix III: List of Modules Produced by PREMST

Modules distributed to teachers

1. PREMST Phase 1

Module 1 :   Official Texts and Mathematics and Science Education

Module 2 :   Mathematics 1 : Construction of Geometric Figures

Module 3 :   Science 1 : Germ and Diseases

Module 4 :   Pedagogy 1 : Learner-Centred Pedagogy applied to Mathematics and Science

Module 5 :   Teaching Materials

Module 6 :   Pedagogy 2 : ASEI-PDSI

Module 7 :   Pedagogy 3 : Assessment of Competence

Module 8 :   Mathematics 2 : Complex Numbers (calculation of time)

Module 9 :   Science 2: Nutrition of Green Plant

Module 10 :   Technology 1 : Sources of Energy

Module 11 :   Pedagogy 4 : Error Analysis in the Problem Solving Approach

Module 12 :   Pedagogy 5 : Group Management

Module 13 :   Mathematics 3 : Fraction

Module 14 :   Science 3 : Nerve System

Module 15 :   Technology 2 : Functioning and Safety measure of Some Technical Objects

2. PREMST Phase 2

Module: Lesson Study

Appendix IV: Lesson Observation Sheet of PREMST

TOOL 3 : Lesson Observation Sheet

IA:	IDEN :	School:	Date:
Step		**Level**	**Duration :**
Number of pupils:		**Girls :**	
Name of teacher :		**Name of observer(s)**	
Theme of lesson :			
Participation in the PREMST training:			

0 : Not Good at all ; 1 : Not Good ; 2 : Good ; 3 : Very Good
NB : Item not applicable = item not observed during the lesson

ITEMS	0	1	2	3	Item not applicable
PLANNING					
1.1. Relevance of justification					
1.2. Relevance of objectives					
1.3. Identification of relevant prerequisite					
1.4. Relevance of the proposed situation problem					
1.5. Choice of teaching materials and other supporting documents					
1.6. Congruence between the planned activities and the objectives					
1.7. Concision and adequacy of a summary planned					
1.8. Relevance of the situation of evaluation planned					

ITEMS	0	1	2	3	Item not applicable
ACTIVITIES AND ATTITUDES OF TEACHER					
2.1. Sharing the justification of the objective of the lesson (stir the interest and motivation)					
2.2. Provide a learning situation to pupils					
2.3. Implementation of planned activities					
2.4. Effective use of pupils' products					
2.5. Mastery of content taught					
2.6. Clarity of assignments					
2.7. Valuing the commitment of pupils					
2.8. Valuing the works of pupils					
2.9. Support of pupils who face difficulties					
2.10. Rational time management					
2.11. Availability of planned materials					
2.12. Participation of pupils in the development of summary					
2.13. Taking care of formative assessment (self-assessment, self-correction)					
ACTIVITIES AND ATTITUDES OF PUPILS					
3.1. Identification of problems					
3.2. Proposition of hypotheses					
3.3. individual work					
3.4. Participation in group work					
3.5. Quality of products					
3.6. Formulating the conclusion from the activities					
3.7. Participation in the development of summary					
3.8. Interaction between pupils					
3.9. Integration of the acquired knowledge to solve the problems or implement a task					

General Observation

Recommendations

Observer:　　　　　　　　　　　　　**Teacher :**

Nom : ....　　**Nom** : ....

Signature :................................　　**Signature** :................................