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Abstract

Despite the importance of teacher educators in influencing the quality of teacher education and by extension, the teacher quality, teacher educator preparation and professional development has received little attention from researchers and its pedagogical knowledge domain is often generalized from that of teachers. This study therefore explored the knowledge development of prospective teacher educators through creating multimedia case studies of practice.

The study was based on the analysis of data collected previously through a teacher development experiment with eighteen prospective teacher educators during a two-semester course for doctoral students in several teacher education programs. I adopted Cochran-Smith and Lytle's theorizing about relationships of knowledge and practice that makes distinctions among three prominent conceptions of teacher learning - Knowledge-for-practice, knowledge-in-practice, and knowledge-of-practice – to describe essential knowledge for teacher educators. I used the constructivist grounded theory approach as a data analysis strategy to explore the participants' experience in creating multimedia case studies to develop theories that were useful to understanding their knowledge development.

The results revealed that through the creation of multimedia case studies of practice, the prospective teacher educators developed greater appreciation of the complexity of teaching and learning, appreciated the importance of reflection as a task of teaching and learning, got the opportunities to think in new ways about their own learning and developed better understanding of linking theory and practice.

The pedagogical implications of these findings generally indicate that prospective teacher educators need professional development opportunities that would lead them to confront and

break their previously held conceptions about teaching and learning while embracing research-based developments in education.

Key words: prospective teacher educators, knowledge development, multimedia case studies

PROSPECTIVE TEACHER EDUCATORS' KNOWLEDGE DEVELOPMENT THROUGH
THE CREATION OF MULTIMEDIA CASE STUDIES OF PRACTICE

by

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Submitted in partial fulfillment of the requirements for the degree of
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List of Abbreviations

MMCSs	Multimedia Case Studies
PTEs	Prospective Teacher Educators
TDE	Teacher Development Experiment

Chapter One

Introduction

In this study, I explored the knowledge development of prospective teacher educators, with the aim of understanding how their knowledge of teaching developed as they engaged in the process of creating multimedia case studies of practice for use with pre-service and in-service teachers. The study was based on an analysis of data that were collected previously through a teacher development experiment on the work of prospective teacher educators carried out during a two-semester course for doctoral students in several teacher education programs at a university in the northeastern part of the United States in the year 2002. The data were collected through a research study supported by the National Science Foundation (NSF) (RED-9725512) and conducted by the principal investigator, Professor Joanna Masingila and three colleagues. The teacher development experiment consisted of two phases, one in each semester.

In the first phase, the prospective teacher educators engaged in making sense of the tasks of teaching and learning through discussion of readings on issues in teacher education, including the use of case studies, and then constructed a multimedia case study of practice. Data sources included (a) team planning documents (b) the instructor's journal (c) two semi-structured team interviews (d) the preliminary version of the multimedia case studies created by the participants, and (e) an individual critique of an existing multi-day multimedia case study that was discussed over several lessons in the teacher education class. The second phase involved reconstructing the records of practice in a way that these records could be used by others to make sense of the tasks of teaching and learning. Data in the second phase included (a) the records of the development of the facilitator guides and matrices, (b) one semi-structured team interview, (c) the instructor's journal, (d) the final version of the multimedia case studies with their supporting materials and

(e) individual reflective essays on the created multimedia case studies. Other than the ongoing analysis that was the basis for continued interventions with the participants, the testing of emerging hypotheses, and the strategies for promoting further development of the prospective teacher educators' thinking, the data had not been analyzed previously. It is these data that form the basis of this study.

In this chapter, I present the background of the study, outline the research problem with which the study is concerned and describe the rationale for taking up this work. I outline the research questions, discuss the significance of the study, and define some of the key concepts of the study.

Background

Debates on the quality of education give much attention to the quality of teachers and researchers (Goldhaber, 2016; Hattie, 2003; McKinsey, 2007) have identified teachers as the most important factor influencing the quality of education in schools. Following this line of thinking, it follows that teacher educators, the people responsible for preparing teachers, may be the most important factor influencing the quality of teacher education and by extension, the teacher quality. Indeed, Snoek et al. (2010) affirmed this school of thought in their identification of the teacher educator as the most influential factor in the preparation of high-quality teachers. The actions that teacher educators take as they prepare teachers for different levels of education play a significant role in determining the subsequent quality of those teachers.

Teacher educators therefore make a significant contribution to “the total ecology of teacher education” (Lunenberg et al., 2007, p. 588) as they help teachers develop a sense of professional identity (Smith, 2005), gain confidence about their teaching (Darling-Hammond et al., 2002), and broaden their knowledge base (Akbari & Dadvand, 2011). To broaden the pre-

service teachers' knowledge base, teacher educators may also strive to be transparent in their pedagogy by being explicit about the process, purpose, and rationale of their instructional activities by sharing as part of their instructional discourse, what they are going to do, how they are going to do it and why they are going to do it (Li, 2019). They also bridge the gap between national policy makers and local practitioners (Moradkhani, 2017) as they implement teacher preparation policies. Teacher educators are therefore key to educational systems globally as they strongly impact the quality of teaching and learning in schools (Vanassche & Kelchtermans, 2016).

Despite this important role, little is known about teacher educators and their professional development - how they are trained and educated and what makes a good teacher educator (Lin, 2013). Researchers and policy makers have often overlooked the people responsible for the education of the next generation of teachers (Vanassche & Kelchtermans, 2016) and have accorded teacher educator research little attention (Lunenberg, 2010). As Namamba and Rao (2017) observed, researchers have shown much interest in teacher preparation all over the world with little interest in teacher educators' preparation. How best to prepare good teacher educators has remained a challenge and, in response, researchers have generalized pedagogical knowledge domain of teacher educators from that of teachers (Lin et al., 2011).

Although being a teacher educator involves different pedagogical knowledge from being a teacher (White, 2013), – such as modelling as the teacher educator is in a position to have a strong impact on the student teachers' views of teaching - Williams and Ritter (2010) observed that higher education institution settings provide little formal preparation for the transition from teacher to teacher educator. Teacher educators may undergo research training through doctoral programs, but few engage in formal preparation to become teacher educators (Stillman &

Anderson, 2014). Yet studies (Robinson & Macmillan, 2006; Snoek et al., 2010) have indicated that the preparation and professional development of teacher educators is a critical factor for preparation of quality teachers.

For any transformation to occur, therefore, we must disrupt this scenario by attending more seriously to the preparation and professional development of teacher educators (Stillman et al., 2019). To this end, there has been recent increased research interest in teacher educators and there are a growing number of studies on their professional learning (Wood & Borg 2010) although it remains a relatively new area of research concern (Lunenberg, 2010; McIntyre, 2009).

Research on teacher educators suggests that teacher educators face myriad challenges such as transforming ingrained beliefs, values, and biased perceptions of teaching that pre-service teachers bring to the teaching institution (Goh, 2012) and developing a pedagogy for higher education (Murray & Male, 2005) to use with these pre-service teachers. However, one of the most difficult problems facing teacher educators is that prospective teachers lack the experience base necessary to meaningfully observe the complex and rapid interactions that occur in any classroom such as the content-specific pedagogy that is taking place (Bowers et al., 2000). This lack of experience in analyzing classrooms prevents preservice teachers from engaging in deeper analyses of the relation between the teacher's actions and the students' understandings.

Bowers et al. (2000) noted that due to the complexity of such knowledge, it cannot be transferred by narrative means. Rather, students can become mindful of such knowledge by observing, discussing, and reflecting on the practice of experienced teachers and how they emphasize specific solutions. They suggested that one way of addressing this challenge is designing and creating multimedia-based case materials that might enable teacher educators to

bring the complexities of a classroom into focus by facilitating access to critical classroom segments. Dolk et al. (2002) observed that multimedia case studies can function as a mediating tool in transcending the apparent dichotomy between theory and practice and can be instrumental in helping teachers develop situated practical knowledge about teaching. They thus suggested that if student teachers were being taught by using new media, it made sense to prepare beginning teacher educators similarly. However, within the growing body of literature on the professional learning of teacher educators, there is little about the knowledge development of prospective teacher educators as they create multimedia case studies of practice.

Research on the use of multimedia case studies of practice has found that these can support pre-service teacher preparation and professional development in several ways. Richman (2015) observed that the use of case studies in pre-service teacher instruction allows pre-service teachers opportunities to understand, interact with, and think through evidence-based practices. Based on the theories of problem-based learning (PBL) and active learning, the case studies allow pre-service teachers to work through scenarios using the strategies they are learning.

Masingila and Doerr (2002) pointed out that multimedia case studies have the potential to provide paradigmatic exemplars of practice, to enable teachers to analyze and reason effectively about the complex particulars of practice and to support the development of teachers as reflective practitioners. This means that case studies can provide authentic examples of diverse settings that the pre-service teachers are likely to encounter in their future practice and allow them to analyze the complex challenges that arise in those settings. In addition, researchers have demonstrated that the use of case studies in teacher preparation improved a teacher's problem solving, critical thinking, analytical, and decision-making skills (Masingila & Doerr, 2002; Richman, 2015). With all these possibilities associated with case studies, Bowers et al. (2000) observed that it is

important for those tasked with teacher preparation, mainly teacher educators, to design and create multimedia case studies of practice that might facilitate pre-service teachers access to critical classroom segments and bring the complexities of classroom practice into focus.

To design and create such multimedia case studies effectively, teacher educators need to understand these benefits and any limitations of multimedia cases as tools for teacher preparation and professional development. McGraw et al. (2007) observed that teacher educators need to understand the nature of discussions stimulated by case viewing to understand how multimedia case study discussions could influence pre-service teachers' future practice. They added that teacher educators must therefore make decisions about when to use cases and how best to facilitate case discussions.

For teacher educators to develop this understanding and make appropriate decisions, it is important that the use of multimedia case studies be part of their preparation. This is in line with Dolk et al.'s (2002) suggestion that if student teachers were being taught by using new media such as multimedia case studies, it made sense to prepare beginning teacher educators similarly.

Designing and creating multimedia case studies of practice would therefore be an important aspect of prospective teacher educator preparation that would not only reveal the thinking of the prospective teacher educators about the complex particulars of teaching and learning (Masingila & Doerr, 2002) but also nudge their thoughts on how pre-service teachers can benefit from these case studies as sites for learning. The act of constructing meaningful multimedia cases of practice and using them with pre-service teachers may serve as professional development for prospective teacher educators (Masingila, 2004). This is because as they create the case studies, the PTEs develop their knowledge by analyzing, reflecting, and critically thinking about the complex interactions and scenarios in the classroom and the important aspects

of teaching and learning that they feel the pre-service teachers should learn about. It is for this reason that I propose to investigate the knowledge development of prospective teacher educators as they engage in the process of creating multimedia case studies of practice. Understanding the nature of prospective teacher educators' knowledge development through the creation of multimedia case studies may have broad implications for their preparation and professional development as it may contribute to the pedagogical knowledge domain of teacher educators.

Setting the Problem

Research on the use of case studies with pre-service teachers has shown that multimedia case studies can be used to support the professional development of pre-service teachers by providing them with authentic exemplars of practice that carry a wide variety of resources to study classrooms and begin to understand the complexity of teaching (Doerr & Masingila, 2001; Masingila & Doerr, 2002; Richman, 2015). Further, as Bowers and Doerr (2001) found, using multimedia case studies with pre-service teachers helped teacher educators to think more intensely about issues involved in preparing teachers. By thinking about these issues in teacher preparation and perhaps understanding them better, the teacher educators were essentially developing their own knowledge based on using multimedia case studies with pre-service teachers and in effect experiencing professional development. I argue that the use of multimedia case studies with pre-service teachers can serve as professional development for teacher educators and contribute to their pedagogical knowledge domain.

However, as Kelchtermans et al. (2018) asserted, the professional preparation and professional development of teacher educators has scarcely been researched, much less in relation to the creation and use of multimedia case studies. There is little research on the preparation and knowledge base of teacher educators, and it has merely been generalized from

that of teachers (Lin et al., 2011). The scarcity of research on the preparation and professional development of teacher educators builds a strong case for this study on the knowledge development of prospective teacher educators as they create multimedia case studies of practice.

Positionality and Personal Interest

I am a black, Kenyan, Christian, middle-class, male, born in Kenya where I had my primary and secondary school education and bachelor's degree and worked as a high school teacher for 12 years. During this time, I took a break from teaching for my Master of Education degree in Tanzania, a neighboring country, after which I returned to Kenya and had the opportunity to teach in university as a part-time lecturer - a teacher educator role - for two years alongside my career as a high school teacher. I then began my doctoral studies in Teaching and Curriculum in the United States, this time as a prospective teacher educator. During this time, I also served as a teaching assistant in the school of education, engaging in teacher preparation and teaching courses for inclusive elementary and special education majors, pre-K inclusive education majors, secondary education majors and teaching and leadership majors as well as facilitating field and community placement projects such as the photo voice project. My experience as a high school teacher, as a part-time teacher educator as well as my M.Ed. course in teacher education and my doctoral program as a prospective teacher educator and teaching assistant stirred my interest towards teacher education research.

As a doctoral student deeply interested in becoming a teacher educator, I was disturbed by information in teacher education literature, and to some extent my own experience over time, indicating that despite the important role that teacher educators played in teacher preparation and ensuring teacher quality, little was known about their professional development, how they are prepared and what makes a good teacher educator (Lin, 2013). Researchers had largely

overlooked teacher educators (Vanassche & Kelchtermans, 2016) and often generalized the pedagogical domain of teacher educators from that of teachers (Lin et al., 2011), even though being a teacher educator involved different pedagogical knowledge from being a teacher (White, 2013). This sparked my interest in exploring the professional development of teacher educators.

Further, as a part-time teacher educator, I had often generalized my knowledge as a teacher into my work as a part-time teacher educator. I do not remember receiving any preparation involving teacher educator pedagogical knowledge or any professional development sessions. My interaction with other teacher educators also revealed that I was not alone in having had no preparation or professional development in teacher educator pedagogical knowledge. This lack of practical preparation further motivated me to explore teacher educator professional development.

My interest in exploring the knowledge development of prospective teacher educators, with the aim of understanding how their knowledge of teaching developed as they engaged in the process of creating multimedia case studies of practice for use with pre-service and in-service teachers was thus not only a personal exercise in sense-making to understand teacher educator professional development better and build my repertoire of skills, but as a prospective teacher educator, it was my hope that this study would provide some information, knowledge or framework for a relevant approach to teacher educator professional development.

I was also interested in the potentialities it would have for teacher educator professional development in the Kenyan context in which as I had some experience as a teacher educator and was aware of some of the strengths and challenges. I also hoped to benefit from some teacher educator development knowledge to build my own repertoire of skills.

Purpose of the Study

The purpose of this study is to understand the nature of prospective teacher educators' knowledge of teaching and learning as it develops as they engage in creating multimedia case studies of practice for use with pre-service and in-service teachers. I will use the following specific questions for this investigation:

Principal Question

How does the knowledge of prospective teacher educators develop as they engage in the process of creating multimedia case studies of practice for use with pre-service and in-service teachers?

Subsidiary Questions.

1. How do prospective teacher educators understand the tasks of teaching and learning?
2. How do their understandings of professional development and the tasks of teaching and learning develop as they engage in the process of creating multimedia case studies of practice?
3. How do they envision that pre-service and in-service teachers may grapple with the issues that emerge from these tasks of teaching and learning?

Significance

Teacher educators constitute a specific category of professionals, needing specific expertise (Berry 2016; Murray 2008; Smith 2003) for the specific goals and responsibilities of their job. Loughran and Hamilton (2016) observed that teacher educators are in need of opportunities to acquire and develop that specific expertise. The findings of this study may contribute towards building the specific expertise that teacher educators need in terms of professional development knowledge and opportunity. The findings may help develop a professional development knowledge base that teacher educators can draw from especially in

relation to the use of multimedia case studies. This will in turn have implications for teacher quality since the professional development of teacher educators is a critical factor for preparation of quality teachers (Robinson & Macmillan, 2006; Snoek et al., 2010).

The findings of this study may also offer insights to researchers and staff development specialists in school districts, teacher education programs and other educational agencies. They may raise the need for further investigation not only on the use of case studies but also other aspects that may contribute to the preparation and professional development of teacher educators. Since there is little research on the preparation and knowledge base of teacher educators (Lin et al., 2011) especially around the creation and use of multimedia case studies, the findings of this study will be a valuable contribution to this body of research. Below is a definition of some of the key concepts that constitute the study.

Key Concepts

Knowledge Development. Exposure to professional knowledge that for teacher educators combines solid theoretical knowledge with practical skills, inter-personal communication competence, experience, beliefs and attitudes (Kelchtermans et al., 2018)

Prospective Teacher Educators. Teacher educators may be professors or lecturers at universities or university colleges, experienced teachers acting as mentors or cooperating teachers in training schools and so forth, with different training backgrounds such as researchers and former teachers, who are professionally involved and responsible for initial and on-going education of teachers (Kelchtermans et al., 2018). In this paper, I will refer to prospective teacher educators as all those preparing to become teacher educators to actively facilitate the formal learning of student teachers and teachers.

Case Study. Used interchangeably with case methods, case-based methods and case based instruction to refer to the process of teaching with cases. This is distinct from the common use in qualitative research as a methodological approach that focuses on intensive and holistic description of an event or a social unit (Creswell, 2009). This second use appears only in the design section in reference to the present study design.

Multimedia Case Study. A case study consisting of various data sources from a set of classroom lessons and may include video clips of lessons, reflections, transcripts, and issues matrix emphasizing important moments (Bowers & Doerr, 2003)

Framework. I adopt Cochran-Smith and Lytle's (1999) theorizing about relationships of knowledge and practice which makes distinctions among three prominent conceptions of teacher learning. Knowledge-for-practice, knowledge-in-practice and knowledge-of-practice.

In the following chapter, I review literature related to the notion of knowledge development of prospective teacher educators as they engage in creating and using multimedia case studies of practice.

Chapter Two

Literature Review

This study was about the knowledge development of prospective teacher educators as they engaged in the process of creating multimedia case studies of practice for use with pre-service and in-service teachers. The following is a review of literature related to the notion of knowledge development of prospective teacher educators as they engage in creating and using multimedia case studies of practice. The review is largely informed by research in four areas of study: (a) teacher educator professional development (b) the role of critical pedagogy in teacher education (c) the development of multimedia cases studies, and (d) the use of multimedia cases in supporting teacher and teacher educator development.

I begin by laying a framework for conceptualizing teacher educator knowledge through a discussion on Cochran-Smith and Lytle's (1999) three prominent perspectives of knowledge and teacher learning, and how they align to this study. I then highlight the findings of some of the studies on teacher educator professional development beginning with suggestions of procedures or models for teacher educator preparation and professional development. I highlight the increasingly important role of critical pedagogy in teacher and teacher educator preparation and professional development. I then focus on the case study including the current use and demarcate the concept of the case study that is the focus of this study as well as the theoretical base. I also highlight the findings of some of the studies on the development of multimedia case studies, and their use with preservice teachers and multimedia case studies with teacher educators.

Conceptual Framework for Teacher Educator Learning

To explore the knowledge development of prospective teacher educators through the creation of multimedia case studies of practice, it is necessary to consider what constitutes teacher educator knowledge. However, just as Kelchtermans et al. (2018) observed that there is limited research in the preparation and professional development of teacher educators, Goodwin et al. (2014) observed that there is limited research into teacher educator knowledge and skills, and conceptual frameworks that specifically build on the knowledge skills and competencies of teacher educators are equally limited. I therefore employ a conceptual framework that specifically builds on teaching although teacher education is a specific aspect needing specific treatment (Berry 2016; Murray 2008; Smith 2003). This is because of the commonalities between skills and competencies for teaching and for teacher educating as the skills that apply to teaching can still offer insights to teacher educators (Goodwin et al., 2014).

Given the focus of this study as understanding the nature of prospective teacher educators' knowledge of teaching and learning and how it develops, I adopt Cochran-Smith and Lytle's (1999) theorizing about "relationships of knowledge and practice" (p. 249) to analyze prospective teachers' knowledge development. Cochran-Smith and Lytle (1999) made distinctions among three prominent conceptions of teacher learning: knowledge-for-practice, knowledge-in-practice and knowledge-of-practice. The three conceptions are useful heuristics for describing essential knowledge for teacher educators. These conceptions align with the research questions about the teaching and learning tasks, how their understanding develops in practice, and strategies that can be generated to deal with emerging issues. As such, the three conceptions provide a framework with which to describe the aspects of knowledge that emanate from this

study. The knowledge discussed in the study can be described within the ambits of knowledge-for-practice, knowledge-in-practice and knowledge-of-practice.

Knowledge-for-Practice

According to Cochran-Smith and Lytle (1999), knowledge-for-practice is the formal knowledge and theory which relates to content and pedagogy such as the tasks of teaching and learning. It hinges on the idea that knowing more, such as more subject matter, educational theory, pedagogy or instructional strategies, leads more or less directly to more effective practice. Here, knowledge for teaching consists primarily of the general theories and research-based findings on a wide range of foundational and applied topics that together constitute the basic domains of knowledge about teaching, widely referred to by educators as "the knowledge base." These domains generally include content or subject matter knowledge as well as knowledge about the disciplinary foundations of education, learning theories, human development, classroom organization, pedagogy, assessment, the social and cultural contexts of teaching and schooling, and knowledge of teaching as a profession (Cochran-Smith & Lytle, 1999). Goodwin et al. (2014) observed that this knowledge exists outside the teacher or teacher educator.

Aspects of this knowledge for practice such as the pedagogy, the content, the classroom organization, assessment, and the context relate to the tasks of teaching and learning and thus correspond well with the aspect of the study that seeks to establish how the prospective teacher educators understand the tasks of teaching and learning. The tasks of teaching and learning essentially form part of the knowledge base that constitutes knowledge-for-practice.

Knowledge-in-Practice

This perspective emphasizes knowledge in action and refers to the knowledge that teachers and teacher educators develop that is embedded in their practices, reflections on their practices, and/or in their narratives and inquiries about practice (Cochran-Smith & Lytle, 1999). This knowledge is “situated and constructed in response to the particularities” (Cochran-Smith & Lytle, 1999, p. 262) and context of teachers’ and teacher educators’ teaching spaces. It is developed over time through experience and deliberate reflection into one’s teaching experiences.

According to Cochran-Smith and Lytle (1999), this perspective, that enhances and elevates the status of teachers’ practical knowledge, presumes that teachers learn when they have opportunities to examine and reflect on the knowledge that is implicit in good practice—in the ongoing actions of expert teachers as they choose among alternative strategies, organize classroom routines, and make immediate decisions as well as set problems, frame situations, and consider/reconsider their reasoning.

The process of creating multimedia case studies focuses largely on the tasks of teaching and learning in action and prospective teachers have the opportunity to examine and reflect on this knowledge in practice. This aligns with the aspect of the study that seeks to understand how the prospective teachers’ understandings of these tasks develop as they engage in the process of creating multimedia case studies of practice. The prospective teachers reflect on the actions the teachers take, how they make judgments, conceptualize, and describe classroom dilemma. They also examine the teachers’ own reflections and make decisions on the aspects to include in the case studies.

Knowledge-of-Practice

Cochran-Smith and Lytle (1999) view knowledge-of-practice as knowledge generated when teachers treat their own classrooms and schools as sites for intentional investigation. This is the case in the study where prospective teacher educators create multimedia case studies of practice from the practice of classroom teachers. This perspective also aligns with the study in that as the prospective teachers envision ways that teachers may grapple with the issues that emerge from the tasks of teaching and learning, essentially, they will be generating knowledge-of-practice from their reflection on the practice of the teachers as they create the multimedia case studies.

Goodwin et al. (2014) observed that knowledge-of-practice bridges the externally consumed formal knowledge related to teaching and teacher educating (knowledge-for-practice) with the internally generated knowledge embedded in practice (knowledge in-practice). It involves the generation of knowledge that is a by-product of purposeful inquiry situated in a teacher's or teacher educator's classroom or course, connected to larger schooling issues, and interpreted through general educational theories and research-based findings.

In interpreting these heuristics in relation to the study on the knowledge development of prospective teacher educators, we can argue that knowledge-for-practice is the understanding of the tasks of teaching and learning that the prospective teacher educators might have acquired during their doctoral programs, formal study or experience and that they bring with them into the study. Knowledge-in-practice would include understandings of the tasks of teaching and learning that the prospective teacher educators develop by observing teachers in practice and creating multimedia case studies. Knowledge-of-practice would include the ways in which the prospective teacher educators envision that teachers may grapple with the issues that emerge

from the tasks of teaching and learning. Cochran-Smith and Lytle's (1999) descriptions of teaching knowledge therefore offer an appropriate lens for understanding the nature of prospective teacher educators' knowledge of teaching and learning as it develops through the creation of multimedia case studies of practice. Table 1 provides a summary of Cochran-Smith and Lytle's (1999) three prominent conceptions of teacher learning.

Table 1

Conceptions of Teacher Learning

Knowledge-for-practice	Knowledge-in-practice	Knowledge-of-practice
Formal knowledge and theory	Practical knowledge- embedded in practice and in teachers' reflections on practice	Generated when teachers treat their own classrooms and schools as sites for intentional investigation
Knowledge that participants might have acquired during their doctoral programs formal study or experience e.g., content/subject-matter, pedagogy and assessment	Knowledge and understandings that participants might have acquired in practice through their own experimentation or by observing others.	Knowledge that participants generate to manage issues that emerge from tasks of teaching and learning.

Research on Teacher Educator Professional Development

Are teacher educators a specific category of professionals in the educational field? How can we stimulate, support or provide opportunities for them to develop professionally? These are some of the central questions that guide this discussion of research on teacher educator

professional development. Kelchtermans et al. (2018) observed that teacher educators make up a particular group of professionals, with particular responsibilities, expertise and commitments in their respective educational systems and as a consequence, the development of that expertise and those responsibilities and commitments constitute an important matter of concern for policy makers, teacher education programs, as well as for educational research.

However, as Zeichner and Conklin (2005) noted, those responsible worldwide for the education of future teachers have rarely been formally and specifically prepared for their role, as in most countries, systematic and sustained efforts for the preparation and professional education for teacher educators have been missing. Additionally, in most cases the subject of educating teacher educators is often omitted even as teacher education is studied (Sever & Ersoy, 2019).

It is only since about the new millennium that both researchers and practitioners have insistently argued that teacher educators constitute a specific category of professionals (Berry 2016; Murray, 2008) that need opportunities to acquire and develop some specific expertise for their job (Loughran & Hamilton 2016), for the specific goals and responsibilities of their job.

There are therefore a growing number of studies on the professional learning of teacher educators (Kelchtermans et al., 2018; Lunenberg et al., 2007; Namamba & Rao, 2017; Swennen et al., 2008; Vanassche & Kelchtermans, 2016; Wood & Borg, 2010). While some of the studies point to a general focus that teacher educator preparation and professional development should take, including possible models for teacher educator knowledge development, some present specific suggestions for teacher educator knowledge.

Namamba and Rao (2017) suggested various steps that would be necessary to strengthen teacher educator preparation and professional development. Although they specifically focused on the Tanzanian context, some of their suggestions cut across contexts and had universal

implications for teacher educator preparation and professional development. For example, they suggested the development of graduate programs specific for teacher educators, stronger collaboration between universities and colleges of teacher education and introduction of induction courses or mentoring and coaching practices for novice teacher educators to ease their transition to the new role as teacher educator.

Kelchtermans et al. (2018), on the other hand, presented a conceptual model of teacher educator professional development. In their study, they presented the outcomes of an international collaborative project towards *an international forum for teacher educator development* that involved experienced teacher educators and researchers from eight different countries who engaged in a series of structured discussions on the professional development of teacher educators. Having examined the needs in practice and policy, as well as the research interests making structured opportunities for teacher educator development necessary, Kelchtermans et al. (2018) presented a model to conceptualize teacher educator development, grounded in a study of the international literature and the systematic critical discussion of its findings by the participants in the project. The following are the key components of the model.

Personal level -knowledge and practice. According to the model, the point of departure for professional development needs to be the enacted practices by the individual teacher educator (personal level), as a reflection of their professional normative choices and judgment about what the appropriate action in that particular situation is. The professional knowledge of teacher educators combines solid theoretical knowledge with practical skills, inter-personal communication competence, and experience. The enacting of such a complex set of knowledge takes place within the teacher educator's professional space, which is created by the situation and rarely repeats itself. Personal judgment, personal knowledge and beliefs as well as the repertoire

of skills and attitudes of the individual professional are central for teacher educators in reflecting on and understanding their practices.

Local level – institutions, programs. Individual practices, however, are always situated in particular local contexts (teacher education institutes, universities, training schools) and within specific programs and curricula as part of the educational system in a particular country. This system also includes different partnerships with other organizations (e.g., training institute-training schools, but also professional organizations).

National level – frameworks or standards. Next, the practices by the teacher educators in their diverse organizational or local contexts are framed and influenced by national policy measures (including national frameworks or guidelines, standards, and evaluation procedures). The relationship between the standards and the teacher education practices are, however, not linear and deterministic. Policy prescriptions are always interpreted, negotiated and translated into particular practices in the local organizational context in which a teacher educator is working. For that reason, the central goal of teacher educator development is personal empowerment to successfully design and enact their practices. Empowerment implies on the one hand acknowledging teacher educators' work and the expertise it reflects, and on the other hand creating opportunities to further develop and improve the expertise. Since teacher educators' expertise often remains hidden (Livingston, 2014) or implicit – often reflected only in their practices – their professional development needs to include efforts to make that implicit expertise explicit and to create opportunities to share it with others. This, at the same time, will inevitably imply collegial discussion, forcing the teacher educator to critically reflect on and possibly modify his expertise. So, becoming aware of and making one's expertise public is an essential constituent of professional development.

Global level. Finally, Kelchtermans et al. (2018) situate teacher educators' practices at a global level to stress the relation with supra-national and societal evolutions. Professional development for and among teacher educators should include exposure to big ideas or worldviews, including not only different theoretical frameworks on education, teaching, and becoming a teacher, but also more fundamental ethical, political and theoretical concepts and positions. This exposure to and study of different conceptual frameworks and theories will also operate as a strong impetus to self-critically become aware of and analyze one's normative ideas.

Some of the studies (Lunenberg et al., 2007; White, 2013) looked at the teacher educator as a model in agreement with Loughran's (2006) argument that in their teaching practices teacher educators inevitably model teaching because student teachers will automatically observe them and judge the relationship between their words and actions. Lunenberg et al. (2007) examined modeling by teacher educators as a means of enhancing new learning and changing the views and practices of future teachers. They observed that modeling can be a powerful instrument but it's potential to enhance the impact of teacher education programs on the learning processes of student teachers is often neglected. They found that teacher educators lacked the knowledge and skills to use modeling to make their own teaching explicit and to rethink the connection between their teacher education practices and public theory.

White (2013) also highlighted the importance of modeling for teacher education in her study on the experiences of secondary teachers within their workplace as they take on the role of leading subject knowledge development days for small groups of student-teachers, essentially playing the role of teacher educators. The aim was to understand the needs of experienced teachers in school when they take on this new responsibility, in order to provide for their effective professional development. The findings revealed several professional development

needs of new teacher educators situated solely in school, some similar to those situated in higher educational institutions. These included fostering an understanding that modeling good practice was important and that there was need to be explicit about the decisions the teacher educators made about their teaching so that the student teachers could learn effectively from observations and activities.

However, modeling by itself is not sufficient. Through a survey of the research literature on teacher educators, Swennen et al. (2010) identified modeling as a current theme, followed by an understanding that modeling alone is not enough to raise the understanding of student-teachers with regard to particular issues. Some studies therefore present specific suggestions for teacher educator knowledge.

In reporting on a narrative analysis of one teacher educator's learning journey in a two-year professional development project, Vanassche and Kelchtermans (2016) found that the capacity to manage the complex learning processes resulting from the meaningful interactions between the individual teacher educator and their working context contributed strongly to the teacher educators' experience of vulnerability. They analytically described three strategies to cope with this vulnerability and the impact on processes of professional development as well as its outcomes: building positive self-esteem; sustaining moral commitment and purpose; and using strategical compliance. Understanding the role of the working context – and vulnerability as a structural characteristic of that context – in professional development processes added to existing knowledge of teacher educators' professional lives and development.

In another study with a specific focus on teacher educator knowledge, Cooper (2019) considered the role of dispositions in the development of pedagogical knowledge, specifically for science teacher educators. She viewed dispositions as tendencies for individuals to act in a

particular manner under particular circumstances, based on their beliefs and perceptions. Indeed, the study found a strong but complex connection between beliefs, dispositions and actions. The notion that beliefs, dispositions and pedagogical knowledge are all developed for each individual at their own pace and in their own way was reinforced. The study also indicated that dispositions such as a tendency to reflect, take risks, build relationships or care for others could assist in developing an understanding of pedagogical knowledge for science teacher education when transitioning from science teacher to science teacher educator.

Generally, research on the professional development of teacher educators suggests that teacher educators are a specific category of practitioners, distinct from teachers and it is necessary to focus on them and suggest or provide opportunities for professional development. In this regard, research studies make various suggestions for teacher educator professional development. While some suggest steps and models for teacher educator preparation, some suggest specific aspects pertinent to teacher educator knowledge. The importance of modeling by teacher educators and the role of dispositions emerged as some of the current themes in teacher educator preparation and professional development.

Critical Pedagogy in Teacher Education

The matter of educating an increasingly diverse and inclusive student population at all levels of education, while promoting social justice and equity has assumed a position of critical importance in many parts of the world today. Researchers, practitioners, and policy makers in many countries are grappling with ways to address the persistent problem of inequitable educational outcomes and opportunities between advantaged and disadvantaged students (Grudnoff et al., 2017). Critical pedagogy has emerged as a possible way of addressing inequalities in the classroom setting and by extension, inequitable educational outcomes.

Critical pedagogy has been a popular topic in academic circles since the 1970s and relates to a conscious critique of social inequities and the necessity of discourse that aims to transform and emancipate social structures and self (Giroux, 2003). However, in today's educational landscape, critical pedagogy has become an approach that is all but ignored in schools because of the focus on testing initiatives like No Child Left Behind, coupled with the primary concentration on academic performance that has trickled down to even the lowest grades (Rozich, 2016). This orientation has left schools and teachers lacking the knowledge of why or how to challenge the dominant discourse that has so shaped current educational practice and policy (Olssen & Peters 2005).

Teacher education with a critical agenda that intends to tap into the political, ethical, and emancipatory dimensions of teaching (Akbari, 2008b) therefore plays an important role in empowering teachers to transform the unjust status quo. Primarily grounded in the seminal works of Paulo Freire (1972), critical teacher education not only intends to prepare teachers who are empowered to transform the unjust status quo but also teachers who can play an active social role by creating the context for positive action and by drawing the attention of their students to the less privileged (Sardabi et al., 2018). With a heightened awareness of their professional roles and identity which incorporates the social, cultural, and political realities of their environment, teachers are both able and willing to explore possibilities for change (Akbari, 2008a).

Hendrix-Soto and Mosley (2019) in their review of critical literacies in preservice teacher education also find that Critical literacy pedagogy is crucially important at all times, but especially in difficult and divisive times. They further observe that employing a critical stance in instructional spaces across the K-12 spectrum means making space for discussion, for gaining sociocultural knowledge, for interpreting dominance, creating a comfort with complexity, and,

thankfully, for taking action when need arises. Hendrix-Soto and Mosley (2019) observe that creating such classrooms is no easy task and that is why critical literacy pedagogy in teacher education is crucial. They further note that empowering educators to make space for critical literacies can take the form of experiential or discursive interactions with theory, opportunities to view models and practice with critical literacy pedagogies, and support from a critical community that includes teacher educators.

Generally, studies that relate critical pedagogy or critical literacies in teacher education show that a critical agenda in teacher education prepares and empowers pre-service teachers to work towards transforming inequities and injustices in educational settings, drawing the attention of the learners to social inequities and creating the context for positive action.

However, since critical pedagogy has been normalized around discourse that sees class as the principal determinant of social and political life, while assigning race to a more subordinate position (Allen, 2004), teacher education also warrants an anti-racist agenda through anti-racist pedagogy. According to Blakeney (2005), anti-racist Pedagogy (a) makes provision for understanding the impact of race on opportunity as well as the cultural differences associated with upward mobility patterns by focusing on the constructs of these inequalities, (b) addresses the historical constructs that facilitate inequalities and seeks to create an anti-racist paradigm that in time will serve to historically condition a new anti-racist society, and (c) includes explicit instruction on confronting racism without reservation or risk of ostracism, both of which are necessary in a society that mandates the purpose of public education as the production of democratic citizenry. Anti-racist Pedagogy aims at transformation by challenging the individual as well as the structural system that perpetuates racism (Kailin, 2002). Blakeney (2005) therefore advocates for recognizing the significance that changing demographics has on the educational

setting and exposing preservice teachers to anti-racist pedagogy, much as it may require extensive restructuring of professional development and teacher education, in order to prepare them adequately for teaching diverse populations.

Cases Studies in Teacher Education

The case method originated in the 1870s at the Harvard Law School before being adopted in the field of medicine and later business, as a form of clinical teaching in these professions to capture important aspects of practice and provide real life situations for learners to apply their abstract knowledge to analyze the cases and to conduct evaluations (Saltan et al., 2016).

Teaching cases have, therefore, been a keystone of professional training in schools of law, medicine and business for more than a century, providing models of thinking about problems in a profession (Kurz et al., 2005). Kurz et al. (2005) defined case-based instruction as an active-learning pedagogy designed for problem analysis and problem-solving, stressing a variety of viewpoints and potential outcomes.

Although suggestions for the use of cases in teacher education had been around educational research for a long time, it is only in the 1990s that Shulman (1992) articulated the value of cases in teacher education, arguing that cases are instructive in quite different ways than propositions about teaching and learning or opportunities to teach in laboratory or field settings. Moster (2007) noted that it is around this time that teacher educators began to increasingly use this methodology with both pre-service and in-service teachers. Rather than putting teachers in classroom or laboratory settings, cases provide indirect encounters with those settings allowing reflection and critical analysis that is not possible when acting in the setting (Putnam & Borko, 2000). As such, case studies bring the complexities of classroom activities into focus and allow students to connect concepts and real life (Kurz et al., 2005). Teacher educators can set up

opportunities for pre-service teachers to examine, with peers, classroom events and issues that are similar to those they may see in their own future practice (Doerr & Thompson, 2004; Masingila & Doerr, 2002).

Based on the theories of problem-based learning (PBL) and active learning, case studies allow pre-service teachers to work through these authentic scenarios using the strategies they are learning (Richman, 2015). In these scenarios, the pre-service teachers get the opportunity to observe, interpret and analyze how the ideas and strategies they have learned play out in a practical setting, raising the possibility of the pre-service teachers implementing the strategies in their own practice. The implementation of case studies in teacher preparation helps pre-service teachers better develop their knowledge in their own classrooms (Hunt, 2009).

Case studies have acted as a powerful tool for bringing the complexities of classroom activities into focus and supporting pre-service teachers in creating a bridge between theory and practice in an engaging, more demanding and more intellectually exciting and stimulating way (Cannings & Talley, 2002; Kurz et al., 2005). They provide an avenue through which pre-service teachers can begin to see the practical aspects of what they have learned. Research has demonstrated that the use of case studies in teacher preparation improves a teacher's problem-solving, critical thinking, analytical, and decision making skills (Hunt, 2009; Zottmann et al., 2012). This blends well with the expectations in the field of teacher preparation that teachers not only need to know the subject matter and pedagogy, but must also be collaborators, decision makers, critical thinkers, and problem solvers (National Council for Accreditation of Teacher Education, 2010). The use of case studies therefore allows pre-service teachers an opportunity to strengthen critical thinking skills and to become more engaged with the content (Herreid & Schiller, 2013). Since case studies play this important role in teacher preparation, it is important

to look into more detail of how case studies are currently used in teacher preparation and professional development.

Current Use of Case Studies in Teacher Preparation and Professional Development

Currently, case studies are used in teacher preparation in a number of ways. The following are some of the general ways in which case studies are used in pre-service teacher preparation.

Bridging the Gap Between Theory and Practice. An opportunity for pre-service teachers to observe, interpret, analyze and possibly practice the teaching strategies that they have learned from class discussions in a real-life context, as a way of linking theory to practice, is of critical importance for teacher preparation programs to be effective. Many teacher preparation programs try to link theory to practice by providing opportunities for field experience for the pre-service teachers. Indeed, field experience has been recognized as an important way of helping pre-service teachers to practice or observe and analyze what they have learned in theory.

However, with fewer opportunities for field experience due to the increased pressure and accountability requirements in schools today (Richman, 2015), many teacher education programs have moved to the use of case studies to provide authentic scenarios similar to what pre-service teachers would find in a school or classroom setting. Saltan et al. (2016) observed that case-based instruction is often applied to bridge the theory and practice gap by providing real life situations. Case studies therefore are useful when opportunities for field experience are not available or are not feasible.

Providing High Quality Classrooms. Even when opportunities for field experience are available to the pre-service teachers, there may not be ideal classrooms that portray what the pre-service teachers have learned in theory and what the teacher educators might want them to

observe and analyze as possible best practice. Masingila and Doerr (2002) observed that there are insufficient numbers of high quality, reform-based classrooms available for pre-service teacher placements and many teacher educators struggle with the difficulty that their pre-service teachers face when confronted with the disparity between what they teach in methods courses as possible best-practices or research-based practice and the reality that pre-service teachers find in the classrooms.

In such instances, case studies are used to provide ideal classroom situations that reflect most of what the teacher educators may consider as best practice and would like the pre-service teachers to experience. While creating these case studies of ideal classroom practice, teacher educators sample methodically and present the learning situation as they feel it would best serve the pre-service teachers. Case studies therefore help teacher educators to approximate what they consider as best practice as they prepare pre-service teachers even though as Saltan et al. (2016) observed, it may not be possible to define all possible real-life situations that pre-service teachers would need to learn and prepare them to navigate these situations.

Creating Low Threat Learning Environments. The increased pressure and accountability requirements in schools today, indicated by Richman (2015), that have made it more difficult for teacher educators to find clinical placement opportunities for pre-service teachers may come with stringent requirements for pre-service teachers if they get the field placement opportunities. The pre-service teachers may be held to very high standards that are not easy for novice teachers to meet.

Teacher educators therefore use case studies to give pre-service teachers an opportunity to experience classroom-like situations before actually going to the classrooms. Case studies provide an opportunity for pre-service teachers to observe, interpret and analyze field related

ideas in a “low-threat” environment where they discuss and practice skills with minimal negative consequences (Southgate et al., 2013) that might come with the school requirements, or environment. These are some of the ways in which cases are currently used to support learning. The following are some forms that case studies have taken over time.

Text-Based Case Studies

Cases have been used in teacher preparation programs in a variety of forms such as text-based case studies, video cases, multimedia case studies and web enhanced case studies that can be used online. Text-based cases have generally been produced in print form as descriptive documents, often presented in a narrative form that is based on a real-life situation or event. Richards et al. (2012) described them as richly detailed contextualized narrative accounts of situations or experiences related to a given field that are intended to promote critical thinking about real-life events. Text-based case studies enable pre-service teachers to reflect upon descriptive scenarios on teaching and learning within a given context (Cannings & Talley, 2002), and interpret and analyze the teaching strategies and situations using what they have learned from class discussions.

Video Case Studies

As new technologies were developed, and new instructional possibilities became available by providing multiple ways of presenting cases, video-based case methods began to attract considerable interest (Bencze et al., 2001; Koballa & Tippins, 2000) as they could present teaching episodes in rich, authentic, real-life settings. Admiraal (2014) noted that video became increasingly popular in professional learning because of its unique ability to capture the richness and complexity of practices for later analyses. Through video, teacher candidates could examine in detail the planning of a lesson, its delivery, and the reactions of both teacher and students as

the lesson unfolded (Hewitt et al., 2003). In addition, video-based cases exposed pre-service teachers to alternative practices that they may not have encountered during their field experiences allowing more analytic and in-depth discussion as well as varied and critical reflection (Admiraal, 2014).

In these and other ways, videos had provided teacher educators with a potentially useful means of providing a natural medium for enhancing the sense of context and realism in case studies (Perry & Talley, 2001). Video cases captured the complexity of the classroom context and provided a very efficient way to expose the viewer to the authenticity of the classroom. Students had the opportunity to replay videos to gather ideas, to learn teaching methods, to observe classroom interactions they might have missed otherwise and to see important features that may have required more than one viewing (Perry & Talley, 2001).

Monroe-Baillargeon (2002) pointed out that video cases provided a common experience through which individuals or groups of teachers could analyze the issues, dilemmas and opportunities of teaching. Videos offered the viewer multiple layers of perspectives in the classroom environment and demonstrated how a variety of simultaneous events affected teachers' instructional decisions (Monroe-Baillargeon, 2002). Mcnaughton et al. (2001) noted that the more vision and sound was centered around a particular case, bringing all the nuances that existed in a school situation into a university classroom situation, the better it was for a meaningful teaching and learning experience.

However, Hewitt et al. (2003) observed that despite the obvious advantage videos brought to the case study method of instruction, video-based case methods suffered from a number of limitations. They observed that video was intrinsically a passive medium and simply observing a teaching episode was not likely, in itself, to effect a great deal of change in pre-

service teacher beliefs or practices. Admiraal (2014) noted that direct video observation might not be sufficient for students' reflection on conceptual questions and a more effective facilitation for supporting conceptualization of ideas used in practical experience is necessary.

Consequently, researchers began to develop a qualitatively different kind of case-based instruction where video cases tended to be used in conjunction with activities that engaged pre-service teachers in analysis, personal reflection, and group discourse (Hewitt et al., 2003). Video cases were also impacted by the internet and multimedia, so that by integrating non-linear web-based video with audio, graphics, text and images, it was possible to provide an even richer experience. All these technologies and multiple forms of media have come in to modify the format of the case and support its use; thus, the expression multimedia case studies has been used to identify case studies of this type (Saltan et al., 2016).

Multimedia Case Studies

A multimedia case study for use with pre-service and in-service teachers typically consists of various data sources from a set of classroom lessons and may include video clips of lessons, reflections, transcripts, matrices emphasizing important moments and book marking features. This combination of different data increases the realism of the case, thus drawing stronger interest and involving the user more actively (Bowers & Doerr, 2003; Pfister et al., 2006). The following is a discussion of some of these components in detail.

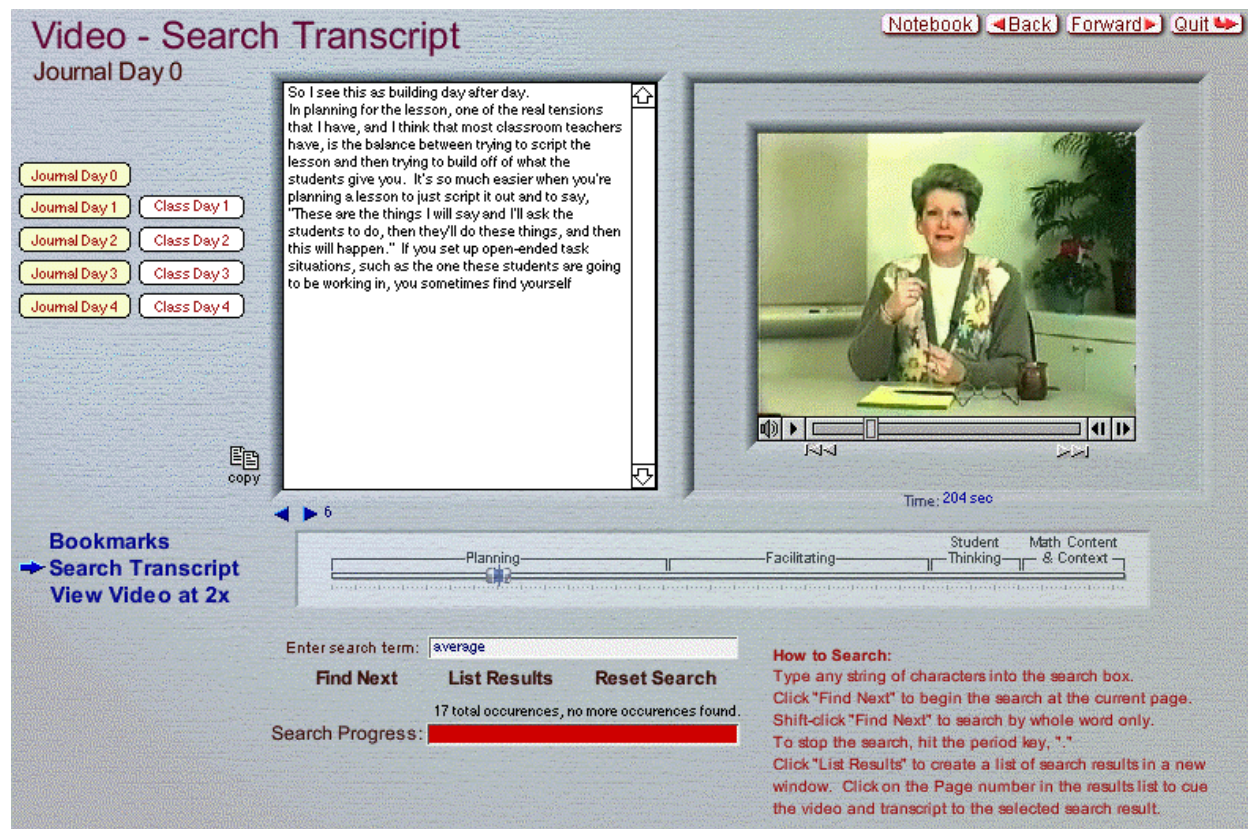
Video clips of lessons. Other than the video clip of the lesson, the case study may contain other video clips such as the teacher's initial reflection on their lesson plan as they prepare for the class as well as the post lesson teacher reflection where they reflect on how each lesson was implemented and how they would revise the subsequent lesson plan. ((Bowers et al., 2000)

Reflections. According to Bowers et al. (2000), the lesson planning and post-lesson reflections, recorded sequentially can capture the teacher's actual concerns as they occur in time and expose the pre-service teachers to the reality of how even a well-planned lesson can still lead to unanticipated outcomes.

Transcripts. The multimedia case usually has transcripts that are synchronized with the video clips to allow the viewer to read what is said as the video plays (Pfister et al., 2006). It could also have a searchable transcript such as the one developed by Bowers et al. (2000) in their study on pedagogical questions and technological design solutions in designing multimedia case studies for pre-service teachers. This transcript, which was linked to the video, was searchable by keyword or phrase to enable pre-service teachers to search for particular topics or follow a specific student via a name search across time. Bowers et al. gave the example where a user might want to investigate whether the teacher anticipated students' use of a computational average strategy and then search both the teacher transcript (see Figure 1) as well as the classroom transcript for occurrences of the key-word "average".

Figure 1

Results of searching linked transcript for word "average". (Bowers et al., 2000)



Matrix. Multimedia case studies may also contain a matrix that emphasizes important pedagogical moments (Pfister et al., 2006). According to Bowers et al. (2000), the matrix encourages pre-service teachers to look beyond superficial aspects of a classroom and observe the complexities of the teaching and learning process by helping to delineate some of the critical issues. As they showed in Figure 2 for example, clicking on any "X" in the matrix brought the user to a video segment, teacher reflection, or lesson plan notation that pertained to the indicated issue and day. The pre-service teachers were therefore able to investigate an issue or theme as it progressed over the span of the lesson sequence.

Figure 2

Matrix from four-day case (Bowers et al., 2000)

Issues Matrix									
Click on an "X" to cue the corresponding video and transcript to the issue of interest.									
	Day 0 journal	Day 1 class	Day 1 journal	Day 2 class	Day 2 journal	Day 3 class	Day 3 journal	Day 4 class	Day 4 journal
PLANNING									
Mathematical Agenda	X X X				X				X
Time Management			X						
Class Organization	X				X		X		X
Anticipating Student Understanding	X X								
Homework/Tomorrow's Activity									
-Sneakers			X						
-Crime					X		X		
FACILITATING									
Managing Transitions		X							
Facilitating Group Work		X X X		X X					
Classroom Norms	X X X	X X		X X		X X X X	X		
UNDERSTANDING STUDENT THINKING									
Student Understanding	X	X X X X		X				X X	X X
-Context					X		X		
-Rate	X				X				
-Sum & Average				X X		X	X		X
-Symbolization						X			X X
-Systems for data analysis							X		X X
-Weighted ranks								X X	
Student Engagement			X				X		
Teacher Decision-Making			X X		X		X X		
Student Questions		X X				X X			
MATHEMATICAL CONTENT									
Context		X X		X X		X		X	
Rank		X X X							
Sum & Average		X X		X X X X X					
Systems for data analysis						X		X	
Frequency		X							

Additionally, multimedia case studies can include other artifacts such as pictures of each student arranged by group and desk location in the classroom to facilitate recognition, scanned images of student work, copies of all lessons, and other auxiliary materials for the case (Bowers et al., 2000).

According to Saltan et al. (2016), being multimedia, with many forms such as audio and video, contributes to the authenticity of cases as many aspects are presented and this makes them more enjoyable to the user. Cannings and Talley (2002) observed that multimedia cases overcome some limits of traditional cases, such as the static perception of a case, low degree of personalization or the trivial access to information by, for example, introducing movement that

can capture the complexities of classroom interactions enabling pre-service teachers to view the real important or critical teaching and learning strategies utilized by the teacher in the classroom.

Bowers and Doerr (2003) added that to overcome the possibility of trivial access to information, there might also be metadata such as links and web addresses, reflections, transcripts and matrices emphasizing important moments, among other aspects that provide more information. The availability of links that lead to other websites for additional information within the case study can help the pre-service teachers to find out more information about what they are learning than would be possible in other types of cases. Generally, the volume of data available to the user would be much larger than in other types of cases, thus allowing the user to engage in more depth. Multimedia cases appear to better capture a classroom's complexity compared to text-based cases that often present a single viewpoint and present events in a linear format (Han et al., 2013).

It is therefore the combination of all these multi-media artifacts that constitute a rich case and set the multimedia case studies apart from other case study forms such as text or video-based case studies. Pfister et al. (2006) observed that it is the combination of these materials that allows pre-service teachers working together to move from the limited scope of their personal observations toward gaining a shared understanding that captures the complexities of the classroom more fully.

The combination of these multimedia artifacts also plays a big role in motivating students and improving their learning. This was evident in a study by Ozdilek (2014) where pre-service science teachers reported increased motivation and engagement in the content due to the integration of a multimedia case study. Brooke (2006) noted that multimedia case studies not only increased student interest but faculty interest as well.

The use of multimedia case studies in teacher preparation has therefore emerged as favorable and beneficial for pre-service teacher, in-service teacher and teacher educator learning (Mcnaughton et al., 2001). In light of these benefits, some researchers have focused on the use of multimedia case studies in teacher preparation to understand the role of case studies, explore better ways of making use of it and how to design and develop multimedia case studies, among other areas of focus. Most of these studies have focused on the use of multimedia case studies with pre-service teachers. Few have focused on teacher educators, and much less on teacher educator preparation and professional development.

Development of Multimedia Case Studies

A few researchers have examined the designing and development of multimedia case studies. While some studies have focused on factors to consider when developing multimedia case studies for pre-service teachers such as the pedagogical questions and technological solutions (Bowers et al., 2000; Bowers & Doerr, 2003) that come into play, some have suggested models that underpin the designing and development of multimedia learning objects such as case studies.

In a position paper to present novice faculty and designers with a concise multimedia development guide based on a review of the literature and a Delphi technique with expert educators, designers, and programmers, Frey and Sutton (2010) proposed a Multimedia Development Model comprising the following steps:

1. *Defining instructional goals, objectives and audience.* An essential element of any multimedia project is to begin with clear pedagogical goals and objectives to be reviewed at every phase of the project since knowing and understanding the needs of the audience is crucial to having an effective learning experience.

2. *Reviewing and investigating existing options.* Frey and Sutton (2010) suggested that it is critically important to complete a thorough review of existing applications to find out if a multimedia learning object exists that may meet most of the required educational objectives or that could serve as a template for the newly proposed project.

3. *Determining the format, budget, and timeline.* These would depend upon the learning goals and resources available.

4. *Determining the content, activities, and assessment strategies.* Even as the methods and technologies used to deliver instruction undergo a transformation, how people learn remains constant. There is need therefore for a clear connection and alignment between the content, activities, and assessments.

Clark and Mayer's (2003) six principles from the cognitive theory of multimedia learning (see Table 2) can be applied to most multimedia projects thus guiding the development of effective learning.

5. *Developing evaluation strategies, criteria, and instruments to determine the effectiveness of the project.* Assessment strategies should be analyzed throughout the development so as to review the project if it is not meeting the objectives.

6. *Developing the flowchart, site map, and/or storyboard.* A visual representation that presents a clear overview of the content should be available to guide the development.

7. *Developing a prototype.* A working model of the project or some portion or aspects of the project that help to apply and test ideas would be necessary. In the case of a multimedia case study, it could be a video clip before the addition of other media.

Table 2

Media Principles from E-Learning and Science of Instruction (Clark & Mayer, 2003)

Principles	Descriptions
Multimedia	People learn more deeply from words and graphics than from words alone.
Contiguity	When corresponding printed words and graphics are placed close to one another on the screen or when spoken words or graphics are presented at the same time.
Coherence	People learn more deeply from multimedia lessons when distracting stories, graphics, and sounds are eliminated.
Modality	People learn more deeply from multimedia lessons when graphics are explained by audio narration rather than onscreen text.
Redundancy	People learn more deeply from multimedia lessons when graphics are explained by audio narration alone rather than audio narration and onscreen text.
Personalization	People learn more deeply when the speaker uses conversational style rather than formal style.

8. *Performing a formative evaluation.* The developers can collect data and information from the target audience as the project is developed. The results of this evaluation would then provide guidance on how to improve the materials or procedures for the development.

9. *Completing the design.* Since multimedia learning objects involve many materials, the

first step of completion is completing all these materials such as video clips, audio, graphics, photographs, animations, assessments, activities, and any other materials. It may also mean contracting a variety of professionals to obtain all the skills needed for the project. Additional support resources such as user guides can also be completed before all the components are assembled.

10. Performing a summative evaluation of product and process. Summative or final evaluation is divided into two phases: an expert review and a field study (Dick et al., 2001). Cennamo and Kalk (2003) recommended having a third party conduct a summative evaluation since what may seem obvious to the developers may not be apparent to a new reviewer who can provide an objective perspective on the project. In the second phase, the proposed field trial would provide feedback directly from the targeted learning audience. Frey and Sutton (2010) observed that one of the key concepts of an expert review and field study is to confirm that the needs of the instructor or organization are being achieved.

Although Frey and Sutton's (2010) Multimedia Development Model applies generally to the development of multimedia learning objects such as simulations, games, puzzles, problem-based learning activities, tutorials, presentations, animations, assessments or case studies, studies specifically examining the development of multimedia case studies for prospective teachers have identified two key intertwined decisions that must be considered in conceptualizing and developing a multimedia case study (Bowers et al., 2000; Bowers & Doerr, 2003).

The first key decision involves deciding what are the instructional goals of the case. Bowers and Doerr (2003), in a study on designing multimedia case studies for prospective mathematics teachers, pointed out that an analysis of the most prominent multimedia cases for mathematics education that had been developed five years prior to their study revealed two

different approaches for identifying the instructional goals for a project. In one approach, the instructional goals in terms of content and/or pedagogical issues were clearly defined, and then video and artifacts collected to illustrate these points. They observed that in this *define and collect* paradigm, the developers defined the types of teaching moments they wanted to find, and then either chose a classroom so they could prescript or prearrange a given lesson, or searched databases of existing video to find ones that illustrated the desired point(s).

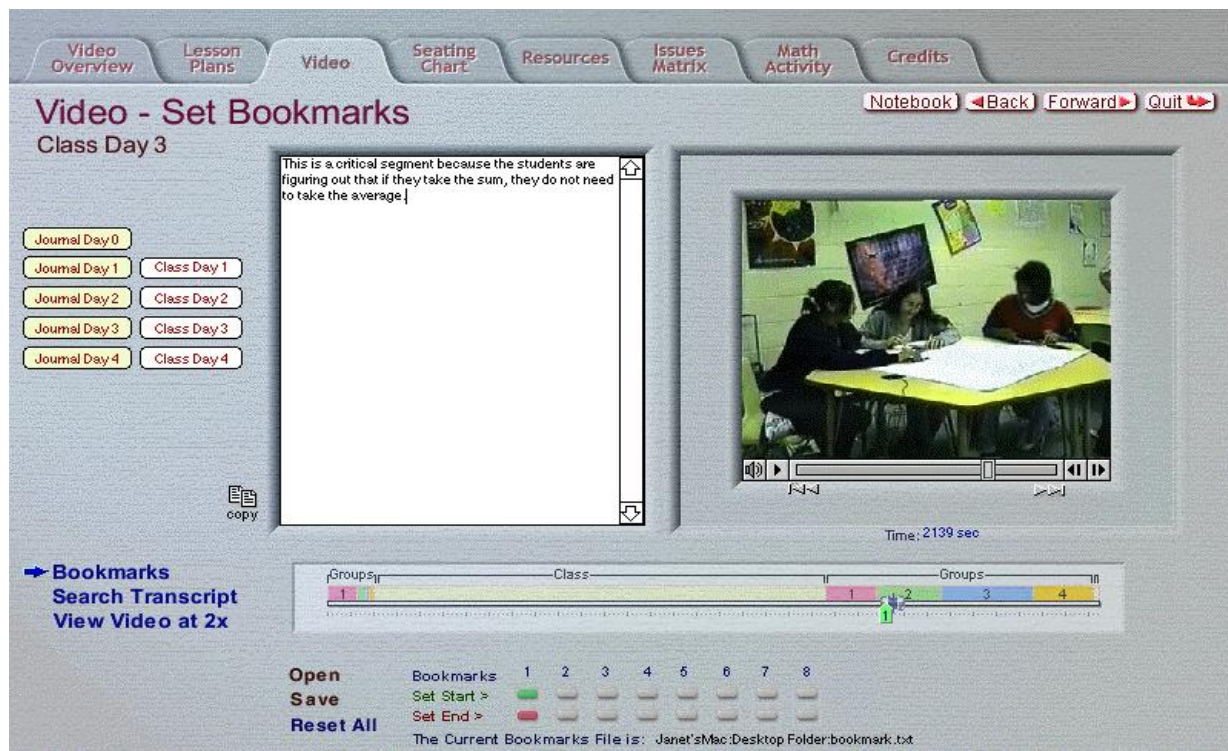
This contrasted with the *collect and define* method where with a general idea about the instructional goals, whether content or pedagogical issues, the developers began by collecting video and other classroom artifacts and then scrutinized the data to refine their ideas about which teaching and learning issues the data could most successfully highlight.

The second key decision involves deciding what multimedia features can be developed, and what artifacts should be included to best reach these goals. Bowers and Doerr (2003) observed that once developers had identified the instructional goals and determined the scope of their case, they needed to develop the multimedia tools and interface to best communicate their goals. For example, in their study on designing multimedia case studies for pre-service teachers, Bowers et al. (2000) developed a case study where they recorded the teacher's initial reflections on her lesson plan as she prepared for her class each day, the post-lesson reflection on how each lesson was realized in the classroom and how she would subsequently revise the next day's lesson plan, as artifacts to illuminate how experienced teachers reflected on their preparation and daily teaching experiences. They also included pictures of each student arranged by group and desk location in the classroom to facilitate recognition in the video, as well as scanned images of student work, copies of all lessons, and other auxiliary materials for the case.

In terms of interface to ease interaction with the multimedia case study, they developed a book marking feature to facilitate deeper analyses of the video and allow users to customize their investigations such as to mark, annotate, save, and later retrieve specific segments for later review (see Figure 3).

Figure 3

Setting a bookmark (Bowers et al., 2000)



They also developed an interactive matrix (see Figure 2) to define some of the critical issues and a searchable transcript (see Figure 1) to enable searching a particular topic or following a particular student over time.

Studies on the development of multimedia case studies have largely revolved around models for designing and developing multimedia case studies as well as some of the decisions that go into the design and development. A larger body of research, however, focuses on the use of these multimedia case studies.

Using Multimedia Case Studies

Research on the use of multimedia case studies in teacher preparation is anchored in a variety of approaches and theories. Researchers have used both qualitative and quantitative approaches as well as a variety of theories such as situated cognition theories, the socio-cultural perspective, theories around problem-based learning, the gestalt principles and constructivist theories to guide their research on the use of multimedia case studies in teacher preparation.

A constructivist theory of learning focuses on learning as a process of constructing knowledge. As it pertains to teacher education, this learning theory is premised on the idea that student teachers, like other learners, construct knowledge by building on a foundation of personal, socially constructed meanings from their experience that change best under certain conditions (Bencze et al., 2001). Having experienced teaching and learning for many years as students, each teacher candidate begins pre-service education with many strong convictions about subject matter, teaching and learning. Wong et al. (2006) observed that constructivist pedagogy involves a series of steps designed to bring about conceptual change: identify students' preconceptions; create opportunities for them to explore and test their preconceptions; provide stimuli for students to develop, modify, or change their views; and support attempts to rethink and reconstruct their views. They also propose that students should be assisted in becoming aware of their own processes of conceptual change, and adept at monitoring and managing them. This means that students should have an opportunity to think about their conceptions and eventually their conceptual change.

The constructivist theory is therefore an important consideration for this study since the creation of multimedia case studies will not only provide the prospective teacher educators with an opportunity to explore and reflect on their conceptions, but they also engage in construction of

knowledge as they rethink and reconstruct their views.

Recent empirical work on the use of multimedia case studies (MMCS) has focused mostly on using the cases with pre-service teachers (e.g., Bowers & Doerr, 2003; Han et al., 2013; Hewitt et al., 2003; Masingila & Doerr, 2002; Pfister et al., 2006) and to a lesser extent with teacher educators (e.g., Dolk et al., 2002; Masingila, 2004). Studies on the use of MMCS with pre-service teachers have generally shown that MMCS play an important role in the preparation and professional development of pre-service teachers. These studies have shown that the use of MMCS can promote many aspects of learning for pre-service teachers including the following:

- reducing cognitive load and increasing learning outcomes (Romig et al., 2018);
- development of critical thinking (Masingila & Doerr, 2002);
- opportunity for later analysis of practice (Admiraal, 2014);
- recursive use, reflection, multiple examples, counter examples and prompts for observation (Pryor & Bitter, 2008);
- help candidates develop deeper insights into their own classroom practice (Hewitt et al., 2003);
- improve pre-service teacher learning of pedagogical content knowledge (Han et al. 2013);
- better capture of classroom complexity (Masingila & Doerr, 2002);
- highlight some of the dilemmas and tensions found in teaching (Bowers & Doerr, 2003);
and
- help frame many of the issues that they encountered in their own practice (Bowers & Doerr, 2003).

The following is a description of some of the results in more detail.

Hewitt et al. (2003) investigated new applications for multimedia cases with the aim of promoting reflective practice in pre-service teacher education. They argued that the theoretical body of knowledge that is taught in schools of education is not the kind of knowledge that teachers draw upon while teaching and that for the most part, teacher education programs emphasize knowledge that is abstract, systematized, and independent of specific instructional settings. They proposed that teachers are constantly immersed in complex situations in which they need quick, concrete answers to a wide range of pressing problems. In such circumstances, the decisions they made were rarely the product of careful deliberation or the judicious weighing of educational principles, rather the split-second product of emotion, needs, values, habit, and a sense of the affordances and constraints of a situation in reaction to the situation-at-hand.

Hewitt et al. (2003) therefore described a professional development activity, organized around a multimedia case study of an elementary science lesson, in which teacher candidates responded quickly to authentic instructional scenarios, and then analyzed their responses in small groups to help new teachers more deeply reflect upon their own classroom behaviors and their reactions to teaching situations. The use of the multimedia case study encouraged the pre-service teachers to reflect on the moment-by-moment decisions that practitioners make in classrooms making it apparent to them that their immediate reactions to classroom situations were not always ideal.

Bowers and Doerr (2003) had similar findings, relating to the prospective teachers' own practice, in their study on designing multimedia case studies for prospective mathematics teachers in which they described issues concerning the designing and developing of a multimedia case study for prospective mathematics teachers. They found that designing, developing and using multimedia case studies with prospective teachers helped the prospective teachers to frame

many of the issues that they encountered in their own practice. They were therefore able to highlight some of the dilemmas and tensions they found in teaching. The pre-service teachers were able to recognize, think about and discuss some of the complexities that occur in teaching.

In helping pre-service teachers to think about their own practice, case studies can also help in enhancing critical thinking skills. In a study to investigate how multimedia case studies of practice can support pre-service teachers in making meaning of complex classroom experiences and in developing strategies and rationales for using student thinking to guide instruction, Masingila and Doerr (2002) suggested that the primary purpose of case studies is to support the development of critical analysis by teachers and informed decision-making. They found that having the multimedia case study as a site to investigate, analyze, and reflect on another teacher's practice supported pre-service teachers in focusing on issues that were meaningful to their teaching practice, thinking critically about another teacher's practice and in turn promoting reflection and critical thinking about their own practice.

Pryor and Bitter (2008) investigated teachers' ability to learn, apply in lesson plans in diverse content areas, and retain knowledge of classroom discourse after using a multimedia professional development program. They found that multimedia holds potential to help teachers improve their practice by providing opportunities to reflect recursively and collaboratively on strategies useful in classroom discourse and other aspects of learning. It provided the opportunity for teachers to think together about the complexities of the classroom and allowed them to reflect over these issues repeatedly. The development of the pre-service teachers' knowledge of classroom discourse in turn improved their pedagogical content knowledge, another way in which the use of multimedia case studies promotes pre-service teacher learning.

In a study to investigate the effects of multimedia case-based learning on pre-service teachers' knowledge integration related to teaching with technologies, Han et al. (2013) found that multimedia case-based learning improved pre-service teacher pedagogical content knowledge and knowledge integration in these areas. In this study, pre-service teachers were provided with interventions that included either video cases or no cases. Participants in the video case group watched two video clips, one per class, for two weeks (once a week), as a group of four or five, discussed what they had watched and wrote a group reflection paper based on reflection questions provided. Participants in the no cases group were not provided video cases as a clip but offered syllabi and PowerPoint™ presentation files that were prepared and used by model teachers shown in the video cases. A comparison of their technological, pedagogical and content knowledge showed that video cases improved pre-service teachers perceived learning of technological and pedagogical knowledge as well as knowledge integration.

In another study on one of the technologies that can support meaningful learning from practice Admiraal (2014), evaluated the use of a web-based video learning environment integrated with multimedia sources, including work samples, feedback from students, supervisors, and colleagues, reflections, and other written documents. In this study, they set up a multiple case study on the use of a web-based video learning environment in two post-graduate teacher education programs and two university undergraduate programs. The students reported the analysis of practices to be the most valuable aspect of web-based video. They pointed out that they noticed things they did not know before and became aware of the criteria that were used to assess their practical skills.

Pfister et al. (2006), in a study on using multimedia case studies to advance pre-service teacher knowing, examined the effects of using multimedia case studies with beginning pre-

service teachers. They focused on how multimedia case studies can be used to facilitate pre-service teachers' ways of making sense of classroom observations. To investigate this, they designed two sets of tasks. The first task, which allowed pre-service teachers to work together in pairs, had them watch parts of a multimedia case and then discuss what they saw with peers and a facilitator. The second task had the subjects interact and make sense of a different multimedia case individually. A key finding was that pre-service teachers operated within contextual ways of knowing more often when working together than when working alone.

Largely, studies on the use of multimedia case studies show that they advance pre-service teacher learning in different ways. They provide pre-service teachers with the opportunity to identify, analyze, think critically and reflect on the complex classroom situations they encounter, and in the process enhance their pedagogical and content knowledge.

Multimedia Case Studies with Teacher Educators

As observed earlier, research on the use of multimedia case studies with teacher educators has not received much focus, and few researchers have focused directly on using multimedia case studies to prepare teacher educators. In one such study on using multimedia cases for educating primary school mathematics teacher educators, Dolk et al. (2002) examined how multimedia video case studies could support the professionalization of primary-school-mathematics teacher educators. They investigated the use of multimedia cases to support teacher educators in learning to mathematize and didactize, and to learn how to use multimedia cases with their student teachers.

Dolk et al. (2002) observed that in traditional classroom observations each pre-service teacher typically observed a different classroom, rarely visited by the teacher educator, and what each pre-service teacher noticed varied considerably. They observed that each student teacher

told a different story even if they observed the same lesson. They felt that having a lesson present “on demand” in the form of a multimedia case study allowed students and teacher educators to share observations and interpretations, and to revisit and review the lesson several times during the construction of educational meaning. This is in line with Pfister et al.’s (2006) findings that if pre-service teachers are to make meaning from their experiences together, then they must have common experiences on which to build the shared and heightened understandings. It is by working together that pre-service teachers can make meaning of their experiences.

Dolk et al. (2002) developed a six-step framework (see Figure 4) for use with multimedia cases to help teacher educators construct knowledge from episodes of classroom situations. The six steps in this framework are:

1. *Observing*. Participants observe learning processes, to become aware of and report the many aspects of teaching in the classroom.

2. *Sharing and discussing observations*. As they share and discuss their observations, learners are encouraged to reflect on their observational and reporting strategies, to see discrepancies between different observations as a stimulus to observe more, better and deeper, and to question their own observations.

3. *Analyzing*. Participants try to analyze their observations. Teacher educators benefit from being able to analyze classroom observations and focus on the children, the teacher and the subject matter within the contextual situation.

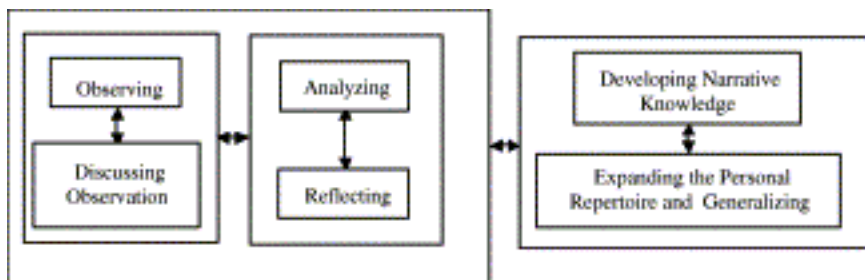
4. *Reflecting*. Participants are challenged to reflect on the situation and construct practical knowledge from it. Reflection is seen as a precondition for the process of constructing meaning and knowledge, especially for learning from one's own observations and analysis.

5. *Developing narrative knowledge.* Students' and teachers' practical knowledge is often embedded in their stories about classroom situations. These stories or narratives relate to observations of a classroom event and can play a central role in intertwining theory and practice. These narratives are organized in educational or psychological categories and support the development of deeper understanding of the situation.

6. *Expanding the personal repertoire and generalizing the situation into a didactic for Teacher Education.* To construct theoretical knowledge through the development of narratives, participants are enticed to generalize narratives of several analogous situations into one encompassing narrative. By generalizing the situation and the narrative, the participants build a personal didactical theory. Where conscious practical knowledge can be put into words, it becomes open to examination by scholars who may then be able to turn it into formal knowledge. Participants are challenged to become scholars and to examine their own theory.

Figure 4

Six-step design framework



In another study on multimedia case studies with teacher educators, Masingila (2004) used the teacher development experiment methodology (Simon et al., 2000) to examine the knowledge development of prospective teacher educators as they engaged in the creation of multimedia case studies of practice. In the first phase of the experiment, the prospective teacher educators engaged in making sense of the tasks of teaching and learning through discussion of

readings on issues in teacher education, including the use of case studies, and worked with a team to construct a multimedia case study of practice.

In the second phase, they reconstructed the records of practice in such a way that they could be used by others to make sense of the tasks of teaching and learning, and to support the professional development of pre-service or in-service teachers. Through the teacher development experiment, it emerged that creating multimedia case studies of practice allowed the prospective teacher educators to develop a greater appreciation of the complexity of teaching and learning, and to think in new ways about their own learning. These are some of the studies that focus on the use of multimedia case studies with teacher educators.

Summary

The aim of this study was to explore the knowledge development of prospective teacher educators, with the aim of understanding how their knowledge of teaching developed as they engaged in the process of creating multimedia case studies of practice for use with pre-service and in-service teachers. As observed earlier, the study was informed by research on teacher educator professional development and case studies in teacher education mainly the development of multimedia cases studies and the use of multimedia cases in supporting teacher and teacher educator development.

The research on teacher educator professional development generally suggests that teacher educators have rarely been specifically prepared for their role, as in most countries systematic efforts for the preparation and professional development for teacher educators have been missing. The research also reveals that the knowledge development of teacher educators has often been generalized from that of teachers despite teacher educators being a specific category of practitioners distinct from teachers. It is therefore necessary to focus on them distinctly and

suggest or provide opportunities for their preparation and professional development. This is in line with the current study that seeks to explore and understand the knowledge development of prospective teacher educators.

The literature on case studies and teacher education portrays case studies as a powerful tool for teacher preparation with the potential for bringing the complexities of classroom activities into focus, enabling pre-service teachers to see the practical aspects of what they have learned and creating a bridge between theory and practice. They can also prepare a teacher for critical thinking, problem-solving and are viewed as one of the ways in which knowledge development for prospective teachers and teacher educators can be achieved. This body of research largely presents work on pre-service teacher preparation. The literature suggests that the multimedia case study is the most effective as the combination of multimedia artifacts give rise to rich cases that capture the complexities of the classroom more fully.

Research on the development of multimedia case studies though not much, has largely revolved around models for designing and developing multimedia case studies as well as some of the decisions that go into the design and development. This is appropriate for the present study since it involves the development of multimedia case studies. A larger body of research, however, focuses on the use of these multimedia case studies.

Preparation and professional development of teacher educators is an important component of teacher education that has received little attention from researchers. Additionally, the role of multimedia case studies in this preparation has not been widely explored and many of the studies, as is evident in this review, focus on pre-service teachers. This literature review therefore establishes the necessity of looking into the knowledge development of prospective teacher educators as a step towards filling the gap in teacher educator preparation and

professional development. The limited focus on multimedia case studies and teacher educator preparation specifically gives a strong basis for proceeding with the intended study on the knowledge development of prospective teacher educators as they engage in the creation of multimedia case studies of practice.

To understand prospective teacher educators' knowledge development, I will adopt Cochran-Smith and Lytle's (1999) theorizing about relationships of knowledge and practice to demarcate the concept of knowledge that I will use. Their three conceptions of teacher knowledge, knowledge-for-practice, knowledge-in-practice and knowledge-of-practice will provide subcategories for aspects of knowledge that emerge in the study. Knowledge that participants acquire formally such as content subject matter and pedagogy will fall under knowledge- for practice. Knowledge that the participants might have acquired through experimentation, observation and reflection such as the teacher reflections will be in the knowledge in practice category. Lastly, knowledge that participants use to handle emerging issues will be in the knowledge for practice category.

Chapter Three

Research Design and Methodology

The purpose of this study was to explore the knowledge development of prospective teacher educators, to understand how their knowledge of teaching and learning developed as they engaged in the process of creating multimedia case studies of practice for use with pre-service and in service teachers. I sought to explore this phenomenon by answering the following specific questions:

1. How do prospective teacher educators understand the tasks of teaching and learning?
2. How do their understandings of professional development and the tasks of teaching and learning develop as they engage in the process of creating multimedia case studies of practice?
3. How do they envision that pre-service and in-service teachers may grapple with the issues that emerge from these tasks of teaching and learning?

I answered these questions by analyzing data collected previously on the work of prospective teacher educators carried out during a two-semester course for doctoral students in several teacher education programs at a university in the northeastern part of the United States in the year 2002. The data were based upon work supported by the National Science Foundation (NSF) (RED-9725512) and conducted by the principal investigator and three colleagues. In the subsequent section, I present the design and methodology that was used for the study. I briefly describe the project, the data sources, the participants and the procedure I followed to analyze the data. I present the steps I followed to ensure the reliability of this study and the ethical considerations.

Research Approach and Design

To understand the nature of prospective teacher educators' knowledge of teaching and how it develops as they engage in creating multimedia case studies of practice for use with pre-service and in service teachers, the study employed the teacher development experiment (TDE) methodology (Simon et al., 2000).

The Teaching Experiment

A teaching experiment involves a sequence of teaching episodes that may each include a teaching agent, one or more students, a witness of the teaching episodes, and a method of recording what transpires during the episode (Steffe & Thompson, 2000). The teaching experiment was therefore appropriate for this study as it involved a teacher as the teaching agent, the teacher's students, doctoral students/teacher educators as witnesses of the teaching episodes and video recording of the episodes. Simon et al (2000) noted that a teaching experiment encompasses two levels of curricula: the teacher education curricula and the students' curricula.

According to Steffe and Thompson (2000), the teacher development experiment builds on the central principle of the constructivist teaching experiment where a team of knowledgeable and skillful researchers can study development by fostering it as a continuous cycle of analysis and intervention thus providing a framework for researchers to work at the edge of their evolving knowledge. Being a teacher development experiment, the constructivist orientation guided data collection and analysis. This study adopted a case study design as the teacher development experiment methodology also integrates a case study approach into its adaptation of the teaching experiment in order to collect and coordinate individual and group data on teacher development (Simon et al, 2000).

The work with the prospective teacher educators involved in this project consisted of two phases. In the first phase, the prospective teacher educators engaged in making sense of the tasks of teaching and learning through discussion of readings on issues in teacher education, including the use of case studies, and then constructed a multimedia case study of practice. In the second phase, they reconstructed the records of practice in such a way that these records could be used by others to make sense of the tasks of teaching and learning.

Phase One. In the first phase of the project, the data collection and analysis focused on how the prospective teacher educators created and interpreted a case study of practice and its salient features and issues. In this phase, participants worked in five teams of two to five members to develop a case study of actual classroom teaching and learning in an urban setting at a middle school or high school by (a) identifying significant content being taught, (b) deciding what video and other artifacts would comprise the case, (c) collecting and editing video, documents, and artifacts for the case, and (d) integrating the materials into a coherent case study of practice using Case Creator software.

The Case Creator software is a video-based case creation tool developed through a supplement to the NSF-sponsored project and is available at: <http://www.sci.sdsu.edu/mathvideo/cc/index.html> to enable people to create multimedia case studies with their own edited video and text. Bowers et al. (2000) developed the case creation tool to provide teacher education faculty and students, a way of sharing a common pedagogical experience using real video embedded in a highly interactive interface.

In this phase, the graduate students engaged in the detailed analysis of issues of teaching and learning in ways that went significantly beyond the kinds of assignments they usually

encountered in their graduate studies. Their analyses were shared with their colleagues in the course and the course instructor, which in turn generated feedback, critique and revision.

During this phase, the researchers collected the following group level data from all the prospective teacher educators participating in the project: (a) planning documents that identified which elements were defined and selected for inclusion in the case, (b) written descriptions of elements of the case and analyses of how and why certain elements were included and excluded from the case, (c) transcripts of group design sessions, and (d) the preliminary multimedia case study.

The researchers conducted three team interviews throughout the project with each of the five teams for in-depth analysis of their developing ideas about the nature and development of teachers' knowledge. The interviews were conducted by one of the co-principal investigators. The interview protocols were designed to probe the participants' emerging understanding of teachers' knowledge in light of the on-going design of the case study. The interviews sought clarification of any ambiguities or discrepancies found in the participants' written descriptions and probed the rationales and tradeoffs for design decisions.

The course instructor also kept a journal that reflected her interpretations of the feedback, critique and revisions that the case study had undergone as they were shared and reviewed in the context of course discussions. The instructor's journal contained a log of key issues that were discussed in the class sessions throughout the course. This group level data allowed the researchers to characterize the development of the design of each group of prospective teacher educators within the context of the instructional setting.

From the individual participants, the researchers collected (a) written descriptions of what they envisioned as important artifacts to include in the case, (b) written descriptions of what they

saw as critical aspects of pedagogical content knowledge that they wanted the case to address (c) a short synopsis of what happened in each design session, and (d) an individual critique of an existing multi-day multimedia case study. The individual level data allowed for the analysis of the development of the understandings of the participants as they participated as members of a design group and as members in a particular course setting.

Thus, in the first phase, there were five primary data sources: (a) team planning documents, written descriptions, transcripts of design sessions, and artifacts as the cases were created, (b) two semi-structured team interviews, (c) the instructor's journal, (d) the preliminary version of the multimedia case studies created by the participants, and (e) an individual critique of an existing multi-day multimedia case study that was discussed over several lessons in the teacher education class. Following the methodology of the TDE, the researchers used both ongoing analysis to assess the current situation and retrospective analyses of the data after the experiment. The ongoing analysis, that occurred during the teacher development experiment, was the basis for continued interventions with the participants, the testing of emerging hypotheses, and the strategies for promoting further development of the prospective teacher educators' thinking.

Phase Two. In the second phase of the project, that corresponded to the second semester of the course, the participants engaged in the task of developing potential ways in which their case study could be used to support the professional development of pre-service or in-service teachers. They continued to work in their teams to develop facilitator guides and matrices. The prospective teacher educators devised questions that could be used to probe teachers' developing understanding and selected samples of interactions that would elicit insightful analyses from pre-service and in-service teachers who might use the case.

In this second phase, the researchers collected the following group level data. (a) preliminary versions of the facilitator guide and issue matrix, (b) written analyses of the rationale for contents of the facilitator guide, and (c) transcripts of group design sessions

The team interviews continued, and the course instructor continued to keep a journal as described above. The researchers collected the following data from all individual participants. (a) written descriptions of the overriding issues and organizing themes in their case, (b) written descriptions of evidence that supports the overriding issues and organizing themes (c) written anticipations of how the case can be used to support pre-service/in-service teachers, and (d) individual reflective essays on the created multimedia case studies.

Thus, in the second phase, there were five primary data sources: (a) the records of the development of the facilitator guides and matrices, (b) one semi-structured team interview, (c) the instructor's journal, (d) the final version of the multimedia case studies with their supporting materials and (e) individual reflective essays on the created multimedia case studies. The ongoing analysis of this portion of the TDE explicitly focused on the prospective teacher educators' emerging understanding of their role in preparing teachers.

All these data collected by the researchers provided rich information that led to the understanding of the PTEs' knowledge development as they created MMCSs of practice. However, if I were to collect these data today, I would propose that the PTEs go one step further and try out the MMCSs with pre-service teachers in a teacher preparation program or in-service teachers. This would provide a whole new experience with the MMCSs that would provide more rich data for example in the semi-structured interviews and individual reflective essays.

Sample

Context of the Study. The prospective teacher educators' work was carried out during a two-semester course for doctoral students in several teacher education programs at a university in the northeastern part of the United States in the year 2002.

Core Coursework. The course was designed for graduate students interested in exploring issues in teacher education. The students examined current issues in teacher education and looked carefully at the use of case studies as a vehicle for preparing teachers. The major assignment in the class was for these prospective teacher educators to create multimedia case studies to be used in professional development.

Research Participants. Eighteen prospective teacher educators participated in the research study. Each of the 18 participants had teaching experience at either the elementary, middle or high school level. The majority had also taught at the post-secondary level as teaching assistants. In addition, some had experience working with pre-service teachers through working with a professor to teach a methods course and/or experienced working with in-service teachers through internships or professional development workshops. The 18 participants were spread across five teams and each team worked to create a multimedia case study (see Table 3).

When working in their case study creation teams, the prospective teacher educators (a) decided on the content and grade level of their case study, (b) set goals and objectives for their work, (c) decided how to capture the lesson through video and audio equipment placement, (d) made editing decisions, (e) prepared questions to ask the case study teacher before and after the lesson, (f) edited the video tapes from the three cameras into one coherent video, (g) developed an issue matrix, (h) developed discussion topics and questions for the facilitator guide, and (i) imported text and video into Case Creator software.

The Case Creator software had these built-in features for the five video slots: (a) Quick Time™ movies with frame control, (b) a book-marking feature, (c) scrolling and searchable transcripts, and (d) an interactive timeline. The software also has an issue matrix to allow the creators to structure access to episodes in the case by creating categories of issues and linking them to specific episodes on video. Case Creator allows for links to websites, as well as the ability to have text documents.

The prospective teacher educators created facilitator guides to accompany their multimedia case studies. Each guide contained information for instructors/facilitators about case studies, suggestions on how to use this case, and questions that could be used to promote discussion about the case.

Table 3

Research Participants and Case Study

Case Study	Participants (Pseudonym)	Program of Study
Case 1: Traveling Through Team Teaching	Chelsea	PhD
	Dean	PhD
	Kendall	PhD
	Micah	PhD
	Monica	PhD
Case 2: Cultivating Communication and Decision Making in Pre-service Art Education	Jasmine,	PhD
	Taylor	PhD
Case 3: Integrating Technology in a Literacy Classroom	Carah	PhD
	Ewing	PhD

	Liev	PhD
Case 4: Technology in the Middle School: Introducing Integers	Blake	PhD
	Bryson	PhD
	Heidi	Masters
	Keith	Masters
	Lucas	PhD
Case 5: Exploring Quadratics	Aiden	PhD
	Dawson	PhD
	Laura	PhD
	Patricia	PhD

Data Sources

For the purpose of data triangulation, which strengthens the reliability and validity of an investigation (Creswell 2009; Mertler & Charles 2005), the researchers used several data sources. Yin (2003) expressed the idea that a case study requires the triangulation of data, using at least three data sources. For this study, I analyzed the team planning documents, individual critiques of an existing multimedia case study, the semi-structured team interviews, the instructor's journal, the preliminary and final versions of the multimedia case studies created by the participants, records of the development of the facilitator guides, matrices, and the individual reflective essays on the created multimedia case studies. Examining data from multiple methods and sources helped enhance the rigor of the study and enabled building a logical justification for the themes that emerged in the study (Creswell, 2009).

Team Planning Documents. Before embarking on creating a multimedia case study, each of the five teams developed a design plan for their case study. The design plans took different formats but included aspects such as a topic of focus, a rationale for the case study project, some features to be included in the case study, media to be used, content materials, storyboards, and timelines among other features. These documents constituted part of the data sources for this study.

Individual Critique of an Existing MMCS. The prospective teacher educators also engaged in an individual critique of an existing multimedia case study, *Making Weighty Decisions* (Bowers et al., 2000) during the first phase of the project. *Making Weighty Decisions* is a multimedia case study that involves a four-day lesson sequence in an eighth-grade mathematics pre-algebra class in an urban public middle school.

The four-day lesson sequence focused on the mathematics concepts of average, weighting rates and ranks and developing generalizable symbols. It depicted an experienced teacher, Ms. Kay McClain, making critical and complex decisions during the lessons. The case study had videos of the various lessons including the transcripts; video journals of the teacher's reflections on the lesson in terms of planning, facilitating, understanding student thinking and her mathematical agenda; the lesson plans used by the teacher, and samples of student work. The case study had an issue matrix, that focused on the main concepts or ideas that the case creators wanted viewers to consider such as facilitation, student thinking and group activities.

Making Weighty Decisions was available to the prospective teacher educators as a CD-ROM package that contained some applications, files, and folders (i.e., Acrobat Reader™, Quick Time™ player, guide.doc, tech_help.text, studentwork.pdf).

Semi-structured interviews of teams. To solicit perspectives from participants and understand their experiences with creation of multimedia case studies, the researchers conducted three semi structured focus group/team interviews with each of the five teams. The researchers used semi-structured interview guides to collect the relevant data in a systematic and focused manner. The first interview in the first phase of the study explored the prospective teachers' understanding of cases in general (see Appendix A) while the second interview focused on their own case study (see Appendix B). The third interview in the second phase and second semester of the course focused largely on their experience with making the case study and what they had learned, as well as possible applications of the case study (see Appendix C).

The semi-structured nature of the interviews allowed the interviewer to clarify questions for respondents and probe for meaning. It enabled participants to raise and pursue issues and matters that might not have been included in the pre-devised interview protocol (Cohen et al., 2000). The interactions and group dynamics also allowed the participants to build on each other's comments to produce more ideas and details (Lodico et al., 2010). The interviewer audio recorded the interview after seeking the consent of the participants to capture the full script and to be free to reflect on the course of the interview so as to plan for the next line of questioning and to take reflective notes and comments (Henn et al., 2009). Transcripts of these semi-structured interviews formed part of the analysis for this study.

Instructor's Journal. The researchers also collected journals of the instructor's reflections on the lesson in terms of planning, facilitation, revisions, student thinking and group activities, among others.

Preliminary and Final Versions of the MMCSs Created. During the first phase of the project, the prospective teacher educators developed a preliminary version of the multimedia

case study after collecting and editing video, documents, and artifacts for the case and integrating the materials into a coherent case study of practice using Case Creator software. In the second phase, they developed supporting materials such as facilitator guides and matrices to go with the final version of the multimedia case study.

Records of the Development of the Facilitator Guides. Records of the development of the facilitator guides were also collected. The facilitator guides were meant to provide support for the use of the various components available within the program. The guide included details about the participants, the layout of the program, issue matrix, internet links to related sites, text documents such as lesson plans, references and discussion questions.

Matrices. The prospective teacher educators developed issue matrices for their multimedia case studies in the second phase of the study. The issue matrices were developed from the transcripts of the videos and included various categories to be explored while viewing the video. The categories were by no means exhaustive. Some of the categories were lesson planning, communication, instruction, feedback and reflection.

Individual Reflective Essays on the Created MMCSs. After creating multimedia case studies of practice, the participants were asked to write individual reflective papers on the knowledge they had gained about teacher education and teacher professional development through the creation of multimedia case studies of practice.

Table 4 provides a summary of the research design including the questions, data sources and participants as well as the data sources that answered the specific questions.

Table 4

Overview of Research Design

Research Questions

RQ 1. How do prospective teacher educators understand the tasks of teaching and learning?

RQ 2. How do their understandings of professional development and the tasks of teaching and learning develop as they engage in the process of creating multimedia case studies of practice?

RQ 3. How do they envision that pre-service and in-service teachers may grapple with the issues that emerge from these tasks of teaching and learning?

Strategy

Case study of five teams.

Data Sources

- Team planning documents - Research Questions 1, 2, 3
- Individual critique of an existing multimedia case study - Research Questions 1, 3
- Semi structured interviews of teams - Research Questions 1, 2, 3
- Instructor's journal - Research Questions 2, 3
- Preliminary and final versions of the multimedia case studies created - Research Questions 1, 2, 3
- Records of the development of facilitator guides - Research Questions 1, 2, 3
- Issue matrices - Research Questions 1, 2, 3
- Individual reflective essays on the created multimedia case studies - Research Questions 1, 2, 3

Sample

- ✓ 18 prospective teacher educators
-

Data Analysis

In line with Gravemeijer and Eerde's (2009) observation that in a teacher development experiment data analysis starts during the teaching experiment followed by the retrospective analysis, the researchers conducted some ongoing analysis of the data. In the first phase for example, the researchers conducted some form of analysis of the participants' understanding of the tasks of teaching and learning. One aspect of the analysis involved familiarizing themselves with the data that had already been collected such as (a) the planning documents that identified which elements were defined and selected for inclusion in the cases, (b) written descriptions of elements of the case and analyses of how and why certain elements were included or excluded from the case, (c) transcripts of group design sessions, and (d) the preliminary multimedia case study. The researchers then conducted interviews, seeking clarification of any ambiguities or discrepancies they found in the participants' written descriptions and probed the rationales and tradeoffs for the design decisions the participants had made.

The ongoing analysis was the basis for continued interventions with the participants, the testing of emerging hypotheses, and the strategies for promoting further development of the prospective teacher educators' thinking. In the second phase of the research study, the ongoing analysis shifted from an analysis of the participants' understanding of the tasks of teaching and learning to an analysis of their understanding of how it is that one prepares someone to engage in the task of teaching and learning. To this end, the researchers formed preliminary models of the development of teacher educators' understanding of teacher development and used these models to further the PTEs' critical analyses of the work of teacher preparation through the use of case studies.

For this study, I conducted a retrospective analysis of the data. As Gravemeijer and Eerde (2009) noted, a retrospective analysis may either create an opportunity for a more thorough and systematic analysis of the data if the teaching experiment phase is well documented or may involve a new look at the data when new topics of interest emerge. Since the teaching experiment was well documented in terms of description and data sources such as the team planning documents, issue matrices, facilitator guides, the semi structured interviews of teams, individual critiques of an existing multimedia case study, individual reflective essays and the multimedia case studies created, I settled for a more thorough and systematic analysis of the data through a carefully structured review of all relevant data of the teacher development experiment as I explain below.

As the teacher development experiment builds on the central principle of the constructivist teaching experiment (Steffe & Thompson, 2000), I employed the constructivist grounded theory approach (Charmaz, 2006) as a data analysis strategy for this study to explore the participants' experience in creating multimedia case studies so as to develop theories that were useful to understanding the knowledge development of prospective teacher educators. In accordance with this approach to grounded theory, the data analysis steps included familiarization with the data, open and focused coding, axial coding, memo writing, theoretical coding and developing a code book, and theory construction. I describe how I undertook these steps in the subsequent sections. To assist in managing the data effectively, I used ATLAS.ti qualitative research software.

In the first phase, I accessed the final versions of the MMCSs from the CD-ROMS using a computer to view the videos including the class videos, the planning videos and the reflection videos. I also explored the issue matrices for an idea on the issues presented in the cases and the

links to the extra resources among other aspects of the case studies. I then iteratively read all the written data sets including the team planning documents, facilitator guides, the individual reflections and the semi-structured interviews to get familiar with the depth and breadth of the content. This was extremely important since it enabled me to develop some initial analytic interests or thoughts (Braun & Clarke, 2006) as I was using secondary data that I did not collect interactively to benefit from prior knowledge. I developed initial analytic interests based on the research questions from which the objectives of the study emanated.

For the first question on how prospective teacher educators understood the tasks of teaching and learning, I not only identified some of the tasks of teaching and learning the PTEs had chosen to include in their cases but also began to a pattern across the cases. Issues such as planning, classroom management and reflection cut across various cases even though with different justification in each case. For the second question on how the PTEs' understanding of professional development and the tasks of teaching and learning, patterns began to emerge from the various data sets. The following excerpts are a case in point:

I learned the most about teacher education by having the opportunity to question how I learn. Throughout my teacher education program, I have learned a great deal about the way others learn, how to assess students learning, and how to create lessons for diverse learners. I had never framed these issues around my own learning. (Keith, Individual Essay)

... by watching the video and reflecting together on the teachers' decision and strategies, we processed our own views on many aspects of teaching. (Kendall, Individual reflective essay)

... viewing the two teachers in their team teaching had encouraged me to think about my own teaching styles and address ways to improve my instructional strategies. (Monica, Individual reflective essay)

The development of the multimedia case study and the analysis of its contents... gave me an opportunity to reflect on my professional knowledge and discuss with my team members my beliefs about instruction in the context of the practices observed in the case study (Ewing, Individual reflective essay)

The above excerpts from the individual reflective essays of members of different groups show a pattern of the PTEs thinking about their own learning in the process of creating MMCSs beginning to emerge. These are some of the initial thoughts that began to emerge during the first step of reading to familiarize with the data. Based on the final versions of the MMCSs and the written descriptions such as the facilitator guides, I summarized the information and gave a description of the structure of each of the five case studies.

As the data were already transcribed, I also missed out on the opportunity to engage in the “interpretive act” (Braun & Clarke, 2006, p. 87) of transcribing and familiarizing myself with the data. I worked with a large volume of data from different data sources including team interviews, design plans, team planning documents and individual critiques among others that required a great deal of attention to manage.

I therefore repeatedly read through the entire data set in an active way as I began searching for meanings and patterns in line with Braun and Clarke’s (2006) suggestion that ideas and identification of possible patterns that can be referred to in subsequent phases are shaped as

one reads through the data set in preparation for the formal coding process. In this section, I describe how each research question was answered to arrive at the themes by providing the analytic procedures and the data sources.

Research Question 1

How do prospective teacher educators understand the tasks of teaching and learning? To answer this question, I analyzed team planning documents, the facilitator guides, the semi-structured interviews, individual reflective essays, individual reflections on the *Weighty Decisions* case study, the issue matrices and the final version of the MMCS. As I read through the data, I identified the tasks of teaching and learning the PTEs had decided to include in the case. These included tasks such as planning, instruction and facilitation, classroom management, reflection, use of equipment such as technology and student activities as presented in the issue matrices and facilitator guides. Some of these also had sub-categories.

These tasks of teaching and learning aligned with Cochran-Smith and Lytle's (1999), knowledge-for-practice that they described as the formal knowledge and theory that relates to content and pedagogy such as the tasks of teaching and learning, and hinges on the idea that knowing more subject matter, educational theory, classroom organization, pedagogy or instructional strategies, assessment and the social and cultural contexts of teaching and schooling, leads more or less directly to more effective practice. The issues relating to pedagogy and instructional strategies, classroom organization and so on that the PTEs selected to include in the case thus represents their understanding of the tasks of teaching and learning.

Using ATLAS.ti coding software, I then coded all phrases that included these tasks of teaching and learning in the semi-structured interviews, individual reflective essays and the individual critiques of the *Weighty Decisions* case study in addition to the team planning

documents, the facilitator guides. This enabled me to derive descriptions and the PTEs' justifications for selecting the tasks of teaching and learning. The following excerpts are examples of descriptions and justifications they gave for selecting some given issues to be included in the case studies:

Teacher questioning techniques are an important and often overlooked issue in teacher development yet, questioning students correctly could promote critical thinking, as well as, allow teachers to conduct informal assessments. (Monica, Individual critique of the *Weighty Decisions* case study)

It is rare for a teacher to fully plan for the outcome of their lesson but only for the implementation since it often does not go as planned. This is an important planning principle of teaching that pre-service teachers need to understand before they take on a teaching role in the field practicum thus the importance of focusing on lesson planning in the case study. (Jasmine, Individual reflective essay)

Pre-service teachers need to develop effective strategies to ensure that the environment created within the classroom cultivates the learning spirit within pupils. Pre-service teachers need to develop some awareness of some of the issues related to management like time, resources within the classroom, dealing with students' requests, managing students' behavior, managing instruction and issues related to how to structure individual instruction or manage the classroom effectively when there are students with learning disabilities. (Carah, Individual reflective essay).

I then gave a thick description of the tasks of teaching and learning or the issues the PTEs selected for the cases including their rationale for selecting these issues to represent the PTEs understanding of the tasks of teaching and learning.

Research Question 2

How do the PTEs' understandings of professional development and the tasks of teaching and learning develop as they engage in the process of creating multimedia case studies of practice? This question represented the core of the study since the main purpose was to understand the PTEs' Knowledge Development through the creation of MMCSs of Practice. This was essentially knowledge-in-practice that according to Cochran-Smith and Lytle (1999), enhances and elevates the status of teachers' practical knowledge, and presumes that teachers learn when they have opportunities to examine and reflect on the knowledge that is implicit in the ongoing actions of expert teachers as they choose among alternative strategies, organize classroom routines, and make immediate decisions as well as set problems, frame situations, and consider/reconsider their reasoning. The process of creating multimedia case studies focused largely on the tasks of teaching and learning in action and prospective teachers had the opportunity to examine and reflect on this knowledge in practice. The prospective teachers reflected on the actions the teachers took, how they made judgments, and conceptualized and described classroom dilemma. They also examined the teachers' own reflections and made decisions on the aspects to include in the case studies.

To answer this question, I relied heavily on the semi-structured interviews, the individual reflective essays and the individual critiques of the *Weighty Decisions* case study in addition to other data sets as these represented the bulk of the PTEs own statements on how and what they had learned. For this question, I fully employed Chamuz's (2006) constructivist grounded theory

approach as a data analysis strategy where after familiarization with the data, I followed the steps of open and focused coding, axial coding, memo writing, theoretical coding and developing a code book, and theory construction. Below is a description of the process using the examples of two themes that emerged from the data for question 2: *Appreciation of the importance of reflection* and the *Complexity of Teaching and Learning*. The illustration depicts only a few excerpts and codes.

Open and Focused Coding. To begin the data analysis process, I used open coding to identify distinct patterns in the data at two levels. I approached the data with an open mindset seeking to identify what concepts were revealed within the data. I also sought to code the data in line with the research question to identify the concepts that related to the objective of the study in this case, the PTEs' Knowledge Development through the creation of MMCSs of Practice. Using the ATLAS.ti software, I conducted exploratory coding, highlighting excerpts or parts of the data and assigning open codes as presented in Table 5.

Axial Coding. I then conducted axial coding to make connections between those patterns and to develop units of meaning that captured and reflected the relationship among related concepts (Cooper et al., 2012) identified in open and focused coding. For example, I looked for conceptual categories and subcategories emerging from the data to come up with the axial codes as exemplified in Table 5. Although I have listed open and axial coding as distinct analytical procedures, I adopted the recommendation of Strauss and Corbin (2015) that they can occur simultaneously as researchers identify patterns and then begin to note how those patterns fit together, and therefore to some extent run open and axial coding simultaneously. I continued to develop and define the coding throughout the analysis. However, since coding data and generating themes can go on ad infinitum and there is need to not to get carried away with

endless re-coding (Braun & Clarke, 2006), I wrote a memo (see Appendix D) after coding each transcript to help in the analysis process (Charmaz, 2006).

Theoretical Coding/ Developing Themes. In Phase 3, after coding and collating all the data, I sorted the different codes into potential themes and collated all the relevant coded data extracts within the identified themes (see Table 5). Through constant comparison of the data, the codes, and the conceptual categories and sub-categories I developed a preliminary code book (see Appendix E) by organizing codes into emergent higher inference codes or themes.

In this stage, I also reviewed the themes to see whether all of them were meaningful based on the data available, and collapsed some into each other, and refined, separated and discarded some. Braun and Clarke (2006) observed that data within themes should cohere together meaningfully, while there should be clear and identifiable distinctions between themes.

Theory Development. As Charmaz (2011) noted that throughout the open, axial, and theoretical coding and memo writing, the researcher should begin to form successively more abstract, theoretical ideas about the data and codes, I defined each theme and what aspect of the data it captured by going back to collated data extracts for each theme and organizing them into a coherent and internally consistent account, with accompanying narrative (Braun & Clarke, 2006). As Braun and Clarke (2006) further observed that it is vital to not just paraphrase the content of the data extracts presented but identify and discuss what is of interest about them and why, I provided an explanation for each data extract and how it applied to the study, essentially coming up with theoretical explanations from the findings. Theoretical explanations are often constructed out of the data and the interpretation of the researcher (Charmaz, 2006). These theoretical ideas provided the structure for final analysis and discussion. The entire analysis process was iterative instead of linear.

Table 5*Example of Coding and Theme Development*

Excerpts	Open Codes	Axial Codes	Theme
<p>“What I have learned as a future teacher educator is that I have a greater need to be reflective about what I do as an educator and how it impacts students” (Jasmine, Individual reflective essay).</p>	<p>Reflective teacher</p>	<p>Own Reflection</p>	<p>Appreciation of the Importance of Reflection</p>
<p>“I’ve learned how to think as an educator and ask questions to myself like: what do I want to present to the pre-service teacher? How do they think about the class and the teacher?” What do they observe and learn from the video?” (Liev, Individual reflective essay)</p>	<p>Self-questioning</p>		
<p>“successful professional development programs needed to include two components for the program to have long-term success: teacher reflection and lesson</p>	<p>PD Component</p>		

purpose” (Monica, Individual reflective essay)		Reflection and	
“The process of reflection allows teachers to confront their theories about teaching and learning during and after teaching ... leading to the development of new understandings about teaching and learning and to the solving of problems of practice.” (Liev, critique of the <i>Weighty Decisions</i> case study)	New Understandings	Professional Development	
“Teaching is very complex ... there are so many issues that may be in the past have not been thought about ... As a teacher educator or as a teacher, you have to be very alert about so many situations that go on in the classroom” (Group 3, 3 rd interview).	Variety of issues	Issue	
“One of the difficulties of making a case comes from the form of decisions about what to put in the case ... the planning requires the	Decision of issues	Selection Challenge	

<p>teacher educator to narrow her focus to maybe one major theme and maybe a few subtopics” (Jasmine, Individual reflective essay).</p>			
<p>“We as a team were not sure whether we could find out what we hoped for. We decided to do something about “team teaching” but we could not determine whether team teaching might occur or not in the class we planned to record. We did not know what kind of interaction would occur in the class” (Micah, Individual reflective essay).</p>	<p>Uncertainty of issues</p>		<p>Complexity of Teaching and Learning</p>
<p>“We debated for a long time about whether a case should show an "everyday" lesson or something special... There may be particular elements that you think it is important for pre-service teachers to be exposed to. However, these things may not occur in what is just a</p>	<p>Natural vs arranged class</p>	<p>Deductive or Inductive selection</p>	

<p>"regular" lesson. So, do you choose to tape and document what would have gone on anyway, or do you choose to influence the lesson in some way in order to get what you want?" (Laura, Individual reflective essay).</p>			
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Research Question 3

How do the PTEs envision that pre-service and in-service teachers may grapple with the issues that emerge from the tasks of teaching and learning?

This question focused on how PTEs could support the development of the knowledge of the tasks of teaching and learning among pre-service and in-service teachers. The PTEs therefore envisioned ways in which the teachers may grapple with the issues that emerged from the tasks of teaching and learning, mainly through their recommendations on how to use the cases. They specifically suggested questions and other aspects for pre-service and in-service teachers to discuss or pay attention to as they studied the case. This process would generate knowledge-of-practice from their reflection on the practice of the teachers as they create the multimedia case studies in line with Cochran-Smith and Lytle’s (1999) view that knowledge-of-practice is knowledge generated when teachers treat their own classrooms and schools as sites for intentional investigation. The questions and other recommendations for discussion were largely provided in the facilitator guides that the PTEs provided for use with the cases.

To answer this question, I therefore analyzed the facilitator guides alongside other data to determine how the PTEs envisioned that the PTEs would grapple with the issues that emerged.

As I read through the data, I identified the questions and topics the PTEs had recommended for discussing the issues that emerged. For example, for classroom management in the *Integrating Technology in a Literacy Classroom* case, discussion questions included (a) potential managerial problems that a teacher must be aware of when teaching in a computer lab, (b) how a teacher could plan for lessons to prevent having such managerial problems, (c) how a teacher might manage the engagement of students from diverse ethnic, socioeconomic, and learning backgrounds, and (d) the possible classroom management challenges a teacher might face when working with such groups of students and how they could be overcome. Using the ATLAS.ti coding software, I again coded all phrases that included the tasks of teaching and learning in the team planning documents, the facilitator guides, semi-structured interviews, individual reflective essays and the individual critiques of the *Weighty Decisions* case study to get more suggestions for ways of grappling with the issues that emerged in the cases. This process enabled me to develop a description to explain how PTEs How do the PTEs envisaged that pre-service and in-service would grapple with the issues that emerged from the tasks of teaching and learning.

Reliability

I ensured the reliability of this study and maintained high standards and rigor by triangulating the data using the different sources of data available including the interviews, facilitator guides, the individual reflective essays, the weighty decisions critiques and the team plans, among others. This provided corroborating evidence per Gay et al's. (2006) suggestion that triangulation of data sources increases the rigor and credibility of a study. In line with

Creswell's (2009) contention that when a detailed description of the research process is given the results become more realistic and richer, I have provided a thick rich description in the write up to allow readers to make decisions regarding transferability.

Ethical Considerations

Since a researcher deals directly with and at times interferes in peoples' lives, ethical issues are highly important and need serious consideration (Creswell, 2009). Towards this end, the researchers sought clearance from the Institutional Review Board of Syracuse University. To recruit participants from among the prospective teacher educators, the researchers sought their informed consent by sharing the purpose of the study and explained the significance and duration of their engagement as well as their role and necessary commitments in the data collection process, giving information about the activities they were going to be engaged in.

Eighteen participants then signed consent letters indicating acceptance to participate and their right to withdraw from the study unconditionally. For confidentiality, I kept the names of the participants anonymous using pseudonyms.

In this chapter, I discussed the design and methodology of the study and presented the sources of data that I used as well as the sample and the data analysis procedures. I then presented the steps I followed to ensure the reliability of the study and the ethical considerations. In the following chapter, I present the findings that emanated from the analysis of the data.

Chapter Four

Presentation of Findings

In this chapter, I present the findings from the data collected for this study on PTEs' knowledge development through the creation of MMCSs of practice. My discussion of the findings proceeds under three themes developed from the research questions. These themes are related to how PTEs understand the tasks of teaching and learning, how their understandings of these tasks and professional development evolved as they engaged in the process of creating MMCSs of practice, and how they envisioned that teachers may grapple with the issues that emerged from the tasks of teaching and learning. First, I provide a description and structure of each of the five MMCSs the PTEs created.

Structure of the Multimedia Case Studies

The 18 respondents, working in teams of two to five members created a total of five case studies focusing on different aspects of teaching and learning. The MMCSs followed a similar format that included videos focusing on specific classroom aspects followed by an interview with the classroom teacher, and in some cases other participants. The cases on CD-ROMs included QuickTime movies with frame control, book marking features, searchable transcripts, and an interactive timeline (see Figure 5). Among the interactive features was the issues matrix that provided structured access to the episodes in the case. Each CD-ROM also included links to various aspects of the case, such as classroom seating charts with links to student work, as well as links to other resources that were useful in understanding the issues raised by the case. The text features in the MMCS included a facilitator guide to guide discussion on specific aspects of the case, text transcripts of the audio from the video as well as classroom artifacts such as lesson

plans and related teaching resources. The facilitator guides also included ways in which the MMCSs could be used in preparing pre-service teachers.

Figure 5

Screen shot illustrating key features of a multimedia case



Although all the MMCSs were similar in terms of the standard features included, they all exhibited unique aspects in terms of how they chose to use the case for teacher education and the issues the PTE teams viewed as critical to the case. Here, I present a description of each of the cases, focusing on the unique features of each case and the team's rationale for the issue they chose to focus on in the case.

Case 1: Traveling Through Team Teaching

The first case was one focusing on team teaching and was created by a team of five PTEs, Chelsea, Dean, Kendall, Micah and Monica. The case was designed to introduce various aspects

of team teaching to pre-service teachers and afford them an opportunity to reflect on collaborative practice before they entered the field of teaching. The case was designed to model how a lesson is planned, executed, and reflected upon over a four-day period by a team of two teachers. A member of the PTE team, Chelsea, explained in her individual reflective essay that they wanted the pre-service teachers to see how the lesson was planned, how it played out in the classroom with the children and how the teachers reflected on it. The setting was an interdisciplinary language arts and social studies elementary classroom featuring two experienced teachers teaching collaboratively.

The rationale of the prospective teacher educator team for choosing team teaching as their theme, as presented in their facilitator guide, was that due to the changing nature of today's elementary schools, as classrooms become progressively more diverse, classroom teachers, who have traditionally worked in isolation, are expected to work collaboratively with other teachers in order to meet the learning needs of their students. To achieve this, they must develop an interdependent relationship, sharing their knowledge and expertise with their colleagues. They argued that teachers are now called upon to plan together, develop instructional materials and assessments, and often even co-teach to improve student learning.

The prospective teacher educator team also felt it was necessary for the pre-service teachers to be aware of what strategies were required of them if they were to co-teach when they finally went to the schools. Another team member, Kendall, indicated in their first interview that they would include in the case, strategies that a pre-service teacher needed to know in order to successfully engage in team teaching in the event that they were partnered with another teacher. In his individual reflective essay, Micah observed that teacher educators might use the case to

show their students how to get involved in team teaching in their professional career, from planning to reflecting on practice as they had seen in the case.

Further, the team wanted to emphasize the value of team teaching while at the same time showing that the teachers did not have to lose their individual teaching styles. Chelsea observed that while they wanted pre-service teachers to see that team teaching is useful and beneficial to them and for student learning, they did not want to give the impression that to work as a team, both teachers must do exactly the same things and have the same teaching style. They thus opted to include footage of the teachers planning and reflecting together, as well as working separately with groups of students. The two teachers featured in the case planned and reflected together. They also conducted parts of the lesson together, but they maintained their individual teaching styles when doing group work with students. The case, therefore, offered an opportunity for novice teachers, as well as their more experienced colleagues, to observe and reflect on exemplary role models.

In this case study, as Monica indicated in her individual reflective essay, the team of PTEs identified and selected for discussion, several issues that they felt were critical to professional development and would allow pre-service and in-service teachers to dialogue and make decisions on how to address certain situations. They then coded these issues into three major issues that they thought related to team teaching and specifically at the elementary school level that was the focus of the case. These issues were (a) approaches and strategies of instruction, (b) classroom management, and (c) other issues of team teaching. These issues were presented in the context of planning, lesson introduction, whole group versus small group activities, small group presentations and teacher reflection. Within each of these broad issues, there were episodes and activities illustrating situations that future teachers would potentially

encounter in their own classrooms (see Figure 6). These were linked with the videos in the issues matrix and reflected the general nature of activities typical of an everyday classroom from planning, execution, and reflection.

Figure 6

Issues Matrix Screenshot for the Team-Teaching Case



Case 2: Cultivating Communication and Decision Making in Pre-service Art Education

Closely related to team teaching is the *Cultivating Communication and Decision-Making* case that specifically focused on the nature of communication between a mentor teacher and a student teacher during a student teaching experience. The case, created by a team of two PTEs, Jasmine and Taylor, represented collaboration and planning of a lesson during a student teaching practicum in the field as well as reflection by a group of pre-service teachers who had just

completed their student teaching practicum. The lesson featured in the case focused on a three-dimension art classroom at an urban high school.

The multimedia case was comprised of video and text that provided possibilities of investigation of the complexities and strategies of writing lesson plans, the development of a collaborative relationship between the mentor teacher and student teacher, and the student teacher's reflection on lesson planning practices and how these practices shifted over time. The case therefore provided users such as pre-service teachers, their mentor or host teachers and university supervisors, a framework for discussion and reflection from the perspective of an art education student and her mentor or host teacher. Jasmine observed that:

in terms of teacher education, it provides a whole lot of framework for thinking about how to work with the student, how to work with the host, how to work when you are introducing lessons then how you go through these conferences. So, there is a lot of use we hope for preservice teachers for future teacher educators or for possible future host teachers (Group 2, 3rd interview).

Specifically, the case included five video clips with transcription. The first clip showed interviews with the mentor teacher and the student teacher about the strategies they employed during lesson planning. The second clip featured the mentor teacher and student teacher reviewing the student teacher's proposed lesson plan. The third clip focused on the student teacher teaching the proposed lesson in a high school art class. In the fourth video clip, the mentor teacher and the student teacher were shown engaged in a collaborative post-lesson reflection, while the fifth clip showed the student teacher's thoughts about how to work with her mentor teacher on lesson planning. The case also included text pages that provided the original lesson plan, the revised lesson plan, a sample art education departmental lesson plan, a written

post-lesson reflection, and mentor or host teachers' tips for collaboration. There were also discussion questions for use by teacher educators facilitating a student teaching seminar, a facilitator guide, and possible assignments.

The PTEs creating this case made careful and purposeful decisions about the case theme and the people featured in it. They went into the project with the goal of creating a case that would meet the three objectives of providing video and text: (a) prompting investigation of the complexities and strategies of writing lesson plans during a student teaching practicum from the perspectives of the mentor teacher and student teacher, (b) portraying the development of a collaborative relationship between a mentor teacher and student teacher during a student teaching practicum, and (c) showing the mentor teacher and student teacher's reflections on lesson planning practices that inform their decision making process as they construct their roles as practicing and future art educators. The issues for discussion were presented in the issues matrix by thematic categories contained within the matrix. These included lesson planning, communication, instruction, feedback and reflection.

Case 3: Integrating Technology in a Literacy Classroom

Integrating Technology in a Literacy Classroom was a case created by three PTEs, Carah, Ewing and Liew motivated by the introduction of technology standards within the education programs as a necessary step prior to accreditation. They therefore perceived working on this MMCS as an attempt to meet these guidelines. Carah explained that at that time, the introduction of technology into the classroom was an issue that had been greatly advocated for with the then trend of technology development in society, resulting in technology standards being introduced within the education programs as a necessary step prior to accreditation. Ewing added that according to the National Council for the Accreditation of Teacher Education

guidelines, teacher candidates were expected to develop an understanding of uses of technology for the subjects they planned to teach, and faculty were expected to be knowledgeable about the current practice related to the use of computers and technology and integrate them in their teaching and scholarship.

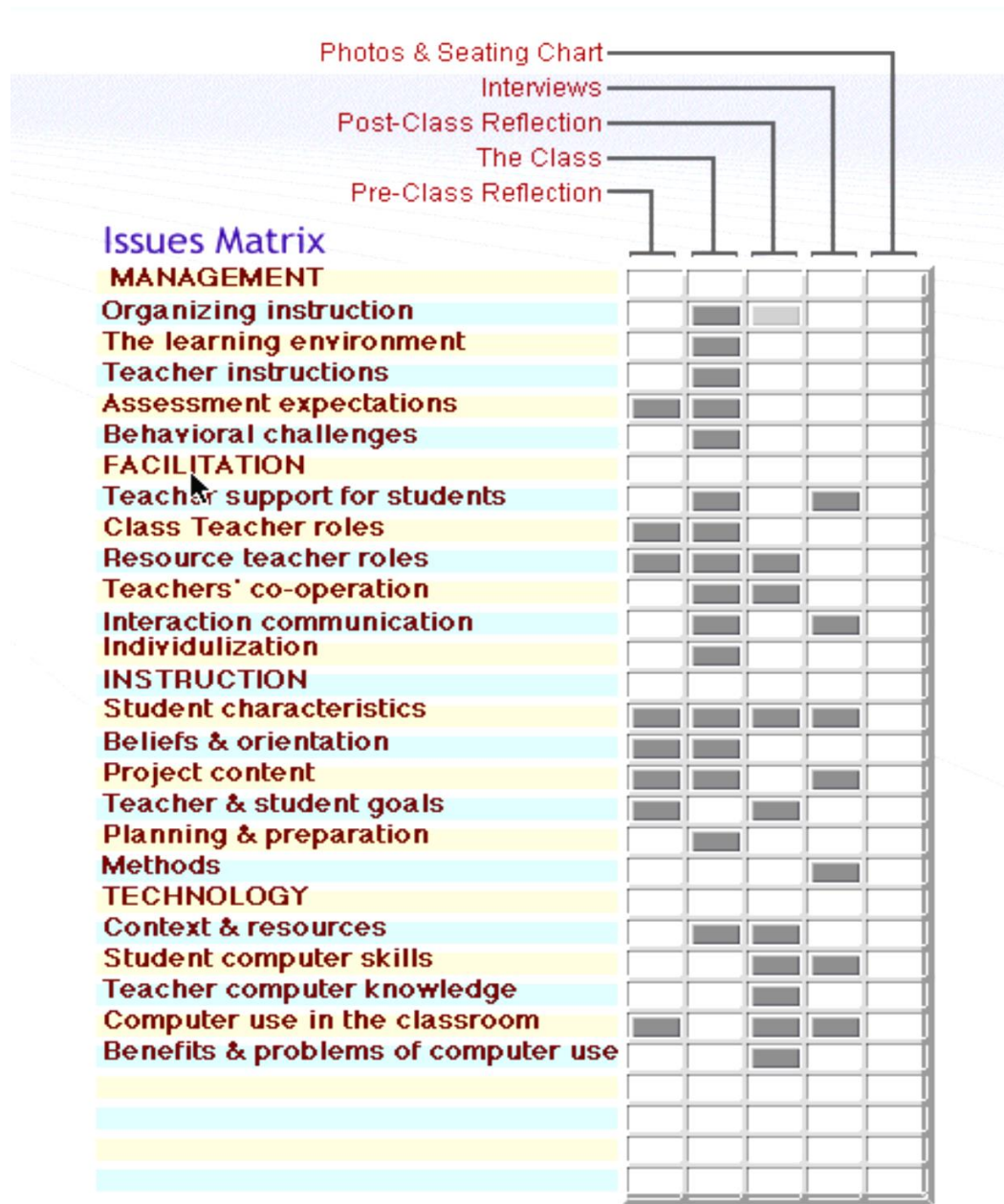
This case focused on a high school English teacher who used technology as an integral teaching and learning tool. She taught in a combination of 80- and 45-minute blocks. The case features included full text of the teacher's lesson plan, the teacher's reflections before and after the class, video vignettes featuring a variety of classroom interactions, and interview with an assistant teacher and students. The interviews were conducted with the aim of providing other perspectives beyond the classroom teachers. Included in the case was a photo gallery that identified most participants in this study and provided additional snapshots from the classroom. Also included were an issues matrix with links to the video, questions for further exploration before and after viewing the case, transcripts that scroll along with the video, samples of student materials used in their class project, bookmarks that can be customized to mark the areas of interest for individual or class exploration, search features for finding text in the transcript, and references to relevant literature with several annotated entries.

The team of three PTEs who created the case identified five ways to use the case in teacher education: (a) to help pre-service teachers gain general knowledge of procedures for lesson preparation and develop critical analytical skills, that is, the ability to make decisions about optimal instructional strategies for their specific teaching contexts, (b) to sensitize pre-service teachers to situational and student factors when weighing options for instructional procedures that they would like to adapt for a particular lesson, (c) to help pre-service teachers learn about the ways to integrate technology in their practices and about the issues that

technology can bring into daily classroom realities, (d) to sustain pre-service teachers' professional growth through the mentored critical analysis of their practices provided in the study guide to this project, and (e) to provide teacher educators with the necessary context for learning and teaching in general, and with technology in literacy education. To achieve these goals, the team identified specific issues and presented these issues in an issues matrix depicted in Figure 7. The identified issues were classroom management, facilitation of student learning, instruction and use of technology. These issues, the rationale for selecting them and the questions suggested for discussion portray the PTEs understanding of the tasks of teaching and learning.

Figure 7

Issues Matrix for Integrating Technology in a Literacy Class Case Study



Case 4: Technology in the Middle School: Introducing Integers

In another technology-focused case study - *Technology in the Middle School* - a team of five PTEs - Blake, Bryson, Heidi, Keith and Lucas - created the case to demonstrate how one

teacher engaged students in using spreadsheets in a middle school mathematics class. The lesson captured for the case was the first in a sequence of several lessons in which seventh graders at a mid-sized, urban middle school explored various properties of integers using spreadsheets. The school was in a medium-sized city and drew its students from different socio-economic backgrounds.

The PTEs explained that they had settled on technology in the middle school, introducing integers to allow future teachers to explore what it looked like to use technology in a mathematics classroom, evaluate its benefits themselves and perhaps get some inspiration to use it in their future practice, and provide a venue for pre-service teachers to make deep educational connections (Group 4 Facilitator Guide). Blake added that pre-service teachers would also learn how the classroom setting and the availability of the technological tools affected the teaching of mathematics, discuss how appropriately the case study teachers had integrated technology into mathematics teaching, and suggest different and more efficient ways of utilizing technology in teaching integers since they could not assume that a teacher who knows how to use technological tools can successfully integrate them into the classroom. Keith brought in the aspect that they had chosen to focus on technology because they knew that it was a buzzword in educational reform at the time.

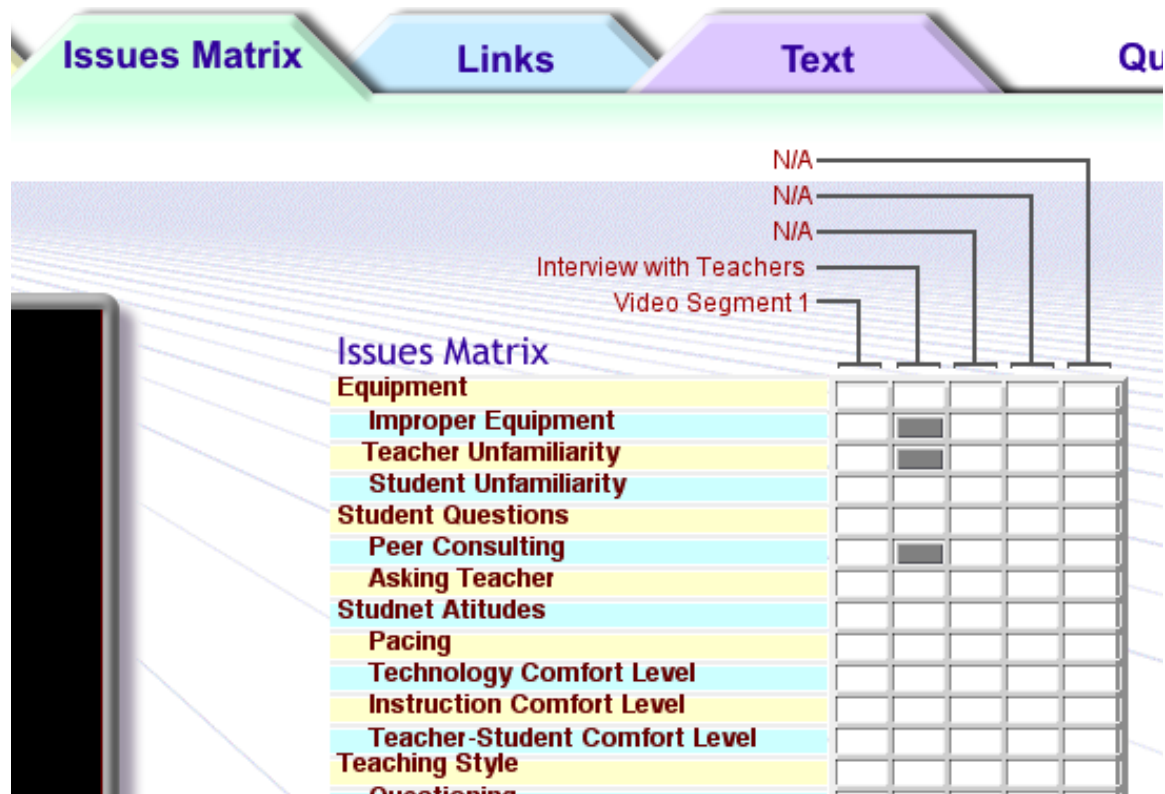
The videos presented in the case included video clips of class activity, a pre- and post-interview with the classroom teacher, and video clips of classroom activities, mainly students working in small groups on computers. Other artifacts included in the case were the teacher's lesson plan of the lesson featured on the video, a copy of a previous lesson plan used by the teacher in earlier classes not using the current technology, and student work sheets. The target audience for the case was both pre-service and in-service teachers.

The PTE team “consciously made decisions” (Group 4, Facilitator Guide, p. 2) in selecting issues they felt appropriate for pre-service teachers to grapple with. The conscious choices depicted what they understood as the tasks of teaching and learning necessary for pre-service teachers to learn about. They felt that the most important was the generation of issues to include in the issues matrix, a process that called for keen observation of the videos with the aim of identifying the issues that could form a basis for a class discussion of the case.

Lucas, in his individual reflective essay, said that in doing this they first asked every group member to bring a list of issues they had identified and it turned out that in some cases more than one person identified the same issue, while in others only one person identified a particular issue. The issues identified in the issues matrix revolved around the equipment or nature of the technology tool used in the class and how it impacted the learning, the nature of students’ questioning with their peers and teachers, and what they reflected about student thinking, student attitudes towards the technology, and the teaching style (see Figure 8). They also formulated discussion questions related to the role of technology in mathematics teaching and learning as opposed to the content of mathematics on introducing integers since the goal of the case was to explore the use of technology in a mathematics classroom (Blake, Individual reflective essay).

Figure 8

Issues Matrix Screenshot for the Technology in the Middle School Case



Case 5: Exploring Quadratics

In the *Exploring Quadratics* case, a team of four PTEs, Aiden, Dawson, Laura and Patricia depicted a reformed, technologically oriented teaching and learning scenario. The PTEs defined a reformed mathematics class as a learning scenario where reformed mathematics curricula are based on constructivist approaches and knowledge is not passed on but learned through personal constructs. The pursuit of students' questions is highly valued, the activities rely on primary data and manipulative materials, students are viewed as thinkers and the teacher is a facilitator mediating the environment for the students. For example, in the class the PTE team videotaped,

the teacher used a game where students were fully engaged in writing out equations for a partner, graphing equations from a partner, and analyzing where the graph curved.

The videos featured in the case were taken during a mathematics class in an urban high school with a culturally diverse student body. The featured class consisted of 11 girls and nine boys, all of whom had taken an algebra course previously, with some in an accelerated 8th grade algebra class. The classroom teacher provided each of the students with a TI-83+ graphing calculator to use during class time. The students worked in pairs or in small groups. The case included videos, lesson plans, mathematics activities, an issues matrix, proposed instructional strategies, and critiques of the selected issues. It also featured links to related web sites on use of graphing calculators, and bibliographic resources. A video clip with background material provided more information about the school, the students, and the teacher.

The lesson showcased in the Day 1 video highlighted the ways that the parameters a , b , and c of the standard quadratic formula ($y = ax^2 + bx + c$) affected the location of the function's graph in the Cartesian plane. This video contained a 24:37 minute, edited version of the classroom discussion. Some transition periods were edited in order to highlight specific classroom events. Several groups of students were shown working on an activity called the "Parabola Game."

The case also included two interviews with the classroom teacher. The first interview video contained the teacher's reflections on the lesson presented in Day 1 and plans for Day 2. She talked about things that she could have done differently in Day 1. She also discussed students' group work, motivation of students, and their participation in class activities. The classroom teacher talked about how she assessed students' understanding and how she used the knowledge

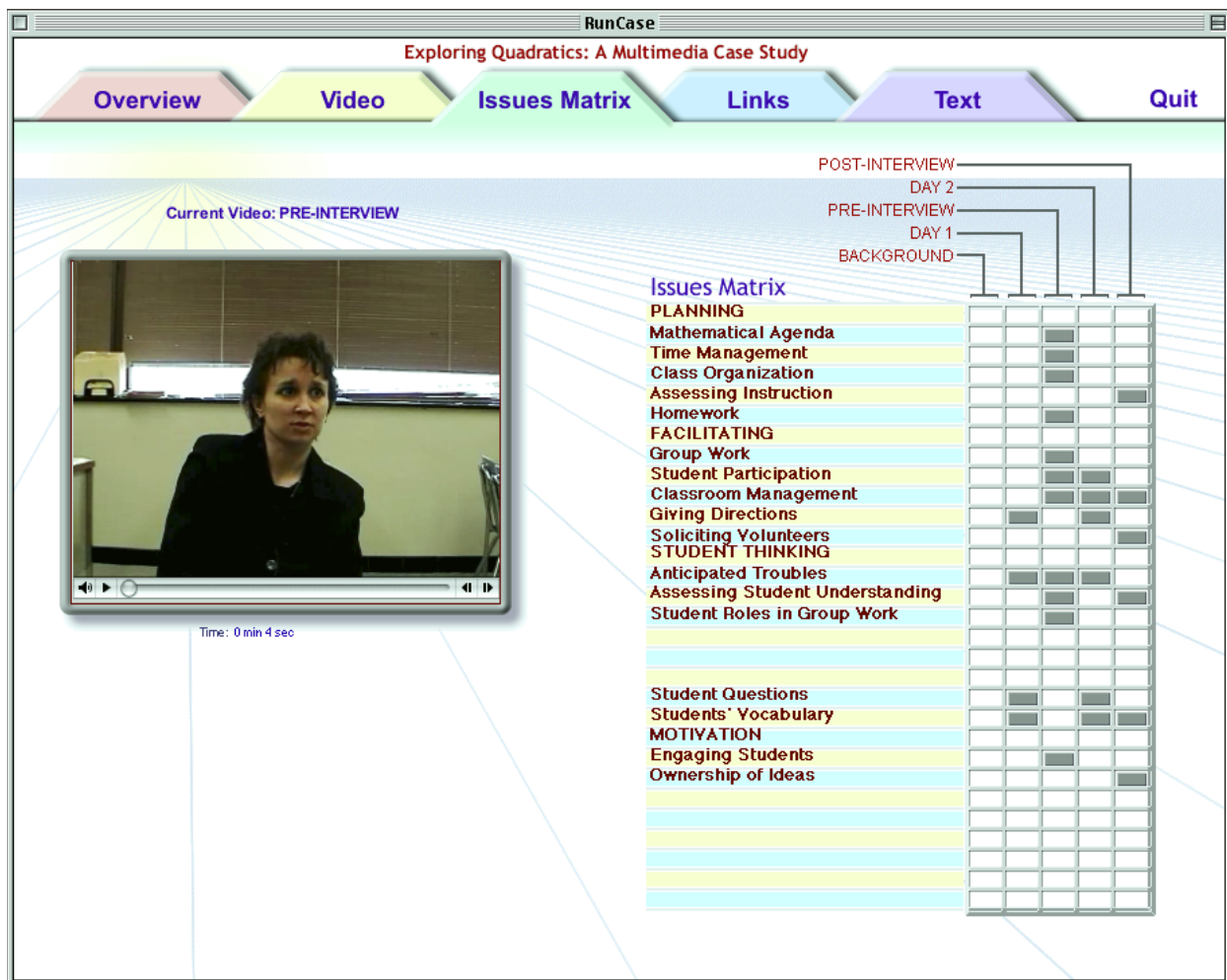
she gained about their thinking, anticipated difficulties, the role of the textbook, getting students engaged, her plan for the Day 2 activities, and her homework policy.

The lesson showcased in the Day 2 video showed students exploring the formula for the axis of symmetry using graphing calculators. This video clip contained a 43-minute, edited version of the classroom discussion which included the review of homework assignments and student explorations. In the second interview video, the teacher reflected on the second day's lesson with suggestions for how she would change it the next time, as well as reflections on the instructional strategy used in the lesson. The teacher also discussed her use of the chalkboard, how the students arrived at a formula, how she assessed their understanding, and what she thought about students' use of vocabulary.

The PTE team created the case with the goal of using it for professional development with both pre-service and in-service teachers to help them learn, discuss, and reflect on practices pertaining to the use of graphing calculators. Patricia observed that it could serve as an example even to practicing teachers on the way to use calculators while Aiden added that it was like some tutorial for pre-service teachers (Group 5, 1st interview). They also intended the case to be used for discussions related to the three major issues of the teaching and learning process they had identified in the case (see Figure 9). These were planning, facilitation and student thinking.

Figure 9

Issues Matrix Screenshot for the Exploring Quadratics Case



How PTEs Understand the Tasks of Teaching and Learning

The first research question was: How do prospective teacher educators understand the tasks of teaching and learning? I summarized the results from analyzing the PTE team planning documents, the facilitator guides, the semi structured interviews of the teams, the individual reflective essays, the individual critiques the *Weighty Decisions* case study, the issue matrices and the final versions of the multimedia case studies created.

Data from the PTEs indicates that they were convinced that MMCSs can play an important role in the preparation and professional development of both pre-service and in-service teachers. This was evident in the opinions they expressed both as teams and as individuals. In his individual reflective essay on the knowledge gained about teacher professional development through making the MMCS, Aiden described MMCSs as material to be used in professional development programs with both pre-service and in-service teachers to help them learn, discuss, and reflect on the best reform approaches. He further observed that they provide important practical information for pre-service and in-service teachers, encourage reflective thinking about different methods of teaching and learning, allow pre-service teachers and in-service teachers to develop problem-solving and decision-making skills, increase awareness of multiple perspectives and other educational settings as well as enhance beliefs about personal influence and capability, and habits of reflection.

Carah noted that MMCSs can give pre-service teachers insight into real-life classroom situations and help them address issues that arise within these classroom situations as well as to challenge some of the beliefs that they happen to have and think critically about these beliefs or the teaching and learning issues that they encounter (Group 3, 1st interview). Monica and Dean also stated that cases may help teachers to see how theories work in the actual classroom setting and how some teaching strategies work (Group 1, 1st interview). The PTEs also acknowledged the versatility of MMCSs. Dawson expressed that there seemed to be no limit to what cases could address including teacher communication, subject specific content, teacher behaviors, student thinking, as well as a host of other areas that may not have been contemplated as the case was made. He observed that a simple case could be used as a set of vicarious experiences for preservice teachers to read or watch, then discuss what they witnessed and critique the teacher,

the lesson, the students, the items on display in the classroom and the activities, among other things. A more advanced kind of case study might follow a novice teacher through the course of a school year to see what kind of problems they encountered.

It therefore follows that the PTEs were convinced that the elements of practice or tasks of teaching and learning that they included in the MMCS or that they chose to focus on in the MMCS, would be of help in furthering the preparation and professional development of pre-service and in-service teachers. This was evident in Lucas' suggestion that:

The stuff that should go into the case are the positive aspects that you want to make other people to get access to and learn from. So, in the case of teaching maybe you want to show other teachers, may be for our case pre-service teachers, something like good lesson planning. So, we want to achieve that objective then we need to build a lesson plan, may be the []. So, if you have to set aside the good things that you want to get to show to the others for them to learn from and whatever is distractive, maybe you leave out (Group 4, 1st interview).

In order to understand how PTEs understand these tasks of teaching and learning, it is important to look at the elements of practice they chose to present in the MMCSs, how they interpreted them and their rationale for choosing these elements.

Two different aspects of the case development depicted the PTEs' understanding of the tasks of teaching and learning. First, there were aspects about teaching and learning that they selected to represent in the case. These were presented mainly in the group interviews and planning documents. Initially, the groups met and planned what case they wanted to develop and what aspects they wanted to represent based on their areas of interest. They then visited the

classroom setting of the case. The initial plans were modified depending on the specific limitations that the classrooms presented.

The second aspect of the cases that depicted the PTEs' understanding of the tasks of teaching and learning was the issues and questions that they recommended for pre-service and in-service teachers to contend with as they studied the case. These were presented both in the issues matrix and the questions posed in the facilitator guides. While the PTEs selected events and activities to include in the case primarily as teaching and learning activities for pre-service and in-service teachers, these elements also reflected their understanding of the knowledge needed by pre-service teachers.

One PTE, in his reflection on the process of developing the cases stated:

This process called for making many decisions in terms of what we thought was relevant to our case. We had initially thought that this would be an easy task but learned that it was not that obvious because it called for critical thinking about why we preferred some clips to others. It took us a few weeks to complete the editing process (Lucas, Individual reflective essay)

This means that the PTEs took time to carefully make decisions on what they thought were the critical elements in the tasks of teaching and learning for the pre-service and in-service teachers to focus on in each case.

The following are the elements of practice or tasks of teaching and learning the PTEs selected for each of the five cases. Their choice of cases and issues for discussion as well as the rationale for choosing them points to their understanding of the tasks of teaching and learning.

Case 1: Traveling Through Team Teaching

The team of PTEs identified and selected several issues that they thought were critical to professional development and would allow pre-service and in-service teachers to dialogue and make decisions on how to address various situations in teaching and learning contexts. They coded the issues into three major categories that they thought related to team teaching at the elementary school level. These issues were (a) approaches and strategies of instruction, (b) classroom management, and (c) other issues of team teaching. The selection of activities for discussion reflected the PTEs' understanding of various tasks of teaching and learning and what they thought was critical for pre-service and in-service teacher professional development. Here are data that illustrate the activities this team selected.

Approaches and Strategies of Instruction. Within Approaches and Strategies of teaching, the PTEs selected teacher-centered activities, modeling discussion and questioning techniques among other issues in the issues matrix as the issues of focus to be used for discussion with the pre-service and in-service teachers.

Teacher-Centered Activities. The activities shown on the case represented mostly teacher-centered approaches. For example, in planning the teachers described how they would elicit student input but in the implementation the teachers sought minimal student input. The PTE team therefore envisioned that pre-service and in-service teachers would reflect on how the lesson would be modified to include activities and resources that the students would use with less teacher direction. They recommended discussions on the differences between teacher centered and student-centered activities as well as the teacher's role in the lesson through planning, delivery, and reflection.

Modeling Discussion. Since elementary school children were still learning how conversation progresses between two people with the teachers in the case modeling a conversation about their vacation travel plans, the PTE team thought that modeling discussion was an important issue of teaching and learning for the pre-service teachers to focus on and think about aspects like the teacher's role in the model conversation.

Questioning Techniques. Questioning techniques is another task of teaching and learning that the PTEs decided to focus on as they felt that teachers often engage in asking and answering questions through the course of a lesson and questioning promotes critical thinking and informal assessment. Monica supported this idea in her critique of the *Weighty Decisions* case study, an existing MMCS, where she observed that teacher questioning techniques are an important and often overlooked issue in teacher development yet, questioning students correctly could promote critical thinking, as well as, allow teachers to conduct informal assessments. The PTEs therefore recommended a focus on questioning techniques, especially aspects such as the type of questions and the pattern of questioning.

Classroom Management. The PTEs suggested a focus on activities such as arranging groups and transitions or instructions for student movement that may have implications on classroom management.

Arranging Groups. The PTEs suggested that since teachers frequently choose to have students work in cooperative groups, careful selection of which student goes to which group is of utmost importance. They thus suggested that it would be valuable for pre-service teachers to discuss methods of choosing students for specific groups. Pre-service teachers might debate the decision to have stronger students work with weaker students, the advantages and disadvantages

of students who do not know each other well working together or heterogenous groups versus homogeneous ones.

Instructions for Student Movement. Since the students transitioned from one activity to another throughout the learning period, the PTEs viewed transitions from one activity to another in the class as a critical element of teaching and learning and thought it useful for pre-service teachers to consider the importance of and how to achieve smooth transitions.

Other Issues of Team Teaching. The PTEs also included other aspects of team teaching such as division of labor, planning and lesson reflection.

Division of Labor. The PTEs viewed division of labor as a critical element of teaching and learning, specifically team teaching. They thought of it in terms of how work would be divided and how important it was for each team member to complete the tasks they agreed to.

Planning. Since it is necessary for teachers who are teaming to plan together as the first step towards working as a team, the PTEs thought it would be of benefit for the pre-service teachers to think about the compromises necessary for a team relationship to work.

Lesson Reflection. The PTEs noted that being a reflective teacher is extremely important and teachers must cultivate the habit of taking time each day to think through how the lesson had progressed. The pre-service teachers would thus discuss the types of things a reflective teacher would consider, such as if the children had learned from the activity, the evidence to support the claim that they had learned, the aspects of the lessons that had gone well and could be repeated, and the changes necessary. Monica presented the following scenario where they had made use of reflection:

In our case, we asked teachers to reflect on their activity. While the activity was colorful and appealing to the eyes, it was extremely difficult for the students to complete

independently. As a result, the activity was teacher-centered with little benefit to the students academically. In order for our case to be beneficial for professional development, we needed to address this issue. The most appropriate way was to have the teachers reflect on the success of the activity. The reflective component of our case allowed the two teachers time to discuss ways to improve or modify the lesson to make it more student oriented. (Monica, Individual reflective essay)

This example depicts reflection in use and would be a point of discussion for pre-service teachers as they discuss the reflective component of the MMCSs.

These are some of the issues or tasks of teaching and learning that the PTE team developing the *Traveling through Team Teaching* multimedia case identified and selected for discussion and as the focus of the case. This selection represents what the PTEs considered as critical to the professional development of pre-service and in-service teachers. The issues they chose, the reasons they give for selecting these issues and the recommendations they make for the pre-service and in-service teachers to discuss depict their understanding of the tasks of teaching and learning.

Case 2: Cultivating Communication and Decision Making in Pre-service Art Education

The PTEs creating the *Cultivating Communication and Decision Making in Pre-service Art Education* case made careful and purposeful decisions about the case theme and the people featured in it. Jasmine, in her individual reflective essay, observed that one of the difficulties of making a case comes from the form of decisions about what to put in the case. She admitted that the selected issues were generated from only their perspectives and analysis of what they had planned to capture as a case blended with what they actually edited for viewing and may be limiting to viewers who held different viewpoints or had alternative ideas since it was possible a

lot more issues could be discussed. Essentially, this meant that the case could be used to discuss a lot more issues than the PTE team had recommended. However, the issues selected portrayed what the PTEs considered critical for pre-service teachers to learn. The issues selected also represented the PTEs understanding of the tasks of teaching and learning. The issues were presented in the issues matrix organized by thematic categories contained within the matrix. The following are issues that PTEs suggested for use by art teacher educators with students who may be enrolled in art education courses prior to their student teaching practicum.

Lesson Planning. Lesson planning is one of the issues of teaching and learning that the PTEs selected for discussion. Jasmine observed in her individual reflective essay that it is rare for a teacher to fully plan for the outcome of their lesson but only for the implementation since it often does not go as planned. She felt that this is an important planning principle of teaching that pre-service teachers needed to understand before they took on a teaching role in the field practicum thus the importance of focusing on lesson planning in the case study.

Communication. Communication was a major focus of this case and therefore an aspect of teaching and learning that the PTEs felt would be a focus of discussion and analysis. In her individual reflective essay, Taylor observed that watching and listening to the post conference sequence again and again brought forth yet another example of how student teachers and mentor teachers communicated with each other. She observed that while during the lesson planning stages student teachers and host or mentor teachers worked together and volleyed conversation back and forth to plot out the lesson, during post-lesson conferences the host teacher did most of the talking while the student teacher's voice remained limited and often stilted. She therefore believed that by providing a common "snapshot" through the case, to use as a basis for deeper discussion, pre-service teachers would develop a variety of ways to approach dealing with

various types of challenges in the classroom. Additionally, with a common picture for discussion, students would begin to see teaching as a whole flexible environment and develop a tolerance for the unknown instead of viewing teaching as individual segments to perfect as they moved from student to educator.

Instruction. The PTEs felt that although they would draw from their own teaching and supervisory experiences to provide an authentic basis for deeper discussion, dialogue based on a multimedia case could “lift the words off the page of the text book and bring the issues and concerns into reality for students and instructors through the students’ observation and analysis of the multimedia and multilayered text.” (Taylor, Individual reflective essay). For example, they suggested a discussion on what adaptations the pre-service teacher would make to ensure all students participated in the lesson whenever she encountered students whose first language was other than English.

Feedback. The PTEs also identified feedback as an important aspect of teaching and learning that merited deeper discussion. They therefore recommended varied aspects of discussion such as the pre-service teachers discussing the role that the mentor teacher plays in ensuring the student teacher meets both her requirements and those of the university.

Reflection. In her individual reflective essay, Taylor observed that as the semester draws to an end, the instructor and students typically create closure to the course. However, learning does not end if both parties continue to practice the art of reflection. Investigation continues, the understanding of incidents and issues morph with past and present experiences and insight to experiences and ideas are gained in the process. The PTEs therefore embedded opportunities for reflective practice in each segment of the case, in addition to analyzing the case data and preparing questions to encourage reflective practice.

Lesson planning, communication, instruction, feedback and reflection are some of the issues the PTEs selected for discussion and analysis in the *Cultivating Communication and Decision Making* case, a pointer to the tasks of teaching and learning they believed as important for professional development of pre-service and in-service teachers.

Case 3: Integrating Technology in a Literacy Classroom

The team of three PTEs who created the *Integrating Technology in a Literacy Classroom* case identified critical issues in the case that could form a basis for analysis and discussed these in the context of using technology in a literacy class and general teaching related issues. The issues identified were classroom management, facilitation of student learning, instruction and use of technology. These issues, the rationale for selecting them and the questions suggested for discussion portray the PTEs understanding of the tasks of teaching and learning.

Classroom Management. As indicated in their facilitator guide, the PTEs felt that the discussion of management strategies in this case could bring to pre-service teachers' attention, an array of issues and potential problems characteristic of different student groups and class types. They felt that the analysis of the potential causes for managerial problems and the ways of dealing with them might prepare pre-service teachers for a richer exploration of these issues both in the case and in their future instructional practices and pre-service teachers needed to be trained or to develop some experience in handling the classroom for the success of any lesson. In her individual reflective essay, Carah said that pre-service teachers needed to be informed by teacher educators of the many other issues they needed to address other than their technical expertise, such as if they may require an assistant teacher within the classroom or may have to adopt individual instructional approach.

Carah further justified the focus on classroom management saying that pre-service teachers needed to develop effective strategies to ensure that the environment created within the classroom cultivated the learning spirit within pupils. Pre-service teachers needed to develop some awareness of some of the issues related to management like time, resources within the classroom, dealing with students' requests, managing students' behavior, managing instruction and issues related to how to structure individual instruction or manage the classroom effectively when there are students with learning disabilities. Liev added that, it is vital for teacher educators to make pre-service teachers aware of how broad management issues were. For instance, management of the students' materials or assignments is something that needs critical attention for the success of the class.

Within Classroom Management, the PTEs suggested a focus on organizing instruction, the learning environment, teacher instructions, assessment expectations and procedures and behavior problems and discussions, among other issues to be used for discussion with the pre-service teachers. They also formulated discussion questions such as about the potential managerial problems that a teacher must be aware of when teaching a class in a computer lab to address potential classroom management problems.

Facilitation of Learning. In facilitation of learning, the PTEs suggested a focus on teacher support for students, teacher roles, resource teacher roles, teacher and resource teacher cooperation, interaction, communication, student/teacher questions and individualization. The PTEs felt that an analysis and critique of these factors could be helpful in equipping pre-service teachers with a variety of strategies for facilitating their classrooms. To support this analysis, they suggested questions such as how the teacher demonstrated values critical to motivation such

as enthusiasm, care, success, personalization, humor, positive attributes and praise, as well as the practices and strategies the pre-service teachers would recommend for improving motivation.

Instruction. The focus on instruction was influenced by three likely scenarios that may occur with preservice teachers. In the first scenario, pre-service teachers might know the content and the skills their students need to possess but do not know how to teach this knowledge to the students. In the second scenario, the pre-service teachers might have the general knowledge of the content and the knowledge of instructional procedures but are unable to link this knowledge to new contexts. It might also happen that some pre-service teachers might not have enough knowledge of the content and the instructional procedures (Group 3, Facilitator Guide). The PTEs therefore felt that for instruction to be most meaningful and effective for a class as a group and as individual members, there was need to explore pre-service teachers background knowledge of the content and their teaching experiences through the lens of these scenarios and equip them with the necessary instructional strategies.

Further, the pre-service teachers might also be struggling with individualized instruction (Group 3, Facilitator Guide), thus the need for teacher educators to train pre-service teachers who are sensitive to the learners' needs, aware of each of their students' abilities, disabilities, their varied intelligence levels and making a conscious effort to address those needs. This prompted the PTEs to focus on instruction. Carah explained:

Student teachers need to be prepared by teacher educators of the need to individualize instruction or make accommodation for individual learner needs when possible in order to be able to achieve the outcomes they intend for their pupils. Pre-service teachers need to be trained on approaches they can use to ensure that they are able to monitor the progress of each of their learners and access their work with due regard to their

expectations and ability. Teacher education has to prepare pre-service teachers to have a deep interest in their students and make them realize their central role in supporting students within the classroom learning environment. (Carah, Individual reflective essay)

To achieve this and much more on instruction, the PTEs recommended a focus on student characteristics, beliefs/orientations, content/project, teacher/student goals, planning/preparation, and methods/manner.

Use of Technology. For technology, the PTEs suggested a focus on the context and resources, the students' computer skills, teacher computer knowledge, specific computer applications in the class and the benefits and problems of the computer use. The PTEs felt at the time of the study that computer technology was becoming common place in schools (Group 3 Facilitator Guide) thus the need to equip pre-service teachers with strategies to use technology for instruction. They also felt that including use of technology in the case study would open discussions about issues that technology brought into the world of teachers, students, teacher educators and instruction. Here, they recommended questions such as about pre-service teachers' philosophy in using technology in instruction.

The discussion of the issues selected as the focus of the case such as classroom management and facilitation of learning as well as the questions suggested to grapple with this issue, present an idea of the PTEs' understanding of the tasks of teaching and learning.

Case 4: Technology in the Middle School: Introducing Integers

For the *Technology in the Middle School* case study, each of the five PTEs in the team recommended issues that they thought were critical to teaching and learning and that the case needed to focus on. In some cases more than one PTE identified the same issue, while in others only one PTE identified a particular issue. They then settled on a number of issues identified in

the issues matrix. The issues revolved around the equipment or nature of the technology tool used in the class and how it impacted the learning, the nature of students' questioning with their peers and teachers, and what they reflected about student thinking, student attitudes towards the technology, and the teaching style.

Equipment. For the equipment and nature of technology used in class, the PTEs suggested a focus on the state of the equipment and the familiarity or unfamiliarity of the students and teachers with this equipment. They specifically recommended discussions on improper equipment, teacher unfamiliarity and student unfamiliarity.

Student Questions. The PTEs also recommended a focus on student questions both to each other in terms of peer consulting and to the teacher with questions such as how students would be encouraged to seek help from each other.

Student Attitudes. Student attitudes was another aspect the PTEs felt had implications on teaching and learning and pre-service teachers should talk about, mainly the technology comfort levels of the students.

Teaching Style. The PTE team also suggested a focus on the teaching style, particularly the aspect of questioning, this time from the point of view of the teacher. Additionally, they suggested a focus on the mathematical ideas the lesson addressed, what the pre-service teachers would include in the lesson plan for the next lesson, the possible objectives and how these objectives were met.

The PTE team created this case to serve as a case for future teachers to consider as they explore what it looks like to teach using technology in the classroom and evaluate its benefits for themselves as prospective teachers. The case provides an opportunity for exploring how to use technology in a middle grade mathematics classroom. Several issues such as student attitudes

and student questions to teachers and to peers are presented for the pre-service teachers to focus on as they use the case. The choice of these issues, though not exhaustive, depicts the pre-service teachers understanding of the tasks of teaching and learning.

Case 5: Exploring Quadratics

The PTE team created the case with the goal of using it for professional development with both pre-service and in-service teachers to help them learn, discuss, and reflect on practices pertaining to the use of graphing calculators. Patricia observed that it could serve as an example even to practicing teachers on the way to use calculators while Aiden added that it was like some tutorial for pre-service teachers (Group 5, 1st interview). They also intended the case to be used for discussions related to the three major issues of the teaching and learning process they had identified in the case mainly planning, facilitation and student thinking.

Planning. The PTEs creating the *Exploring Quadratics* case selected planning as a critical element of teaching and learning that pre-service teachers needed to discuss. In this case, planning entailed decisions on the mathematical agenda for the class, time management, class organization and assessing instruction and homework, factors that they thought were key to the success of the class.

Facilitation. The PTEs also suggested a focus on issues of facilitation of the class with discussion questions such as whether group activities were used effectively and appropriately. Here, facilitation involved working with groups, student participation, classroom management, giving directions and soliciting volunteers.

Student Thinking. On the nature of student thinking, the PTEs envisaged a focus on anticipated troubles, assessing student understanding and student roles in groupwork as some of the factors that would help understand student thinking.

The PTEs selected a wide range of issues for discussion across the various MMCSs. Issues around planning, aspects of instruction such as questioning techniques, facilitation and classroom management featured across the cases. This selection represents what the PTEs considered as critical to the professional development of pre-service and in-service teachers. The issues they included, the reasons they give for selecting these issues and the questions they suggest for the pre-service and in-service teachers to grapple with depict their understanding of the tasks of teaching and learning. The creation of the MMCS, therefore, revealed the thinking of the PTEs about the tasks of teaching and learning and important aspects about these tasks that pre-service teachers need to learn. The findings reveal that prospective teacher educator thinking about these aspects to include in planning and creating the case contributed to the PTEs' knowledge development as discussed in the next section.

Knowledge Development through Creation of Multimedia Case Studies

The main purpose of this study was to understand the PTEs' Knowledge Development through the creation of MMCSs of Practice. In this section, I present the findings for the second question on how PTEs' understandings of professional development and the tasks of teaching and learning, developed as they engaged in the process of creating MMCSs.

Through my analysis of the data, I found that PTEs' understanding of professional development and the tasks of teaching and learning developed as they engaged in the creation of MMCSs. This was evident in the opinions the PTEs expressed both as individuals and as groups. For example, in her reflective essay on the knowledge she had gained about teacher professional development and the tasks of teaching and learning through making the multimedia case study, Patricia stated that:

Discussing the issues in a class set-up did not prepare me much compared to the experience I gained in creating the case. In creating the *Exploring Quadratics* case, I witnessed quality teaching - new knowledge about teaching and learning, new approaches implemented, new challenges [group work] and opportunities [calculator, creating student activities] availed. The teaching issues that arose for me in creating the case were: the student's language and vocabulary; classroom discourse; the culturally diverse population of students in the videotaped class; pedagogical issues about math activity; group work; cheating on the game for the sake of winning and the role of the teacher as a-facilitator, motivator, questioner, and reflective practitioner (Patricia, Individual reflective essay).

I interpret this to mean that Patricia did not learn as much from the class discussions in the teacher education classroom as compared to what she learned while engaged in creating the case study where she experienced new challenges and opportunities as well as new approaches to teaching and learning. Through this new knowledge about teaching and learning, Patricia's understanding of professional development and the tasks of teaching and learning underwent some development beyond what she perceived she had gained in a class set-up.

Carah also indicated in her reflective essay that the process of developing a MMCS was a great learning experience and was challenging for her as a future teacher educator but it proved to be an experience that helped her grow professionally in being more aware of many issues facing teaching as a profession. Dean noted that working on the use of cases in teacher education and actually preparing one added a lot to his professional knowledge and brought a new perspective to his understanding of teacher education.

In addition to the new perspectives, some PTEs also acknowledged having learned more than just teacher education. Laura stated in her reflective essay, “I learned a lot of things from creating our case study. Some of the things that I have learned relate to teacher education and some have a much broader reach.” Dawson was of a similar opinion, saying that in creating of their case - *Exploring Quadratics*, - he had learned a lot about issues tangential to teacher development. This means that in addition to learning about issues directly related to teaching and learning like planning, facilitating learning, classroom management and reflection, they also improved their knowledge on other issues such as group dynamics, the use of technology such as video editing and the need to conduct a dry run before actual implementation.

Ewing viewed the development of the MMCS and the analysis of its content as reflection-in-action upon classroom situations of uniqueness, uncertainty, and instability, as featured in the case study. He stated in his reflective essay that the process was beneficial to him as an educator on a more personal level and explained it in this way:

The development of the multimedia case study and the analysis of its content gave me an opportunity to reflect on my professional knowledge and discuss with my team members my beliefs about instruction in the context of the practices observed in the case study.

Such conversations were valuable as they forced me to look at my pedagogy more critically (Ewing, Individual reflective essay).

Reflecting on classroom situations of uniqueness, uncertainty, and instability, and critically examining his own pedagogy likely led Ewing to a better understanding of the tasks of teaching and learning, and professional development. It is therefore evident that the PTEs’ understanding of professional development and the tasks of teaching and learning developed as they engaged in the creation of MMCSs.

I identified four dominant themes from the data collected for this study on how PTEs' understandings of professional development and the tasks of teaching and learning developed as they engaged in the process of creating MMCSs. First, the PTEs developed greater appreciation of the complexity of teaching and learning through the process of creating MMCSs of practice. In this activity, the PTEs found it challenging to determine the issues to include in the case study and needed more intellectual discussions to determine the issues of teaching and learning to focus on. This reinforced the PTEs' understanding of teaching as a complex process. Secondly, the process of creating MMCSs reinforced the PTEs' appreciation of the importance of reflection as a task of teaching and learning. This involved the importance of reflection for their own experience as teacher educators, for professional development with pre-service and in-service teachers, and as an important component in case studies. Additionally, creating MMCSs afforded the PTEs opportunities to think in new ways about their own learning. This involved processing their own views, reflecting on their own learning, and possibly changing their existing conceptions about teaching and learning.

Lastly, the process of creating MMCSs supported the PTEs in developing better understanding of linking theory and practice and developing ideas of reconciling theoretical and practical ideas. These were the major themes that represented the knowledge development of the PTEs through the creation of MMCSs. However, there were also some minor themes that contributed to the knowledge development of the PTEs. For example, the creation of MMCSs allowed the PTEs the opportunity to think about issues pertinent to pre-service teacher professional development.

Complexity of Teaching and Learning

While engaged in the process of creating MMCSs of practice, the PTEs experienced challenges such as selecting the issues to include in the case, the class to focus on or the teacher to work with and this led them to acknowledge or reinforce their conception of teaching and learning as a complex process. They thus developed greater appreciation of the complexity of teaching and learning and this was evident when asked what they had learned about teacher professional development through the making of the case or how the process had influenced their thinking. One participant from Group 3 that was working on creating the *Integrating Technology in a Literacy Classroom* case noted:

I always believe that teaching is a tough job but after having watched that class I think it again raises the issue of how difficult that job is and how unpredictable it is and the issues of how, what type of knowledge, what type of skills we need to provide, what set of tools we need to provide the pre-service teachers so that they can function if they happen to encounter an environment like that or situations with a lesser degree of that complication in the classroom (Group 3, 3rd interview).

This participant essentially acknowledged the complexity of teaching and learning and indicated the need to think through the type of knowledge, skills, and tools with which to equip pre-service teachers to enable them function effectively in classroom settings. According to another participant in the same group, the complexity also arose due the many issues in a classroom that a teacher needed to be vigilant about and this became more obvious to him in the process of creating the case. The participant noted:

Something that at least was made more pronounced is the fact that teaching is very complex. I mean there are so many issues that may be in the past have not been thought

about, but I just got more informed about in the project. As a teacher educator or as a teacher, you have to be very alert about so many situations that go on in the classroom (Group 3, 3rd interview).

This means that creating the case study brought to the fore the many issues that abound in a classroom situation that a teacher needs to be conscious about and adapt to, thus making teaching a complex process. The PTE realized that there is need for teachers to be very creative, resourceful and able to adapt the instruction to the situation.

Much of the appreciation of teaching and learning as a complex process also revolved around the difficulty the PTEs experienced in determining the issues of teaching and learning to include in their case studies. In her individual reflective essay at the end of the project, Jasmine declared this struggle:

One of the difficulties of making a case comes from the form of decisions about what to put in the case. As it should be a case of “something”, the planning requires the teacher educator to narrow her focus to maybe one major theme and maybe a few subtopics...Included also in the planning is the issue of who is the intended audience. For example, maybe the case of a mathematics unit in an elementary classroom originally intended for pre-service teachers may become of benefit to some in-service professional development seminar. The multiple use of the case may be planned for as well so that the finished product can be of greater utility (Jasmine, Individual reflective essay).

This meant that making a case study versatile enough to be relevant for multiple audiences and increasing its utility, while at the same time keeping the focus narrow so that it is a case study with a specific focus, made it very difficult to determine what issues to include in the case. Micah also raised the challenge of deciding on an issue beforehand and then not being sure

whether it would occur in the interactions that were planned for recording. He discussed this in his reflective essay:

Through the experience of creating a case, I have learned how difficult it is to determine the issues in teacher education ... We as a team were not sure whether we could find out what we hoped for. We decided to do something about “team teaching” but we could not determine whether team teaching might occur or not in the class we planned to record. We did not know what kind of interaction would occur in the class. We knew what we wanted to have but we were not sure about the incidents we were going to be faced with (Micah, Individual reflective essay).

This indicates that the PTEs faced the uncertainty of whether the issues of teaching and learning they wanted to focus on would occur in the class interactions they planned to record. It therefore became difficult to settle on the issues to focus on in the case when they did not know whether the issues would occur in the class they planned to observe and record. That participants found it difficult to determine issues in teacher education based on not knowing the kind of interactions they were going to get in the class points to the complexity of the teaching and learning process and drove the PTEs towards appreciating as much.

Laura and her group that focused on creating the *Exploring Quadratics* case also had difficulties going through the process of selecting the issues to present in their case, especially around whether to get them through natural class interactions or arranged ones. She discussed this in her reflective essay:

We debated for a long time about whether a case should show an "everyday" lesson or something special. I am still not sure which is better. On the one hand, it would be nice to have cases that demonstrate good activities. There may be particular elements that you

think it is important for pre-service teachers to be exposed to. However, these things may not occur in what is just a "regular" lesson. So, do you choose to tape and document what would have gone on anyway, or do you choose to influence the lesson in some way in order to get what you want? What we ended up doing was somewhere between the two (Laura, Individual reflective essay).

This means that Laura and her group faced challenges on whether to focus on natural class interactions to catch the real practices administered by the teachers or give directions to the teachers to influence the lesson and determine the issues that play out for pre-service teachers to discuss. Although the PTE team ended up striking a balance between the two – partly focusing on natural class interactions and partly influencing the teacher's actions to achieve the desired issues – the dilemma they had faced complicated the process of selecting the issues to focus on and illustrated the complexity of the teaching and learning process.

Closely related to the difficulties of determining the teaching and learning issues to include in the case was the difficulty to select the class to focus on and the teachers to work with in creating the case. Lucas, in his individual reflective essay, explained that the very first challenge their group, which created the *Technology in the Middle School: Introducing Integers* case, faced was identifying the teacher with whom to work. This was because they wanted a teacher who was either using technology already or would be using it in the next few weeks. From this recruitment process, Lucas and his team learned that as teacher educators they needed to stay informed about what the teachers in the field were doing and how they were doing it so as to fit their instructional plans in some of the teachers' classes without interfering with their regular schedules. This whole process also underscored the complexity of the teaching and learning process.

Liev and his group that was creating the *Integrating Technology in a Literacy Classroom* case also experienced difficulties but this time with finding a class to shoot their video. He explained in his individual reflective essay that it took them a month and a half to find a class with the technology application specifications they were looking for and where the teacher was willing to let the class be filmed.

The PTEs therefore needed more intellectual discussions to determine the issues of teaching and learning to focus on, the teachers to cooperate with and the classroom contexts to base their case studies. The difficulties they experienced reinforced their understanding and appreciation of teaching and learning as a complex process. Dean acknowledged this in his reflective essay:

Working on the cases helped me reinforce my understanding of teaching as a complex, continually evolving, full of decision-making process. Cases are representative of diverse situations and contexts. That is why use of case studies in teacher education encourages teachers to think and propose alternative solutions to the problems or dilemma situations in cases. This is a way of developing reflective teaching habits (Dean, Individual reflective essay).

Dean saw the complexity of teaching as largely revolving around the constant evolution, making of decisions, and providing solutions in diverse situations and contexts. Working on case studies had also reinforced teaching as a profession of extreme complexity for Ewing as he affirmed in his reflective essay:

It has also reinforced for me the extreme complexity of teaching as a profession and the constant challenge it gives me in my efforts to provide preservice teachers with the skills and knowledge adequate to handle a variety of such classroom situations...I would like to

help preservice teachers embrace the complexity of teaching as a profession (Ewing, Individual reflective essay).

This showed that Ewing viewed teaching as a complex process that posed a challenge for pre-service teachers to acquire teaching and learning skills and he hoped to help them understand and work through the complexity. Patricia seemed to confirm this complexity that posed a challenge for pre-service teacher learning in her individual reflective essay where she revealed that a pre-service teacher merely observing a teaching and learning situation may not be able to comprehend all that goes on. She likened it to her own example where she noted that:

despite all the discussions we had on the *Weighty Decisions* case, a number of teaching and learning complexities escaped me in the videotaped class. As an observer there was a lot of communication going on that I was unaware of. Implicit issues that took place in the classroom that we videotaped only became explicit to me during the interviews held with the teacher and students (Patricia, Individual reflective essay).

Patricia therefore concluded that case studies do actually reveal the complexities that exist in a classroom, further emphasizing the complexity of the teaching and learning process and how it is brought out by the creation of MMCSs.

Appreciation of the Importance of Reflection

The process of creating MMCSs also reinforced the PTEs' appreciation of the importance of reflection as a task of teaching and learning. This was clear in the opinion they expressed about reflection during and after creating MMCSs of practice. They expressed the importance of reflection at three levels. The importance of reflection for their own experience as teacher educators, importance of reflection for professional development as a task of teaching and

learning that pre-service teachers need to embrace and learn about, and reflection as an important component in case studies.

In her reflective essay at the end of the creating MMCSs project, Jasmine described her experience with reflection, portraying its importance for teacher educators:

What I have learned as a future teacher educator is that I have a greater need to be reflective about what I do as an educator and how it impacts students. Simply from observing classroom dynamics during the capturing of video, I learned that anything could happen and usually does. I already knew that but now I see how important it is to think deeply about my words and actions amid classroom dynamics (Jasmine, Individual reflective essay).

Through the creation of MMCSs, Jasmine realized the importance of thinking about and reviewing what she did as an educator, during and after the lesson, and how it impacted her students. This was so much so that she added that being reflective-in-action for her own teaching had become a goal for her as she re-entered the classroom and in future when she became a teacher educator.

Liev also acknowledged the importance of reflection while working on MMCSs. He stated that to design a good case for pre-service teachers, there was need to first view the video again and again to select meaningful and representative clips according to the issues they wanted to present. He noted that, "I've learned how to think as an educator and ask questions to myself like: what do I want to present to the pre-service teacher? How do they think about the class and the teacher? What do they observe and learn from the video?" Essentially, Liev and his team were engaging in reflection-in-action so as to come up with a good case for pre-service teachers to learn from.

Patricia, in an example mentioned earlier on the complexity of teaching where she had failed to notice a number of teaching and learning complexities in a videotaped class despite related discussions earlier in the *Weighty Decisions* case study, also deeply appreciated the importance of reflection for helping her understand what she had initially missed:

As an observer there was a lot of communication going on that I was unaware of.

Implicit issues that took place in the classroom that we videotaped only became explicit to me during the interviews held with the teacher or students. I learned the power of reflection, inquiring, questioning, and exploring (Patricia, Individual reflective essay).

The importance of reflection played out here in the fact that after Patricia missed out on a lot of complex issues of teaching and learning that were pertinent to her knowledge as a teacher educator and for preparing pre-service teachers, she came to learn about these issues through reflective interviews they conducted with teachers and students after viewing the videotaped lesson.

The PTEs also expressed the importance of reflection for professional development for pre-service and in-service teachers. In her reflective essay, Monica mentioned that through the creation of their case study – *Travelling Through Team Teaching* - she had learned that successful professional development programs needed to include two components for the program to have long-term success: teacher reflection and lesson purpose. She added that teacher reflection was one of the best ways for a teacher to improve their teaching abilities and although most educators planned a lesson and implemented it without giving any additional thought to the success of the lesson once instruction was over, in their case they asked teachers to reflect on their activities.

While observing that working on developing the multimedia case study was for him reflection-in-action upon classroom situations of uniqueness, uncertainty, and instability, Ewing underscored the importance of reflection for professional development in his reflective essay through the assertion that:

I would also like preservice teachers to develop the skills of life-long reflection-in-action practitioners, who are capable of gathering data about their instructional practices and contexts, reflecting on them, and modifying their instructional procedures to meet specific students' needs and specific context realities (Ewing, Individual reflective essay).

Ewing advocated for pre-service teachers to learn to reflect on their practices and modify them to meet learner needs. Chelsea's group - *Travelling Through Team Teaching* - also pointed to the importance of reflection in professional development. In their 3rd interview, one participant in the group cited the importance of reflecting when asked what they had learned about teacher professional development through the making of the case or how the process had influenced their thinking. Another participant described reflection as an ongoing process that teachers were constantly involved in even in subtle ways:

It is an ongoing process. Teachers are constantly reflecting and the art of catching them reflecting is difficult because I do not think people normally, like I know our teachers said they did not normally sit down together and normally reflect. But you know one would be working in her room and the other would be working in you know her room and they would sort of yell back and forth you know as things came to them "Oh gee that was really bad today" or you know "I really like what we did" whatever (Group 1, 3rd interview).

This means that reflection takes place all the time even in unplanned or unconscious ways. Teachers could be engaged in reflection through their comments and discussions about previous classes, for example, what had taken place, what had worked or what had gone wrong, without necessarily meeting in a structured manner to reflect.

Reflection is therefore an important part of the teaching and learning process that proceeds in both planned formal set ups and unplanned ways. In his critique of the *Weighty Decisions* case study, Liew identified that it is important for both teachers and students in teacher education to reflect on cases in order to improve quality teaching: “The process of reflection allows teachers to confront their theories about teaching and learning during and after teaching ... leading to the development of new understandings about teaching and learning and to the solving of problems of practice.”

Carah, in her reflective essay, summed up reflection as a critical feature of professional development necessary for effective instruction:

Reflection is a crucial feature for any teacher to be able to professionally develop and constantly improve or enhance their instruction to ensure they are most effective in the classroom. This reflection, which is an ongoing process is vital because it ensures that the teacher meets the learner needs adequately. There is a great need for critical thinking skills to be developed within the pre-service teachers and the ability to be reflective, good assessors of pupils’ development and learning. This process can only be effective if the teacher educators are reflective in their practice too and capable of creating situations that foster the process of critical thinking (Carah, Individual reflective essay).

This suggests that constant reflection enhances instruction by ensuring that the teacher realizes and meets the learner needs adequately. Carah gives the example of the need for teacher

educators to be reflective in their practice too to create situations that nurture the critical thinking process since the pre-service teachers they prepare need to develop critical thinking skills.

Through the creation of MMCSs the PTEs also recognized reflection as an important component of case studies and the mutual relationship between reflection and the case study. In her reflective essay, Taylor said that in preparing their project - *Cultivating Communication and Decision Making in Pre-service Art Education* - opportunities for reflective practice were embedded in each segment of the case, a pointer to the importance of reflection as a component of the case study. Dawson emphasized the mutual relationship between reflection and the case study in his reflective essay:

Cases, by their very nature lend themselves to reflection. Reflection is one of the most important skills a teacher needs to develop. Reflection is good for its own sake.

Preservice teachers may have difficulty reflecting on their own experiences since they have few relevant experiences of their own. Providing cases can help them experience a wider variety of issues than otherwise possible. Writing about a case or discussing it in groups is valuable for preservice teachers to be critical of their own practice (Dawson, Individual reflective essay).

This means that discussing a case study was naturally an act of reflection since the discussion would be about classroom interactions that had already taken place. In addition, the cases would provide more scenarios or a wider variety of issues to reflect on, far beyond what one's own practice may offer for reflection and discussion.

Jasmine added in her reflective essay that the case study fostered reflective practice by allowing a common experience for a class of preservice teachers and this was unique to the multimedia case because it offered other than a narrative case for shared examination: "The real

time classroom actions reveal that nuances of classroom practice mean different things to different viewers. Such reflection by a group of preservice teachers offers social construction of pedagogical and content knowledge for teaching that would otherwise not be available.”

In her critique of the *Weighty Decisions* case study, Carah also pointed out that the journal section of the case study was useful as it provided the teachers’ reflection of the lessons. Through this, pre-service teachers got an opportunity to understand the thought process, decisions and aspects that needed to be considered when developing a lesson. Carah argued that this case study would be effective in developing the reflective practice of pre-service teachers and their ability to critically think about decisions they made in the classroom and how they managed the classroom. The fact that they consider the journal section important because it entailed the teacher’s reflections points to the PTEs’ appreciation of the importance of reflection.

Working on developing the MMCSs therefore reinforced the PTEs’ understanding and appreciation of the importance of reflection for the teacher educators’ own practice, for professional development with pre-service teachers, and importance in relation to the case study.

Thinking in New Ways about their Own Learning

Creating MMCSs presented the PTEs with opportunities to think in new ways about their own learning. By working and developing cases studies, the PTEs had the opportunity to think about and reflect on the issues of teaching and learning in relation to their own learning. This opportunity was evident in the statements of some of the PTEs regarding their own learning or practice. For example, in his reflective essay at the end of creating the *Technology in the Middle School: Introducing Integers* MMCS project, Keith wrote:

I learned the most about teacher education by having the opportunity to question how I learn. Throughout my teacher education program, I have learned a great deal about the

way others learn, how to assess students learning, and how to create lessons for diverse learners. I had never framed these issues around my own learning. The study of cases has enabled me to study my own learning in ways that I never had before ... I was able to see how teacher educators were able to think about their own learning. I do not think that I would have understood the value of reflecting on your own learning without having the ability to see these models of this that were in the cases that we were exposed to during the first part of this course (Keith, Individual reflective essay).

It appeared that Keith had learned a lot about teaching and learning issues but had never thought about these issues around his own learning until the project of studying and creating cases came along. Creating cases had therefore provided him with the opportunity to think about his own learning, a factor that would impact his future practice. He summed it up this way:

In both creating and observing cases I learned to reflect upon my own learning. I was able to make direct connections between my actions and outcomes observed in the classroom. This learning outcome will be invaluable in my future career as a teacher and possibly a teacher educator (Keith, Individual reflective essay).

Keith had learned to think about his own actions around the issues of teaching and learning and the implications or consequences of these actions in the classroom, a practice he hoped to carry into his future career as a teacher and teacher educator.

Kendall for her part, admitted that she thought they had all learned something about teaching and teacher education through the making of the case studies. In her reflective essay she noted that “by watching the video and reflecting together on the teachers’ decision and strategies, we processed our own views on many aspects of teaching.” Processing their own views means that they thought about their own learning or ideas around the decisions the teachers in the case

were making and the strategies they were using. Closely related to this, Monica also noted in her reflective essay that viewing the two teachers in their *Travelling Through Team Teaching* case had encouraged her to think about her own teaching styles and address ways to improve her instructional strategies. In a sense, this meant that creating the MMCS had given her the impetus to think about her own practice and probably her own learning.

Creating MMCSs also presented Ewing with the opportunity to think in new ways about his own learning including about his pedagogy. In his reflective essay Ewing conceded:

The development of the multimedia case study and the analysis of its contents were beneficial to me as an educator on a more personal level as well. Both tasks gave me an opportunity to reflect on my professional knowledge and discuss with my team members my beliefs about instruction in the context of the practices observed in the case study. Such conversations were valuable as they forced me to look at my pedagogy more critically. Frequently, by making me ask anew the questions such as why I make the decisions I do, what evidence I have to determine how effective my choices are, and what I need to rethink and/or change about my instruction so that it becomes most effective, my team members helped me to reflect on these aspects of my pedagogy (Ewing, Individual reflective essay).

By questioning his own decisions on his pedagogy examining it more critically, reflecting on it and discussing with his colleagues, Ewing was essentially thinking in new ways about his own learning.

Other participants also engaged in activities around teaching and learning I interpreted as new ways of thinking about their own learning as a result of creating MMCSs. Taylor, for example, wrote in her reflective essay that in addition to analyzing case data and preparing

questions to encourage reflective practice, she became reflective about her own teaching practices and the reflections she wrote about her own experiences during the semester, coupled with student's feedback helped her to continuously improve her own teaching practice. The process of reflecting on her own practice and experiences entailed thinking in new ways about her own learning, another indicator that the making of case studies can provide this opportunity to reflect on own learning.

Lucas also noted that the project involving the creation of a multimedia case study had served as a catalyst in furthering the insightful thoughts about teacher education, formed during the initial discussions of cases. I argue that some of these new insightful thoughts were as a result of thinking in news ways about his own learning around issues of teaching and learning.

Thinking in new ways about their own learning had likely led the PTEs to modify their existing ideas about teaching and learning to a great extent. Based on an idea from classroom discussions, Dean had asserted in his reflective essay that people coming to teacher education programs had already developed strong ideas about ideal forms of teaching and learning because they had been in a lot of different classes and been exposed to diverse teaching approaches. These ideas and beliefs of prospective teachers influence their future teaching behaviors and roles in the classroom. By providing opportunities to think in new ways about their own learning, case studies played a role in helping future teachers to re-consider and, if necessary, change their existing conceptions about teaching and learning.

Better Understanding of Linking Theory and Practice

The process of creating MMCSs supported the PTEs' understanding of reconciling ideas they had learned during class discussions with how the ideas played out in practice, an exercise they believed was important in the preparation of teachers. In his critique of the *Weighty*

Decisions case study, Liev opined that it is the universal truth that theory should relate with practice and in examining multimedia cases, pre-service teachers had the opportunity to see conceptual change teaching played out in the real classroom context. Chelsea, in her reflective essay, observed that it was particularly important for pre-service teachers to be able to actually see the topics discussed in their textbooks in practice. In preparing their Group 1 case study - *Travelling Through team Teaching* - both pre-service teachers' reflections discussed how valuable they felt the experience of actually seeing the two teachers team teaching was, compared to just reading about team teaching in a textbook. MMCSs thus provided a degree of realism for teacher professional development that could not be gained from a textbook alone.

The PTEs therefore saw the creation of MMCSs as an opportunity to put knowledge into context. In his reflective essay at the end of the project, Dean said that since knowledge and skills must ground in theory and practice, case studies had emerged as one of the best ways to actualize this. He said:

Much of what we know about learning to teach points that teacher knowledge and skills must ground in both theory and practice. However, considering the relatively short teacher preparation time, teacher educators have problems of helping teachers to meld and mix theory and practice. Cases are one of the major ways of bridging the gap and blurring the lines between theory and practice in teacher education along with field experiences (Dean, Individual reflective essay).

In essence, Dean meant that since teacher preparation necessarily required linking the theoretical principles the pre-service teachers had learned to some practical experience and teacher education programs barely had time to help pre-service teachers put knowledge into practice,

case studies were a major mitigating factor providing an opportunity for the pre-service teachers to experience theory in practice.

Blake supported this idea in his assertion that case studies could be one of the best ways to bridge the gap between theory and practice. He gave the example of university courses where pre-service mathematics teachers could learn how to use technological tools in a classroom and may also read about pluses and minuses of using them in mathematics teaching or observe a classroom where a teacher teaches a mathematical subject using technological tools.

However, he observed that due to the difficulty of observing and catching the complex interactions in the classroom, field placement experiences may not give enough information to pre-service teachers to think and try to understand the issues in teaching and learning mathematics and case studies could come in handy as complementary tools in helping teachers to connect theory and practice. Therefore, in his reflective essay, in reference to their *Technology in the Middle School: Introducing Integers* case, Blake wrote, “by creating this case we were hoping that pre-service mathematics teachers would find an opportunity to explore what it looks like to the teacher using computer technology in the mathematics classroom.” The PTE team hoped that the case study would provide an opportunity for the pre-service teachers to observe what it looked like to use technology in a mathematics classroom in a better way than they had observed within the complex interactions during their field placement experience.

Micah touched on the aspect of field experiences alone not being enough to help pre-service teachers to link ideas from class discussions to practice thus the role of case studies. He noted that:

In teacher education programs, the common practice is to send students to schools to have some experience and apply what they have learned to educational settings. The

student who watches the teacher comes back to her university class to discuss the issues or write a paper about her experiences. If she is lucky, the professor helps her to make connections with her practice and theories learned in class. But with case studies, because everyone in the class has seen the case, the discussion might be more intellectual and meaningful. Moreover, MMCSs provide opportunities for students to put their knowledge into a variety of contexts by evaluating different issues within these contexts (Micah, Individual reflective essay).

This means that from field experience, the pre-service teachers get different experiences of which they may or may not get help to connect to the theories learned in class. But with case studies providing a uniform scenario for everyone in the class, discussions may be more meaningful with everyone analyzing the same scenarios or contexts and possibly evaluating different issues within these contexts.

Monica and Dean also added in the 1st interview of Group 1 that cases may help teachers to see how theories work in the actual classroom setting and how some teaching strategies worked. Creating MMCSs of practice had therefore given the PTEs some insight into bringing ideas from class discussions into practice by providing an opportunity to put knowledge into context.

The analysis of other case studies as they created their own also supported the PTEs' ideas of bridging the gap between theory and practice. In his critique of the *Weighty Decisions Multimedia Case Study*, Micah observed that the case study could help the student teachers make connections between theory and practice due to its exemplary features. He gave the example of the tasks in the case that were created in a way that they tended to promote high-level cognitive skills. It was thus possible for pre-service teachers to discuss how the case teacher had

maintained high-level cognitive tasks or how she had caused a decrease of the task's cognitive level. By discussing this issue, students' connection between the framework and the practice of the case teacher could be clarified.

For her part, Chelsea felt that by including video segments of all the important parts of this multi-day lesson in the *Weighty Decisions* case study, the hope was that pre-service teachers would gain an understanding of what a lesson really looked like in an actual classroom. They could also trace the differences in what the teachers planned to do, what they actually did, and their reflection about what transpired during the lesson.

However, Monica affirmed that the *Weighty Decisions* case did not only address mathematical issues and concepts but could also be used with preservice teachers to apply theory to practice and foster decision-making, develop plans to address issues, and create solutions within a risk-free environment. The process of creating MMCSs therefore provided insights to PTEs on putting theoretical knowledge provided to pre-service teachers into context.

Appreciation of the complexity of teaching and learning, greater appreciation of the importance of reflection, thinking in new ways about their own learning and gaining a better understanding of reconciling abstract and practical ideas were some of the dominant themes that I determined in analyzing the data on PTEs' knowledge development through the creation of MMCSs. However, there are many other fringe ways in which the PTEs' knowledge developed through the creation of MMCSs.

For instance, creating MMCSs afforded the PTEs an opportunity to think about issues of teaching and learning that were pertinent to pre-service and in-service teachers. Laura brought this out in her reflective essay where she said that going through the process of selecting the subject for the case had forced her to think about what might be useful to a pre-service or in-

service teacher. Although not expressly mentioned by the participants, the process of determining and selecting issues to include in the cases gave them the opportunity to think about or find out what was important for pre-service teachers. Creating MMCSs therefore helped advance their knowledge on what may be important for professional development.

Through the creation of MMCSs, it also became apparent to the PTEs that there were teachable moments going on all the time in the classroom. In her reflective essay, Jasmine said that she had learned that almost any classroom time sequence or any records of education issues that were relevant to pre-service teachers could become a case since they could be analyzed from multiple perspectives and so we were limited in scope of what to focus on only by our imaginations. Dawson was of a similar opinion and put it this way:

there are teachable moments going on continually in ordinary classrooms ... class is abuzz with activity, chatter, collaboration, and gossip, students on task, students off task. Everywhere you look (and really look) you can see something that could be useful to someone. A multimedia case study is rich enough that different people watching it will glean different things from it (Dawson, Individual reflective essay).

This means that there are many issues of teaching and learning that manifest in almost all instances of classroom teaching, all of which can be analyzed in multiple perspectives for the benefit of pre-service and in-service teachers. Creating MMCS of practice is therefore an important aspect of professional development that leads to the knowledge development of PTEs in many ways as discussed above to make teacher preparation more meaningful and effective.

Grappling with Issues from Tasks of Teaching and Learning

The third question focused on how PTEs could support the development of the knowledge of the tasks of teaching and learning among those who were preparing to teach or

were already teaching. The PTEs intended the case studies for a purpose beyond just recording and organizing the elements of practice and thus endeavored to design them in a way that they could be used to prepare and support others in learning to teach. Towards this end, the PTEs envisioned ways in which the teachers may grapple with the issues that emerged from the tasks of teaching and learning. This was mainly through their recommendations on how to use the cases to support pre-service teachers, specifically the questions and aspects they recommended for pre-service and in-service teachers to discuss or pay attention to as they studied the case. These were largely provided in the facilitator guides that the PTEs provided for use with the cases.

Case 1: Traveling Through Team Teaching

In the *Traveling Through Team Teaching* case, designed to introduce various aspects of team teaching to pre-service teachers and afford them an opportunity to reflect on collaborative practice before they entered the field of teaching, the PTEs identified several issues for discussion and recommended questions that pre-service and in-service teachers could use to grapple with these issues. They classified three major issues that they thought related to team teaching specifically at the elementary school level that was the focus of the case: (a) approaches and strategies of instruction, (b) classroom management, and (c) other issues of team teaching. For each of the issues, they recommended aspects or questions that pre-service and in-service teachers could use for discussion. Here, I present some of the questions they recommended for discussion to support the development of the knowledge of the tasks of teaching and learning among pre-service and in-service teachers.

Approaches and Strategies of Instruction. As part of the approaches and strategies of teaching, the PTEs suggested a focus on teacher-centered activities, modeling discussion and

questioning techniques among others in the issues matrix. The PTEs recommended a variety of questions and aspects of discussion to help the pre-service and in-service teachers grapple with these issues that they deemed critical for professional development.

Teacher-Centered Activities. In addition to reflecting on how the lesson would be modified to include activities and resources that the students would use with less teacher direction the PTEs further suggested possible questions for each segment to facilitate discussions among pre-service teachers. For lesson introduction, they suggested discussion on how the teachers introduced the lesson, the brainstorming techniques used and how the teachers connected the activity to student readings. For the group work and group presentations, they suggested discussions on how the class activity could be made student-centered and, different ways teachers could introduce the activity and how they would relate it to the travel brochure activity they had been learning about. They also suggested thinking about how the teachers interacted with the students. These were some of the questions the PTEs felt would occasion a rich discussion and understanding of the issues around teacher centered activities in the class.

Modeling Discussion. The PTEs thought that with elementary school children still learning how conversation progresses between two people and teachers in the case modeling a conversation, the pre-service teachers would focus on questions such as the extent to which the teachers' interaction mirrored what they had planned as well as what the teachers' roles were in the model conversation. This would be helpful to the pre-service teachers in thinking about the issue of modelling discussion.

Questioning Techniques. Since the PTEs had identified questioning as an important issue of teaching and learning as teachers often engage in asking and answering questions through the course of a lesson, they recommended a number of discussion questions to support

pre-service and in-service teachers to develop their knowledge of the issue of questioning. In addition to tracing the pattern of questioning and discussing the type of questions, the PTEs also recommended a focus on the contrast between lower-level questions and higher-order questions, the level of higher-order questions the teachers in the case asked, and the importance of using good questioning techniques. They suggested specific discussion questions such as what questions would be asked to reach the synthesis and evaluation levels of questioning.

Classroom Management. In the *Traveling Through Team Teaching* case study, classroom management manifested in several ways including arranging groups and instructions for student movement. The PTEs suggested ways for the pre-service teachers to grapple with these aspects of classroom management.

Arranging Groups. For arrangement of groups, other than the focus on the methods of choosing students for specific groups, the PTEs suggested a focus on questions about the advantages and disadvantages of grouping stronger students with weaker students, having students who are unfamiliar with each other work together, heterogenous groups versus homogeneous groups and many other decisions that went into forming groups.

Instructions for Student Movement. In terms of movement or transition from one activity to another, the PTEs thought it would be useful for pre-service teachers to consider questions such as how the teachers used prompting and other ways to refocus students on task and the effect of the teacher's directions and whether the instructions helped achieve smooth transitions.

Other Issues of Team Teaching. The PTEs also suggested ways for pre-service teachers to grapple with other aspects of teaching and learning related to team teaching such as division of labor, planning and lesson reflection.

Division of Labor. To examine division of labor as an important aspect of team teaching, the PTEs suggested that pre-service teachers would benefit from a discussion on how to begin team teaching relationships. The pre-service teachers would also examine how the teaming teachers in this particular case study shared work in preparation for their team teaching.

Planning. For planning, in addition to thinking about the compromises each teaming teacher needed to make for the cooperation to be successful, the PTEs recommended discussions about the role each teacher played within the planning process and how the teachers negotiated these roles.

Lesson Reflection. Since the PTEs identified reflection as a critical element of teaching and learning that teachers needed to take time and engage in each day for example by thinking through how their lesson had progressed, they suggested a number of discussion questions that pre-service teachers would use to examine the issue of reflection. The PTEs recommended discussions about what a reflective teacher would consider, such as a class activity had turned out well and could be repeated or if changes were necessary, and the evidence to support these claims.

For team teaching in this case study, the PTEs suggested that pre-service teachers would discuss the obstacles the teachers who were team teaching talked about, how team teaching could enhance or hinder classroom instruction, whether compatibility was significant when team teaching with another person, and whether they agreed with the teachers' choices of assessment and parents' conferences.

These are some of the aspects and questions that the PTE team developing the *Traveling through Team Teaching* multimedia case envisioned to support pre-service and in-service teachers to grapple with the issues that arose in the tasks of teaching and learning.

Case 2: Cultivating Communication and Decision Making in Pre-service Art Education

In the *Cultivating Communication and Decision Making in Pre-service Art Education* case, which specifically focused on the nature of communication between a mentor teacher and a student teacher during a student teaching experience at an urban high school, the PTEs made careful and purposeful decisions about the case theme and the people featured in it. They suggested the following issues and discussion questions for use by art teacher educators with students who may be enrolled in art education courses prior to their student teaching experience.

Lesson Planning. The PTEs suggested a variety of discussion questions that they thought pre-service teachers could engage with about lesson planning and that would be helpful in advancing the pre-service teachers' knowledge. These included discussions about the pre-service teachers' understanding of the lesson planning process as described by the mentor or host teacher, and how the student teacher had experienced the mentor teacher's guidelines. The pre-service teachers would also discuss the importance of observation prior to teaching a class and how this process could benefit or hinder a student teacher's teaching experience, based on examples from the case. Further, pre-service teachers could explain, based on the case, the rationale of the mentor teacher's requirement that the student teacher maintain certain requirements, such as her basic classroom structure and grading policies, applying New York State Standards in their lesson plans, planning for the distribution and collection of materials, using materials efficiently, constructing a teacher exemplar of the assignment, creating visuals, and preparing written plans.

Communication. Since the PTEs understood communication as an essential part of working with a host teacher and an important part of the student teaching process, they envisaged that the pre-service teachers would discuss and give examples from the case of how student

teachers, mentor teachers and university supervisors developed relationships that allowed for ongoing dialogue, as well as what would hinder building these relationships and thus dialogue. They would then focus on ideas of establishing a partnership with a host or mentor teacher and supervisor, using data from the case study. They would also talk about the value that pre-service teachers derived from pre, mid and post conferences between the student and mentor teachers as evident in the case.

Instruction. For instruction, the PTEs suggested that the pre-service teachers could discuss ways in which the student teacher had implemented her planned lesson regarding motivation and encouragement. Based on the lesson *An Event to Remember*, they could focus on how relating lesson content to student lives became an issue for reflection and how reflecting on this issue could change their instructional practices. The PTEs also suggested a discussion on what adaptations the student teacher could make to ensure all students participated in the lesson whenever she encountered students whose first language was other than English.

Feedback. To contend with the issue of feedback, the PTEs suggested various aspects of discussion. They recommended that the pre-service teachers focus on how the mentor teacher's feedback on suggested ideas for lesson implementation fostered the student teacher's decision making and problem-solving skills when the feedback was directive and when it was collaborative. They also suggested a discussion on the role that the mentor teacher plays in ensuring the student teacher meets both her requirements and those of the university.

Reflection. The PTEs embedded opportunities for reflective practice in each segment of the case, in addition to analyzing the case data and preparing questions to encourage reflective practice. The PTE's recommended a focus on how the mentor teacher had contributed to the student teacher's growth in reflective practice, how the tensions within the student teacher's

experience were confronted in order to promote or inhibit reflection, or any evidence in the case of how the student teacher's institution had worked towards developing reflective practitioners, among other questions for reflection and discussion purposes.

Case 3: Integrating Technology in a Literacy Classroom

In the *Integrating Technology in the Literacy Classroom* case that focused on a high school English teacher who used technology as an integral teaching and learning tool, the PTE team identified critical issues that could form a basis for analysis and discussed these in the context of using technology in a literacy class and general teaching related issues. The issues they identified were classroom management, facilitation of learning, instruction and use of technology. For each of the issues, the PTEs generated specific questions to guide discussion around the issues. I present a select number of questions from the facilitator guide here to illustrate what the team envisioned for the discussion of each issue.

Classroom management. The PTEs formulated discussion questions to address potential classroom management problems, as well as social factors related to classroom management. The focus of questions for this issue ranged from (a) the potential managerial problems that a teacher must be aware of when teaching a class in a computer lab, (b) how a teacher can plan for lessons to prevent having such managerial problems, (c) how a teacher might manage the engagement of students from diverse ethnic, socioeconomic, and learning backgrounds, to (d) the possible classroom management challenges a teacher might face when working with such groups of students and how they could be overcome.

Facilitation of learning. In facilitation of learning, the PTEs suggested a focus on teacher support for students, teacher roles, resource teacher roles, teacher and resource teacher cooperation, interaction, communication, student/teacher questions and individualization.

The PTEs fashioned discussion questions focused on questioning patterns that were framed to promote pre-service teachers' reflective thinking about their personal experiences as students and on issues such as the types of questions that helped them most in their own learning and how they sought answers to these questions. Other questions in this category prompted pre-service teachers to draw on research when reflecting on classroom issues and for example, think of the recommendations research offered for questioning techniques in the classroom.

Other questions focused on the teacher/student relationships, such as how the teacher in the case study video demonstrated values critical to motivation such as enthusiasm, care, success, personalization, humor, positive attributes and praise, as well as the practices and strategies the pre-service teachers would recommend for improving motivation. The PTEs felt that an analysis and critique of these factors could be helpful in equipping pre-service teachers with a variety of strategy for facilitating their classrooms.

Instruction. In addition to focusing on student characteristics, beliefs/orientations, content/project, teacher/student goals, planning/preparation, and methods/manner to enhance individualized instruction, the PTEs suggested discussion questions that pertained to lesson development and writing instruction to grapple with the issue of instruction. They focused on (a) what instructional methods and procedures were most helpful in advancing meaningful writing instruction, (b) how the strategies in the case related to current theories of writing and composition instruction, and (c) what parameters teachers must consider and the resources they needed to identify for their students' successful and meaningful learning.

Use of Technology. The questions the PTEs recommended to support discussions in this category explored the use of technology for instructional purposes. They included questions about pre-service teachers' (a) philosophy in using technology in instruction in general, and/or in

writing instruction, in particular, (b) approach in using technology in instruction in general and for writing instruction, (c) ideas of how the issues of computers and students with special needs are addressed in the case video, (d) recognition of adaptive devices (hardware and software) and interface devices (keyboards, mice, touch screens) in the video, and (e) thoughts about how they would introduce adaptive technology into their classrooms to promote learning for students with learning difficulties.

Case 4: Technology in the Middle School: Introducing Integers

In another technology focused case study demonstrating how one teacher engaged students in using spreadsheets in a middle school mathematics class, the PTEs formulated discussion questions related to the role of technology in mathematics teaching and learning as opposed to the content of mathematics on introducing integers since the goal of the case was to explore the use of technology in a mathematics classroom. They suggested the aspects and discussion questions that the pre-service teachers could use to grapple with each aspect of the case.

Equipment. To discuss the equipment and nature of technology used in class, the PTEs suggested a focus on the state of the equipment and the familiarity or unfamiliarity of the students and teachers with this equipment in addition to how the physical environment of the classroom affected the use of technology, among other topics and questions of discussion.

Student Questions. On student questions, the PTEs envisaged pre-service teacher discussion around issues such as strategies that would be put in place to encourage students to elicit help from each other, as well as the technology might have affected student-student and student-teacher interactions.

Students Attitudes. To contend with the issue of student attitudes that the PTEs thought had implications for teaching and learning they suggested for discussion, factors such as pacing, the technology comfort level of the students, the instructional comfort level, and the teacher student comfort level.

Teaching Style. The PTEs thought it was important to focus on the teaching style and one of the issues of focus was questioning. To discuss this, they recommended questions for discussion including what methods the teacher used to assess student understanding, how technology influenced the teacher's assessment of students work and the additional assessment techniques the teacher might use. These were some of the questions they felt would help pre-service teachers begin to grapple with the issue of use of questions as an aspect of teaching.

Case 5: Exploring Quadratics

In the *Exploring Quadratics* case depicting a reformed, technologically oriented teaching and learning scenario pertaining to the use of graphing calculators, the PTE team recommended several ways for using the multimedia case with pre-service and in-service teachers that would help the teachers grapple with the issues in the case. One way they outlined for using the case was to have the pre-service or in-service teachers first study the lesson plans for Day 1 followed by a whole-class discussion. The team suggested discussion questions focused on pedagogical issues framed around the specific content of the lessons to be used in the follow up discussion. These included questions such as: What would the lesson look like? What kind of preparation would be needed on the part of the teacher? What questions and problems the students would likely have? If students were going to be working in groups, how would the groups be chosen? How would you deal with introducing students to a graphing calculator for the first time?

The suggested outline for using the case then proposed that the participants follow the discussion by watching the video of the teacher teaching the lesson in the Day 1 video. This would be followed by a discussion reflecting on the strengths and weaknesses of the Day 1 lesson. After the discussion, the pre-service teachers would then view the videotaped teacher reflection. The same procedure would be used with the video from Day 2 and the second reflection.

An alternative approach recommended by the team was a more content-embedded approach in which the participants in the teacher education program would first be given an opportunity to solve the same problems that the students in the video solved. They would then go through the same sequence of discussion and reflection as in the first approach but with a better understanding of not only the teacher's context of the lesson but also the experiences that the students went through as well as the level of difficulty of the learning activities.

The PTEs also intended the case to be used for discussions related to the three major issues of the teaching and learning process they had identified in the case, mainly planning, facilitation and student thinking and therefore formulated a number of questions to guide the discussion.

Planning. For planning, the PTEs suggested discussion questions such as the role vocabulary should play in a mathematics classroom, whether the graphing calculators were used effectively and appropriately and how the teacher's homework policy affected what was done and accomplished in the classroom. The PTEs thought that discussions these questions would have a positive impact on the pre-service teachers future planning.

Facilitation. On how facilitation proceeded in the class depicted in the case, the PTEs recommended discussion around whether group activities were used effectively and appropriately, how the teacher engaged students in classroom activities, the classroom

management strategies the teacher used to maintain control, and the strategies the teacher used to solicit student responses. These are some of the questions the PTE thought would help pre-service teachers deal with and understand the issue of facilitation in the class.

Student Thinking. On the nature of student thinking, the PTEs suggested discussing how the teacher had accommodated different ways of student thinking and how the teacher used student thinking and answers to help grapple with the issue of student thinking that they viewed as a critical element of teaching and learning.

The PTEs selected a wide range of issues for discussion across the various MMCSs and formulated discussion topics or questions to help pre-service teachers grapple with these issues. The aspects and discussion questions that the PTEs recommended represent how they envisaged pre-service and in-service teachers to grapple with the issues that emerge in the cases.

Chapter Five

Discussion

The purpose of this study was to understand the nature of prospective teacher educators' knowledge of teaching and learning, and the development of this knowledge as they engaged in creating MMCSs of practice for use with pre-service and in-service teachers. To achieve this, I analyzed data collected previously on the work of PTEs carried out during a two-semester course for doctoral students in several teacher education programs. I examined how PTEs understood the tasks of teaching and learning, how their understanding of these tasks and professional development developed as they engaged in the process of creating MMCSs of practice, and how they envisioned that pre-service and in-service teachers using the case studies would grapple with the issues of teaching and learning that emerged.

In this chapter, I discuss the findings from the data and connect it with what is known about the nature of prospective teacher educators' knowledge of teaching and learning, and its development. I start by discussing how the prospective teachers understood the tasks of teaching and learning, how this knowledge and their knowledge of professional development developed and how they recommended that teachers should grapple with issues that emerged from the tasks of teaching and learning. I summarize the discussion of the findings by suggesting implications for the study and then make some recommendations.

How Prospective Teacher Educators Understood the Tasks of Teaching and Learning

My analysis of the data demonstrated the PTEs' perspective that MMCSs played an important role in the preparation and professional development of both pre-service and in-service teachers. The PTEs thought that MMCSs could give pre-service teachers insight into real life classroom situations, help them see how theories and some teaching strategies work in actual

classroom settings and help them address the issues that arose within these classroom situations as well as think critically and challenge some of their beliefs.

The PTEs' confidence in the importance of MMCSs was consistent with studies on the use of MMCSs that have generally shown that MMCSs play an important role in the preparation and professional development of pre-service teachers. The studies showed that the use of MMCSs can promote many aspects of learning for pre-service teachers including reducing cognitive load and increasing learning outcomes (Romig et al., 2018), developing critical thinking and better understanding of classroom complexity (Masingila & Doerr, 2002), providing opportunities for later analysis of practice (Admiraal, 2014) as well as potential for recursive use, reflection, multiple examples, counter examples and prompts for observation (Pryor & Bitter, 2008), helping candidates develop deeper insights into their own classroom practice (Hewitt et al., 2003), improving pre-service teacher learning of pedagogical content knowledge (Han et al. 2013), highlighting some of the dilemmas and tensions found in teaching (Bowers & Doerr, 2003) and helping frame many of the issues that pre-service and in-service teachers encounter in their own practice (Bowers & Doerr, 2003). Indeed, the PTEs acknowledged the versatility of MMCSs expressing that there was no limit to what cases could address including teacher communication, subject specific content, teacher behaviors, student thinking, as well as a host of other areas that may not have been contemplated as the case was made.

The findings further indicated that the PTEs thought that the elements of practice or tasks of teaching and learning that they included or chose to focus on in the MMCS they created would be of help in furthering the preparation and professional development of pre-service and in-service teachers. This perspective was based on the idea that MMCS could promote many

aspects of learning and so the tasks of teaching and learning depicted in the case study would constitute learning points for pre-service teachers and in-service teachers. The elements of practice the PTEs chose to present in the MMCSS, how they interpreted them and their rationale for choosing these elements therefore depicted how the PTEs understood these tasks of teaching and learning.

I used Cochran-Smith and Lytle's (1999) framing of the relationships of knowledge and practice to categorize the PTEs' understanding of the tasks of teaching and learning as knowledge for practice that formed part of their knowledge base. According to Cochran-Smith and Lytle (1999), knowledge-for-practice is the formal knowledge and theory that relates to content and pedagogy such as the tasks of teaching and learning. It hinges on the idea that knowing more, such as more subject matter, educational theory, pedagogy or instructional strategies, leads more or less directly to more effective practice. In this study, the tasks of teaching and learning constituted part of the formal knowledge, especially the knowledge that relates to pedagogy or instructional strategies.

Across the five case studies cited in this study, the PTEs focused on a variety of issues they wanted the pre-service teachers to learn. Although in each case the PTEs separately identified or proposed tasks of teaching and learning to focus on, my analysis of the data demonstrated clear patterns and relationships or similarities in what the PTEs recommended across the cases. The similarities in their proposals suggested that there is some universality in the teaching and learning process and the tasks of teaching and learning are generally related or similar, save for certain contextual differences. Frey and Sutton (2010) alluded to this fact in their observation that even as the methods and technologies used to deliver instruction undergo a transformation, how people learn remains constant. Since how people learn remains constant and

perhaps similar, the methods are bound to be similar across the board even as they undergo a transformation. The similarities in the PTEs' proposals may also mean that some tasks of teaching and learning bear great importance in terms of utility and that is why the PTEs across different case studies feel the need to include them for the pre-service teachers to discuss and learn. Lastly, the PTEs were all at the same level of the teacher education program and there was bound to be some uniformity in their thinking and opinions.

While a task of teaching and learning might be recommended for discussion across several case studies, the specific issues or topics and questions of focus in each case was different perhaps due to the specific content area addressed and the overall focus of each case study. For example, while classroom management in the *Travelling Through Team Teaching Case* was about arranging groups and transitions or instructions for student movement, classroom management in the *Integrating Technology in a Literacy Classroom Case* was about potential managerial problems characteristic of different student groups and class types, and the ways of dealing with them.

Other than the impact on the specific aspects or the discussion topics and questions of each task of teaching and learning, the nature and overall focus of each case study also influenced and perhaps limited the tasks of teaching and learning the PTEs chose to focus on. The PTEs' understanding of the tasks of teaching and learning is likely not therefore limited to the tasks they proposed for discussion only. They may have been restricted by the nature and focus of the cases. In the following section, I discuss some of the tasks of teaching and learning that were prevalent in the PTEs' propositions for the preparation and professional development of the pre-service and in-service teachers.

Instruction/Facilitation

As was evident in the facilitator guides and the individual reflective essays, the PTEs in all the five case studies identified either instruction or facilitation as important tasks of teaching and learning for the pre-service teachers to focus on in their analysis of the case studies. This was perhaps due to the prominent role played by instruction and facilitation in the teaching and learning process as some of the major teacher class activities. The data showed that the PTEs generally considered instruction as purposefully directing or implementing of the learning process. Although some focused on the related aspects of facilitation and teaching style, their recommendations revolved around a focus on teacher centered activities, drawing on their own teaching and supervising experiences, questioning techniques and teacher support and roles. The prominent attention given to instruction and facilitation, roles largely performed by teachers in the teaching learning process, is aligned with teacher education research that has identified teachers and therefore teaching or instruction as the most important factor influencing the quality of education in schools (Goldhaber, 2016; Hattie, 2003; McKinsey, 2007) thus the teacher's practice warranted attention in all the five cases. We could therefore argue that the PTEs considered instruction and facilitation as important tasks of teaching and learning.

Planning/Lesson Planning

My analysis of the data posited planning as the next most prevalent task of teaching and learning that the PTEs suggested for discussion in the MMCSS. The PTEs noted that planning is an important principle of teaching that pre-service teachers needed to understand before they took on a teaching role. Undeniably, planning is a major teacher class activity that often occurs in the teaching learning process and contributes to the success of learning. This is perhaps the reason why the case study teams that did not outrightly suggest a focus on planning, at least

mentioned it in passing as an obvious and inevitable aspect of teaching and learning. While some case studies focused on planning in general, some specifically narrowed it to lesson planning. Generally, they focused on aspects such as the agenda for the class, issues of time management, class organization and assessing instruction and homework, among others. The PTEs' proposal for a focus on planning issues appears warranted since planning is an integral part in making the teaching learning process successful.

Classroom Management

The findings indicated that the PTEs thought that the discussion of management strategies could bring pre-service teachers' attention to an array of issues that may have implications on classroom management such as time, resources within the classroom, dealing with students' requests, managing students' behavior, managing instruction and issues related to how to structure individual instruction or manage the classroom effectively when there are students with learning disabilities, as well as potential problems characteristic of different class types. They further rationalized that the analysis of the potential causes for managerial problems and the ways of dealing with them might prepare pre-service teachers for their future instructional practice and pre-service teachers needed to be trained or to develop some experience and effective strategies in handling the classroom to ensure that the environment created within the classroom cultivated the learning spirit within pupils for the success of the lesson.

Essentially, the PTEs recognized the need for pre-service teachers to develop skills to manage classes with diverse learners ranging from disability to different backgrounds, an important consideration to create a socially just and comfortable environment for all learners. This relates to a critical agenda in teacher education that intends to prepare teachers who are

empowered to transform inequities and injustices and play an active social role by creating the context for positive action and by drawing the attention of their students to the less privileged (Sardabi et al., 2018). I think the focus on management issues especially touching on management of diverse school or class settings and learning to create a just and comfortable environment for everyone is an important idea given the current statistics where schools are getting ever more diverse.

Reflection

My analysis of the data indicated that the PTEs felt that being a reflective teacher is extremely important and teachers must cultivate the habit of taking time each day to think through how the lesson had progressed. This meant that a reflective teacher would consider things like if the students had learned and the evidence for it if an activity had gone well and been effective as well as aspects of the lessons that had gone well and could be repeated or the changes necessary. Bowers et al. (2000) supported this position in their remark that post-lesson reflections, recorded sequentially could capture the teacher's actual concerns as they occurred in time and expose the pre-service teachers to the reality of how even a well-planned lesson could still lead to unanticipated outcomes. This clearly showed the importance of reflection in the teaching and learning process.

The PTEs embedded opportunities for reflective practice in each segment of the case, in addition to analyzing the case data and preparing questions to encourage reflective practice and proposed that pre-service teachers using the case study would discuss the types of things a reflective teacher would consider, such as if the learners had learned from an activity, the evidence to support the claim that they had learned, the aspects of the lessons that had gone well and could be repeated, and the changes necessary.

Equipment/Use of Technology

The PTEs also viewed the use of various equipment, mainly the use of technology as a task of teaching and learning. It was however not a prevalent proposal and only came up in the two cases that had their overall focus on technology integration. This is probably because at the time of the data collection, the use of technology in teaching and learning may not have gained as much prominence as it did later, peaking at the time of the COVID-19 pandemic.

The PTEs noted at the time of the study that use of technology was becoming common place in schools thus the need to equip pre-service teachers with strategies to use technology for instruction. They therefore suggested a focus on the context and resources, state of the equipment and aspects such as the familiarity or unfamiliarity of the students and teachers with this equipment and specific applications in the class as well as the benefits and problems of the equipment. This was a very important consideration since it is essential to expose pre-service teachers to any upcoming phenomenon in teaching and learning that they may come across in their future practice.

Student Activities

Away from the focus on the teacher in the teaching learning process, my analysis of the data revealed that the PTEs also considered aspects of the students' activities as tasks of teaching and learning. They recommended a focus on activities such as student questions both to each other in terms of peer consulting and to the teacher, student thinking especially focusing on anticipated troubles and assessing student understanding, and student attitudes that had implications on teaching and learning. This was an important consideration since students as the subjects in the teaching learning process are as important as the teacher and issues around their learning need to be understood.

Although the above mentioned tasks of teaching and learning were the more prevalent ones across the various case studies, the PTEs also identified a few others such as feedback and communication as important aspects of teaching and learning that merited deeper discussion. The issues presented above that the PTEs identified and recommended for further discussion in the MMCSs represent their understanding of the tasks of teaching and learning. The PTEs' interpretation of these elements and their rationale for choosing them further represents their understanding of the tasks of teaching and learning thus responding to the first question on how PTEs understand the tasks of teaching and learning.

Knowledge Development through Creation of Multimedia Case Studies

In this section I discuss the findings related to the second question on how PTEs' understandings of professional development and the tasks of teaching and learning developed as they engaged in the process of creating MMCSs. The findings largely revealed that the PTEs' understanding of professional development and the tasks of teaching and learning developed as they engaged in the creation of MMCSs. This was evident in the perspectives the PTEs expressed both as individuals and as groups where they observed that in creating the case they had witnessed (a) quality teaching, (b) new knowledge about teaching and learning, (c) new approaches implemented, and (d) new challenges and opportunities availed, bringing a new perspective to their understanding of teacher education. In addition, they had learned about issues much broader than teacher development.

In terms of the Cochran-Smith and Lytle's (1999) framing of the relationships of knowledge and practice, PTEs' knowledge development relates to the knowledge-in-practice perspective. This perspective, that enhances and elevates the status of teachers' practical knowledge, presumes that teachers learn when they have opportunities to examine and reflect on

the knowledge that is implicit in good practice—in the ongoing actions of expert teachers as they choose among alternative strategies, organize classroom routines, and make immediate decisions as well as set problems, frame situations, and consider and reconsider their reasoning. The process of creating MMCSs focuses largely on the tasks of teaching and learning in action and PTEs have the opportunity to examine and reflect on this knowledge in practice. This aligns with the aspect of the study that seeks to understand how the PTEs' understandings of these tasks developed as they engaged in the process of creating MMCSs of practice. The PTEs reflected on the actions the teachers took, how they made judgments, conceptualized and described classroom dilemma. The PTEs also examined the teachers' own reflections and made decisions on the aspects to include in the case studies.

In my analysis of the data, I found four dominant themes on how PTEs' understandings of professional development and the tasks of teaching and learning developed as they engaged in the process of creating MMCSs. First, the PTEs developed greater appreciation of the complexity of teaching and learning through the process of creating MMCSs of practice. The process also reinforced their appreciation of the importance of reflection as a task of teaching and learning and afforded them opportunities to think in new ways about their own learning. The process of creating MMCSs also supported the PTEs in better understanding of linking theory and practice and developing ideas of reconciling abstract and practical ideas. Although not prominent in the data, the creation of MMCSs also allowed the PTEs the opportunity to think about issues pertinent to pre-service teacher professional development.

Complexity of Teaching and Learning

In my analysis of the data, I found that while engaging in the process of creating MMCSs of practice, the PTEs experienced challenges such as selecting the issues to include in the case, the class to focus on or the teacher to work with that reinforced their conception of teaching and learning as a complex process. These challenges likely arose due to the complexity of the teaching and learning process. Bowers et al. (2000) acknowledged this complexity in their observation that complex and rapid interactions that prospective teachers lack the experience base necessary to meaningfully observe, occur in any classroom and such knowledge is so complex that cannot be transferred by narrative means but by observing, discussing and reflecting on the practice of experienced teachers.

The main complexity for the PTEs arose from the difficulty in determining what issues to include in the case. Making a case study versatile enough to be relevant for multiple audiences and increasing its utility while at the same time keeping the focus narrow so that it is a case study with a specific focus made it very difficult to determine what issues to include in the case. Indeed, decisions around selecting issues to include such as what type of knowledge, what type of skills, what set of tools the pre-service teachers need so that they could function, the class to focus on and the teacher to work with can be difficult decisions given the many issues in a classroom that a teacher needs to be vigilant about.

For these issues, they also faced the challenge of whether to include the issues through the natural class interactions or through prearranged class interactions. These two approaches available to the PTEs aligned with the two different approaches for identifying the instructional goals for a project as identified by Bowers and Doerr (2003) in their analysis of prominent multimedia cases for mathematics education. In one approach, the instructional goals in terms of

content and pedagogical issues were clearly defined, and then video and artifacts collected to illustrate these points. They observed that in this *define and collect* paradigm the developers defined the types of teaching moments they wanted to find, and then either chose a classroom so they could prescript, or prearranged a given lesson to illustrate the desired point(s). However, in my analysis I found that the this approach was problematic for the PTEs emphasizing the complexity of selecting issues to include in the case and by extension teaching and learning. My interpretation of the data suggests that the PTEs faced the challenge of deciding on an issue before hand and then not being sure whether it would occur in the interactions they had planned to record especially where they did not have an opportunity to prescript or prearrange a classroom. I also found that in some cases, after defining the teaching moments they wanted to include in the case, getting a class with the specifications the PTEs needed or where the teacher was willing to be filmed proved extremely difficult.

In the second approach, the *collect and define* method, with a general idea about the instructional goals whether content or pedagogical issues, the developers began by collecting or recording videos and other classroom artifacts and then scrutinized the data to refine their ideas about which teaching and learning issues the data could most successfully highlight. I found that that most of the PTEs opted for this approach by beginning with a general idea of the issues of teaching and learning they wanted to focus on before recording a classroom and scrutinizing it to determine more specifically, the issues of teaching and learning to highlight. Some PTEs also struck a balance between the two by first deciding on some specific issues then trying to find a class with the specific issues or working with the teacher to prearrange the lesson. Either way, the entire process of selecting the issues to include in the case, in addition to settling on the class to focus on or the teacher to work with proved complex, leading the PTEs to develop greater

appreciation of the complexity of teaching and learning.

Appreciation of the Importance of Reflection

The process of creating MMCSS reinforced the PTEs' appreciation of the importance of reflection as a task of teaching and learning. In my analysis of the data I noted the importance of reflection at three levels - the importance of reflection for their own experience as teacher educators, importance of reflection for professional development as a task of teaching and learning that pre-service teachers needed to embrace and learn about and reflection as an important component in case studies.

In terms of their own experience as PTEs, I found that they realized the importance of thinking deeply about their words and actions and how these affected the classroom dynamics. I think this is an important consideration for PTEs as their actions are bound to fundamentally impact their students. Reflection for the PTEs also took the form of reflection in action and thinking as an educator about questions like what they wanted to present to pre-service teachers, how pre-service teachers thought about the class and the teacher, and what they observed and learned from the video. Reflection also came in handy for the PTEs for helping understand the teaching and learning complexities and other implicit issues they might have initially missed in the classroom observation but were pertinent to their knowledge for preparing preservice teachers. Dolk et al. (2002) captured the significance of reflection for teacher educators in their six-step framework for use with multimedia cases to help teacher educators construct knowledge from episodes of classroom situations where reflection is seen as a precondition for the process of constructing meaning and knowledge, especially for learning from one's own observations and analysis, and participants are challenged to reflect on the situation and construct practical knowledge from it.

In my data analysis I also found that the PTEs appreciated the importance of reflection for professional development for pre-service and in-service teachers. They observed that the process of reflection contributed to professional development by allowing teachers to confront their theories about teaching and learning during and after teaching as they reflected, leading to the development of new understandings about teaching and learning and to solving of problems of practice. This means that as teachers reflected, they were able to develop new conceptions of knowledge based on what they had observed in class. This idea corresponds with Pryor and Bitter's (2008) finding that multimedia held the potential to help teachers improve their practice by providing opportunities to reflect recursively and collaboratively on strategies useful in classroom discourse and other aspects of learning. The aspect of reflection in multimedia provided the opportunity for pre-service and in-service teachers to think together about the complexities of the classroom and allowed them to reflect over these issues repeatedly. The development of the pre-service teachers' knowledge of classroom discourse in turn improved their pedagogical content knowledge, another way in which the creation and use of MMCSs promotes pre-service teacher learning and professional development. This depicted reflection as a critical feature of professional development necessary for effective instruction.

Pryor and Bitter's (2008) observation about the potential of multimedia to provide opportunities for recursive and collaborative reflection further supports the PTEs' recognition of reflection as an important component of case studies and the mutual relationship between reflection and the case study. In my analysis, I found that the case study fostered reflective practice by allowing a common experience for a class of preservice teachers in line with Monroe-Baillargeon's (2002) assertion that video cases provided a common experience through which individuals or groups of teachers could analyze the issues, dilemmas and opportunities of

teaching. A common experience is important as stated by Pfister et al. (2006) that if pre-service teachers are to make meaning from their experiences together, then they must have common experiences on which to build the shared and heightened understandings. The PTEs attached great value to the journal section of the case study as it entailed the teachers' reflection on the lessons pointing to their appreciation of the importance of reflection.

Thinking in New Ways about their Own Learning

My findings indicated that creating MMCSs presented the PTEs with opportunities to think in new ways about their own learning. This meant that by designing and developing cases studies, the PTEs had the opportunity to think about and reflect on the issues of teaching and learning in relation to their own learning. This is consistent with Bowers and Doerr's (2003) findings in their study on designing MMCSs for prospective mathematics teachers where they found that designing, developing and using MMCSs with prospective teachers helped the prospective teachers to frame many of the issues that they encountered in their own practice. The process encouraged the PTEs to reflect on the moment-by-moment decisions they made and were able to highlight some of the dilemmas and tensions they found in teaching and learning. Since the focus was their own practice, it was inevitable to think about these issues of teaching and learning in relation to their own learning. The creation of case studies thus accorded PTEs the opportunity to recognize, think about and discuss some of the complexities that occurred in teaching in relation to their own learning.

Specifically, my findings indicated that creating of case studies had accorded the PTEs several opportunities that led them to think in new ways about their own learning. Bencze et al. (2001) observed that having experienced teaching and learning for many years as students, each teacher candidate begins pre-service education with many strong convictions about subject

matter, teaching and learning. It is therefore important that they have the opportunity to think in new ways about teaching and learning. The PTEs had the opportunity to question how they learn that allowed them to frame the issues of teaching and learning around their own learning as opposed to just how others learn and to make direct connections between their actions and outcomes observed in the classroom. They also had the opportunity to process their own views on many aspects of teaching by thinking about their own learning or ideas around the decisions the teachers in the case were making and the strategies they were using. Then they had the opportunity to think about their own teaching styles and addressing ways to improve their instructional strategies. They had the opportunity to question their own decisions by thinking critically and reflecting on their professional knowledge and discussing their beliefs about instruction in the context of the practices observed in the case study thereby developing new and insightful thoughts about teacher education. Generally, through creating MMCSs, the PTEs appeared to have become more reflective about their own teaching practices, thinking in new ways about their own learning and possibly modifying their existing ideas about teaching and learning. Creating opportunities to think in new ways about their own learning through the creation of MMCSs is consistent with the constructivist pedagogy that Wong et al.(2006) described as a series of steps designed to bring about conceptual change and that involved identifying students' preconceptions; creating opportunities for them to explore and test their preconceptions; providing stimuli for students to develop, modifying or changing their views; and supporting attempts to rethink and reconstruct their views.

Better Understanding of Linking Theory and Practice

My analysis of the data demonstrated that the process of creating MMCSs supported the PTEs' understanding of reconciling ideas learned from class discussions with practice. They

viewed the creation of MMCSs as an opportunity to put knowledge into context, a practice they thought was important in the preparation of teachers. My analysis further revealed the nature and importance of MMCSs in relation to linking ideas learned in class and practice. My findings showed that through MMCSs pre-service teachers had the opportunity to see conceptual change teaching played out in real classroom contexts and actually see the topics they had seen discussed in their textbooks play out in practice. Richman's (2015) findings aligned with this adding that through MMCSs pre-service teachers get the opportunity to observe, interpret and analyze how the ideas and strategies they have learned play out in a practical setting, raising the possibility of the pre-service teachers implementing the strategies in their own practice. Studies further showed that MMCSs provide an avenue through which pre-service teachers can begin to see the practical aspects of what they have learned. The cases also acted as a powerful tool for bringing the complexities of classroom activities into focus and supporting pre-service teachers in creating a bridge between theory and practice in an engaging, more demanding and more intellectually exciting and stimulating way (Cannings & Talley, 2002; Kurz et al., 2005).

The PTEs therefore thought that MMCSs provided a degree of realism for teacher professional development that could not be gained from a textbook alone. Indeed, Richman (2015) observed that as per the theories of problem-based learning (PBL) and active learning, case studies allowed pre-service teachers to work through authentic scenarios using the strategies they were learning. Generally, MMCSs can function as a mediating tool in transcending the apparent dichotomy between theory and practice and can be instrumental in helping teachers develop situated practical knowledge about teaching (Dolk et al., 2002). Due to the opportunities for bridging the gap between theory and practice provided by case studies, it follows that

creating MMCSs of practice had given the PTEs insight into bringing ideas from discussions and practical ideas together by providing an opportunity to put knowledge into context.

Other than these four major themes, through my analysis I found many other fringe ways in which the PTEs' knowledge developed through the creation of MMCSs. For instance, I found that creating MMCSs afforded the PTEs an opportunity to think about issues of teaching and learning that were pertinent to pre-service and in-service teachers. The process of determining and selecting issues to include in the cases gave them the opportunity to think about or find out what was important for pre-service teachers therefore helping advance their knowledge on what may be important for professional development.

Through the creation of MMCSs, it also became apparent to the PTEs that there were teachable moments going on all the time in the classroom. There are many issues of teaching and learning that manifest in almost all instances of classroom teaching, all of which can be analyzed in multiple perspectives for the benefit of pre-service and in-service teachers. Creating MMCSs of practice can therefore serve as an important aspect of professional development that leads to the knowledge development of PTEs in many ways as discussed above to make teacher preparation more meaningful and effective.

Grappling with Issues from Tasks of Teaching and Learning

In this section, I discuss the findings on the third question describing how the PTEs reported that they could support the development of the knowledge of the tasks of teaching and learning among those who were preparing to teach or were already teaching. The PTEs envisioned ways in which teachers may contend with the issues that emerged from the tasks of teaching and learning. This was mainly through their recommendations on how to use the cases to support pre-service teachers, specifically the questions and aspects they recommended for pre-

service and in-service teachers to discuss or pay attention to as they studied the case. My analysis revealed that the PTEs recommended questions and discussion topics for pre-service teachers to use to discuss the issues or tasks of teaching and learning that they had identified, or to dialogue and make decisions on how to address certain situations. I further found that even when the task of teaching and learning was similar across the different case studies, the questions the PTEs recommended for discussion were different and specific to the content being taught in each case study.

Discussion of the questions and topics recommended by the PTEs for grappling with the issues that emerge from the tasks of teaching and learning would likely generate knowledge-of-practice that in Cochran-Smith and Lytle's (1999) framing of the relationships of knowledge and practice is viewed as knowledge generated when teachers treat their own classrooms and schools as sites for intentional investigation as is the case in the study where PTEs create MMCSs of practice from the practice of classroom teachers. This perspective also aligned with the study in that as the PTEs envisioned ways that teachers would grapple with the issues that emerged from the tasks of teaching and learning, they essentially were generating knowledge-of-practice from their reflection on the practice of the teachers as they created the multimedia case studies. The following are some of the ways in which the PTEs envisioned that pre-service teachers would grapple with the issues that emerged from the tasks of teaching and learning. Largely, these were questions and aspects they recommended for pre-service and in-service teachers to discuss or pay attention to as they studied the case. I discuss them in relation to the prevalent tasks of teaching and learning that were identified by the PTEs for discussion.

Instruction/Facilitation

As mentioned above, in my analysis of the data I found that the PTEs' recommended different questions and topics for discussion in each MMCS even for the identical issues and tasks of teaching and learning. This was largely due to the different aspects of content presented in the cases and the overall goal of each case study. Related to instruction for example, while the PTEs creating the *Travelling through Team Teaching Case* recommended discussions on how the teachers introduced the lesson, the brainstorming techniques used and how the teachers connected the activity to student readings among other topics, the PTEs creating the case on *Cultivating Communication and Decision Making in Pre-service Art Education* suggested a discussion on the adaptations the student teacher would make to ensure all students participated in the lesson whenever they encountered students whose first language was other than English. However, there were also similarities across the case studies in some of the questions and topics they suggested for discussion. Generally, they recommended questions around the ideas the lesson addressed, how the teachers had introduced the lesson and how else it could be done, the teaching style, how the class activities could be made student-centered, the teacher/student relationships and how the teacher assessed student understanding.

Planning/Lesson Planning

In terms of planning, the PTEs formulated a number of discussion topics and questions that they speculated that pre-service teachers could discuss about planning and lesson planning. Although different questions were suggested in the different cases that focused on planning, my analysis of the data revealed that some of the general ideas discussed were questions around the compromises necessary in planning for a teaching and learning session, the role of those involved in the session, decisions on the agenda for the class, how the time would be managed,

the classroom organization and assessment of instruction and homework. Most of the questions revolved around these components as these are some of the factors to consider in most classroom settings.

Classroom Management

For classroom management, through my analysis I found that the focus of questions ranged from the potential managerial problems that a teacher must be aware of, how a teacher can plan for lessons to prevent such managerial problems, how a teacher might manage the engagement of students from diverse ethnic, socioeconomic, and learning backgrounds to the possible classroom management challenges that might arise when working with such groups of students and how they could be overcome.

Reflection

To grapple with the issues around reflection, the PTEs' recommended a number of discussion topics and questions that the pre-service teachers would discuss. Although the questions and topics for discussion were different across the various MMCSs, my analysis indicated that generally, they revolved around factors such as the types of things a reflective teacher would consider - if the strategies had worked, if the students had learned and the aspects of the lessons that had gone well and could be retained. This means that irrespective of the content or the general focus of a class, the PTEs' perspective was that there are near universal factors that a reflective teacher must grapple with and that the PTEs were interested in conveying to the pre-service teachers.

Equipment/Use of Technology

The PTEs also recommended questions for discussion that were specific to the case studies, the content and the equipment in focus. However, some of the general ideas that cut

across the two cases that focused on equipment, specifically technology, included questions concerning the approach in using the equipment for instruction in the relevant area, how the issues of students with special needs in relation to the equipment were addressed and how the physical environment of the classroom affected the use of the equipment.

Student Activities

Although the PTEs presented the tasks of teaching and learning mostly from the point of view of or relating to the teacher, they also focused on some issues touching on students such as student questions, student attitudes and student thinking. Here, they recommended questions such as how to encourage students to elicit help from each other and how the teacher used student thinking to advance learning. Masingila and Doerr (2002) associated MMCSs with supporting pre-service teachers in developing strategies and rationales for using student thinking to guide instruction. The above were general questions that cut across various cases but the PTEs also recommended questions that were very specific to the content the lesson addressed.

The PTEs selected a wide range of issues for discussion across the various MMCSs and formulated discussion topics or question to help pre-service teachers grapple with these issues. The aspects and discussion questions the PTEs recommended represent how they envisaged pre-service and in-service teachers to grapple with the issues that emerge in the cases.

The discussion above represents the findings from the data in connection to what is known about the nature of prospective teacher educators' knowledge of teaching and learning, and its development. However, it is important to point out that certain important aspects of teacher education as brought out in the literature review are evidently missing from the discussion. For example, while studies show that educating an increasingly diverse and inclusive student population, while promoting social justice and equity has assumed a position of critical

importance in teacher education today and researchers, practitioners, and policy-makers are grappling with ways such as critical and anti-racist pedagogy to address the persistent problem of inequitable educational outcomes and opportunities between advantaged and disadvantaged students (Grudnoff et al., 2017), in the multimedia case studies the participants created, there is little focus on issues of diversity and how to change an unjust status quo.

The *Exploring Quadratics* team mentions recording their video in a culturally diverse mathematics classroom but does not specifically focus the issues they select on meeting the needs of learners in a diverse setting. The *Travelling Through Team Teaching* team point out the need for teachers to work collaboratively with other teachers in order to meet the learning needs of their students in classrooms that are becoming more diverse as their rationale for choosing Team Teaching as their theme. But there is no specific focus on meeting diverse learner needs in the issues they suggest for discussion such as planning and classroom management.

This is probably because the issues of diversity and teacher education with a critical agenda that intends to tap into the emancipatory dimensions of teaching as well as an anti-racist pedagogy that challenges the individual and structural systems that perpetuates racism were not viewed by some as major issues in teacher education at the time of the study thus the lack of a focus on them.

Potential for Multimedia Case Studies Today

Given that the MMCS in the study were created in the year 2002, the technology used then, such as CD-ROMS, would face various limitations today on issues such as compatibility, storage capacity, security, versatility, and costs, among others. For example, since optical drives that read and write data from optical discs are bulky and are no longer a part of many computers especially with the increased levels of internet coverage, it is becoming increasingly difficult to

find computers to read CD-ROMs such as those used to store the MMCSs in the study. Further, unlike USB flash drives or external hard drives, CD-ROMs have limited storage capacity, and this may be a limitation given the wide variety of video clips and artifacts contained in a MMCS that may require a lot of space to keep. CD-ROMs are also non-modifiable thus limiting the versatility of the MMCSs stored therein. For example, a teacher educator may want to change aspects of a case study such as the issues for pre-service teachers to focus on in a particular session or to include new links to websites that lend themselves better to the prevailing discussion. This may not be possible with CD-ROMs since they are non-modifiable. CD-ROMs are also easy to be damaged, putting at risk a lot of information that is contained in the MMCS. They also make the MMCS more difficult to share compared to MMCS stored in a web-based tool.

Nevertheless, since the technology context is ever changing, MMCS would look a lot different today, based on the many opportunities that the new technologies have to offer. This would come with a lot more potentialities for learning in the 21st century such as enabling teachers to transform a linear learning environment into a non-linear form of learning since as Lambert and Cuper (2008) noted, students no longer process information in a sequential manner. They would also offer learners interactivity, control of progress and choice in their construction of knowledge.

In addition to other media such as text, audio, graphics, animations or video and the case creator software, Mischel (2019) suggested newer multimedia technologies that can be used to promote 21st-century skills such as critical thinking and reflective practice. They suggested interactive video platforms such as PlayPosit, a web-based tool that enables teachers create and edit interactive videos from streamed or uploaded content. Alongside the video, PlayPosit would

include artifacts such as lesson plans and related teaching resources as well as interactivities such as discussion questions and polling surveys. The web embed feature would allow for the incorporation of links to various aspects of the case such as classroom seating charts with links to student work, as well as links to other resources useful in understanding the issues raised by the case or other third-party media in the form of web addresses.

EDpuzzle, would also be helpful for creating MMCSs since it is used to augment the use of video in learning experiences mainly by placing interactive content into pre-existing videos from a variety of sources (Mischel, 2019). This gives it the potential to combine classroom videos with other content such as issue matrices and other documents such as teacher reflections and student assignments as well as links to websites. The text box feature also allows for insertion of other video links. Podcast apps such as Spotify can also be incorporated into MMCS for example for uploading interview excerpts or audios from the class videos that can then be linked to the webpage or blogs.

These are just a few of the new technologies that can offer new potentialities for MMCS. Other than new technologies, more contemporary contextual issues can also be included in the cases. For example, issues of diversity, inclusion and social justice that are big issues in education today, driven by critical and anti-racist pedagogies can be included in the MMCSs as some key issues of focus.

Perhaps, one of the biggest issues that has shown the invaluable potential of the MMCS has been the COVID-19 pandemic. With most learning having gone virtual at the height of the pandemic and curtailing any opportunities for pre-service teacher field experience, it was still possible for PTEs and pre-service teachers to access classroom scenarios, if necessary, through MMCSs since MMCSs have the potential to provide classroom situations that reflect most of

what the teacher educators may consider as best practice or practice that they would like the pre-service teachers to experience.

Conclusion

The purpose of this study was to explore the knowledge development of prospective teacher educators as they engaged in the process of creating MMCSs of practice for use with pre-service and in-service teachers. In chapter one, I presented the background of the study emphasizing how despite the important role of teacher educators in preparing teachers and ensuring teacher quality and quality education, there has not been much focus on their professional development and their knowledge base is often generalized from that of teachers. I explained that designing MMCSs would be an important aspect of PTE preparation as it would reveal the thinking of the PTEs about the complex particulars of teaching and learning. To investigate the PTEs knowledge development through the creation of these case studies, I posed three questions on how the PTEs understood that tasks of teaching and learning, how their knowledge developed as they created the cases and how they envisioned the pre-service teachers would grapple with the issues of teaching and learning in the cases.

In chapter two, after laying a framework for conceptualizing teacher educator knowledge through a discussion on Cochran-Smith and Lytle's (1999) three prominent perspectives of knowledge and teacher learning, I reviewed literature about teacher educator professional development, the role of critical pedagogy in teacher education, the development of multimedia cases studies, and the use of multimedia cases in supporting teacher and teacher educator development.

In chapter three, I described the teacher development experiment that was used to collect data for the study over a two-semester period. I described the sources of data that I analyzed to

answer the research questions as well as the sample and the data analysis procedures. I also presented the steps I followed to ensure the reliability of the study and the ethical considerations.

In chapter four, I presented the results from the data on the PTEs' understanding of the tasks of teaching and learning, some of the ways in which their knowledge had evolved and how they thought they would support the pre-service teachers to use the case studies.

In chapter five I presented a discussion of the findings, connecting it with what is known about the nature of prospective teacher educators' knowledge of teaching and learning, and its development. I discussed the findings within the framing of the relationships of knowledge and practice to categorize the PTEs' understanding of the tasks of teaching and learning, their knowledge development and the knowledge that would possibly emanate from grappling with the issues of teaching and learning.

The findings of the study revealed the knowledge development of the PTEs. The findings for example showed that the PTEs developed a better understanding of linking theory and practice, gained opportunities to think in new ways about their own learning, and appreciated the importance of reflection as well as the complexity of teaching and learning. Creating MMCSs of practice can therefore serve as an important aspect of professional development that leads to the knowledge development of PTEs to make teacher preparation more meaningful and effective.

Limitations

The findings of this study have to be seen in light of some limitations. First, the findings are based on data that were collected in the year 2002 and a lot of changes may have occurred in the field of teacher education or about some of the issues in the case studies such as the use of technology. It was therefore not possible to fully capture the prevailing dynamics in teacher and teacher educator development. For example, the *Integrating Technology in a Literacy Classroom*

case was motivated by the introduction of technology standards within the education programs as a necessary step prior to accreditation and the PTEs creating the case perceived it as an attempt to meet these guidelines. At that time, the introduction of technology into the classroom was an issue that had been greatly advocated for with the then trend of technology development in society. It is possible that this may have changed over time.

However, I used current analysis strategies and current data or more contemporary studies to analyze and discuss the findings to help mitigate this limitation. Analyzing and discussing the data using a contemporary lens enabled me to interpret and describe the significance of the findings in light of the prevailing dynamics in teacher educator development and to explain fresh insights about the problem in question after taking the findings into consideration.

Although future studies could use current data to fully capture the prevailing dynamics in teacher educator development, the use of secondary data in this study proved an invaluable asset for exploring the phenomenon of knowledge development of teacher educators at a time that it was not possible for me to collect such data due to the absence of any in-person learning activity as occasioned by the COVID-19 pandemic.

Secondly, to a small extent, some of the information I used in this study, especially from interviews and reflections, was in the form of retrospective data, recollections of experiences in the prospective teachers' project and may therefore have been subject to problems inherent with memory. I however triangulated these using the other data sources such as the facilitator guides and the issue matrices to minimize any disadvantages.

Implications

For Professional Development

The results of the study generally indicated that creating MMCSs led to the knowledge development of PTEs. For example, while for the most part teacher education programs emphasize knowledge that is abstract, systematized, and independent of specific instructional settings (Hewitt et al., 2003), creating MMCSs provided an opportunity for the PTEs of seeing procedures in authentic instructional situations, as well as an opportunity to analyze the decision making behind such practices and learning how to make such decisions for new contexts. Through creating MMCSs, the PTEs had thus developed a better understanding of reconciling ideas learned from discussions with practice. This suggests that prospective teacher educator professional development programs need processes that provide opportunities to investigate, analyze, and reflect on instructional situations in authentic circumstances.

Creating MMCSs also contributed to the PTEs' appreciation of the complexity of the teaching and learning process. Since teachers are constantly immersed in complex situations in which they need quick, concrete answers to a wide range of pressing problems, the decisions they make are rarely the product of careful deliberation or the judicious weighing of educational principles, rather the split-second product of emotion, needs, values, habit, and a sense of the affordances and constraints of a situation in reaction to the situation-at-hand (Hewitt et al., 2003). PTE professional development programs therefore need activities that help new teachers or PTEs to more deeply reflect upon their reactions to teaching situations and the moment-by-moment decisions that practitioners make in classrooms.

Additionally, the process of creating MMCSs reinforced the PTE's appreciation of the importance of reflection as a task of teaching and learning and they thus recommended it as one

of the tasks for the pre-service teachers using the case study to focus on. By creating scenarios for reflection in their cases studies, the PTEs themselves developed a perspective that empowered them to look at teaching situations in context and to select learning experiences likely to provide rich information and enhance pre-service teachers understanding. Opportunities for reflection should therefore of necessity always be an integral part of PTE professional development.

My findings also indicated that creating MMCSs presented the PTEs with opportunities to think in new ways about their own learning. This was perhaps the most compelling aspect of the findings for me. This was important because the PTEs were becoming more reflective about their own teaching practices, thinking in new ways about their own learning and possibly modifying their existing ideas or preconceptions about teaching and learning that were largely influenced by how they were taught. Indeed, Hewitt et al. (2003) observed that the theoretical body of knowledge that is taught in schools of education is not the kind of knowledge that teachers draw upon while teaching; rather they mostly draw upon their own experience of how they were taught. As the PTEs had noted, people coming to teacher education programs often had already developed strong ideas about ideal forms of teaching and learning because they had been in a lot of different classes and been exposed to diverse teaching approaches. These ideas and beliefs of prospective teachers influenced their future teaching behaviors and roles in the classroom.

In addition, since the pedagogical knowledge domain of teacher educators is often generalized from that of teachers (Lin et al., 2011), it is likely that teacher educators too, bring their existing ideas into teacher preparation. But by providing opportunities to think in new ways about their own learning, creating MMCSs had played a role in helping future teacher educators

to re-consider and, if necessary, change their existing conceptions about teaching and learning. This is very impactful since it is a professional development opportunity that has the potential of moving teacher educators from the pedagogical knowledge domain of teachers and their existing conceptions into a new way of thinking that is more appropriate for teacher educator development. It is a professional development opportunity with the potential of contributing to specific expertise for teacher educators, away from their existing conceptions as teachers.

The PTEs therefore need professional development opportunities that would lead them to confront and break their previously held conceptions about teaching and learning while embracing research-based developments in education. As emerges in the study, creating MMCSs seems to provide PTE's with an opportunity to develop their knowledge in various ways such as appreciating the complexity of teaching and learning thus developing appropriate strategies to help prepare pre-service teachers and appreciating the importance of reflection thus embedding reflection in every aspect of teacher preparation and selecting the most informative learning experiences, in addition to confronting previously held conceptions on teaching and learning and adopting notions based on research. Creating MMCS is therefore beneficial to PTEs and can be adopted widely as part of teacher educator preparation and professional development programs.

The above are some of the suggestions the findings of this study provide for the professional development of PTEs since teacher educators constitute a specific category of professionals, needing specific expertise for the specific goals and responsibilities of preparing teachers and are thus in need of opportunities to acquire and develop that specific expertise. This study therefore contributes towards building the specific expertise that teacher educators need in terms of professional development knowledge and opportunity. This study contributes to the development of a professional development knowledge base that teacher educators can draw

from especially in relation to the use of MMCSs. This in turn has implications for teacher quality since the professional development of teacher educators is a critical factor for preparation of quality teachers.

For Policy and Practice

The contribution of the study findings towards building specific expertise and a professional development knowledge base for teacher educators indicates that professional development for teacher educators is possible and desirable. Further, the findings indicate that MMCSs can play a role in the preparation and professional development of teacher educators. Policy makers should therefore formulate policies targeting both teacher educator preparation and professional development. For example, they could push for the development of graduate programs specific for teacher educators, urge stronger collaboration between universities and colleges of teacher education to share teacher educator professional development knowledge and organize for the introduction of induction courses or mentoring and coaching practices for novice teacher educators to ease their transition to the new role as teacher educator. The policy makers could also come up with a certification program that encourages teacher educators to undergo professional development. This can be arranged at institutional level or beyond. This would support teacher educators to develop insights for their teacher preparation practice, improve their practice and by extension improve teacher quality.

For School Administrators

Since experienced teachers acting as mentors or cooperating teachers in schools can also be considered as teacher educators, the findings of this study are significant in providing them with more insights to work with the teachers they mentor. It is therefore important for school administrators in conjunction with staff development specialists to arrange for professional

development sessions for their experienced teachers and teacher mentors, to share this information with them, as part of their professional development to improve their practice and ultimately improve teacher quality.

For the Kenyan Context

Just as in most parts of the world, as indicated in research studies, teacher educator professional development has received little attention in Kenya. The Kenya Teacher Education and Professional Development Program focuses only on improving instruction at teacher training colleges that prepare elementary and middle school teachers, to better prepare trainees for classroom challenges, such as students affected by HIV and to enhance child-centered learning, improve approaches to teaching multi-grade and large classes, and address gender issues. The findings of this study would therefore contribute greatly towards the preparation and professional development of teacher educators.

Teacher educators can engage in creating MMCSs for use with pre-service teachers and this can serve as a professional development exercise for them for example as their knowledge develops as they think about what pre-service teachers need to learn from the MMCSs they create. The created MMCSs and existing MMCSs can then be used with pre-service teachers. These would be greatly applicable in the teacher education context in Kenya.

One important role that the MMCSs would play that would significantly enhance teacher preparation in Kenya would be to provide pre-service teachers an opportunity for field experience way before student teaching. The teacher preparation program in Kenya is organized in such a way that pre-service teachers only go out to schools for field experience during student teaching when their focus is to practice teaching. They therefore miss out on other opportunities of learning such as observation and other activities that they may undertake in a school setting

before student teaching. For example, they do not have opportunities to observe other teachers and learn from their practice or observe other issues such as planning, classroom management and other teaching strategies before student teaching. This field experience component is probably missing due factors such as the structure of the teacher preparation programs, large classes and inadequate funding among other factors. MMCSs can therefore provide a platform for the pre-service teachers to begin classroom observations and experience elements of a classroom setting before being in an actual classroom setting during student teaching.

The MMCSs would also come in handy to mitigate the effect of large teacher education classes that are prevalent in teacher preparation settings in Kenya. This is in the sense that however large the teacher preparation class is, the MMCSs would provide a common point for discussion and reflection as opposed to each individual bringing varied experience from their field placement.

A good starting point to access MMCSs to be used with pre-service teachers and even teacher educators in Kenya would be the *Multimedia Case Studies in a Kenyan Context* website (<https://kenyammcs.syr.edu/>) developed through the Syracuse University's Higher Education Partnerships in Kenya, consisting of MMCSs reflecting on teaching and learning in Kenyan secondary classrooms. The 40+ MMCSs created in collaboration with colleagues at Kenyatta University and University of Embu would also be a good resource for the MMCSs relevant to the Kenyan context.

The findings of this study also have implications for researchers. The findings raise the need for further investigation not only on the use of case studies but also other aspects that may contribute to the preparation and professional development of teacher educators as discussed in the subsequent section.

Recommendations for Further Research

The findings of this study show a lot of promise for the knowledge development and thus professional development of the PTEs. Since PTEs are a specific category of professionals, needing specific expertise for the specific goals and responsibilities of teacher preparation, the findings on their knowledge development may not be effectively generalized as benefits to the preservice teachers too. In any case, the PTEs as the case creators with the task of determining what to include in the case had a greater opportunity to think critically about what to include in the case. Since the case studies have a purpose beyond merely recording and organizing the elements of practice, they will need to be designed in such a way that they can be used to prepare and support others in learning to teach.

Other than providing high quality classrooms and creating low threat learning environments as outlined in the literature review, MMCSs can also provide pre-service teachers with the opportunity to observe, interpret and analyze teaching and learning strategies in real-life contexts before embarking on their own practice. In this case, the MMCSs can be used with pre-service teachers by constantly adapting them to make them relevant to the pre-service teachers specific contexts and topics of discussion. With more recent technology that allows modifications, the issues of focus can be changed to suit a particular learning session, links to websites can be replaced to pick the appropriate ones for the topic and some artifacts can be added or changed. These are some of the general ways in which MMCSs can be used with pre-service teachers. The study therefore raises the need for further research on more practical ways in which the MMCSs may be used to develop the pre-service teachers' understanding of teaching and learning.

Further research can focus on how the PTEs can support the development of this knowledge among those who are preparing to teach or are already teaching. For instance, the research can focus on how PTEs organize larger frameworks for teachers to use in understanding the inter-relatedness of teaching and learning. The studies could examine the ways in which the PTEs create contexts for teachers to examine the inter-relatedness of teaching and learning and how these frameworks develop through the process of creating MMCSs. A similar study may also be carried out in a different experimental setting.

As mentioned earlier, in this study there is little focus on issues of diversity and how to change an unjust status quo in an educational setting even though educating an increasingly diverse and inclusive student population, while promoting social justice and equity has assumed a position of critical importance in teacher education today. Further research can therefore be conducted on the knowledge development of prospective teacher educators but with an anti-racist or critical pedagogy lens. For example, some of the issues to focus on would be how an anti-racist agenda could play out in the tasks of teaching and learning such as planning, facilitation, and classroom management.

In planning for a course or a class, an anti-racist agenda would obligate the teachers to plan in a way that no members of any race in the classroom are disadvantaged. An anti-racist agenda would lead teachers to think about reflecting the class diversity in their choice of resources for the class. In terms of books for example, the teachers would need to plan for books that represent aspects or characters of the different races so that the diversity of the class is represented. This would allow learners from different backgrounds to ‘see themselves’ depicted in print, with the opportunity for linking cultural knowledge and experiences to text worlds

(Brooks, 2006). Representation of all learners as opposed to just those from the dominant groups fosters a sense of equity and social justice in an educational setting.

During instruction or facilitation of the class, it is possible that some learners especially from the non-dominant groups may feel subdued and fail to participate or participate only minimally in class activities. The learners may feel marginalized, and their voices may rarely be heard. Critical pedagogy and an anti-racist agenda would necessitate ensuring that youth from historically marginalized groups have their voices heard and have leadership opportunities as one way to support and empower them (Gonzalez et al., 2017). The teacher would level out participation, ensuring that those that feel marginalized and are not participating are given an opportunity. The use of culturally relevant pedagogy that brings in elements of the learners' culture and makes them comfortable may also draw out their participation.

In terms of classroom management, an anti-racist agenda would lead teachers to push back against systemic challenges that affect the way classrooms are managed and how students from different groups are treated. For example, girls of color face higher rates of exclusionary suspension and expulsion for subjective behavioral infractions at 12% compared to White girls at 2% and teachers sometimes exercised disciplinary measures against Black girls to encourage them to adopt more “acceptable” qualities of femininity, often related to looks and demeanor—standards that appear to reflect a White, middle-class idea of femininity (Crenshaw et al., 2015). In their classroom management procedures, teachers can push back against such systemic disparities at their own class or school level to move towards equity and social justice.

There is also the issue of referrals to high incidence special education programs such as those related to mental retardation, learning disabilities, and emotional disturbance. Students of color are often more likely to be labeled as emotionally disturbed for example and referred to a

special education program (Blanchett et al., 2009) thereby missing out on the general education that other learners are getting. This has led to a disproportionate representation of students of color in special education programs. Classroom management with an anti-racist agenda would therefore focus on consciously pushing back on this representation towards a socially just educational setting.

While in the United States the impact of racism is a major factor to consider while conducting the study with a critical pedagogy and anti-racist lens, the Kenyan context presents a very different scenario and racism is not the dominant factor that drives inequitable educational outcomes. One major cause of inequitable outcomes has been the impact of colonization. Since colonial governments focused mainly on high potential and highly productive areas that they could benefit from through activities such as large-scale farming, a lot of resources were directed to these areas at the expense of the rest of the country. Inevitably, these areas ended up with better educational facilities alongside all other facilities like hospitals and industries. This created inequities among regions that have over the years trickled down to individuals largely in terms of their social economic status. While those in the well-resourced regions continued to prosper and receive higher quality educational and other services than the rest, others continued to remain in poverty. These inequalities have found their way into the school system as some schools are better resourced than others and some and some families can support their children's learning more than others. Although this is a universal phenomenon, in Kenya it has historical roots in the way the colonial governments organized the country in its early years that have led to inequitable outcomes for regions and their populations. One way of ensuring equitable outcomes in a Kenyan educational setting therefore would be for the teachers and schools to use materials and provide facilities that all students can access.

Overall, to change an unjust status quo and achieve equitable outcomes in an educational setting, we must examine, call out, and disrupt inequitable policies and actions that operate to form systems of oppressions that affect students' access to an equitable and socially just educational setting that enhances their learning.

Appendices

Appendix A

Interview Protocol #1

1. What is a case? In other words, what makes up a case?
2. What are different types of cases?
3. For what purposes might a case be used?
4. How can cases be used to help people become better teachers? In other words, why use cases? When would you use cases?
5. Tell me about your plans for your case? What do you anticipate as the biggest potential problems for creating your case? Have you thought about how your case might be used?

Appendix B

Interview Protocol #2

1. Describe your case for me. Tell me what artifacts are in the case. What is it a case of? Are there themes running through it? Are there key issues or central incidents that you've identified? If you had to give a short phrase to tell someone what it's a case of, what would you say? What's the title of the case?

2. What decisions have you made about what goes into your case? How did you make those decisions? Were there disagreements? If so, what were they? How did you decide what to include and exclude? What decisions will you need to make?

3. What have you learned about making a case so far? What difficulties did you encounter? What things went as you expected? What things exceeded your expectations?

4. Who will review the case (video) besides you before the final version?

5. How do you envision your case being used?

Appendix C

Interview Protocol #3

1. If you were to describe your case to someone else, what would you say? What are the strongest features of your case? The weakest?
2. What have you learned about making a case through this experience? What difficulties did you encounter? What things went as you expected? What things exceeded your expectations?
3. What have you learned about teacher professional development through the development of this case? How has making a case influenced your thinking about teacher professional development?
4. What has been the most frustrating part of this experience? What has been the most fulfilling part?
5. After taking this class, completing the readings, discussing them, planning for and then creating your case, how do you see the role of cases in teacher professional development?

Appendix D

Sample Memo

Memo for Individual Reflective Essay Analysis

The individual reflective essays have turned out to be a key part of these data and an important part of this analysis as they carry a lot of information relevant to the objectives of the study. One idea that keeps recurring in the essays is that teaching and learning is a complex process. Although the participants do not necessarily say it directly, they highlight some of the challenges they experienced in the process of creating the multimedia case studies. The challenges seem to revolve around four main issues.

At one level, the participants strongly felt that determining the issues to include in the case was a difficult process. The participants expressed that making the case versatile enough to be relevant for multiple audiences and increasing its utility while at the same time keeping the focus narrow so that it is a case study with a specific focus made it very difficult to settle on the issues to include in the case. This challenge was expressed by members from all the groups.

The second challenge discussed in a few of the reflective essays was whether to select the issues through the natural class interactions or through prearranged class interactions. Here, in one approach, the instructional goals in terms of content and pedagogical issues were clearly defined, and then video and artifacts collected to illustrate these points. In the other approach, with a general idea about the instructional goals, the case developers began by collecting or recording videos and other classroom artifacts and then scrutinized the data to refine their ideas about which teaching and learning issues the data could most successfully highlight.

Another challenge that the participants admitted having faced was deciding on an issue before hand and then not being sure whether it would occur in the interactions they had planned

to record especially where they did not have an opportunity to prescript or prearrange a classroom. Lastly, I also found that in some cases, after defining the teaching moments they wanted to include in the case, getting a class with the specifications the PTEs needed or where the teacher was willing to be filmed proved extremely difficult. The participants therefore seem to suggest that teaching and learning is a difficult and complex process.

Appendix E

Codebook

Themes	Codes	Definitions	Exemplars	Excerpts
PTEs understanding of the tasks of teaching and learning	Instruction/ facilitation	purposefully directing or implementing of the learning process	supervising experiences, questioning techniques and teacher support and roles	‘Student teachers need to be prepared by teacher educators of the need to individualize instruction or make accommodation for individual learner needs when possible in order to be able to achieve the outcomes they intend for their pupils. Pre-service teachers need to be trained on approaches they can use to ensure that they are able to monitor the progress of each of their learners and access their work with due regard to their expectations and ability. Teacher education has to prepare pre-service teachers to have a deep interest in their students

				and make them realize their central role in supporting students within the classroom learning environment.’ (Carah, Individual reflective essay)
	Planning/Lesson Planning	Preparing a guide for facilitating a lesson	Lesson Planning	‘it is rare for a teacher to fully plan for the outcome of their lesson but only for the implementation since it often does not go as planned’ (Jasmine, Individual reflective essay)
	Classroom Management	skills and techniques used to keep students organized, orderly, focused, attentive, on task, and academically productive during a class	dealing with students’ requests, managing students’ behavior, managing instruction	‘pre-service teachers need to be informed by teacher educators of the many other issues they need to address other than their technical expertise, such as if they may require an assistant teacher within the

				<p>classroom or may have to adopt individual instructional approach’</p> <p>‘pre-service teachers need to develop effective strategies to ensure that the environment created within the classroom cultivated the learning spirit within pupils.’</p> <p>(Carah, Individual Reflective Essay)</p>
	Reflection	Think about how lesson went	like if the students had learned and the evidence for it if an activity had gone well and been effective	<p>In our case, we asked teachers to reflect on their activity. While the activity was colorful and appealing to the eyes, it was extremely difficult for the students to complete independently. As a result, the activity was teacher-centered with little benefit to the students academically. In order for</p>

				<p>our case to be beneficial for professional development, we needed to address this issue. The most appropriate way was to have the teachers reflect on the success of the activity. The reflective component of our case allowed the two teachers time to discuss ways to improve or modify the lesson to make it more student oriented. (Monica, Individual reflective essay)</p>
	Equipment/Use of Technology	Physical resources	Use of technology, the computer	<p>including use of technology in the case study would open discussions about issues that technology brought into the world of teachers, students, teacher educators and instruction.</p>

				(Group 3 Facilitator Guide)
	Student Activities	Issues or activities that touch on students/student focused	student questions, student attitudes and student thinking	focus on student questions both to each other in terms of peer consulting and to the teacher with questions such as how students would be encouraged to seek help from each other.
Complexity of Teaching and Learning	Issue selection	Selecting issues to include in case	Determining issues in teacher education	<p>“Teaching is very complex ... there are so many issues that may be in the past have not been thought about ... As a teacher educator or as a teacher, you have to be very alert about so many situations that go on in the classroom” (Group 3, 3rd interview).</p> <p>“One of the difficulties of making a case comes from the form of</p>

				<p>decisions about what to put in the case ... the planning requires the teacher educator to narrow her focus to maybe one major theme and maybe a few subtopics”</p> <p>(Jasmine, Individual reflective essay).</p>
	<p>Deductive vs Inductive</p>	<p>Emerging issues or pre-arranged issues</p>	<p>Influenced lesson, regular lesson</p>	<p>“We debated for a long time about whether a case should show an "everyday" lesson or something special... There may be particular elements that you think it is important for pre-service teachers to be exposed to.</p> <p>However, these things may not occur in what is just a "regular" lesson.</p>

				So, do you choose to tape and document what would have gone on anyway, or do you choose to influence the lesson in some way in order to get what you want?" (Laura, Individual reflective essay).
	Continuous evolvment	Teaching changes constantly	Diverse situations and contexts	Working on the cases helped me reinforce my understanding of teaching as a complex, continually evolving, full of decision-making process. Cases are representative of diverse situations and contexts. That is why use of case studies in teacher education encourages teachers to think and propose alternative solutions to the problems

				or dilemma situations in cases. This is a way of developing reflective teaching habits (Dean, Individual reflective essay).
	Constant challenges	Teaching always has challenges	Variety of classroom situations	It has also reinforced for me the extreme complexity of teaching as a profession and the constant challenge it gives me in my efforts to provide preservice teachers with the skills and knowledge adequate to handle a variety of such classroom situations...I would like to help preservice teachers embrace the complexity of teaching as a profession (Ewing, Individual reflective essay).

Importance of Reflection	Own reflection	Reflection about self	How what I do impacts students	<p>“What I have learned as a future teacher educator is that I have a greater need to be reflective about what I do as an educator and how it impacts students”</p> <p>(Jasmine, Individual reflective essay).</p>
	Reflection and PD	Reflection in professional development	Modifying instructional procedures	<p>“successful professional development programs needed to include two components for the program to have long-term success: teacher reflection and lesson purpose” (Monica, Individual reflective essay)</p>
	Reflection and Case study	Reflection in case studies	Common experience for students	<p>“The process of reflection allows teachers to confront their theories about</p>

				<p>teaching and learning during and after teaching ... leading to the development of new understandings about teaching and learning and to the solving of problems of practice.”</p> <p>(Liev, critique of the <i>Weighty Decisions</i> case study)</p>
<p>Thinking in New Ways about their Own Learning</p>	<p>Question own learning</p>	<p>Framing issues around own learning</p>	<p>How to assess learning, how to cater for diverse learners</p>	<p>I learned the most about teacher education by having the opportunity to question how I learn.</p> <p>Throughout my teacher education program, I have learned a great deal about the way others learn, how to assess students learning, and how to create lessons for diverse learners. I had never framed these issues around my own learning.</p>

				<p>The study of cases has enabled me to study my own learning in ways that I never had before ... I was able to see how teacher educators were able to think about their own learning. I do not think that I would have understood the value of reflecting on your own learning without having the ability to see these models of this that were in the cases that we were exposed to during the first part of this course (Keith, Individual reflective essay).</p>
	<p>Reflect on own learning</p>	<p>Process own views</p>	<p>Beliefs about instruction</p>	<p>In both creating and observing cases I learned to reflect upon my own learning. I was able to make direct connections</p>

				<p>between my actions and outcomes observed in the classroom. This learning outcome will be invaluable in my future career as a teacher and possibly a teacher educator (Keith, Individual reflective essay).</p>
	Think about own learning	Consider own actions	Teaching styles, improve instructional strategies	<p>Such conversations were valuable as they forced me to look at my pedagogy more critically.</p> <p>Frequently, by making me ask anew the questions such as why I make the decisions I do, what evidence I have to determine how effective my choices are, and what I need to rethink and/or change about my instruction so that it becomes most effective,</p>

				my team members helped me to reflect on these aspects of my pedagogy (Ewing, Individual reflective essay).
Better Understanding of Linking Theory and Practice	Relate	show a connection between.	See topics discussed in books in practice	it is particularly important for pre-service teachers to be able to actually see the topics discussed in their textbooks in practice (Chelsea, Individual Reflective Essay)
	Context	Setting of an event	See conceptual change in real classroom context	the hope was that pre-service teachers would gain an understanding of what a lesson really looked like in an actual classroom. (Chelsea, individual Reflective Essay)
	Grounded	Based on	Teacher knowledge and skills relate to theory and practice	Much of what we know about learning to teach points that teacher knowledge and skills must

				ground in both theory and practice. However, considering the relatively short teacher preparation time, teacher educators have problems of helping teachers to meld and mix theory and practice. Cases are one of the major ways of bridging the gap and blurring the lines between theory and practice in teacher education along with field experiences (Dean, Individual reflective essay).
	Experience	Practical contact	Opportunities to explore	

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In *Studying Teacher Education*, edited by M. Cochran Smith and Kenneth Zeichner, 645–736. Mahwah, NJ: Lawrence Erlbaum.
- Zottmann, J. M., Goeze, A., Frank, C., Zentner, U., Fischer, F., & Schrader, J. (2012). Fostering the analytical competency of pre-service teachers in a computer-supported case-based learning environment: A matter of perspective? *Interactive Learning Environments* 20(6), 513-532.

Vita

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Education

Doctor of Philosophy - Teaching and Curriculum, 2021. Syracuse University, Syracuse, New York.

Master of Education – Teacher Education, 2012. Aga Khan University, Institute for Educational Development, East Africa, Dar es Salaam, Tanzania

Dissertation: *Exploring ESL Learners' Perspectives on Oral Error Correction Bachelor of Education*. 1998. Kenyatta University, Nairobi, Kenya.

Honors and Awards

Certificate in University Teaching - Syracuse University Graduate School Future Professoriate Program – 2019

Association Memberships

American Educational Research Association (AERA) 2017 – Present

Association of Teacher Educators (ATE) 2020 – Present

Professional Experience

Teaching Assistant, Teaching and Leadership Department, Syracuse University. (2016 – Present)

- Collaborated with faculty members to teach several required courses for inclusive elementary and special education majors, pre-K inclusive education majors and secondary education majors.
- Used online teaching such as Zoom, Blackboard collaborate, Kaltura
- Facilitated field and community placement components of courses in inclusive elementary and special education majors, early childhood education majors and teaching and leadership majors.

Part-time University Teaching (2012 – 2016)

- Taught Special Methods in English Language Teaching courses

High School Teaching (2004 – 2016)

- Taught 9th -12th grade English & Literature
- Served as head of languages department.
- Facilitated technology integration workshops for department members.

Member – School of Education (SOE) Strategic Planning Steering Committee (2018 -21)

- One of two graduate students in the SOE to serve on this school-wide committee of faculty, staff, and student representatives.
- Contributed to reviewing progress in implementing of the SOE strategic plan and implementation and monitoring for the academic year.

Reviewer AERA Conference Proposals

- Reviewed conference proposals for the Teacher Education Division

Professional Development (2004 – Present)

- Participated in Seminars and workshops on teaching and learning, classroom management and teaching and learning of English language and literature.

Training (2013)

- Professional Teacher Development Training on Early Childhood Care and Education on Literacy and Numeracy (A Strengthening Education Systems in East Africa Program) at Aga Khan University, Institute for Educational Development, Dar es Salaam, Tanzania
- Contributed to the design and compilation of materials for Early Years Literacy and Numeracy course handbooks and Pre and Post Tests
- Contributed to the development of course assessment strategies and rubrics.

Additional experience (2004 – 2016)

- Examiner, Kenya National Examinations Council
Worked with the national exam council as an examiner for the English Paper Three exam- Composition and essays based on set texts.

Research Interests

I have broad interests in teacher preparation, particularly the preparation and professional development of teacher educators in the context of an anti-racist and critical pedagogy lens and emerging technological advancements.

Teaching Experience

As a Teaching Assistant:

EDU 202: Culturally Sustaining, Inclusive and Anti-Racist Pedagogy for Inclusive Elementary and Special Education majors. Online Synchronous format (2020)

- Collaborated with faculty member in Teaching and Leadership to teach culturally sustaining, inclusive and anti-racist pedagogy for Inclusive Elementary and Special Education majors in an online synchronous format. Provided feedback for class assignments and reflections.

EDU 100: Ambitious Education for an Equitable Society (2018, 2019, 2020)

- Facilitated and supervised the photo voice project and the community placement projects – planning and implementing and processing project activities including photo walks, classroom observations, photo/writing project with kids, evaluations help link course topics e.g., equity, poverty, language and diversity, comparative perspectives on schooling, with field experience.
- Facilitated and supervised the community placement project in a diverse setting - planning and facilitating project activities including community mapping projects, photo projects, community engagement, after school projects with community kids.
- Facilitated discussions and provided feedback.
- Taught selected topics: Teaching for Black Lives - Enslavement, Civil Rights, and Black Liberation

EDU 204: Principles of Learning in Inclusive Classrooms (2017)

- Collaborated with faculty member in Educational Leadership and Inclusive Elementary/Early Childhood Education to teach principles of learning in inclusive classrooms.
- Independently taught selected topics: Impact learning, Classroom management, Phases of instruction. Provided feedback for class assignments.

EDU 300: Understanding English as a New Language & All Learners in Diverse Classrooms (2017)

- Collaborated with faculty member in Teaching and Leadership to teach the psychological experiences of those learning English as a new language and the situation they face in learning.
- Taught selected topics: Behavioral Approaches to learning, Socio-Cognitive Approaches to learning, Motivation and Engagement. Provided feedback for class assignments and reflections.

EDU 202: Book Buddies Tutoring for Inclusive Elementary and Special Education majors (2018, 2019)

- Facilitated, supervised, and evaluated book buddies tutoring in an inclusive elementary school setting. Provided feedback for class assignments and reflections.

EDU 201: Practicum in Pre-K Inclusive Education (2018, 2019)

- Supervised practicum in inclusive early childhood education school setting
- Provided feedback for class assignments and reflections.

CFE 614: Critical Issues in Disability & Inclusion (2016)

- Coordinated and facilitated discussion sessions for groups and facilitated peer feedback.

Professional Presentations

Ojwang, C. (2021) Creating multimedia case studies for prospective teacher educator knowledge development. *Paper to be presented at the Association of Teacher Educators Annual Conference*. Anaheim, California.

Ojwang, C. (2021) Preservice teachers' perception of their preparedness to teach in an inclusive learning environment. *Paper to be presented at the AACTE 73rd Annual Meeting*. Seattle, Washington.

Ojwang, C. (2020) Prospective teacher educators' knowledge development through the creation of multimedia case studies. *Paper presented at the Association of Teacher Educators Online Summer Conference*. Washington, DC.

Ojwang, C. (2018) Investigating students' perceptions of effective feedback strategies that support their learning. *Paper presented at the annual Kenya Scholars and Studies Association Conference*. Atlanta, GA.

Ojwang, C. (2017) Graduate students' lived experiences and perceptions of using Weblogs for reflection: an exploratory study. *Paper presented at 5th International Conference on Education*. Kenyatta University, Nairobi, Kenya.

Ojwang, C. (2014) A novel approach to technology in the language classroom. *Paper presented at the 1st Annual International Interdisciplinary Conference on Africa and the New World Order*. Kisii University, Kisii, Kenya.

Ojwang, C. (2013) Corrective feedback in English language teaching and learning: Which way to go? *Paper presented at the 1st International Conference in English Language Education*. Moi University, Eldoret, Kenya.

Ojwang, C. (2013) Integrating technology in the language classroom: A ground-breaking approach. *Paper presented at the 3rd International Conference on Education*. Kenyatta University, Nairobi, Kenya.

Ojwang, C. (2013) Challenges of development in Africa: The language aspect. *Paper presented at the Second Annual International Interdisciplinary Conference*. Catholic University of Eastern Africa, Nairobi, Kenya.

Ojwang, C. & Rea-Dickins, Pauline; (2012) Behind closed doors: Language in

development and economic participation. *Paper presented at British Association for Applied Linguistics (BAAL) Conference on Multilingual Theory and Practice on Applied Linguistics*. University of Southampton, UK.

Ojwang, C. (2012) English as a second language learners' perspectives on oral error correction. *Paper presented at Kenyatta University International Conference on Educational Reforms and Innovation in Enhancing Quality and Equity*. Nairobi, Kenya.

Publications and Papers

Ojwang C. W. (2013). Impact of language in development and economic participation. *Kenya Studies Review*, 6 (1), 196 – 210.

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