The contribution of theory and practice to the professional development of students learning to become secondary teachers in Zimbabwe

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ABSTRACT

This research investigated the perceptions of student-teachers and lecturers regarding Initial Teacher Education (ITE) for secondary teachers in Zimbabwe. The ways in which factors in and between the university and school settings for ITE shaped learning to teach were investigated. Student-teachers' and lecturers' perceptions of the development of ideas as student-teachers moved through the different stages of training were also investigated. The study employed a qualitative case study methodology and methods - interviews, biographical questionnaires and document analysis. Data analysis began by defining *a priori* themes and identifying parts of the interview transcripts that were relevant to these *a priori* themes. The initial coding was then refined by adding additional codes which emerged from the data to create a final coding template to interpret findings. Activity Theory was used to provide a conceptual map to help describe and analyse the findings.

Student-teachers had varied backgrounds and motives for joining the teacher education programme. These were often at variance with the goals of ITE. They had pre-conceived ideas about teaching from their years of schooling, prior training and work experience. Student-teachers were learning to teach in the university setting and attempting to prove their competence in school settings. In both settings students, teachers and lecturers constituted the learning communities. Relationships and availability of tools often determined the kind of support student-teachers were receiving. The factors encountered within and between the two different activity systems shaped learning to teach in various ways. 'Taken-for-granted' practices were not questioned and this limited the ways in which ideas presented in the university were used in the school setting. The student-teachers' professional development, evident both to the students themselves as well as their lecturers, demonstrated not only growth in their pedagogical maturity, but also some deeper insights and the beginnings of their teacher identity. Much literature argues that learning to become an effective practitioner necessitates the use of reflective practice as a tool to resolve contradictions and for processing and internalising the complexities of boundary crossing between settings. The 'theory-practice' gap can be viewed as a 'transformation space' where teacher identity is often developed. A model to explain learning to teach made up of five elements is proposed: preconceived ideas of teaching, new ideas, contradictions, socialisation and reflective practice.

The findings suggest that the university where the study was carried out should harmonise espoused practice and actual practice so that activities are consistent with the notion of concurrent learning. Concerted efforts are also needed to develop collaborative school-university partnerships, which foster reflective practice as a tool to promote professional development. Staff development programmes are needed to develop appropriate working practices. Working conditions for teachers need to be revised by the Zimbabwe government, both to encourage teaching as a desirable profession and to keep pace with changes occurring in pedagogic practice. Further research is needed to investigate how students can successfully negotiate and learn from university-school boundary crossing issues, and what sort of boundary brokers and tools are needed. Contextual factors in Zimbabwe are such that little funding is available to develop ITE. The challenge is to find innovative ways of using scarce resources to produce high quality teachers.

ACKNOWLEDGEMENTS

DEDICATION

To my parents

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ACRONYMS

ASE:	Applied Science Education
AS:	Activity system
AT:	Activity theory
BScEd:	Bachelor of Science Education
BScEd Hons:	Bachelor of Science Education Honours degree programme
BUSE:	Bindura University of Science Education
DTE:	Department of Teacher Education
FSE:	Faculty of Science Education
ITE:	Initial Teacher Education
MESC:	Ministry of Education, Sport and Culture
MHET:	Ministry of Higher Education and Technology
OFSTED:	The Office for Standards in Education
OIM:	Oxford Internship Model
PCK:	Pedagogical Content Knowledge
PD:	Professional Development
PK:	Pedagogical Knowledge
RP:	Reflective Practice
SMK:	Subject Matter Knowledge
STs:	Student-teachers
TE:	Teacher education (Teacher educator)
TP:	Teaching practice
UoM:	University of Mashonaland
ZCTTP:	Zimbabwe-Cuba Teacher Training Programme

1 CHAPTER I: THE INTRODUCTION

1.1 My story

1.1.1 A teacher by chance

When I look back and ask myself "why did I opt to train as a teacher?" I am surprised to realise at that time I never thought deeply about such a choice. It was a case of picking up whatever first came my way. It took me time to realise that I had opted to be a teacher for life, and recently I have started to ask what learning to teach entails, a question I decided could be partially answered by hearing the stories of those engaged in teacher education. I have sought, in this study, to undertake a journey to try and understand the perceived contribution of theory and practice in learning to teach, and in doing so I wanted to engage lecturers, teachers and student-teachers in the conversations.

1.1.2 My education and training

I was educated in Zimbabwe and completed my secondary education the same year Zimbabwe attained independence. Between 1982 and 1984, I trained as a secondary science teacher at The Teachers' Training College, later to be named Hillside Teachers' College, and gained a Certificate in Education. My training coincided with expansion of the education system and need for trained teachers. I practised in the north part of the country for a couple of years and went to study Bachelor of Education, specialising in Chemistry Education at University of Zimbabwe. At that time it was the only university in the country. The objective of the in-service programme was to train teachers able to teach science subjects like chemistry up to Advanced level. I taught for a couple of years after graduating and returned to the same university to study for MEd in Curriculum Studies. This time, when I left university, I joined the United College of Education, a college training primary teachers and there I taught Science and Science Teaching Methods. I also studied Educational Technology at postgraduate level at University of Zimbabwe. In 2002, ten years after attaining my MEd, I joined University of Mashonaland (UoM) as a lecturer and taught Educational Technology and Curriculum Development to students learning to become secondary teachers of mathematics and science.

1.1.3 My teaching experience

I taught at rural secondary schools and boarding schools, before moving to teacher training in colleges and eventually university education. My journey was not smooth and there was a lot for me to learn on the way. I remember beginning my career with a belief that a course outline was there to be implemented from beginning to end on time for examinations. I had passion for my subject but did not understand why some students found learning science difficult. Now when I look back I realise how long it took me to recognise that reaching students was as important as the course content to be taught; only then could the latent potential be nurtured. I was proud to have discovered and nurtured some exceptionally gifted students and I remember feeling admiration for the average hardworking student, who overcame the impoverished learning environment to be successful. Regrettably there were some students who never got to like the subject I was teaching, but who may have had unique skills elsewhere but because I never had time to get to know them I was never able to engage them. What a difference it might have been had I found out their interests and helped them to develop along those lines. It was only when I started to train teachers that I began to realise the importance of being able to reach out to a much wider range of children and help them develop an interest in learning. I realised there were many children I had failed to engage. I had opportunity to interact with student-teachers and teachers in various ways, and they taught me patience, determination and perseverance.

1.1.4 How I developed new interests

I joined University of Mashonaland initially as a part time lecturer teaching Curriculum Planning and Development courses. When I became a full time lecturer, I continued to teach the same courses as well as methods courses. I joined a team of lecturers, known as science educators, who were teaching the methods courses, and I was given the responsibility of teaching the sections on educational technology. From the onset I realised that there was friction between 'science educators' and 'educational theorists', not about teaching their areas of specialisation necessarily, but to give one example there was much dispute between the above groups about from which group the departmental head should be selected. I found it difficult to understand such mistrust and developed an interest in investigating the contribution of each area to the development of the knowledge, skills and attitudes required of an effective science teacher.

I therefore engaged in this study to broaden my horizon to the debate between theory and practice in teacher education. I came to realise that teaching is more than transmission of what you know as a teacher. I begin by looking at broader issues in learning to teach including theory and practice debate, university and school partnerships and teacher knowledge.

1.2 Background to the study

1.2.1 Theoretical and practical knowledge of teaching

Learning to teach requires both theoretical and practical knowledge (Carr, 2005; Saugstad, 2005; Wilson and Demetriou, 2007). The two forms of knowledge are closely related but different (Saugstad, 2005). Literature is inconclusive about the relative importance of theory and practice, what the right mix is, about where learning to teach should occur, and about the best kind of partnership between providers of initial teacher education. Drawing a line between theory and practice is problematic; and so is keeping them together (Carr, 2005; Saugstad, 2005) because teacher education involves more than merging the two forms of knowledge. These issues are introduced in the next sections *1.2.1.1* and *1.2.1.2*.

1.2.1.1 The 'separation' of theory and practice

In an attempt to gain an understanding of contradictions in teacher education the historical debate of the 'theory-practice gap' is examined. Before a teaching qualification became a requirement prospective teachers 'learnt on the job' (Roth and Tobin, 2001) and this has since changed to learning educational foundations and methods courses in the university classroom together with school-based experiences (Roth and Tobin, 2001). At one stage there was a belief that individuals were able to teach up to the level of their own education without further training. With time training was considered necessary and colleges were set up to run educational foundations and methods courses. These were validated by universities and some become university programmes (Roth and Tobin, 2001).

In Europe, particularly the United Kingdom, the place of educational disciplines (philosophy, psychology, sociology, and history of education) in teacher education was not disputed up to mid-1970s (Edwards, Gilroy and Hartley, 2002). Government initiated reforms then changed

the status quo. In America the Holmes Group's *Tomorrow's Teachers* separated knowing from doing and created geographical and hierarchical boundaries between teachers and lecturers (Edwards et al., 2002), implicitly giving rise to issues of power, discussed using Bourdieu's cultural theory of learning in section 2.3.5. In the United Kingdom, the 1980s and 1990s witnessed increased government influence in education and there was an increase in specific initiatives aimed at involvement of teachers and schools in initial teacher training that was further supported by the 'teacher competences' movement (Turner-Bisset, 1999). The 1990s reforms included a national curriculum for schools, a national curriculum for initial teacher education and centralised control of in-service training (Edwards et al., 2002). The Office for Standards in Education (OFSTED) was set up which, through inspection, monitored implementation of the reforms. The reforms removed social criterion, "that the activity of teaching must be autonomous", by increasing government control of the curriculum and teacher education leaving only epistemological criterion (body of knowledge unique to those practising the profession) to justify the professional status of teachers (Edwards et al., 2002, p. 30-31).

The separation of theory and practice has given rise to two models of teacher education. However, each model has its own shortcomings. The traditional *application-of-theory* model (Korthagen and Kessels, 1999), where student-teachers learn theory to become professionals, faces the criticism that there is no one theory sufficient to explain teacher learning. Schön (1983) uses the term 'technical-rationality' to describe theory-led model of learning to teach. In contrast learning from practice, the apprenticeship model (Zeichner, 1980), is not adequate because current practice is not necessarily the best. These two positions are illustrated well by Edwards et al. (2002), studies in Europe by Buchberger and Beernaert (1995) and Buchberger, Campos, Kallös and Stephenson (2000) and discussed in section 1.2.3.

1.2.1.2 Contradictions between theory and practice

Researchers have reported that prospective teachers often experience discrepancy between educational *theory* and the 'knowledge-skills' of experienced teachers (Anagnostopoulos, Smith and Basmadjian, 2007; Carr and Kemmis, 1986; Postlethwaite and Haggarty, 2010; Tobin and Kincheloe, 2007). The prospective teachers faced with this dilemma find the knowledge of experienced teachers more relevant than what they learn in universities. The practising teachers' feeling of disillusionment with educational theory taught at university is

"a mistake in which students, teachers and university all often collude", (Carr, 1992, p. 247). Some researchers argue that contradictions in what students experience in different settings are inevitable. Anagnostopoulos, Smith and Basmadjian (2007) who review studies in teacher education argue that there are differences in values, identities and tools found in university and school settings.

Research evidence is available suggesting that when teachers learnt knowledge directly relevant to what students were learning, improvements in students' learning were recorded (Kennedy, 2002; Shulman, 1986; and Sykes, 1999). This suggests that learning theory and knowledge that is not immediately relevant to what and how prospective teachers are going to teach, might not significantly impact on professional growth. In defence Carr (1992, p. 247) argues that "the task of … theory in universities … is that of education of individuals in the kind of professional autonomy which will assist them to make wise and principled decisions on complex moral and evaluative issues". The relevance of theory is apparent when examining 'autonomy' and 'epistemological knowledge' as criteria of judging teaching as a profession.

Research has not been conclusive in demonstrating that teachers with good knowledge of theory are better teachers than those with less theoretical knowledge. Professional practice appears to be equally important, and has immediate benefits. The disjuncture between university activity and school activity is well documented in research on learning to teach (Anagnostopoulos et al., 2007). The 'gap' is not the problem; rather the issue worth investigating is the interplay between theory and practice. Research is needed to understand the 'what', 'when', 'where', 'how' and 'why' of learning to become a teacher that occurs in these two different settings.

1.2.1.3 University-school partnership in teacher education

A university-school partnership offers promise to enhance quality teacher education as supported by literature from developed nations. In essence, what binds the different actors, located at various sites, is training effective teachers (Wilson, 2004). A key issue is then what is learnt in these sites; and one aspect of this is the student-teachers' and lecturers' perceptions of what happens, and the contradictions likely to arise from their different objectives.

The different actors in teacher education have different objectives and these differences should be recognised and accepted. The question posed is how the different actors can effectively support learning to become a secondary teacher when they participate in the same activities to achieve different objects, and when they seek different evidence to reward the same kind of professional development. Students may be caught between deciding either to earn a good grade by reproducing what they think their supervisors want them to display, or on the other hand experimenting with new ideas learnt in teacher education. It was not the intention of my study to examine outcomes *per se*; rather the focus was on understanding how participation in activities with different outcomes ultimately promotes professional development of students learning to teach.

My study is greatly influenced by the Oxford Internship Model (OIM) where research investigated what both the university and the school were best placed to do (Benton, 1990). The university would teach the general ideas and the school would teach the specific. A more extensive examination of OIM is given in Chapter II, section *2.5.4.2*. The university-school partnership raises its own problems. As an example Roth and Tobin (2001) ask "What is the nature of knowledge if it can be acquired in one place ... and then applied in another? Is that knowledge transferable?" (p. 744); these questions raise several issues including the question of the epistemology of teacher education.

1.2.2 Modernism and postmodernism as different discourses in teacher education

Modernists argue that "there is certain truth about teacher knowledge" (Edwards et al., 2002, p. 47), an argument consistent with the 1990s reforms. The national curriculum for initial teacher education in England included an objective list of 'teacher knowledge'. In the new millennium postmodernism and the trends in the economic market (Edwards et al., 2002) have put pressure on teacher education to aim for an epistemology that leads to teachers who are knowledgeable and skilled to respond to contexts that cannot be predicted in advance without compromising the quality of service they offer.

Pedagogical postmodernists argue that there is no such thing as certain truth. They accept 'fluidity of knowledge', that is, there is no one set of knowledge which would identify the professional knowledge of teachers. They see the national curriculum for initial teacher

education as "merely one amongst many epistemological programmes, one among many social communities of practice, which teachers and lecturers step into and out of as necessity demands", Edwards et al., (2002, p. 51). How can student-teachers be prepared for a world of uncertainty?

1.2.3 Using socio-cultural theory to enrich theory models of teacher learning

The traditional theory models of teacher learning (Korthagen and Kessels, 1999; Schön, 1983) are being challenged, extended and enriched by an epistemology "based on the notions of 'lived uncertainty' and 'collaborative professional'" (Edwards et al., 2002, p. 8), activity theory (Engeström, 1995; 2001), and cultural models of learning (Bourdieu, 1977; Bourdieu and Passerson, 1990; Hodkinson, Evans and Kersh, 2004). In the new thinking, learning is constructed in a given context, re-focusing interest on how teachers' own learning is constructed when they are teaching pupils in their classroom, and how it is constructed when they meet with their mentors, and how it is transferred and transformed as the teacher moves between these different contexts.

Some researchers consider the development of teacher knowledge to be dynamic, rather than fixed and static (Burgress, 2006). Buchberger and Beernaert (1995) carried out a study in which they question suitability of Initial Teacher Education (ITE) programmes "which focus on the transmission of knowledge products or on recipes of practice" in helping teachers to acquire problem solving skills. They revisit this argument later (Buchberger et al., 2000) and take the position that such assumptions "to some extent ...valid in static societies ... are inappropriate in the dynamic and rapidly changing contexts of the today" Edwards et al. (2002, p. 52). According to this school of thought teachers' professional development "emerges from a process of reshaping their existing knowledge, beliefs, and practices rather than simply imposing new theories, methods, materials and practices to teachers", (Johnson and Golombek, 2002). They argue that it is more important to understand students' construction and reconstruction of teacher knowledge in different social settings than to decide whether it is best learnt in university or school. One approach to understand complexities and realities of learning to teach could be to gather detailed accounts of how teachers come to know their knowledge, how they use that knowledge within contexts where they teach, and how they make sense of and reconfigure their classroom practices in and over time, (Johnson and Golombek, 2002).

1.2.4 What makes a good teacher?

The way lecturers conceptualise 'what makes a good teacher' inevitably influences how they think and design activities for students learning to become teachers. The teacher knowledge model typically consists of "three broad stages: acquisition of the profession's fundamental knowledge-base, relating this knowledge to cases and puzzles, and finally applying it through some form of supervised practice or internship", (Lester, 1995, p. 46). However little attention has been given to investigating the nature and kind of activities student-teachers engage in when learning at university and school, and whether there is consistency in teacher education epistemology and how students are expected to teach their subjects (Richardson, 1997).

The issues raised so far extend beyond the Western community and influence learning to teach in Africa and Zimbabwe. The contextual nature of learning though does raise the possibility that perceptions of learning and therefore the most effective structures for learning may be different in, the very different, Zimbabwe context. The next section discusses the Zimbabwe education system beginning with a brief history of the country, then an overview of education and ends with a brief discussion of teacher education routes in Africa with particular reference to Zimbabwe.

1.3 Zimbabwe Education System

1.3.1 Brief history of Zimbabwe

Between 1953 and 1963 the country now known as Zimbabwe was part of the federation of three southern African territories – the self-governing British colony of Southern Rhodesia and the British protectorates of Northern Rhodesia and Nyasaland. It became Rhodesia in 1965, Republic of Rhodesia from 1970, Zimbabwe-Rhodesia briefly in 1979, and now The Republic of Zimbabwe from 1980. The Republic of Zimbabwe is a landlocked country located in the southern part of Africa between the Limpopo and Zambezi Rivers. To the south is South Africa, Botswana is found to the southwest, Zambia to the northwest and Mozambique to the east. Zimbabwe uses three languages as official, namely English,

Ndebele and Shona. There are also several minor languages spoken across the country, e.g. Tonga.

Zimbabwe is a former colony of Britain. The history of Zimbabwe can be divided into the pre-colonial era before 1888, the colonial era between 1888 and 1961, Unilateral Declaration of Independence (UDI) and civil war from 1961 to 1979, and the independence era from 1980. The era of independence can be further divided into 1980-1990, 1991-2000, and period after 2000. Others have described 1980-2000 as period of decline, and after 2000 as period of deep decline when hyperinflation rose from 32% in 1998 to 11, 200, 000% in August 2008 as reported by Central Statistics Office of Zimbabwe. The state of hyperinflation was characterised by introduction of the Z$100 billion note in 2008. A government of national unity was formed in 2009, and the Zimbabwean currency was abandoned in favour of multiple currencies notably the rand, the USA dollar, the Euro and Sterling. The government of national unity managed to stabilize the economy but recovery is still a long way off. It is important when reading this thesis to realise that in this context there was frustration, anxiety, and uncertainty in education.

When Zimbabwe gained its independence in April 1980 there was expansion in the education system and by 1995 it had the highest literacy rate in sub-Saharan Africa. Zimbabwe's educational reforms in the 1980s, like most post-colonial states, were guided by a policy of equity and development, the ideology of 'scientific socialism' and philosophy of education with production (EWP) (Maravanyika, 1990). Similarly, post-apartheid South Africa's changes have been driven by two competing imperatives; social constructivism and economic instrumentalism (Schäfer and Wilmot, 2012). Within teacher education in Zimbabwe EWP was interpreted to mean that school experiences brought together theory and practice (Kiggundu, 2007; Maravanyika, 1990) whereas in South Africa the National Qualifications Framework (NQF) was an attempt to integrate the historically separate world of work and learning (Schäfer and Wilmot, 2012). Education, in particular science education, has always been considered a vital tool for economic development in post-colonial Africa (Bunoti, 2011; Wang et al., 2003; Maringe, 2005; Phuthi and Maphosa, 2007; Glennerster at el., 2011; Zezekwa, Mudau and Nkopodi, 2012) hence large investments were made to improve the access to and quality of education (Glennerster at el., 2011). The government of Zimbabwe recognizes teachers as a key factor in producing quality education in an environment of scarce resources (MESC and MHTE, 2004) and, as such, pre-service and in-service training

programmes are constantly reviewed. When demand for teachers outstripped the supply through conventional routes, the government launched a number of innovative training programmes in the 1980's (UK NARIC, 2007), and these earlier initiatives continue to shape teacher education in Zimbabwe today. A need for more graduate teachers was highlighted as far back as the 1980s (Chung, 1989), for example there were 3,000 graduates among a population of 80,000 teachers in Zimbabwe (Dzvimbo, 1989). For Zimbabwe, meeting the demand for secondary science and mathematics teachers is an elusive goal because of the economic and political environment, labour migration and negative images of teaching profession (UK NARIC, 2007).

The period between 1990 and 2000 witnessed expansion in the provision of education at university level. Ideological goals and the inherited capitalist infrastructure shaped educational development in post-colonial states (Maravanyika, 1990). Before 1980 Zimbabwe's education system was divided along racial lines – European Education and African Education Systems. There was one university, the University of Rhodesia, responsible for education of graduate teachers and supervising training of non-graduates in teachers' colleges. After 1980 there was an amalgamation of the two systems and the number of secondary teachers' colleges increased from two to five. From 1995 onwards there was a marked increase in the number of universities, thus increasing diversity in teacher education programmes. Today most of the sixteen universities offer teacher education programmes.

The extreme economic and political instability between 2000 and 2010 led to marked decline in the provision of social services, education included. The situation could best be described as chaotic. In 2000 and beyond the gains of reforms of the 1990s were "eroded by the adverse economic climate, with registered successes being reversed and implementation of programmes challenged by lack of continuity and resources to move policy to action" (Kapungu, 2007, p. 3).

In the mid-1990s Zimbabwe was described as stable and a breadbasket for Southern Africa with steady economic growth supporting strong health and education programmes. However, Zimbabwe's involvement in Democratic Republic of Congo (DRC) along with a combination of economic mismanagement, political instability, and poorly implemented land reforms contributed to the economy declining. Rivero (2008) argues that violence and monopoly wielded by President Mugabe and the Zimbabwe African National Union – Patriotic Front

(ZANU-PF) turned Zimbabwe into a failing state. Zimbabwe has held elections every five years since independence but torture and violence always increased during election periods with 90% of victims being members of parties opposing ZANU-PF (Rivero, 2008). Kovacs (2012) also argues that causes of failure in Zimbabwe are political in nature.

Zimbabwe has been classed as a failing state for over a decade. It is listed as one of the 46 fragile states for the period 1999-2003. In 2007 Zimbabwe was ranked 4th most failed state on the 'Fund for peace' Failed States Index Scores (Rivero, 2008), 2nd in 2009 (Kovacs, 2012), and 6th in 2010. In fragile and failing states there is violation of basic rights to life and security, and sufficient food, water, health and education are not guaranteed (Department for International Development, 2005). The contextual factors reviewed above are revisited in Chapter II section 2.7.3.

1.3.2 Overview of education in Zimbabwe

Zimbabwe's formal oversight of education is located in two ministries: the Ministry of Education, Sport and Culture (MESC) is responsible for early childhood, primary and secondary education whereas the Ministry of Higher Education and Technology (MHET) is responsible for tertiary education and training (Rwezuva, Sibanda and Mutasa, 2012). Locating enterprise of learning to teach in separate ministries was likely to create tension between universities responsible for teacher education in MHET and learning through experience schools under MESC. Section 1.3.2 gives an overview of formal education in schools and section 1.3.3 discusses teacher education as one form of tertiary education.

Most children begin school in Grade 0 at 4/5 years old and thereafter continue with 7 years of primary education (Grades 1-7). The medium of instruction is English. Shona and/or Ndebele are taught as separate subjects. The curriculum is nationalised and textbooks are prescribed. The end of primary education is marked by nationally-set examinations in English, Mathematics, Shona or Ndebele and Content (a combination of topics in natural and social sciences).

At 12 or 13 students enter secondary education (Forms I-VI). There is competition for places in private schools and boarding schools based on Grade 7 examination results and entry tests. Secondary education is divided into 3 stages: Zimbabwe Junior Level or Forms I and II;

Ordinary Level or Forms III and IV, and Advanced Level (Forms V and VI). There are national examinations at Ordinary level and Advanced level, with some candidates and schools preferring similar examinations offered by international boards like the Cambridge Examination Board. Entry to Advanced level courses is selective, based on Ordinary level results.

The school calendar is divided into 3 terms: January-early April, May-early August, and September-early December. Students write examinations in late October to December, often referred to as November examinations and are given opportunity to re-sit examinations in June of the following. The results are published in February/March and September/October. The subject content that is assessed by national examinations determine the content covered at secondary schools in the country.

1.3.3 Overview of teacher education in Zimbabwe

Zimbabwe shares many similarities in its education system with the rest of Africa. Such similarities are also evident in teacher education. In Zimbabwe teacher education occurs at a teachers' training college and/or at a university as shown in Table 1.1. Teachers' colleges are affiliated to a university through the department of teacher education, within a faculty of education. On successful completion of training a diploma or certificate in education is awarded. Universities offer mainly two routes into teaching: either a first degree (3 years duration) in a teaching subject within the school curriculum followed by a Post-Graduate Certificate/Diploma in Education (1-2 years duration) or Bachelor of Education degree (2-3 years duration) for candidates who hold a diploma/certificate in education from a teachers' college, and who have experience of teaching. A third route is a combination of studying academic subjects and professional courses simultaneously leading to as an example, a Bachelor of Science Education degree (4 years duration). Further training is offered through Master of Education degree programmes (2 years full time) and various diploma courses. One institution offering teacher education, which is unique in that students graduate with both academic and professional qualifications, is University of Mashonaland.

Table 1.1: Teacher education routes in Zimbabwe

Minimum entry	5 O-Level passes (plus A-Level pass for secondary school teachers)	5 O-Level passes plus 2 A-Level passes	CE/DE +2-years work experience + A-Level pass
Length	3 years (2-5-2)	4 years	2-3 years
Location	Teachers' colleges and Schools	University and Schools	University and Schools
Qualification	CE/DE	(BScEd) degree	BScEd/Bed
Award	University	University	University
Mode	Pre-service Residential Teaching practice	Pre-service Residential Teaching practice	In-service Residential Teaching practice

1.3.4 University of Mashonaland

In the mid-eighties Zimbabwe sent people out of the country to train as secondary teachers e.g. to Cuba. The programmes, like the Zimbabwe-Cuba Teacher Education training programme (ZCTTP), was targeted at prospective teachers who specialised in subjects like biology, chemistry, geography, mathematics, and physics. After 10 years a decision was made to train teachers along the same lines but in Zimbabwe. A college was set up in Mashonaland under the auspices of the University of Zimbabwe, and in 2000 through an Act of Parliament (the University of Mashonaland Act), the college was conferred with a university status. Mashonaland is located north of Harare. The university has since grown to establish faculties of Agricultural Science (FAES), Commerce (FC), Science (FS) and Science Education (FSE). My study focused on the Department of Education in the faculty of Science Education at University of Mashonaland (UoM). The university academic year begins in August and ends in July of the following year, with the first semester being August-December and second March-July. There is a difference between the school calendar and the university calendar in Zimbabwe with respect to the number of terms and when to take breaks.

Teaching in Zimbabwe is attracting few candidates which threatens the viability of teacher education programmes. Teaching is regarded as a last resort by secondary pupils and their parents (Chivore, 1986a). Bindura University of Science Education enrolled 125 pre-service student teachers in 1996 but there were less than 10 students enrolled for BScEd Honours

conventional programme in 2011 (Zezekwa et al., 2012). This could be because in 1996 the university offered only BScEd degrees but by 2011 it had grown to offer degrees in Agriculture and Environmental Science, Commerce, and Social Science. Prospective candidates now had a wide choice, other than teaching degrees. Strategies that have been adopted to increase enrolments in universities include lowering entry requirements, introducing new programmes, and Virtual and Open Distance Learning (VODL) (Zezekwa et al., 2012). However in Africa e-learning remains problematic because of lack of funding and information technology infrastructure (Kayongo, 2010).

1.4 Formulating the problem

1.4.1 Expansion in education in the 1980s and strategies to overcome teacher shortages in Zimbabwe

In the early 1980s Zimbabwe witnessed expansion in education in response to such educational policies as the 'right' to education, 'free' and 'compulsory' primary education, and 'affordable' secondary education. Since then there have been teacher shortages and this problem has been felt especially acutely in science subjects. As reported by Mtetwa and Thompson (2000), a number of short-term and long-term strategies were initiated to overcome teacher shortage in the 1980s - namely, recruiting volunteers, adopting new training modes, and engaging untrained teachers. Teachers were also recruited from other countries notably Mauritius and Sri Lanka. Teacher training colleges increased enrolments. One innovation was the introduction of teaching practice, where student-teachers would spend between 12 weeks and 36 weeks in schools with the same responsibilities as qualified teachers and simultaneously being expected to fulfil teacher training requirements. In other initiatives the government sent school leavers to other countries such as Cuba in government-to-government cooperation to study for bachelors' teaching degrees in science subjects. Thirdly, the University of Zimbabwe started offering part-time PGCE courses so that teachers were not taken out of service (Mtetwa and Thompson, 2000; Maravanyika, 1990). The government enlisted university graduates without PGCE as full time teachers in their subject of specialisation. Further, the "government introduced in-service upgrading courses for non-graduate teachers, to enable them to teach competently, and also improve their career prospects through the Bachelor of Education programme" (Maravanyika, 1990, p. 17). Hardman et al. (2011) hold the view that in-service training in Africa is conceptualized as

'certificate upgrading', and is different from competence-based continuous professional development (CPD). In-service training in post-apartheid South Africa faces the problem of trying to attend to three conflicting imperatives: access to higher education, improving pedagogical knowledge and skills, and learning a new discipline or area of the curriculum (Schäfer and Wilmot, 2012). In the late 1990s and early new millennium globalisation and unfavourable socio-political and socio-economic conditions have resulted in professionals leaving Zimbabwe, exacerbating the problem of teacher shortage.

There seems to be an understanding between government, teacher education institutions and schools to allow student-teachers opportunity to visit schools and learn from practice. It is not clear whether these actors have a common understanding of how students learn to teach. In many cases the teacher education institution deploys student-teachers to schools, and schools in turn accept student-teachers and give them opportunities to learn from practice. The government provides funding, and in some cases pays students a stipend (if they spend a month or more at a school), that is equivalent to a temporary teacher's remuneration. The different actors participate in teacher education for different reasons: the university to fulfil broader purposes of education, government to standardise the teacher education curriculum. Schools, on the other hand, usually target performance as measured by pupils' scores on public tests.

Student-teachers, learning in various setting where institutional goals differ from other settings, encounter synergies and contradictions. As an example, whereas the university expects student-teachers to be given minimum responsibility in schools and learn by observing and shadowing expert teachers, what could be called legitimate peripheral participation (LPP) of the newcomer in the community of practice (Lave and Wenger, 1991), school administrators think otherwise. In Zimbabwe school administrators often give student-teachers full responsibility and expect them to maintain standards of their students' performance in public examinations. The question to ask is whether student-teachers see a dialectical interaction between what they learn at university (idealised practice) and experiences in school (real practice), and to ask whether they are capable of seizing opportunities for professional development that arise in these differing contexts (Smith, Brisard and Menter, 2006).

1.4.2 New teachers face problems in practice

The dominant classroom discourse in Africa is authoritarian, teacher-centred and transmissive (Bunoti, 2011; Akyeampong, 2000; Akyeampong et al., 2000). Teachers in Africa are conscious of the value of progressive teaching and learning methods, constructivist and child-centred approaches but fail to make them a regular part of their practice (Nziramasanga, 1999; Akyeampong, 2000; Akyeampong et al., 2000; Maringe, 2005; Nyaumwe and Mtetwa, 2010; Zezekwa et al., 2012). In fact most teacher education programmes have witnessed a shift in assumptions about science teaching and learning from traditional positivist to constructivist approaches and reflective practice (Maringe, 2005; Adúriz-Bravo and Izquirdo, 2002; Lederman, 1992). In South Africa Curriculum 2005 advocated a shift from an education system based "on the tenets of positivist epistemology and behaviourist learning theory… to constructivist epistemology and learner-centred education" (Schäfer and Wilmot, 2012, p. 44). However, teachers graduating from the colleges and universities are often reported to face problems with the interpretation and teaching of science despite being given detailed curriculum materials. They are frustrated when what they learnt at university seem not to work during teaching practice because they would be expecting smooth and straight forward knowledge transfer. One possible cause of this may be that prospective teachers were not adequately prepared to meet the teaching challenges at secondary school level. As an example, secondary school students often have difficulties understanding the particulate nature of matter in chemistry. Looked at differently, it could be *the teachers* who might have difficulties teaching students to understand the particulate nature of matter even when they were provided with high quality teaching materials. Several reasons can be suggested, and among these are the teachers' misconceptions, inadequate models of transformation (Shulman, 1986), and lack of teaching skills that handicap teachers in their communication with pupils. Taking this argument a step further, teachers are likely to pass on their own misunderstandings and rely on the transmission modes of teaching as opposed to the constructivist modes of teaching and learning. Hence attempts to equip teachers with problem-solving skills may not have been successful, particularly when we accept that teachers find themselves in contexts completely different from those in which they learnt to become teachers (Edwards et al., 2002).

1.4.3 Learning to teach in troubled nations

In section 1.3 the period after 2000 in Zimbabwe was labelled era of deep decline and the country was classed failed state (Kovacs, 2012; Rivero, 2008). She witnessed conflict and fragility evident in poor governance, violence, inequality and exclusion (Castle, Elder, Baxter and Cornu, 2005). Resources became scare in contexts where the economy was stressed.

Cuts in education funding because of negative economic growth and lack of investment, compromised the training of teachers (Kapungu, 2007). Lack of funds meant that daily operations at the tertiary institutions could not be carried out (Murwira, 2013), completion of infrastructural projects was stalled because contractors and consultants could not be paid (Murwira, 2013), and students could not get loans and grants through the cadetship scheme (Moyo, 2013; Murwira, 2013). When general elections took place institutions of higher education were directed by the government not to turn away students who had failed to pay fees, however, the institutions were withholding certificates and transcripts to force students to pay (Moyo, 2013).

Conflict often has a devastating effect on education because structures are corroded, communities are displaced and fragmented, and inputs are threatened. It becomes a challenge to recruit lecturers and teachers ensuring that they are properly trained and remunerated (Castle, Elder, Baxter and Cornu, 2005). Safe learning environments are threatened because of violation of basic rights and insecurity (Department for International Development, 2005). All these factors significantly reduce the quality of teaching and learning.

In the new millennium the situation in Zimbabwe did not deteriorate into full scale civil war as has been witnessed in Rwanda, Sierra Leone and Liberia in 1989 (Inter-Agency Network for Education in Emergencies, 2011). However, these countries share similarities where economic, political and social instability left education systems underfunded. Using Zimbabwe as a case, my study was aimed at finding out for example factors shaping teacher education and how these influenced how student-teachers were learning.

1.5 Theoretical and conceptual frameworks

1.5.1 Nature of the problem studied

Investigating the contribution of theory and practice to pedagogy lends itself to interpretive

research since it is something that can be understood through hearing stories of those directly involved. Student-teachers and lecturers were well placed to describe their own lived experiences of the contribution of theory and practice in learning to become teachers. In doing so they interpret their own experiences, and as researcher my description of student-teachers and lecturers' perceptions is a *secondary* form of interpretation. The problem studied dictated adopting a socio-cultural perspective; specifically, social constructionism. Socio-cultural theory, activity theory and reflective practice were adopted as useful frameworks to understand learning to teach. My theoretical framework, as defined by Miles and Huberman (1994) is rooted in constructs (Bell, 2005) describing social constructionism.

1.5.2 Constructionism

The study investigated student-teachers and lecturers' perceptions of the professional development of students learning to become secondary teachers. Researchers who subscribe to constructionism believe that social phenomena are constructed by the participants and the researcher, and tend to adopt an interpretive approach. My study was largely informed by the constructionism paradigm of knowledge and employed a qualitative case study methodology.

1.5.3 Socio-cultural theory

Socio-cultural theory suggests that individuals' understandings and practices are always shaped by the various settings in which they find themselves (Grossman et al., 2000). As well as focusing on social settings, using socio-cultural theory implies accepting that individuals' participation in an activity often means trying to achieve two or more conflicting goals at the same time. This has an impact on how the available resources are used. In this study the aim was to understand, through student-teachers' and lecturers' perceptions, what students learn as they encounter differences, including conflicting goals, in various settings.

Activity theory suggests that instead of questioning why student-teachers do not teach as they have been instructed to do at university, it is more worthwhile to "understand the process through which a person adopts the pedagogical tools available for use in particular activity settings", (Grossman et al., 2000, p.8). The same sentiments have been echoed by Burgress (2006), Buchberger and Beerenaert (1995), Johnson and Golombek (2002) and Edwards et al. (2002). Others argue that a useful tool for practitioners to use when thinking about practice

and seeking ways to make improvements is reflective practice (Dewey, 1933; Schön, 1983). Activity theory and reflective practice are examined more extensively in Chapter II.

1.6 Conducting research in Zimbabwe

Conducting research in Zimbabwe at this time was difficult because it was politically volatile, unpredictable and economically stressed. Student-teachers (who are either pre-service or in-service students), teachers and lecturers lived in fear of being accused of belonging to 'wrong' political part and the challenge was to gain their trust so that they could tell me stories of their experiences confident that the information was used for educational purposes only. These were deeply challenging issues and discussed in more detail in the methodology chapter III (section 3.4) and as limitations in section 6.2.

1.7 Significance of the study

In Africa, and Zimbabwe in particular, initiatives in training teachers (like the university-school partnerships) were driven by teacher shortages as well as influence of developments in western countries, like the United Kingdom (UK). According to Edwards et al., (2002) pressure to change in the UK could be attributed to the quest for standards and structure in teacher education contrary to "lived uncertainty" (p. 8). There are shortages of teachers in many countries. Findings from this study may provide new insights into how factors such as shortage of teachers, employment opportunities and restricted budgets influence teacher education.

The findings may also be of interest to policy makers in Zimbabwe who wish to improve the quality of teaching and learning at secondary schools.

It is hoped that findings from my study will reveal why it might be important for student-teachers to learn in differing settings with different outcomes. Lecturers, administrators and mentors may find the research findings informative and useful for their own practice and for their endeavour to support student-teachers.

The study's findings of student-teachers' and lecturers' perceptions of what goes on in different settings, when student-teachers learn to think and act as teachers, can help lecturers

be aware of the kind of learning activities students engage in, when they learn be it in the university-based portion or school-based segment of their training. Such activities would, of course, need to be properly supported and resourced in order to really improve the quality of learning.

The study's findings of student-teachers' and lecturers' perceptions of the various factors shaping objects of activities for different settings may help those involved with training of teachers to appreciate the role of collaboration in increasing learning opportunities. As an example, the object for learning of planning lessons at university, though different from the purpose of planning in school, serves the same outcome, of increasing secondary school students' learning, by helping student-teachers develop knowledge and skills required of an effective teacher. Therefore this study hopes to highlight possibilities of how the synergistic and contradictory factors and tensions can be harnessed and hopes to help the key actors in teacher education to continually seek new ways of partnership and collaboration that reinforce each other's efforts.

From a practical point of view, the socio-political and economic situation in Zimbabwe is currently under stress. In theoretical terms, broader social cultural theory stresses the importance of 'field' in influencing practice. The context of Zimbabwe is a challenging one and my research attempts to understand how such a field influences what happens in teacher education. By focussing on some of the key aspects of teacher education I seek to understand how it might be possible to help the country develop a more effective programme for teacher education when circumstances allow.

1.8 Summary of other chapters

In Chapter II a review of related literature is presented and the methodology, methods and data explication strategies are examined in Chapter III. I also present details of data collection, generation and explication in Chapter III. Analysis of the data, including direct quotations from participants in search of emerging issues is presented in Chapter IV. These emerging issues are then discussed in Chapter V. The last chapter refers back to questions with which the study began, discussing possible answers and their implications as well as posing further questions.

2 CHAPTER II: REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter discusses the literature about learning to teach. First the concepts of teacher training, teacher education and professional development are examined. The next section looks at socio-cultural learning theories; cognitive apprenticeship, situated learning, socialization, activity theory, reflective practice and Bourdieu's social theory as useful theories to illuminate teacher learning. The next section looks at perspectives on what teachers are learning and is followed by a section on models of teacher learning programmes. Then motives for becoming a teacher are examined. This is followed by a section looking at factors that influence learning to teach. There is a section on gaps worth investigating, then I state my research questions and the chapter is concluded by looking at how the rest of the thesis is organized.

2.2 Teacher training, teacher education and professional development

2.2.1 What is teaching?

In an attempt to address the question 'what is teaching?' a quote from von Glasersfeld (1989) is useful:

> since the days of Socrates, teachers have known that it is one thing to bring students to acquire certain ways of acting-be it kicking a football, performing a multiplication algorithm, or the reciting of verbal expressions-but quite another to engender understanding. The one enterprise could be called 'training', the other 'teaching', but educators, who are often better at the first than at the second, do not always want to maintain the distinction (p. 131).

Teaching means to engender understanding, implying to produce learning. The role of the teacher is to help learners acquire knowledge and skills and to use their cognitive skills to solve problems. The activity of teaching involves planning, interaction and assessment. To teach effectively the teacher needs understanding of these three elements of the task, relevant skills and the capacity to make appropriate classroom decisions in changing situations (Beckett and Hager, 2000; Hodkinson and Hodkinson, 2004). Teaching is not just about skills that are fit for purpose it is about considering whether the purpose itself is appropriate. It tests

the fitness of purpose. Educators often do not make a distinction between 'training' and the more complex notion of 'teaching' which is outlined in this section, yet the distinction has serious implications for teacher training and teacher education.

2.2.2 Teaching is a multifaceted activity

Kennedy (2006) challenges the role of knowledge in teaching by examining the nature of teaching. Teaching is a multifaceted activity where teachers deal with multiple things namely; "covering desirable content, fostering student learning, increasing students' willingness to participate, maintaining lesson momentum, creating a civil classroom community, and attending to own cognitive and emotional needs", Kennedy (2006, p. 205). Those concerned with preparation of teachers must attend to these six concerns. Kennedy (2006) argues that often we attend to one area and ignore others, and when things do not work most likely it is because what was left out was critical. Teachers also need to address how to integrate competing ideals. Society holds aims for education in general and for teaching in particular which are often in tension for example "the desire to follow students' interests often conflicts with the desire to treat all students equally", Kennedy (2006, p. 205). There is no one solution and different teachers do it differently. Teachers are also concerned with generating many multidimensional solutions in the moment, as events unfold (Kennedy, 2006). In a nutshell Kennedy (2006) describes nature of teaching as

> an endeavour that requires consideration of six different areas of concern, that strives towards ideals that are inherently contradictory and that happens in real time where the merits of alternative courses of action must be weighed in the moment (p. 206).

Lecturers have a mammoth task to attend to these concerns raised by Kennedy (2006) but there is neither agreement about the knowledge teachers need, nor about the process of learning to teach. While lecturers do not share the same vision about teaching, Kennedy (2006) suggests that they do have a general framework and that this framework generates four problems: it is incomplete because it does not address the six concerns cited above; it lacks a repertoire of habits and rules of thumb; it ignores the press of competing ideals; and it is static rather than dynamic. There are two dilemmas, one being a threat to reduced professional status

The first is an external problem: We reside within institutions that are designed largely for the transmission of knowledge and are not well suited to other strategies of development. Our institutional hosts and our public audiences expect us to provide our candidates with knowledge. When we focus on beliefs they suspect us of proselytising. These expectations and suspicions reduce our professional status. (Kennedy, 2006, p. 210)

The second dilemma is internal, our own vision of teaching, which is incomplete in that it fails to address all areas of concerns for teachers (Kennedy, 2006). The vision is blind to competing ideals embraced by society as a whole. Hence lecturers fail to prepare student-teachers to accommodate these contradictory expectations. Not only do lecturers fail to provide prospective teachers with tools they need to develop a sustainable practice, they may also prevent prospective teachers to develop such tools on their own (Kennedy, 2006).

Many factors have shaped conceptualisation of teaching, for example, professionalization, accountability and economic market trends. According to Wilson and Berne (1999, p. 173) seeing teaching as a profession suggests reforming "'what teachers learn', 'by what mechanisms that learning takes place', 'what knowledge teachers acquire across these experiences', and 'how long that knowledge improves their teaching'" (p. 174). In the 1990s the national curriculum for initial teacher education in England produced sort of an objective list of teacher knowledge (Edwards, Gilroy and Hartley, 2002). However, uncertainty trends in the economic market put pressure on teacher education to aim for an epistemology that leads to teachers who are knowledgeable and skilled to respond to contexts that cannot be predicted well in advance without compromising the quality of service they offer (Edwards et al., 2002). This unpredictability seems to suggest that any predetermined curriculum is going to be inadequate. The stance taken in my own study was that similar pressures exist in teacher education in Zimbabwe and therefore it was important for me to question 'what do students teachers learn?' and 'how do student-teachers learn it?' Although training and education are often used interchangeably in the section below an attempt was made to distinguish the two terms.

2.2.3 Teacher training or education

The term 'teacher training' has been viewed as narrow because it seems to imply an activity to equip prospective teachers with relatively routine skills. A broader and more encompassing concept of learning to teach is 'teacher education' and that is linked to the preparation of a reflective practitioner. Teacher training or teacher education refers to policies and procedures to equip prospective teachers with knowledge, skills and the attitudes they require to perform their tasks in the classroom, school and wider community.

Those who opt to use the term 'education' argue that the business of learning to teach has been moved from teachers' colleges to schools of education within universities reflecting a broader and open-ended pedagogy. The term teacher education was adopted in this study based on the same reasoning but at times was used interchangeably with the more familiar term 'teacher training'. Teacher education is divided into initial teacher education (or training) for pre-service students, induction for newly qualified teachers and continuing professional development for practicing teachers. Professional development encompasses initial teacher training, induction and continuing professional development. The next section looks at 'what makes teaching a profession' because the word 'professionalism' captures many of the ideas that are to do with education rather than training.

2.2.4 What makes teaching a profession?

At different times in history professionalism has been defined differently, even recently in terms of sociological traits (Whitty, 2006). Typical features in the 1950s in UK were use of skills based on theoretical knowledge, education and training in those skills, plus certification by examination, a code of professional conduct oriented towards the public good, and a powerful professional organisation (Whitty, 2006). The traits model has been challenged (Runté, 1995), and more recent sociological perspectives on professionalism reject such normative notions and settle for "whatever people think it is at any particular time" (Whitty, 2006, p. 3) and accordingly teaching is easily recognised as a profession these days though teachers continue to push for being treated like the traditional professions (medicine and law) for purposes of negotiating working conditions with employers. Teachers talk about *being professional*, in terms of the quality of what they do; and of the conduct, demeanour and standards which guide it (Hargreaves, 2000; Hargreaves and Goodson, 1996); and literature usually refers to this conception as *professionalism* (Hargreaves, 2000; Hargreaves and Goodson, 1996). Teachers also talk about being *a professional*; this normally has to do with

how teachers feel they are seen through other people's eyes in terms of their status, standing, regard and levels of professional reward (Hargreaves and Goodson, 1996)-*professionalization* refers to improving status. Now discussion is turned to learning theories, the intention being to illuminate learning to teach.

2.3 Learning theories

2.3.1 Why learning theories are important in this study

Student-teachers need to develop personal philosophies of teaching, and to do so require an understanding of learning theories and knowledge of the impact of the theories on teaching and learning. By questioning beliefs about teaching, learning and learners, teachers begin a journey into constructing and reconstructing their own theories (Blaise, 2006), hence, as such, teachers are theory makers. It was not the purpose of this study to examine learning theories extensively; rather it was necessary to introduce socio-cultural theories relevant to learning to teach as a social process such as cognitive apprenticeship, situated learning, socialisation, activity theory, and reflective practice. My discussion includes ideas from Bourdieu's social theory. If we are talking about the development of professionals (through education rather than training process) the issues of motives (object), values (part of subject) and the influence of society (through rules and community) strongly suggest that socio-cultural theories of learning are likely to be more relevant than, say, behaviourist theories (which might well have been powerful in a training context). These theories are helpful in understanding and interpreting the phenomenon of learning to teach.

2.3.2 Socio-cultural theory

Socio-cultural theories are now examined as theories that are directly relevant to adult learning. According to Bandura (1977) social learning theory people learn within a social context through process of observation, imitation and modelling. However, the limitation of this conception of social learning theory is that it is behaviourist. Vygotsky and Engeström start from a socio-cultural perspective. Sociocultural theory draws heavily on Vygotsky's (1986) zone of proximal development and argues that higher order thinking skills develop through participation in activities that require cognitive and communication functions, and emphasize how support from more knowledgeable others and peers influence individual

learning together with how cultural beliefs and attitudes impact on teaching and learning. Socio-cultural theories that have been used in the past to explore teacher education include cognitive apprenticeship, situated learning, socialisation, activity theory, reflective practice and Bourdieu's social theory.

Socio-cultural theory suggests that individuals' understandings and practices are always shaped by the various settings in which they find themselves (Grossman et al., 2000). Besides focusing on social settings, using socio-cultural theory implies accepting that individuals' participation in an activity often means trying to achieve two or more conflicting goals at the same time, and the later had a bearing on how the available resources are used. In this study the aim was to understand, through student-teachers' and lecturers' perceptions, what students learn as they encounter differences, including conflicting goals, in various settings.

2.3.2.1 Cognitive apprenticeship

Student-teachers' learning practices in schools, where they work alongside experienced teachers, exemplify apprenticeship in teacher education. They learn from observing other people in a social setting and such learning involves attending, remembering and rehearsal (Merriam and Caffarella, 1991). Students observe consequences of teachers' behaviours, and remember this as a possible way of doing things, and play out how it might work for them in different situations (Smith, 1999).

Cognitive apprenticeship enables students to acquire, develop and use cognitive tools in authentic domain activity (Brown, Collins and Duguid, 1989). There are two apparent principles here for effective cognitive apprenticeship: first, knowledge needs to be presented in an authentic context (settings and applications that would normally involve that knowledge); and second, participation in a community of practice needs to take place in order to learn through social interaction and collaboration. Such an argument supports the place of teaching practice in teacher education, that is, learning becomes a function of the activity, context and culture in which teaching occurs (Lave, 1988). Situated learning is a more radical model of social learning than cognitive apprenticeship.

2.3.2.2 Situated learning

According to Lave and Wenger (1991) situated learning or participation in a community of practice places learning in social relationship, as opposed to acquisition of knowledge. There is a shift here from a position that learners acquire structures or models to understand the world, to a more radical model where learners participate in frameworks that already have structure (Lave and Wenger, 1991). In a study where Lave and Wenger (1991) observed different apprenticeships, professional growth (learning) was the movement of beginner from 'legitimate peripheral participation' to becoming a full participant or an 'old timer' in socio-cultural practice (Kelly, 2006; Smith, 1999). When learning is seen as a process of social participation, there is concern with identity, with learning to speak, act and improvise in ways that make sense in the community (Smith, 1999). Continuous learning becomes "an evolving, continuously renewed set of relations", Lave and Wenger (1991, p. 49)

One criticism of social learning theory is its failure to consider learning that occurs in de-contextualised situations (Smith, 1999). The theory is silent about the possibility of learning that is unrelated to context or indeed theory that underpins actions taken but is neither in itself observable nor the topic of discussion with the 'master' who might not be skilful in describing those underpinnings in a formal way; as an example, classroom learning often involves knowledge which is abstract and out of context. This shortcoming of situated learning calls to mind reflective practice and where theories are explicitly espoused theories (that might need to be learnt from the literature) and personal theories (that could be acquired from apprenticeship). If learning is dependent on community of practice, it then means that what is learnt might be dependent on the quality of the practice and power relations in that community (Smith, 1999). Where the community of practice is weak or existing relationships inhibit entry and participation, situated learning is threatened. Despite these weaknesses social learning theory places emphasis on conversations between community members, informal learning, and learning through problem solving (Smith, 1999).

Situated learning is based on the following assumptions: that learning is in the relationships between people, that educating is exploring with people in communities how all may participate to the full, and that there is an intimate connection between knowledge and activity (Smith, 1999). One can further look at social participation as learning to think in partnerships supported by culturally available resources and tools - what Smith (1999) describes as 'the geography and terrain of learning'.

Situated cognition relies on realist problem solving scenarios and contextually relevant learning environments. The social-situational orientation to learning highlights the importance of relationships between people and the environment. Learning is establishing communities of practice in which conversation and participation can occur. If learning to teach occurs in various settings, how does learning in one setting interact with learning in another? What are the factors in and between these settings and how do these shape learning to teach? These questions were the focus of the current study.

2.3.2.3 Socialisation

Socialisation is a process through which you learn language of a culture, roles and norms (appropriate and expected behaviours) in order to be accepted as member of a community. Three characteristics were identified as important in defining a community of practice; domain, community and practice (Cummings and van Zee, 2005). Members of a community must be committed to "a shared domain of interest and a shared competence that distinguishes them from other people", Cumming and van Zee (2005, p. 10). In the community "members engage in joint activities and discussions, help each other and share information", Cumming and van Zee (2005, p. 10). Members of a community "develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems, namely a shared practice", Cumming and van Zee (2005, p. 10). In becoming experts, people build new identities. Thus one of the central components of learning to teach is teacher identity (Wenger, 1998). Accordingly, learning is seen as a transformation process, resulting from participating in social activities (Kelly, 2006; Smith, 1999).

Professional identity can be seen as teachers' orientations towards their profession, with orientation being defined as teachers' perception of what is important in their work, and the tasks that they find meaningful (Vähäsantanen et al., 2008). Identity has also been defined in many ways like a set of reified, significant, endorsable stories about a person (Sfard and Prusak, 2005b); long-term, lived relations within a community of practice (Lave and Wenger, 1991), and recognition by self or others as a certain 'kind of person' (Gee, 2005; 2001).

Issues of professional identity stem from professional socialisation and development (McGowen and Hart, 1990). Professional socialisation and development is a social learning

process that includes the acquisition of specific knowledge and skills that are required in a professional role and the development of new values, attitudes, and self-identity components (Hall, 1987; McGowen and Hart, 1990; Watts, 1987). For instance, as a professional educator, teachers should acquire specific knowledge and skills in such areas as critical thinking, interpersonal skills, and conflict resolution skills, as well as an ability to use computer technology and alternative assessment techniques (Gettys and Holt, 1993; Roden and Cardina, 1996). They need to learn about "requirement for general value judgement about the desirability of particular ways of acting" and "value judgement about the means that we can use in education to try to achieve certain desirable outcomes" (Biesta, 2010, p. 501). Student-teachers need to learn why it is not proper to use punishment lest pupils learn that it is appropriate to enforce one's will (Biesta, 2010; Carr, 1992).

Student-teachers have pre-conceived teaching ideas; they have experiences, beliefs, knowledge and identities related to science and science learning that are very different from, even contradictory to, those being advocated during training (Luehmann, 2007). The advocated attributes constitute alternative teaching ideas. Students learning to teach can be viewed as developing an identity by transformation of pre-conceived teaching ideas into alternative teaching ideas. Socialisation plays a crucial role.

Cherubini (2009), in a meta-analysis, reviewed the research from 1966 to 2005 describing how pre-service candidates transform from student-teacher to professional educator during their socialisation into school cultures. According to Cherubini (2009) socialisation is a broad concept that includes formal and informal as well as unconscious influence from collectivity. It is not only the transfer from one group to another in a static social structure, but the active creation of a new identity through a personal definition of the situation (Cherubini, 2009). According to Luehamnn (2007) "learning as identity development best occurs when one has multiple opportunities to display competence, receive feedback, exercise agency, and assume a central role in practice" (p. 8). These identity resources might be found in school setting and are supported by reflective practice. Sfard and Prusak (2005) argue that *identity* is created and re-created through social interactions. Discrepancies have often been reported between actual identity (history) and designated identity - expected (Sfard and Prusak, 2005). According to Postlethwaite and Haggarty (2010) unless the gap between actual identity (who they are) and designated (who they/we want them to be) identity is closed students were "in danger of becoming the kind of teacher that fits the school system's notion of a good teacher" (p. 5).

Progressive filtering (Postlethwaite and Haggarty, 2010) can be seen as a consequence of socialisation of beginning teachers. Postlethwaite and Haggarty (2010) found out that student-teachers learn new ideas of teaching mathematics and science in the university-context, and encounter challenges when they try to implement these ideas in the school placements. Thus, student-teachers, faced with such contradictions between the university-value system and the school-value system find "alignment with the institution they are joining and with colleagues who hold power in relation to the assessment of their training, is perhaps understandable response" (Postlethwaite and Haggarty, 2010, p. 17). In turn the school stands to benefit when student-teachers 'fit-in' because of reduced interruptions and disruptions. Socialisation of beginning teachers has benefits of stability and continuity, but limits both personal and institutional development. In order to minimize the limitations of socialisation, once settled student-teachers need to return to the new ideas and get support from the experienced teachers and try out new approaches of teaching mathematics and science (Postlethwaite and Haggarty, 2010).

Since socialisation is inevitably socialisation into a specific community of practice the influence of this particular context will always be important (and may become another limitation of the socialisation process). Socio-cultural theories consider contexts as critical determinants of learning, and for this reason activity theory and reflective practice have been examined more extensively because they illuminate contextual factors.

2.3.3 Activity Theory

2.3.3.1 Why is activity theory important in this study?

According to Grossman et al. (2000) activity theory assumes "that a person's frameworks for thinking are developed through problem-solving action carried out in specific settings" (p. 6). By opting to use activity theory, the study afforded opportunity to look at both the individual's experience, as well as at how settings were structured by historical forces (Engeström, 1999; Grossman et al., 2000), that is, personal and institutional histories. This was useful as a way to understand the professional development of the individual teacher. In teacher education, student-teachers engage in social learning contexts which can be seen as

activity settings. The formal and informal activity settings include university coursework, field experiences, mentoring and supervision, and concentric settings of school, department and grade level (Grossman et al., 2000).

Activity theory provides a powerful framework for analysing needs, tasks and outcomes for teacher education (Jonassen and Rohrer-Murphy, 1999). The theory is a powerful socio-cultural lens to analyse human activity: the kinds of activities, who is engaging, what their histories, expectations and preferences are, what objects (goals) they have in mind, what physical and mental 'tools' they can bring to bear on the activity, what products are created, what rules and norms operate. An activity setting is likely to create tensions and contradictions between competing goals, but such contradictions are the stimulus to the improvement of practices. As such they are problems student-teacher must face and resolve creatively – rarely by simply adopting one position and ignoring the other. For example, students on teaching practice must strike a balance between aiming to earn a good grade and trying new strategies (Grossman et al., 2000). As noted above, activity theory provides an analytical framework that focuses attention on the use of pedagogical 'tools'. Student-teachers must therefore learn to use available resources and develop resources that are new to them. These could be conceptual resources (broad ideas about teaching science; appropriate language or models through which to convey ideas), and practical tools (practices, strategies and equipment for the here and now problems). My study therefore was an attempt to explore this range of issues in seeking to understand student-teacher learning, both by collecting relevant data and by using activity theory as a framework for analysis.

A reciprocal regulatory feedback between knowledge and activity exists (Fish, 1989). Accordingly "as we act, we gain knowledge, which affects our actions, which changes our knowledge, and so on", Jonassen and Rohrer-Murphy (1999, p. 64). The important transformation is 'boundary crossing', which is the transfer of ideas and practice across activity systems (Engeström, 1995), and occurs when learners move between different learning settings and encounter different goals, expectations, and ways of working. My study attempted to find out how students learning to become teachers experienced boundary crossing.

Lave and Wenger (1991) suggest that learning is a function of the activity, context and culture in which it occurs; it is 'situated'. Students learning to become secondary teachers are

likely to learn different things in different settings: especially theory in university context and culture; and especially practice in classroom-school context and culture – though probably more than these in both contexts. In turn lecturers had the responsibility to be knowledgeable about (and perhaps to do) "research on teacher thinking and seek ways of helping their students to think and act in ways that will eventually become good teaching" (Clark, 1988, p. 10) in both the university and school settings.

2.3.3.2 Philosophical background of activity theory

The philosophical underpinnings of activity theory can be traced back to ideas of Hegel and Kant, and theory of dialectical materialism developed by Marx and Engels, and is centred on claims that whatever is experienced or known is in part due to our minds, to our ways of thinking. It was Vygotsky who extended the idea of how Marxist tools mediated labour and production, to how psychological tools mediate thought. While the tools are used by humans to change the world, humans are also changed by using the tools. Vygotsky extended the stimulus-response link to include an alternative root that makes use of psychological tools. The instrumental method was still largely behaviourist in orientation.

Psychologists who belong to the first generation of activity theory proposed an activity composed of subject and an object mediated by tools. Their focus was on activity, not the individual as in cognitive psychology. A subject is motivated by an object (objective) to participate in an activity and mediates using a set of tools. At this stage what was missing was the idea of collective action; participation of others and relationships with others. In the 2nd
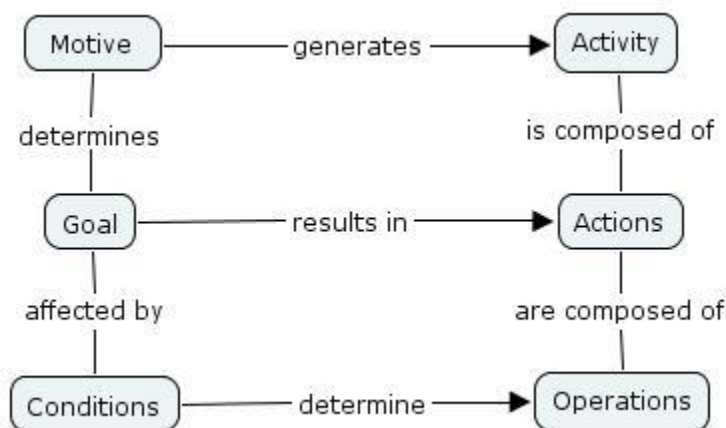
Figure 2.1: Activity, actions and operations (Wilson, 2006)

generation activity theory Leontiev proposed collective activity. Leontiev's hierarchical conception of activity was an attempt to separate individual action from collective activity. A good example of the idea suggested by Leontiev is given by Tolman (1999)

> The beater who needs food for survival is engaged in actions that result in the opposite of what he is immediately seeking. Instead of closing the distance with the quarry, he is driving it away. This makes sense only if he knows that someone is waiting to achieve his goal (consciously shared with others) at the other end. The sense of his action was not in the action itself but in relation to other members of the group (p. 73).

The beaters and hunters are carrying actions which result in a successful hunt. Accordingly

> the uppermost level of collective activity is driven by an object-related motive; the middle level of individual or group action is driven by a goal; and the bottom level of automatic operations is driven by the conditions and tools of action at hand (Engeström and Miettenin, 1999, p. 4).

In order to understand the individual's participation in an activity it is essential to the subjectively and hidden motive.

2.3.3.3 Activity systems

The idea of activity systems (AS) was borne out of the need to accommodate shared meaning of activity. In the reconfiguration; rules, community and division of labour were added. The model is based on the premise that transforming the object into an outcome motivates the existence of an activity. The components of the 2nd generation activity system are shown in Figures 2.2 and 2.3 below. Mwanza and Engeström (2003) used a teaching and learning activity. Figure 2.2 shows the questions to answer when examining components of the activity theory and in Figure 2.3 Mwanza and Engeström (2003) provide possible answers from their study. My study makes use of these ideas when examining activity systems in which student-teachers act and learn.

The activity elements are organised into activity systems (Engeström, 1987) conventionally shown as a triangle. The top part comprises subject, object and tools and focuses on the subsystem *production* of object (Jonassen and Rohrer-Murphy, 1999). Wilson (2004), analysing school-university partnership, argues that the 'owners' of the instruments are controllers of the *production* subsystem. The other subsystems are *consumption*, *exchange* and *distribution*. The *exchange* subsystem negotiates rules and describes how the community functions, what it believes and ways that it supports different activities (Wilson, 2004). In the *consumption* and *distribution* subsystems members or partners are found crossing boundaries by taking on new roles and responsibilities (Wilson, 2004). In order to understand learning-to-teach activity it is important to analyse the activity, and this means examining the components mentioned above: who is involved, what are their motives, what objects result, what are the rules, and the larger community in which activity occurs (Jonassen and Rohrer-Murphy, 1999).

Human activities do not occur in isolation. There are always related activities. The 3rd generation of activity theory introduced by Engeström (1987) in *Learning by Expanding* uses dialogues, multiple perspectives and networks of interacting activity systems. The model is represented by a minimum of two interacting activity systems (Engeström, 2001). The 3rd generation draws on dialogicality and multivoicedness in order to expand the framework of 2nd generation AT. It involves questioning traditional practices. Contradictions arise between communities which in turn induce conflicts in individuals. Conflicts also arise during boundary crossing (movement from one community to another) by individuals. Expansive learning is about transformation as a response to contradictions between activity systems. In order to attend to the dissonance within communities and individuals, a dialogic process is essential to reconstitute the object and produce a new shared object (Avis, 2007). A diagram showing 3rd generation activity theory is presented in Chapter V, section 5.3.3 Figure 5.3. In my study two distinct activity systems in which student-teachers act and learn are the university and the school. Contradictions occur because any activity has other related activities, and the relationship between interacting systems, as well as among subjects, results in conflicts (Carper and Williams, 2004). For example legitimate peripheral participation contradicts expectation to be cover teachers. When subjects decide to do something about the contradictions, learning and transformation occurs. How can student-teachers learn from experienced teachers and at the same time teach classes without support? Surely, they need to redefine working relationships with mentors so that they can reconcile the contradictory

goals. Given the insights from 3rd generation activity theory my study explored how student-teachers experience and use the contradictions which exist between these two systems.

Tools: By what means are the subjects performing the activity?

Subject(s): Who is involved in carrying out the activity?

Object(ive): Why is the activity taking place?

Rules and regulations: Are there any cultural norms or rules or regulations governing the performance of the activity?

Community: What is the environment in which this activity is being carried out?

Division of labour: Who are responsible for what when carrying out activity and how are those roles organised?

Figure 2.2: Using questions to identify components of an activity system (Mwanza and Engeström, 2003)

Tools:
Equipment, materials, manuals, texts, checklists, training packages, theory of teaching and learning, concepts of the subject area

Subject:
Student
Teacher
Tutor
Coordinator

Object:
Develop learners' abilities towards expertise

Rules:
Workplace values
Culture of practice
Instructional expectations
Accreditation

Community:
Learners
Tutors
Business staff

Division of labour:
Role of learner
Role of teacher

Figure 2.3: Teaching and learning as an activity system (Mwanza and Engeström, 2003)

2.3.3.4 The five basic principles of activity theory

Activity theory can also be summarised using 5 principles (Engeström, 1999) as shown in Table 2.1 below. The first principle describes object-oriented activity as a unit of analysis for activity systems. The second principle describes the hierarchical structure of activity (Nardi, 1997) and this gives rise to multi-voicedness. The division of labour creates different positions for participants and makes the activity a community of multiple points of views, traditions and interests. The third principle, historicity, is that activity systems take shape and get transformed over lengthy period of time. The fourth principle describes the role of historically accumulating structural tensions within and between activity systems as sources of change and development (Engeström, 1999). The 4th principle is examined in the next section. The fifth principle is expansive transformation; when individuals question things and deviate or when there is collective envisioning and a deliberate collective change effort (Engeström, 1999).

Table 2.1: Engeström's (1999) summary of activity theory using five principles

	Principle	**Description**
1	Object-orientedness	Object motivates activity and directs it in a specific direction.
2	Multi-voicedness	An activity system is always a community of multiple points of view, traditions and interests.
3	Historicity	Activity systems take shape and get transformed over lengthy periods of time.
4	Contradictions	Contradictions are agents of change.
5	Expansive transformation	Activity systems move through relatively long cycles of qualitative transformations.

2.3.3.5 Contradictions as agents of change (the 4th principle of AT)

Many studies have focused on the descriptive nature of second generation activity theory, and used activity systems analysis as a supplementary tool in qualitative research (Yamagata-Lynch and Haudenschild, 2009). The activity systems model was developed to permit researchers to identify contradictions in work settings and tensions that ultimately helped participants to change the nature of work (Engeström, 1987; Yamagata-Lynch and Haudenschild, 2009). Contradictions are agents or motive force of change (Engeström, 2001; Yamagata-Lynch and Haudenschild, 2009; Warmington, et al., 2005) whether perceived by

the subject or latent, that is, evident to an outsider but not subject (Warmington, et al., 2005). The contradictions occur where there are interacting activity systems; the third generation activity theory (Engeström, 1987; Yamagata-Lynch and Haudenschild, 2009). A key assumption is that any human activity occurs where there are other related activities, and how the different activities relate results in imbalances and conflicts.

Four types or levels of contradictions have been identified; primary, secondary, tertiary and quaternary (Engeström, 2001). The classification makes a distinction of whether the contradictions are within the elements of the activity system, between elements, between the old and the new way, or between activity systems (Carper and Williams, 2004). The 4 levels are summarised in Table 2.2 below including examples given by Yamagata-Lynch and Haudenschild (2009). The study found these examples useful in carrying activity systems analysis.

Table 2.2: Engeström's four levels of contradictions and examples from Yamagata-Lynch and Haudenschild (2009).

Level	Description	Example from Yamagata-Lynch and Haudenschild (2009)
1	Primary contradictions: when subjects encounter more than one value system attached to an element with an activity that brings about conflict.	School districts, universities and classroom teachers share a common object for improving classroom practice but they do not share the same values that define what type of professional development programs are most effective for achieving this common goal.
2	Secondary contradictions: when subjects encounter a new element of an activity and the process of assimilating the new element into the activity brings about conflict.	When teachers become responsible for meeting professional development expectations and requirements at the same time although they are managing their work related expectations PD programs become a burden for completing daily-related responsibilities (p. 10).
3	Tertiary contradictions: when subjects face conflicting situations by adopting what is believed to be a newly advanced method for achieving the object.	School districts may require teachers to implement a new math curriculum programme which may take a minimum of 60-minutes of daily teaching time in the classroom and require teachers to rearrange their lessons on other subject areas.
4	Quaternary contradictions: when subjects encounter changes to an activity that results in creating conflicts in adjacent activities	Teachers may have been accustomed to implementing interdisciplinary lessons where they blended math and science activities but once the math curriculum in 3 above is set teachers no longer have the time to engage students in interdisciplinary lessons, therefore teachers will have to develop new strategies for teaching science

2.3.3.6 *Research studies that have used activity theory*

Many research studies have used activity theory. Examples from America include Yamagata-Lynch and Haudenschild (2009), Carper and Williams (2004), Barab et al. (2002), Jonassen and Rohrer-Murphy (1999), Smith (1999), and Wenger (1999). Yamagata-Lynch and Haudenschild (2009) in the paper entitled 'using activity theory to identify contradictions in teacher professional development' discuss how conflicts can be used to improve partnership-based professional development between K-12 schools and universities. Teachers' motives for participating in professional development were found to contradict the goals of school districts and universities who designed and facilitated the professional development activities (Yamagata-Lynch and Haudenschild, 2009). The contradictions created tensions, and hindered teachers from implementing curricular-based interventions targeted at improving

classroom practices. Barab et al. (2002) used activity theory to understand systemic tensions between learning astronomy and building 3-D models. They found out that neither teacher-imposed nor student-initiated constraints directed learning; rather that rules, norms and division of labour arose from the requirements of building and sharing 3-D models. Jegede and Aikenhead (1999) propose a new pedagogy, 'collateral learning theory', in which teachers assume a role of culture broker in the classroom to help pupils cope with disparate worldviews between their everyday culture and the culture of science. Jonassen and Rohrer-Murphy (1999) argue that activity theory provides an appropriate framework for analysing needs, tasks, and outcomes for designing constructivist learning environments (CLEs).

Examples of studies in United Kingdom are: Postlethwaite and Haggarty (2010), Edwards (2005), Avis (2007), Daniels (2006) and Wilson (2004). Edwards (2005) looks at professional learning in Teaching and Learning Research Programme (TLRP) as multi-layered and complex by discussing key concepts in Cultural Historical Activity Theory (CHAT). She looks at participation as a search for meaning, and suggests that "to deny the cognitive potential in approaches which focus on action in the world is to underplay the importance of action in the study of learning" (Edwards, 2005, p. 1). Avis (2007) cautions that Engeström's version of activity theory rooted in Marxism holds progressive possibilities as long as it validates situated learning and the on-going transformation of practice. Avis (2007) concludes that -

> any discussion of learning, identity and transformation must be placed in a setting that recognizes social antagonism as well as the wider socio-economic and political context-failure to do so leads to a conservative praxis (p. 175).

Daniels (2006) discusses the way in which the concept of social position can be used to promote theoretical development in activity theory and uses the theory of the social structuring of discourse in society developed by Bernstein (2000) and Hasan's (2001) discussion of Vygotsky. Daniels (2006) also uses Holland et al.'s (1998) study of the development of identities and agency. Daniels (2006) underscores the importance of subject-subject and within subject relations (relationships) in activity theory. Wilson (2004) reports a study of using activity theory as a lens to analyse interaction in a university-school initial teacher education and training partnership. In the study she provides evidence of successfully using an explicit pedagogical strategy to shift perspectives of beginning teachers.

In Europe examples come from Jaworski and Goodchild (2005; 2006), Engeström (1987; 2001), Hayes (2002) and Cultural Historical Activity Theory (CHAT). The Centre for Activity Theory Development, University of Helsinki has done extensive work using CHAT. Jaworski and Goodchild (2006) describe a research project aimed at developing mathematics teaching and learning called Learning Communities in Mathematics (LCM) and show that activity theory can be applied to support understanding and progress. LCM involved collaborative communities of teachers in schools and didacticians in a university setting. Jaworski and Goodchild (2006) revealed that complexities of socially embedded factors created contradictions related to learning within the project. Engeström (2001) in the paper 'expansive learning at work: toward an activity theoretical reconceptualization' looks at the possibility of inter-organizational learning using third generation of activity theory (see also sections 2.3.3.3 and 5.3.3). Systems learn and change as well as individuals. Perhaps when we focus on student-teacher learning we pay too little attention to how the system could and should change as a consequence of student-teacher involvement in it. This might be one of the limitations of socialisation – that seems to me to be based on the idea that the system is fixed and the student just has to fit in (see also section *2.3.2.3*). Hayes (2002) takes concepts of activity systems into a science classroom by studying elementary science teaching as mediated action. As shown by the study, Hayes (2002) found out that teachers were able to forge links between pedagogy, their students' socio-economic positions, science teaching, and experiences in a pre-service teacher education program.

There are examples from Australia, namely Roth (2004), Roth and Lee (2007; 2006; 2004), and Groves and Dale (2003). Roth and Lee (2007) through studying language, language learning and literacy show activity system as a theory of praxis, and reveal the potential of using the AT to confront the theory-practice gap. Roth and Lee (2004) describe science in a local middle school where students learn science while participating in a community effort to contribute to the knowledge base about a local creek. Groves and Dale (2003) adopted Cole and Engeström's (1991) model of activity theory to examine data on young children's learning outcomes in number in terms of the mediating role of calculators and the broader context of the classroom community, teachers' beliefs and intentions, and the classroom norms and the division of labour.

A good example from Asia is Tsui and Law (2006) who report a study on the expansive learning that was afforded by a university-school partnership as university tutors, mentor teachers and students teachers engaged in a new activity system mediated by a lesson plan. Tsui and Law's (2006) study showed that, in the course of resolving contradictions, the activity system was shifted from helping student-teachers learn to teach to learning of all participants.

Some examples from Africa are Mtika (2008) who adopted an activity theory perspective when he studied teaching practice as a component of teacher education in Malawi. Mtika (2008) found out that student-teachers had different perceptions for teaching, different motives for joining teaching, and varied experiences during teaching practice; all which influenced their learning. Further, there were contradictions between what student-teachers had learnt at college and what they encountered during teaching practice, e.g. shortage of material resources contradicted desire to use learner centred activities.

Activity theory is very difficult to understand due to its heavy reliance on Marxist dialectical materialism as well as its basis in German philosophy, which itself is not easy to understand. Fortunately, as evidenced by the literature discussed above, activity theory has been widely used in educational research and thus has become more understandable and a lot more accessible. As a result it has helped to shape my inquiry in the ways outlined above and in serving as a basis for my data analysis.

2.3.4 Reflective practice

2.3.4.1 Why is reflective practice important in this study?

When research participants are asked to describe their beliefs and views of the contribution of theory and practice in what students learn they inevitably engage with reflection. Reflective practice is shown as Figure 2.4. Reflection is both retrospective and prospective (Alsop, 2000) because one looks back at the experience (Spalding, 1998) and poses evaluative questions, then looks forward, again posing appropriate questions to improve the practice. The reflective cycle is dialectical in the sense that

our thoughts affect actions, which affect the situation we are dealing with, and therefore after feedback through the reactions of others involved affect how we understand and think about the situation, Reid (1994).

Reflective practice implies constantly learning through gathering evidence of effectiveness and then changing the practice and so on. In my study, reflective practice offers opportunity for student-teachers and lecturers to, for example, evaluate and judge whether learning from theory at university helps to inform and influence learning from practice. Similarly, there is the opportunity to explore, whether learning from practice helps to inform and influence what student-teachers learn from theory at university.

In many ways activity theory and reflective practice explore the same factors but conceptualise relationship of the factors differently. On one hand if we consider student-teachers' learning as a cycle, and as individuals then reflective practice is most suited to explore such learning. On the other hand if we consider student-teachers' learning as something resulting from contradictions within and between contexts then activity theory is more useful. However, in reality both occur – students learn in a cycle (reflective practice) and through problem solving when they encounter contradictions within and between settings (activity theory).

2.3.4.2 From reflective thinking to reflective practitioner

John Dewey (1933) is often considered to be the originator of reflective thought (reflective thinking) describing it as "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (p. 9). Dewey's five steps were

> 'perplexity, confusion, doubt'; 'conjectural anticipation and tentative interpretation'; 'examination, inspection exploration, analysis of all attainable considerations'; 'elaboration of the tentative hypothesis suggestions'; and deciding on 'a plan of action' or 'doing something' about a desired result (van Manen, 1995, p.33).

Donald Schön used the term 'reflective practitioner' (1983) and 'professional knowledge-in-action' (1987). He argued that professional education undervalues practical knowledge and

grants privileged status to intellectual scientific and rational knowledge forms that may only be marginally relevant to practical acting (van Manen, 1995). Reflection-in-action, often described as 'thinking on our feet', "involves looking to our experiences, connecting with our feelings, and attending to our theories in use... entails building new understandings to inform our actions in the situation that is unfolding", (van Manen, 1995, p. 33). The act of 'reflecting-on-action' enables us to spend time exploring why we acted as we did, what was happening in a group and, in so doing, we develop sets of questions and ideas about our activities and practice (van Manen, 1995).

2.3.4.3 Place of reflective practice in the theory and practice debate

Van Manen (1995), in the paper 'On the Epistemology of Reflective Practice', raises some questions about the meaning and place of practical reflection in teaching and about the relation between knowledge and action in teaching, the kind of teaching that is educational or pedagogical. He uses a 3-stage model of reflective practice consisting of technical rationality, practical action and critical reflection. He discusses the relations between theory and practice, and argues that,

> rather than see practice teaching as applied theoretical (university-generated) knowledge one needs to see that practice possesses its own integrity... and rather than say that implicit theories (such as constructivist knowledge) give meaning to the actions that we perform, it would seem equally valid, if not more accurate, to presume that our actions give meaning to the words we use (Van Manen, 1995, p. 47).

Ottesen (2007), based on socio-cultural and activity theoretical perspectives on human activity by Vygotsky, 1986 and Leont'ev, 1978, recognizes reflection as action embedded in societal activities, that is, as processes involving student-teachers and mentors in socio-cultural contexts. "Analysis of discussions between student-teachers and mentors during internship suggest three modes of reflection: reflection as induction, as conceptual development and as 'off-line' actions" (Ottesen, 2007, p. 42). The inferior mode is induction but it appears to be the most common (Ottesen, 2007).

> In order for reflection to meet its full potential in teacher education, an important issue to be worked out in partnership enterprises concerns the learning of the lecturers

in schools and university, to make mentors more aware of the theoretical underpinnings of their work, and to make university teachers more aware of the embodiment of theoretical concepts in the practices of teaching (Ottesen, 2007, p. 43)

Instead of asking which between theory and practice is superior, Tobin and Kincheloe (2007, p. 11) argue that student-teachers need to be empowered "to work in the space *between* theory and practice" – the idea of contradictions in activity theory. They argue that reflective practice is one way to achieve this.

2.3.4.4 A model of reflective practice

Reflective practice is defined by Moon (1999, p. 63) as "a set of abilities and skills, to indicate the taking of a critical stance, an orientation to problem solving or state of mind". It involves a wide range of activities that involve thinking about one's own learning (Cowan, 1999). Individuals engaged in reflection evaluate personal experiences and make an effort to generalise from that thinking (Hinett, 2002). At each stage of the reflective cycle we need to think of theories, contexts (resources available, policies, relationships, expectations, past histories of setting … see Bourdieu's idea of *field)*, and values (and beliefs) discussed in section 2.3.5. These 3 groups of factors influence each stage of the reflective cycle, Haggarty and Postlethwaite (2003).
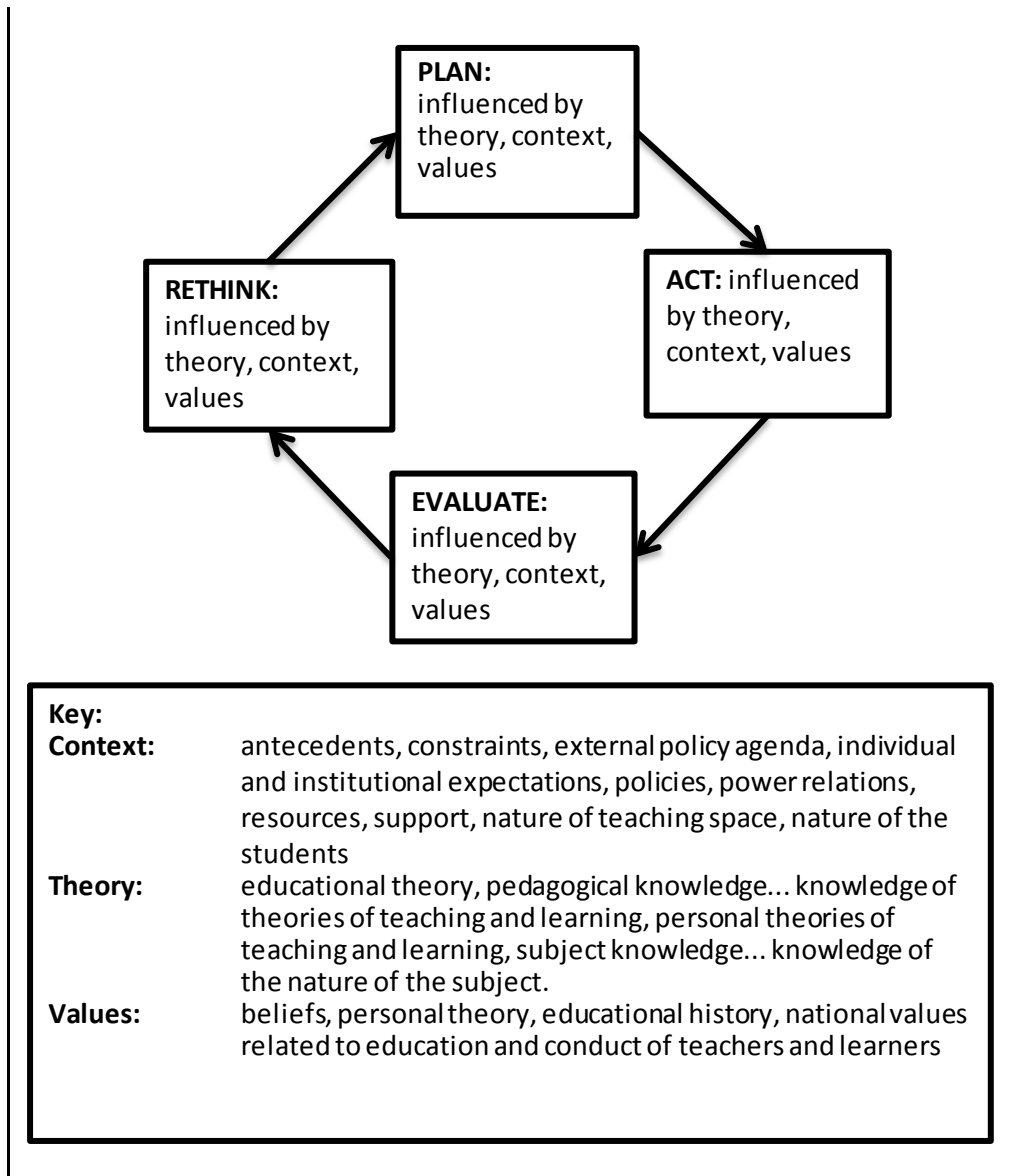
Figure 2.4: A model of reflective practice (Skinner, 2010; Schön, 1983)

The notions of theory, context and values that together inform each stage of reflective practice cycle are consistent with the ideas in activity theory (Haggarty and Postlethwaite, 2003). Examples of contextual factors are resources available, politics and policies, relationships and expectations, and histories of the setting. Context includes teacher education policy

> the process by which teachers are educated is the subject of political discussion in many countries, reflecting both the value attached by societies and cultures to the preparation of young people for life, and the fact that education systems consume

significant financial resources (of which teacher salaries is often the largest single element) (http://en.wikipedia.org/wiki/Teacher_education).

The degree of political control varies from being entirely in the hands of universities, to systems where education is subject of detailed prescription, and to where there is separation of the process of acquiring the relevant knowledge and skills to be a teacher and process of acquiring the official permission to teach in public schools (http://en.wikipedia.org/wiki/Teacher_education).

According to Boud, Cohen and Walker (1985, p. 19):

> *reflection is an important human activity in which people recapture their experience, think about it, mull it over and evaluate it. It is this working with experience that is important in learning.*

Reflection helps learners to understand what they already know (reflection is individual), identify what they need to know in order to advance understanding of the subject (reflection is contextual), make sense of new information and feedback in the context of their own experience (reflection is relational), and guide choices for further learning (reflection is developmental), (Hinett, 2002). Reflection acts like a third space between theory and practice. Theory informs practice, and when an individual reflects on practice he/she attempts to generate (personal) theory. Reflective practice is consistent with Kolb's (1984) learning cycle shown in Figure 2.5.

```
Taking stock: What          Reflection: What do
do I know?                  I need to know?
(individual)                (contextual)


Planning: How can           Feedback and
I take my learning          evaluation: How
further?                    much and how
(developmental)             much well do I
                            understand?
                            (relational)
```
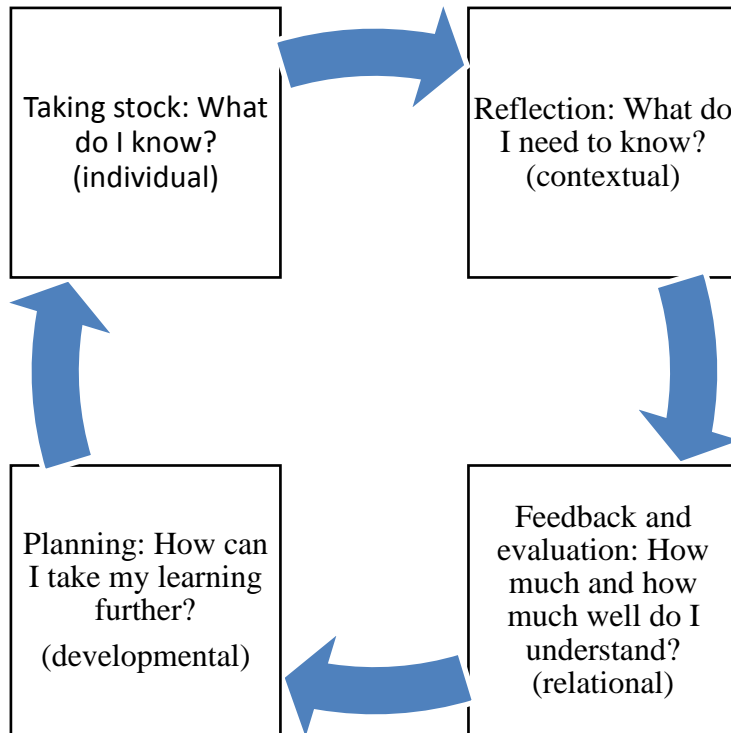
Figure 2.5: Learning cycle (Hinett, 2002, p. 2)

2.3.4.5 Reflective practice as both private and social activity

Often researchers examine reflective practice using teachers' artefacts such as written reports of practice, autobiographies, narrative accounts, personal diaries and reflection journals (Hung, 2008). Zeichner (1994) made a distinction between reflective practice as a private activity pursued in isolation and as a social activity and public activity involving communities of teachers. Studies comparing reflective practice as a private activity and as a social practice (Farrell, 2001; Orland-Barack, 2005; Zeichner, 1994) show that social practice creates more opportunities for professional development. Thus lack of a social context for teachers to discuss their personal beliefs, and to construct shared understanding, limits professional development because teachers' beliefs are brought to their awareness through communication and interaction with others (Zeichner, 1994). The contribution of reflective practice could be seen as challenging existing assumptions and beliefs, second as a mechanism for transformation to ensure that practice produces new learning rather than merely conforming to existing understanding and position(ing)s. My study attempted to find out if student-teachers were looking for opportunities for social learning, how the situation at the time of the study shaped this kind of learning and whether student-teachers avoided social

situations where this kind of learning could happen because they were anxious about their own safety.

2.3.5 Bourdieu's social theory

The 'context', within which reflective practice occurs, and the 'community' in activity theory, can be linked to Bourdieu's theory particularly the notion of field and habitus. Activity theory looks at dispositions in 'subjects' and power in 'division of labour', but what Bourdieu does for me, is to deepen understanding of dispositions and power. Bourdieu's theory as introduced by Calhoun, LiPuma and Postone (1993) is therefore examined in brief. Bourdieu sees classical theory as a dichotomy between subjectivist and objectivist approaches to understanding social life. The former is "centred in the beliefs, desires, and judgments of agents ... endowed and empowered to make the world and act according to their own lights", Calhoun et al. (1993, p. 3). The objectivist approaches "explain social thought and action in terms of material and economic conditions, social structures and cultural logics", Calhoun et al. (1993, p. 3). In my study it is acknowledged that students' freedom to learn and practice what they value most was constrained by authority consciously and unconsciously bestowed on lecturers and mentors. Such power relations give rise to *restricted and expansive* learning environment (Hodkinson and Hodkinson, 2005) considering that student-teachers were likely to learn what the superior lecturers valued most. Finding how certification needs, financial needs, power relations in the university/school, and texts like regulations/guidelines/books shape students' learning to become teachers was most likely to illuminate the context in which learning to become a teacher occurs. Similar to a stance that is neither modernist nor postmodernist (Edwards et al., 2002), reflexive approach is a third way neither subjectivist nor objectivist. Reflexive approach addresses contextuality. The 'context' includes resources available, formal policies relevant to particular setting, relationships, expectations and past histories in that setting. It was hoped that my study would be able to understand how the contextual factors determine learning to teach as reported by student-teachers and lecturers.

Bourdieu's concept of 'field' is useful to illuminate social relations, nature of power relations, and how power is operationalised in teacher education. The notion of 'field' suggest that learning to teach is influenced by institutional expectations about teaching and

assessment, allocation of resources, and power relations with external agencies (Postlethwaite and Haggarty, 2010).

Motives, power and personal starting points are influenced by society, therefore, socio-cultural theory was found useful in understanding the nature and practice of learning to teach. Social theories are analytical frameworks used to examine social phenomena such as social behaviour, social and power relations, and identity. Actors in teacher education, for example lecturers and students learning to become teachers, interact within a system of expectations. The expectations include what these actors bring and what others have about the learning activities and practices. Lecturers engage with their tasks on the basis of their understanding of what it means to be a lecturer. Student-teachers' history (how they perceive the task of teaching, their tacit theories, their expectations and motives) influence what they see as worth learning (Postlethwaite and Haggarty, 2010). Outsiders, who have an interest in teacher education, have ideas about training of teachers and expectations that influence, shape and limit what insiders do.

Learning to teach also involves the development of teacher *identity*. Sfard and Prusak (2005) argue that *identity* is created and re-created through social interactions. Discrepancies have often been reported between actual identity (history) and designated identity - expected (Sfard and Prusak, 2005). According to Postlethwaite and Haggarty (2010) unless the gap between actual identity (who they are) and designated (who they/we want them to be) identity is closed students were "in danger of becoming the kind of teacher that fits the school system' notion of a good teacher" (p. 5).

There are many learning theories and only a few have been mentioned. One can compare the theorists' view of the learning process, of the locus of learning, of the purpose of education, of the educator's role (or learner' role) and of manifestations in adult learning (Merriam and Caffarella, 1991).

2.4 Perspectives on what teachers are learning

The previous section discussed the processes through which student-teachers learn. This section examines literature concerned with various perspectives on teaching and teacher education. Perspectives on teaching are interrelated set of beliefs and intentions that give

meaning and justification for actions of teachers (Pratt, 2002; Pratt and Associates, 1998). They are a lens through which the world of teaching and learning can be viewed. According to Pratt and Associates (1998) knowing only one perspective is not enough because

> If we know only one perspective on teaching, it will dominate our perceptions of all that goes on, yet remain hidden from view. Just as the world above the pond is invisible to a fish, so too are other perspectives invisible to those who know only one perspective on teaching
> (https://www.academia.edu/317235/Five_Perspectives_on_Teaching).

Researchers have used different terms to describe teacher cognition for example teacher knowledge (Shulman, 1987), teacher beliefs (Pajares, 1992) and teacher conceptions (Calderhead, 1996). Most researchers tend to use conceptions and perceptions interchangeably (Meirink et al., 2009). In an effort to show the distinctions, the following are examined; dimensions (Hargreaves and Fullan, 1992), orientations (Feiman-Nemser, 1990), and conceptions (Hoban, 2003).

2.4.1 Dimensions of professional development

Hargreaves and Fullan (1992) identify three dimensions of professional development: *the personal* (stimulating the intellect, developing and experiencing a sense of worth and accomplishment and becoming more knowledgeable, Bell and Gilbert, 1994), *the career* (obtaining higher qualifications, promotion prospects, job satisfaction, higher salary and with advancing age-looking towards retirement and/or mid-term career change/consolidation), and *the practitioner* (improving classroom skills and other performance competences; increasing the professional knowledge base for practice-better understanding of content, becoming aware of alternative instructional strategies, reading more research-based literature; preparing for and incorporating new curricular changes in the repertoires (Feldman, 1996). These dimensions are useful because they give me clues of what to look for in terms of student-teachers' motives and expectations.

2.4.2 Feiman-Nemser's (1990) conceptual orientations

Table 2.3: Feiman-Nemser's (1990) conceptual orientations in relation to educational commonplaces

	Subject matter / Teacher-teaching / Learner-learning / Milieu
ACADEMIC	Transmit knowledge to students. Assume the role of a scholar and intellectual leader. Assume the role of a subject-matter specialist. Induct students into different ways of knowing and thinking. Understand the structures of the disciplines.
PRACTICAL	Focus attention on the elements of craft, technique and artistry that skilful practitioners reveal. Deal with unique and ambiguous situations within classrooms. Focus attention on the primacy of experience as a source of knowledge. Adjust to the localized, uncertain and often conflicting nature of teaching. Develop adaptability and invention skills.
TECHNOLOGICAL	Focus on the knowledge and skills of teaching. Carry out the tasks of teaching with proficiency. Acquire principles and practices derived from the scientific study of teaching. Focus on generic teacher behaviours and strategies associated with student achievement. Develop procedural knowledge: ways to achieve specified goals and solve familiar problems.
PERSONAL	Understand, develop and use oneself effectively. Drive towards self-adequacy and enhancement. Be facilitators that create conditions conducive to learning. Know their students as individuals and allow students to know them as a person. Form classrooms where learning derives from students' interests and takes the form of active, self-directed exploration.
CRITICAL/SOCIAL	Develop a progressive social vision. Question taken-for-granted (conventional) assumptions about teaching, learning, knowledge and schooling. Create classrooms that promote democratic values and equity. Participate in curriculum development and policy-making in schools. Work to improve school conditions and educational opportunities through community involvement and political activity.

The term 'conceptual orientation' (Table 2.3) was used by Feiman-Nemser (1990) to refer to a cluster of ideas about the goals of teacher preparation and the means of achieving them. A conceptual orientation provides a coherent perspective on teaching, learning, and learning to teach that gives direction to the practical activities of educating teachers by stipulating the roles of lecturer and the student-teacher, and the nature of content, and context of learning (Feiman-Nemser, 1990). The 5 conceptual orientations are academic, personal, critical, technological and practical orientations (Feiman-Nemser, 1990). Adopting the academic orientation means seeing the work of a teacher as distinctive, and learning to teach means developing the understanding, skills and dispositions of a professional teacher. With the personal orientation one sees a teacher as a person and learner, and learning to teach as personal development evidenced by transformation. Adopting the critical orientation focuses on schooling and the teacher's obligations to pupils and society. Learning to teach in a democratic society is questioning conventional assumptions about teaching, learning and knowledge. When the technological orientation is embraced, learning to teach focuses on scientific knowledge and systematic training. Those who call for a practical orientation believe in 'wisdom of practice' and learning from experience. Feiman-Nemser (1990) acknowledges the partial nature of the conceptual orientations and a fuller pictures requires one to see the orientations as not mutually exclusive, and to use a comprehensive framework attending to all the commonplaces of education (See Table 2.4); teacher, student, subject matter and milieu (Schwab, 1973). Similarly, Pratt (2002) argues that it is not a "one-size fits all" since there is overlap among transmission, developmental, apprenticeship, nurturing and social perspectives.

2.4.3 Hoban's four conceptions of teaching and learning

Hoban (2003) discusses the relationship between conceptions of teaching and views about learning to teach. He revealed problems in conventional teacher education models. Hoban (2003) looks at four conceptions of teaching and learning as either simplistic (craft and labour) or complex view of teaching (profession and art). As a craft teaching is believed to be a repertoire of skills or competences accrued over time. In terms of labour teaching is seen as a set of goals, lesson plans and skills designed by others and the role of the teacher was to implement them. These two are simplistic approaches characterised by mechanistic and reductionist thinking as evidenced by compartmentalized structure of courses (Hoban, 2003)

and what Schön (1983; 1987) labelled technical rationality. A teacher training model based on technical rationality means

> the university provides the theory, the methods and skills; the school provides the setting in which that knowledge is practiced, and the beginning teacher provides the individual effort to apply knowledge (Wideen, Mayer-Smith and Moon, 1998, p. 167).

A problem with individual effort is that effort may not be enough. Using theory in a given context is a conceptually and emotionally demanding task for which the student-teacher needs scaffolding and support not just the opportunity to work.

Alternatively seeing teaching as a profession or art implies a complex view of teaching, that is "a dynamic relationship that changes with different students and contexts", Hoban (2000, p. 165) where the classroom aspects are interrelated e.g. the curriculum, the resources available, socio-economic background of children and different ways of learning. In any one lesson teachers are expected to deal with many influences, some of which cannot be predicted in advance (Hoban, 2003). Similarly, any one university class is a set of interacting 'ecosystems' of students, lecturers, teaching contexts and curriculum (Biggs, 1993).

According to Hoban (2003) conventional teacher education models do not mirror the complexity of teaching. The issues of concern include fragmented courses, lack of collaboration, discontinuities between university courses and school practice, and socio-cultural influences (Hoban, 2003; Tom, 1997). In order to address problems of conventional teacher education models Hoban (2003) proposes focussing on multiple relationships in designing TE programmes and how to use a four dimensional approach. The first dimension is conceptual links across the university-based curriculum. The second dimension is making explicit theory-practice links between schools and university. The third dimension is socio-cultural links between participants in the programme so as to encourage social interaction between academics and teachers (practitioners). The fourth dimension is personal links in establishing the identity of a teacher educator as a way of modelling reflective practice to their pre-service teachers. These four dimensions are present in all teacher education designs but differences are reflected in the degree of connectedness (Hoban, 2003), and when the guidelines are used to a large extent more coherence is achieved and quality of learning to teach is increased.

Perspectives on what teachers learn were important in my study. They directed me in what to look for and establish the kind of teacher targeted at the university studied. Perspectives inform models on teacher learning.

2.4.4 Teacher knowledge

2.4.4.1 Variations in categorizing teacher knowledge

Before looking at models of teacher learning programmes it is vital to highlight different forms of teacher knowledge. Different authors have tried to categorize teacher knowledge as shown in Table 2.4; the commonplaces of education (Schwab, 1964), forms of teacher knowledge (Shulman, 1986), and a typology of six domains (Grossman, 1994). Others show variations in terms of areas as shown in Table 2.5; 2 major components (Kennedy, 1997), 6 concerns (Kennedy, 2006), 4 areas (Lewin, 2008) and 3 broad areas (Watson et al., 2008). Basically the 2 broad areas are theoretical and practical knowledge (Kennedy, 1997; Carr, 2005; Saugstad, 2005; Wilson and Demetriou, 2005; Wilson and Demetriou, 2007). Teacher knowledge can be split into subject matter knowledge, pedagogical knowledge, and professional studies. Pedagogical knowledge and professional studies are often combined into educational theory. A distinction between theory as codified knowledge and practice as context specific knowledge is given by Wilson and Demetriou (2007). Beliefs about teacher knowledge influence decisions about what model of teacher learning programme to adopt.

Table 2.4: Forms of teacher knowledge

Author Year	Schwab 1964	Shulman 1986	Grossman 1995
Description	The commonplaces of education	Forms of teacher knowledge	A typology of 6 domains
Forms (knowledge of ...	Subject matter	Content	Content
		General pedagogical	General pedagogy
		Pedagogical content	
		Curriculum	Curriculum
	Learner	Learners and characteristics	Learners and learning
	Milieu	Educational context	Context
		Educational ends, purposes, values	
	Teacher		Self

Table 2.5: Areas of teacher knowledge

Lewin (2008) *4 areas*	Watson et el. (2008) *3 broad areas*	Kennedy (1997) *2 major components*	Kennedy (2006) *6 concerns*
Subject matter knowledge	Content		Content
Pedagogical content knowledge	Pedagogy	Theory	Student learning
Professional studies			Increasing 'students' willingness to participate
Teaching practice	Practicum	Field	Maintaining lesson momentum
			Creating a civil classroom community
			Attending to own cognitive and emotional needs

2.4.4.2 Learning to teach as 4 areas

Teacher education models and structures suggest that student-teachers learn skills in four areas: subject matter knowledge, pedagogical content knowledge, professional studies and teaching practice (Lewin, 2008). Watson et al. (2008) refers to three broad components of teacher education as content, pedagogy, and the practicum. Subject content refers to knowledge and understanding of school subjects. Student-teachers need to know what they are going to teach. Pedagogical content knowledge which are commonly referred to as 'methods courses' include teaching methods and ways of assessing learning. The term 'education courses' has been used instead of professional studies and covers an understanding of how children learn, how cognitive, affective, psychomotor and social development take place; knowledge and skills in classroom management and pastoral care; acquisition of professional identity as a teacher, awareness of relevant educational history, psychology, sociology, philosophy and legislation. Teaching practice involves working under supervision, initial periods of classroom observation, practice micro teaching with peers, and follow up discussions of school experience.

Literature is inconclusive on the relative importance of subject matter and pedagogy with some studies assuming that a graduate teacher's depth of content knowledge is very important (Grossman 1994), while others argue that a teacher's knowledge of the processes of teaching and learning is more highly related to quality teaching (Monk, 1994; Ferguson and Womack, 1993). Darling-Hammond (2000b) moves beyond this debate by arguing that both are interdependent, because any positive effects from a teachers' knowledge of their subject matter are augmented by knowledge of how to teach the subject to various kinds of students (Watson et al., 2008). Darling-Hammond (2000a) in her paper 'how teacher education matters' argues that despite longstanding criticism of teacher education, the weight of substantial evidence indicates that teachers who have more preparation for teaching are more confident and successful with students than those who have had little or none. My study looked at what student-teachers were learning, and what they valued most among the different components of teacher education curriculum, and why this was the case.

2.5 Models of teacher education

2.5.1 Models of teacher learning programmes

2.5.1.1 Categorizing systems and models of teacher education

Various criteria can be used for categorizing systems and models of teacher education (TE). Examples of such criteria are evident in institutional structures and elements of training programmes. Some teacher education programmes are targeted at particular stages of the educational system: pre-school, primary school, or secondary school. Further, models are characterised by who provides the training: colleges of education, or department of teacher education, or school of education within a university. Some programmes can be split between various departments or institutions. Garm and Karlsen (2004) examine teacher education reform in Europe by looking at trends and tensions in a global perspective using Norway as a case. They look at 2 pathways to the teaching profession. Prospective candidates can enrol in a teachers' college to become either primary teachers or lower secondary school teachers. Alternatively prospective candidates take university studies to become secondary school or adult education teachers. The later pathway is discipline-oriented, more specialized, and involves at least a one-year programme in educational theory and practice on top of an academic degree. In United Kingdom recent developments such as 'School Direct' have emphasised schools taking more control over teacher education. These reforms came to prominence after I had completed my fieldwork and so I was not able to take them into account and therefore have not covered them in this literature review chapter.

Kennedy (1997) describes programs in terms of their general organization, specifying the length of the two main components; theoretical courses and field experiences. The alternatives differ in terms of the extensiveness of the preparation offered, boundaries of responsibility, and location on the pre-service – in-service continuum.

In terms of organisation teacher education can be described as consecutive, concurrent or integrated models. In a consecutive model a student-teacher first obtains a qualification in one or more subjects, e.g. undergraduate Bachelor's degree, and then studies a further period to gain an additional qualification in teaching, e.g. postgraduate certificate in education. The student-teachers study academic disciplines first and then enrol for professional studies and teaching practice. In a concurrent model a student-teacher simultaneously studies both one and more academic subjects, and the ways of teaching that subject, leading to a combined Bachelor's degree and teaching credentials to qualify as a teacher of that subject e.g.

Bachelor of Science Education degree. The different components of TE are studied parallel to each other. In an integrated model the components are offered at the same time and professional studies, theory and practice are integrated. Each model has its own advantages and disadvantages. It has been reported that "the motivations for adopting one professional learning model over another are not always the same across differing contexts", Mtetwa and Thompson (2000, p. 311). The decisions could be "pragmatic", "philosophical", "curricular", "methodological, economic, and political considerations" (Mtetwa and Thompson, 2000, p. 312). My study compared and contrasted how the model at the University of Mashonaland was represented in documents like the prospectus, how lecturers and student-teachers described the model, and what happened as educational practice.

2.5.1.2. Theory and apprenticeship models

Researchers have discussed the tension between theory (or traditional) and apprenticeship models in teacher education (Hodkinson and Harvard, 1995; Garm and Karlsen, 2004). The craft or apprenticeship model (Zeichner, 1980) is shown below as **Figure 2.6**. In the craft model of teacher education "the wisdom of the profession resides in an experienced professional practitioner… the trainee learns by imitating the expert's techniques and by following the expert's instructions and advice" (Wallace, 1991, p. 6). The training procedure of the model is described as 'sitting with Nellie', where teachers are found learning their trade by working in schools alongside more experienced colleagues (Hodkinson and Harvard, 1995). The apprenticeship model puts emphasis on training and 'on-the-job' performance. In this model knowledge derived from practice is emphasized and utility is used as a criterion for validity (Garm and Karlsen, 2004). One criticism of the model is that teachers are perceived as technicians who need a *tool box* of skills. An issue here is that apprenticeship can lead to acquisition of skills without an understanding of the principles that underpin those skills. When the new teacher moves to a new context they have no basis for modifying the skills in an appropriate way. This could be overcome if experienced teachers discussed their rationales with the student-teachers, but experienced teachers are not in a context where they have to do this routinely so these discussions can be difficult and superficial. Thus, the major criticism of the model is that it tends to be conservative, and difficult to sustain where the educational context, methodologies and syllabus are rapidly changing (Wallace, 1991; Stones and Morris, 1972).
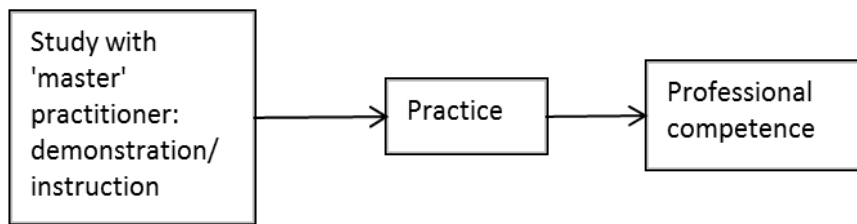
Figure 2.6: The craft model of professional development (Wallace, 1991, p. 6)

Different terms have been used in literature to describe the 'theory model' of teacher education, for example, the traditional model (Hodkinson and Harvard, 1995), the applied science model (Wallace, 1991), or 'technical-rationality' model Schön (1983; 1987). The model is shown as Figure 2.7 and emphasizes theory based knowledge (Gram and Karlsen, 2004). The model is based on student-teachers learning about educational theory in order to apply it in practice. As stated by Wallace (1991) "the whole issue of the practice of a profession is therefore merely instrumental in its nature" (p. 8). In the traditional model teachers are seen studying academic educational theory, alongside teaching practice in a higher education institution and could be viewed as a non-technician mode where teachers learn theory in order to interpret and criticize their own action (Eraut, 1989). In practice "the traditional model encouraged learning of theory as if it were fact... sometimes as a result of pressure of time" (Hodkinson and Harvard, 1995, p. 4). The traditional model is based on the assumption that knowledge is acquired during time spend at university, and when students are given opportunity to teach in the classroom the knowledge is used (Russell and McPherson, 2001). Those in support of the model argue that teaching problems can be solved by the application of empirical science (Wallace, 1991). If things do not work something is wrong with the scientific knowledge, however, change or new knowledge is the prerogative of the scientists and scholars who are experts in generating theory and not practitioners (Wallace, 1991). The main criticisms of the applied science model are that professional problems remain despite a proliferation of scientific knowledge, and the model downgrades the value of classroom practitioners. The tendency of experts to be at a distance from the classroom has resulted in separation of theory and practice.
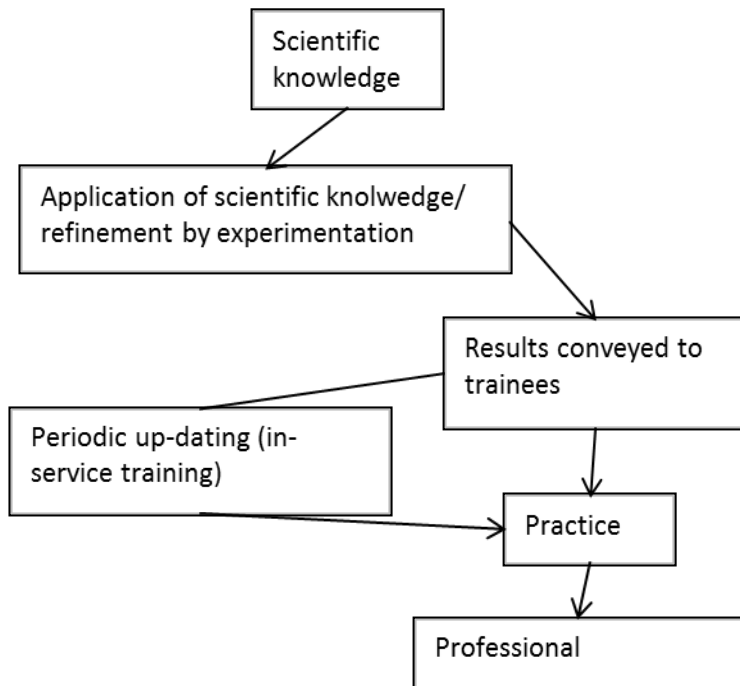
Figure 2.7: Applied science model of professional development (Wallace, 1991, p. 9)

A third model of professional development, reflective practice, attempts to overcome the main criticism of the applied science model discussed above because it considers both 'received knowledge' (Wallace, 1991), sometimes referred to as 'research-based theories and techniques' e.g. Schön (1983); and 'experiential knowledge' (Wallace, 1991). Schön (1983) labelled experiential knowledge as 'knowledge-in-action' which works in the space between theory and practice. See Figure 2.8.
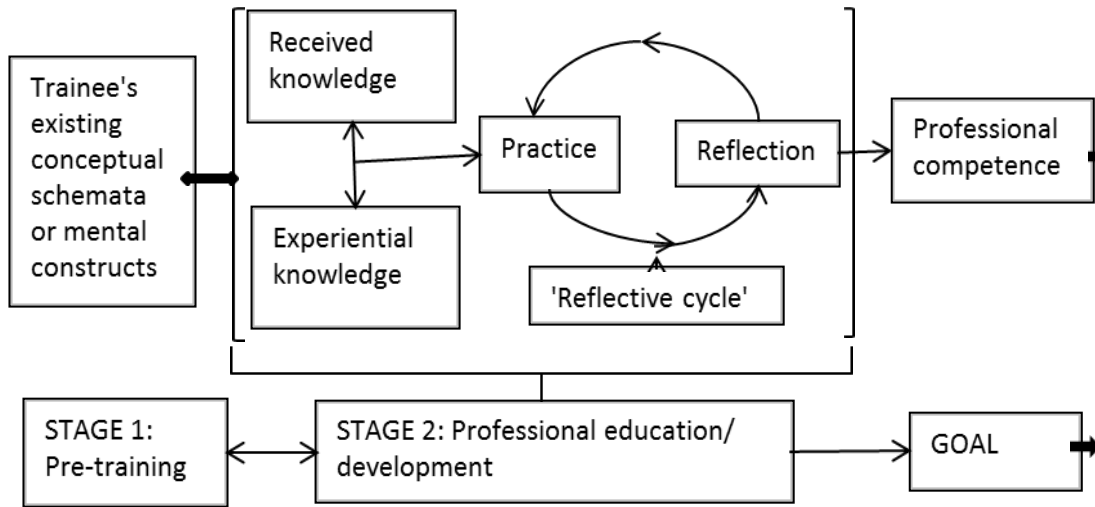
Figure 2.8: Reflective model of professional development (Wallace, 1991, p. 15)

2.5.1.3 Transforming academic models into professional approaches

The constructions about the relationship between theory and practice can be located in the history of teacher education the world over. As an example Laursen (2007) gives a historical perspective of the theory-practice gap using the Danish system in a report of a study of student-teachers' conceptions of theory and practice. In the 18th century, teacher education programmes were comprised of two main parts, an academic part taking place at teacher training colleges or universities and a practical part taking place at schools (Laursen, 2007). Student-teachers learnt subject matter knowledge and principles and methods of teaching, and later learnt how to practice the principles and methods (Laursen, 2007). Students knew theory as a product of other people's work. Such a straight-jacket relationship was based on the premise that there was one best way of teaching. Despite a gradual acceptance that learning contexts dictate the most appropriate method to use, and that the professional teacher must master multiple ways of teaching, the 20th century relationship could still be described as application of theory (Laursen, 2007). Teacher educators functioned as models that student-teachers were meant to imitate. The latter half of the 20th century was influenced by Tyler's (1949) objectives model and is consistent with the technical rationality model. The latest view is that theory and practice should be integrated but there seems to be no agreement on how it is best achieved, although numerous suggestions have been made, such as reflection, a social constructivist approach, and a 'realistic approach' (Laursen, 2007).

Student-teachers often dismiss academic research arguing that it is as neither practical, contextual, credible nor accessible (Laursen, 2007; Gore and Gitlin, 2004). Often educational theory is perceived as incomprehensible jargon by politicians and policy-makers, an esoteric ivory tower unrelated to the professional needs of teachers, and of inferior intellectual status in academia (Carr, 2005). Further, the impact of global market orientation in the national discourses is evident in the trends toward outcomes and external control, and "teacher education … narrowly focused upon measureable skills and professional training with less emphasis on broader educational issues" (Garm and Karlsen, 2004, p. 742). Initial teacher education institutions that have made efforts in transforming academic models into professional approaches report varying levels of success.

Yüksel (2008) examines conflict and controversy during the transformation from an academic approach to a professional approach in Turkish Teacher Education. On one hand, "academicians believe that general education and knowledge of the discipline should be required in order to be a teacher" (Yüksel, 2008, p. 369). On the other hand, "most teacher educators state that all teachers must acquire a common body of knowledge about teaching and learning" (Yüksel, 2008, p. 369 citing Cruickshank 1985). The controversy between the academic and professional approach in teacher education has been an on-going debate. Those who critique education courses argue that "student-teachers graduate without enough knowledge of subject matter", Yüksel (2008, p. 369). As Yüksel (2008) points out

> while Bestor (1953) claimed that education of future teachers should be done in the liberal arts and science faculties, Koemer (goes further to) argue that educational courses should be derived directly from academic disciplines and they should be taught by persons qualified to teach in the appropriate department of the same institution (p. 369).

Because teacher educators are often 'theorists' and not subject specialists the above cited argument explains why "education faculties... have relatively low status, were academically second-class, and received the lowest level of support of all programs on the university campus", Yüksel (2008, p. 369). The teacher education curriculum in Turkey shows the existence of the controversy between academic and professional approaches (Yüksel, 2008). In my study similar arguments and tensions could be represented within the Faculty of

Education where there are 'educational theorists' and 'science educators', between the Faculty of Education where student-teachers were learning professional courses and the Faculty of Science where the same students were learning subject matter knowledge.

Watson et al. (2008) describes the experiences of faculty staff at the University of Canberra in delivering content and pedagogy to pre-service teachers through 'Teaching Clinics' in school classrooms. They demonstrate the potential of professional education conceptualised by Furlong (2000) as providing expertise in teaching and learning grounded in teaching experience and professional practice. Most governments have directed providers of teacher education, like universities, to develop strong and enduring links with schools to underpin the provision of authentic professional learning experiences for pre-service teachers (Watson et al., 2008). University-school partnership models are examined in section 2.5.2.

Shulman (1998:15) argues that becoming a professional involves "acquiring a deep understanding of complex practice, of ethical conduct and higher-order learning which occurs in schools and classrooms". Sutherland, Scanlon and Sperring (2005) describe 'professional knowledge' as the successful integration of theoretical knowledge about the situational, emotional, cognitive, physical, cultural and organisational factors that interact and impact on students' learning in classroom practice. In order to develop professional knowledge, pre-service teachers need to reflect on and integrate the knowledge gained from practice with the theoretical knowledge provided by teacher education institutions (Watson et al., 2008):

> There is a strong case for professional experience to involve more than experiencing the norms of a typical classroom. Time spent in school should provide opportunities to engage with student learning, drawing on theoretical knowledge about teaching and learning, and reflecting on how theory can inform future classroom practice (p. 4).

Teachers who engage in professional development processes and activities often do so to enhance their knowledge, skills, and attitudes so that they might, in turn, improve the learning of students under their care (Guskey, 2000). Effective teachers need both an understanding of theory at 'generality' level, that informs decision making in contexts that might not be predictable in advance, as well as to be open to revising personal theories based on experiences they encounter in particular settings or 'real world specificity'. An understanding of theory and practice cannot be over emphasized.

Imants and van Veen (2008) characterize literature on teachers' professional development in terms of "views of learning (acquisition versus constructivism), designs (fragmented versus on-going and systematic), and opportunities (formal and informal, mandatory and voluntary, serendipitous and planned)" (p. 2). In their paper, Imants and van Veen (2008) argue that teacher learning in the workplace is complex and has problems and settle for a balance between individual and organizational learning, and also between off-site and onsite learning. They highlight one major drawback of teacher education, which is that the teachers do not claim ownership of their own learning and fail to sustain new practices in their classrooms. Imants and van Veen (2008) support the idea of treating teachers "as active learners and as agents in co-determining their working and learning goals, contents, processes and outcomes" (p. 10).

From the literature, the importance of theory is as a means to interpret and criticize teachers' own actions (Eraut, 1989), thus supporting the view that teaching is a multi-faceted activity where learning is on-going, constantly with new and unique situations. Teaching requires professional competence, experience, understanding and principles of procedures (Stenhouse, 1975). Others see teaching as an interpersonal activity, with personalities and relationships at its heart, meaning that different teachers teach in different ways (Hodkinson and Harvard, 1995). Student-teachers bring belief and value systems from 12-13 years of schooling. They use the already established mental structures to interpret, to understand, to predict events, objects, people and feelings (Hodkinson and Harvard, 1995) simultaneously filtering out unwanted information and thus limiting their ability to perceive situations in unfamiliar ways (Hodkinson and Harvard, 1995). Partnerships models of teacher education are based on the premise that both theory and practice contribute toward professional growth. Third generation activity theory is useful here because student-teachers need to understand the range of factors in different settings for example; subject, object and tools. They need input from university and school and there is therefore a problematic juxtaposition of systems – the issues explored by 3rd generation activity theory.

2.5.2 Partnership models of teacher education

2.5.2.1 Four partnership models

The term partnership encompasses different notions of collaborative working in a range of different contexts. In my study the partnership referred to is that between university as provider of ITE and schools as workplaces where teachers practise. Others have focussed on partnerships related to induction and continuing professional development. My study made reference to categorisation of partnership models as suggested by the Modes of Teacher Education (MOTE) project; Furlong, Barton, Whiting and Whitty (2000); Brisard, Menter and Smith (2005); and Mutton and Butcher (2008) who describe four partnership models namely: complementary, collaborative, university-led (HEI-led), and school-led.   The different models of partnerships show variations in the nature of the partnership, financial arrangements, number and type of institutions involved, focus of the partnership and the geographical extent of the partnership (European Commission, 2007). Models of partnership, it is said, are not static and tend to adapt themselves to the changing landscape of teacher education (Brisard et al., 2005) due to factors like the introduction of employment-based routes and changing contexts.

2.5.2.2 The Oxford Internship Model (OIM)

In England one 'collaborative' partnership model is the Oxford Internship Model (OIM) (Benton, 1990) where the student-teacher's activities were jointly planned and delivered by school and the Higher Education Institution (HEI) working together in an integrated fashion (Mutton and Butcher, 2008). The division of labour in the model was based on what the university and the school were best placed to do. The partnership was aimed at the university teaching the general ideas because its purpose was to generate knowledge, and to debate broad issues such as national values. On the other hand the school as a particular case was left to teach the specific because it knew best what parents value, what resources are available and the curriculum. The OIM was "a one year postgraduate programme for intending secondary school teachers, operated in partnership between the University of Oxford, Oxfordshire Local Area Authority (LEA) and its secondary schools" (McIntyre and Hagger, 1992, p. 265). Typically each school had 10 interns throughout the year (October to June) and the programme was jointly planned by mentors and curriculum tutors making it a closely integrated school-university partnership. Interns were provided with a secure learning environment and recognized as adult learners capable of setting their own agenda. The OIM was not aimed at consensus, rather

just as the contrasting perspectives of teachers and tutors (were) to be valued as providing different kinds of knowledge, so frequently contrasting opinions to which these different perspectives must lead (was) not an embarrassment but a valuable resource (McIntyre and Hagger, 1992, p. 268).

It was centred on testing ideas that seemed valuable. The OIM model had dual purposes for certification and professional development, as needed by student-teachers, and potential to address needs of practicing teachers. Lastly the OIM provided opportunities for contextualised study of school and system policies and practices. The OIM was a 'collaborative model'. However "findings from Modes of Teacher Education (MOTE) project indicate that what was actually in place was an 'HEI-led model' with a top down approach characterised by a teacher training curriculum and its related processes that are directed by the university" (Mutton and Butcher, 2008, p. 46). The key feature of the university role is quality assurance (Mutton and Butcher, 2008). The OIM model exemplifies a partnership with benefits to all partners.

2.5.2.3 The Exeter Model of University-Schools Partnership

The Exeter Model of University-Schools partnership is a model of cognitive apprenticeship that is informed by theories of socio-cultural constructivism, situated learning, communities of practice and reflective practice. These theoretical frameworks are evident in the structure and learning activities. The partnership as a community of practice is made up of trainee, university subject leader, university personal tutor, university visiting tutor (UVT), principal subject tutor (PST), mentor and Initial Teacher Education Coordinator (ITEC) who all have a clearly defined role. The model recognizes the importance of Vygotsky's zone of proximal development and scaffolding provided by tutors and mentors. The model also recognizes the uniqueness of each school. Reflective practice is pivotal and trainees are required to analyse their practice and articulate their own understanding through conversations and discussions with tutors, mentors and colleagues. They reflect upon educational theories, research and professional contexts. In order to help trainees, the University of Exeter provides the following tools:

- a framework for dialogue about teaching,

- formative reflections on achievement and progress (FRAPs),

- demonstrations by teachers,

- lesson observations of trainee by teacher,

- lesson observations by visiting university tutor,

- agendas,

- weekly development meetings, and

- supervisory conferences with mentor and critical reflection (Skinner, 2010).
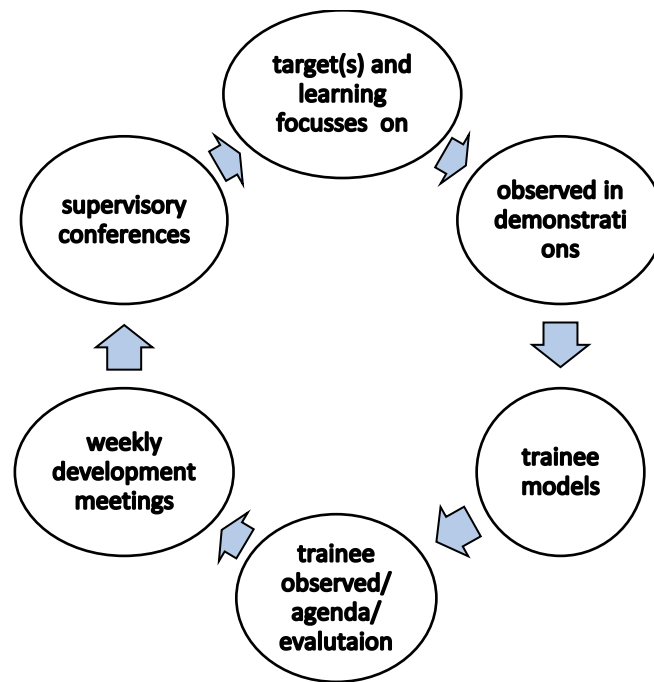
Figure 2.9: Training cycle in school (The University of Exeter Model)

The University of Exeter Model of teacher learning is fully integrated. Each term trainees participate in university-based learning, school-based experience, and reflect on their understanding of theory and practice. Two things make this model unique: agendas and supervisory conferences. Student-teacher's own learning is formalised through an 'agenda' linked to an 'episode' of a lesson. An agenda is used to expose specific elements of student-teacher's teaching to detailed, and explicit analysis. There is space for an observer, usually class teacher, to annotate where plan of the episode is followed and where there is deviation. The annotated agenda is used as a basis for reflection on the outcomes and later for detailed evaluation. Annotated agendas form an important part of the evidence that student-teacher will present during supervisory conferences with their mentor in the school. The student-teacher chooses the focus of the conference, and therefore takes a leading role of their own progression. The University of Exeter model is important in my study because it exemplifies how socio-cultural theories and reflective practice in particular can be used. In the next section *2.5.2.4* the current university-schools partnership model in Zimbabwe is discussed, compared and contrasted with the models discussed above, especially how contextual factors shape the model.

2.5.2.4 The current university-schools partnership model in Zimbabwe

The current model of university-school partnership at UoM could be described as HEI-led partnership. The classroom is seen as the best place to learn to teach (Chiromo, 2007) where student-teachers are afforded opportunities to develop various competences (Zindi, Nyota and Batidzirayi, 2003). The university uses schools as 'laboratories' to put theory into practice, and demonstrate teaching competences. The university provides detailed guidelines of what student-teachers do, and spell out the kind of support they expect schools and teachers to give. The role of lecturers is to assess student-teachers using university criteria and guidelines, and experienced teachers are expected to act as mentors. Such an arrangement tends to leave teachers unsure and less confident of how to help the student-teachers, because the students know much more about UoM expectations than the experienced teachers. However, on paper, the school-based experience is described as a 'smart partnership' involving the university, the school, the community, and the student-teacher (ASE Handbook, 2010). Student-teachers are expected to perform all duties as prescribed by school heads and any other senior member of staff (ASE Handbook, 2010), and often find themselves filling in gaps created by teacher shortage (Mtetwa and Thompson, 2000; Ndawi, 1997; Maravanyika, 1990). The idea of teaching practice – where student-teacher assumes full teaching responsibilities, as opposed to school experience – where student-teacher is supernumerary to the host class teacher, was pioneered in Zimbabwe through the Zimbabwe Integrated Teacher Education Course (ZINTEC) – a teacher education model for primary school teachers (Ndawi, 1997; Maravanyika, 1990; Chivore, 1988). Similarly, student-teachers training to become secondary teachers were given full teaching responsibilities for the duration of their school experience (Nyaumwe and Mtetwa; 2011). The current university-school partnership model is informed by socio-cultural theory, reflective practice and constructivist teaching approaches. Student-teachers are encouraged to observe experienced teachers and get support from mentors, and to provide evidence of reflective practice in records they keep; and to this extent show similarities with university-school partnerships elsewhere. The Zimbabwe model compares favourably with both OIM and Exeter model discussed earlier. However contextual factors makes the Zimbabwe model show marked variations from the other two. The current university-school model of partnership in Zimbabwe is unique in the student-teachers potentially can assume full teaching duties, especially where shortages of qualified teachers exist. Literature on how contextual factors influence student-teachers' learning during school experience are discussed in section *2.7.2.4*.

The literature is inconclusive about how school-university partnership works. However, looking at examples of the models provides insights into how the partnerships ought to work.

2.6 Motives for becoming a teacher

Knowing student-teachers' motives for becoming a teacher is essential because motives are important determinants of engagement. Motives shape behaviour and attitudes. For most prospective student-teachers the decision to become a teacher is difficult. However prospective teachers are driven by numerous motives and these are discussed below using literature from Europe, Asia and Africa.

Andrews and Hatch (2002) examined the justifications given by serving teachers of secondary mathematics for their decisions to become teachers in two regions of England. They interviewed teachers about their professional life histories and analysis revealed five categories of response: people became teachers as a consequence of their experiences of mathematics as learners, a desire to work with people, a sense of inevitability, a serendipitous life event or a desire or need to change career. Andrews and Hatch (2002) argue that there is evidence to show that teachers' professional motives fall into three categories: altruistic, intrinsic and extrinsic. They define an altruistic motive as seeing teaching as "a socially worthwhile act related to a desire to facilitate the development of both the individual and society at large" (p. 185). On one hand an intrinsic motive "includes, inter alia, a person's desire to work with children or their subject specialism", and on the other hand, "an extrinsic motive pertains, for example to salary, conditions of service, holidays or status" (p. 185). Literature used by Andrews and Hatch (2002) show that "the evidence derived from different groups of serving and pre-service teachers, indicates that intrinsic factors dominate teachers' professional motives with, in general, extrinsic and altruistic motives less frequently mentioned as significant factors in career decisions" (p. 186). Andrews and Hatch's (2002) findings reveal that "while there are clear resonances with other studies of teachers' and prospective teachers' professional motives, (their) evidence suggests that the career motivations of many teachers of secondary mathematics fall outside existing descriptive frameworks", suggesting cultural differences.

Hobson and Malderez (2005) carried out a six-year longitudinal study of beginner teachers' experiences of initial teacher preparation and early professional development in England and

report preconceptions and concerns (p. 60). They reported that many student-teachers enter initial teacher preparation with an orientation to their own learning of teaching, and with a number of concerns, relating particularly to workload, pupil behaviour and personal finances.

Bruinsma and Jansen (2010) investigated pre-service teachers' intrinsic and extrinsic motivation for becoming teachers in the Netherlands and focused on the distinction between adaptive motives which promote lasting and effective engagement, and maladaptive motives, which promote superficial engagement. Bruinsma and Jansen (2010) found out that "pre-service teachers with intrinsic adaptive motives were more positive about the quality of the teacher training programme and about their experiences in the teacher training programme" (p. 198). They established that "pre-service teachers with extrinsic adaptive motives were more positive about their early classroom experiences... but indicated lower teacher self-efficacy". Bruinsma and Jansen (2010) also found out that "positive perceptions of quality and positive teaching experiences during traineeships were positively related to the decision to remain in the profession" (p. 198).

Another study in the Netherlands, by Canrinus and Fokkens-Bruinsma (2011) "provides insight into the change that and is not present after a year of teacher training in pre-service teachers' motivation to become a teacher, their professional commitment, and their self-efficacy" (p. 2). They found out that "the pre-service teachers' change in motivation, professional commitment, and self-efficacy appeared to be unrelated to perceptions of their learning environment" (p. 2).

Literature shows consensus that teaching is popular in Finland, where teaching is a prestigious career (Lopez, 2012; Sahlberg, 2010). According to Sahlberg (2010) wages are not the main reason young people become teachers in Finland. Rather the following reasons are more important than salary; high social prestige, professional autonomy in schools, and the ethos of teaching as a service to society and the public good. Malaty (2006) reports the 5 main reasons behind the success of Finland in Programme for International Study Assessment. Among reasons stated by Malaty (2006) is keeping the level of teacher education high and being able to recruit motivated students. Most nations fail to attract the best candidates into teaching.

Chan (2004) carried out a survey, in Hong Kong, of "in-service teachers' motives, perceptions and concerns about teaching" and identified three motives for choosing teaching as a career; influence from others, intrinsic/altruistic, and extrinsic/job conditions" (p. 66). Chan (2004) found out that teachers studied demonstrated a higher proportion of 'concern for pupils' than 'concern with self' suggesting they had progressed to a higher stage of professional development" (p. 69). The participants were enrolled in a "two-year part-time postgraduate diploma of education (PGDE) and a three-year mixed mode bachelor of education (MMBEd)" (p. 60).

Low, Lim, Ch'ng and Goh (2011) studied student-teachers' reasons for choosing teaching as a career. This study was conducted at a university in Singapore. They found out nine reasons for choosing teaching as a career, and that only four accounted for more than 80% of the reasons (love for children/young people, interest in teaching, to fulfil a mission, and job factor/fit). Low, Lim, Ch'ng and Goh's (2011) concluded that "the need to fulfil basic needs (extrinsic factor) did not feature high in order of reasons for coming into teaching; rather, the altruistic and intrinsic factors account for most of the reasons", (p. 69).

Studies of motives for becoming teachers use different expressions. Some examples are motives, teacher motivations and incentives (Towse et al., 2002; Mulkeen et al., 2007; Chireshe and Shumba, 2011), adaptive and maladaptive motives (Fokkens-Bruinsma and Canrinus, 2012); perceptions and aspirations (Watt and Richardson, 2008; Sinclair, Dowson and McInerney, 2006; Hobson and Malderez, 2005; Chivore, 1988; 1986). Chivore (1986b) investigated perceptions of and attitudes of form IV pupils towards teaching profession in Zimbabwe. Chivore (1986b) revealed that for those pupils who wanted to become teachers "the main reasons given were job security, relatively good salaries, promotion prospects, and convenient holidays" (p. 247). Further, Chivore (1986b) reported that for those who did not want teaching, the main reasons were "low salaries, poor housing conditions, too large classes, heavy teaching loads, unequal conditions of service among teachers, and few promotion prospects" (p. 247). Form IV pupils showed concern with remuneration, benefits and working conditions; pupils satisfied with what teaching could offer wanted to become teachers where as those who felt otherwise did not want to become teachers. Form IV pupils expressed concern for self and did not mention reasons showing concern for learners. Low salaries and poor working conditions are the main reasons pushing out potential candidates

from teaching profession in Zimbabwe (Chireshe and Shumba, 2011; Marist International Solidarity Foundation, 2011; Chivore, 1988; Chivore, 1986b).

Prospective student-teachers hold beliefs about teaching and learning that may influence and shape motives. Literature suggests cultural differences in motives to become a teacher e.g. in Finland teaching is a very high status profession so there is much competition for places. In other countries and contexts (including Zimbabwe I expect) teaching is not a high status profession and so it is often a 'second choice' profession. In other situations (I think the UK fits here) the situation is between the two – some people see it as a first choice 'vocational' profession; others may see it as second best. In contexts where there is economic stress and industries closing down because of political problems teaching is seen as a 'stable' career and thus more sought after. My study attempted to establish whether this was the case in Zimbabwe by seeking why student-teachers chose teaching.

2.7 Factors that influence learning to teach in various settings

In this section learning to teach is examined as an activity that occurs in different settings and shaped by various factors.

2.7.1 What are settings?

To gain an understanding of 'settings' the study examined Edwards' (2005) distinction of settings, domains and sites. Edwards (2005) defines learning domains as educational institutions and other structured learning opportunities wherein people are held to learn. He gives examples of learning domains as the workplace, the home and community. Edwards (2005) further makes a distinction between domains and sites by saying sites are specific and found within domains. These are learning contexts distributed across the social order and embedded in social practices for example Internet, library and lecture room. Edwards (2005) believes learners move in and between the domains, carrying aspects of their learning and identity. While learning occurs across a range of domains and sites, the learning is situated or contextualized. Sometimes pedagogic approaches may seek to bind the learning and the learner within 'spaces of enclosure' of the lecture room, the book, and the curriculum (Edwards, 2005). When this happens learning from one site is not necessarily realized as a resource in other sites by either the lecturers or student-teachers (Edwards, 2005).

Learning to become secondary teachers occurs in many settings, one such site being the university where the dominant culture is concerned with understanding and developing *theory,* and is therefore best placed to support student-teachers in gaining an understanding of general practice and theory (Hodkinson and Harvard, 1995). Another site is the school where the dominant culture is the day to day support of pupil learning and where rapid decision making is necessary, and is best placed to support student-teachers in developing *practice* (Hodkinson and Harvard, 1995).

2.7.2 A global view of factors that influence learning to teach

Postlethwaite and Haggarty (2010) put social factors that shape learning to teach into three clusters; characteristics of *subjects* (student-teachers, their mentors and their teachers), learning sites/*contexts*/settings (university and school), and boundary crossing (movement between different contexts). As mentioned earlier to understand *subjects* one needs to consider their background and histories, dispositions, and identity. Synergistic and contradictory factors are encountered in boundary crossing, and tend to create *restrictive* and *expansive* learning environments. In workplace learning student-teachers encounter restrictive and expansive learning environments in classrooms and schools (Hodkinson and Hodkinson, 2005). *Expansive* environments support learning whereas *restrictive* environments attenuate learning. The notions of *habitus* and *field* are useful to illuminate contexts' histories, power relations, and values (see also section 2.3.5). Other factors to consider are the *motives* of the student-teachers (see section 2.6), and the kind of tools and support available for learning.

Hoban (2003) looks at classroom factors that influence learning e.g. the curriculum, resources available, socio-economic background of learners, and ways of learning. To Hoban's (2003) list of factors one can add Biggs' (1993) interacting ecosystems of student-teachers, lecturers and teaching contexts. Tom (1997) identified ten issues that were problematic in teacher education that can be reduced to three; fragmentation of courses, relationship between theory and practice, and social-cultural influences (Hoban, 2003).

A possible reason why student-teachers abandon new ideas learnt is discontinuity between university courses and school practice (Tom, 1997), and another is "lack of communication

between universities and schools in regard to mentoring of student-teachers in practicum" (Hoban, 2003, p. 4). Lewin (1992) has suggested four reasons why this is so; familiarity and convenience, cultural origins, resource constraints, and lack of change in attitudes assessed. By 'familiarity and convenience', Lewin (1992) means that student-teachers do not teach the way they are trained to teach but they teach the way they were taught, and the way teachers teach because this is how they have come to understand teaching and learning. Further, student-teachers did not try out new ideas but used the 'tried and tested' methods because they do not see need for change when teachers are using methods that are effective in maintaining pupils performance in examinations. Now if student-teachers are not going to be change agents, why bother them with new ideas? The need for change and to adopt new ideas comes from pressure to meet learning needs, to use appropriate pedagogies and motivate teachers to organise practical work for their pupils (Lewin, 1992).

Economic and political crises impinge on quality of teacher education because often this results in lack of funding for education in a country; de la Sablonniére, Taylor, Perozzo, and Sadykova (2009) raised this point when describing the challenges of applying a student-centred approach to learning in Kyrgyzstan formerly part of Soviet Union. In Kyrgyzstan there was social pressure to teach differently and promote efficient learning. Budget cuts have also been reported in the United Kingdom, for example, Haggarty and Postlethwaite (2003), who conducted an action research at one school reported that "throughout the work of Effective Learning Group (ELG) the school faced budget cuts and this in turn led to threatened staff redundancies, staff losses and increased class sizes" (p. 427). In their study, Haggarty and Postlethwaite (2003) found out that teachers filtered out some contextual factors to attend to in order to reduce complexity (Shavelson, 1983). At times teachers point out to their abilities and motivation as problematic (Haggarty and Postlethwaite, 2003; de la Sablonniére, Taylor, Perozzo, and Sadykova, 2009). "Task difficulty" was caused by the constraints imposed on teachers by the macro system of policies and resources (Haggarty and Postlethwaite, 2003; p. 430). Teachers take personal responsibility, perhaps to avoid conflict with management who controlled the resources (Haggarty and Postlethwaite, 2003). In order to understand teachers' trajectories of professional development the context is important because contextual factors, for example, lack of resources tend to shape how new ideas are adapted. An element of escapism cannot be ruled out; where teachers who do not want to change or to learn new things complain of external demands, reduction in resources and shortages of time (Haggarty and Postlethwaite, 2003) resulted in need for retrenchment, a

falling back on the familiar ways of teaching in order to complete the course on time and to 'survive' (Haggarty and Postlethwaite, 2003, p. 433).

In Africa teachers were not able to conduct practical work because of inadequate equipment and materials, textbooks and facilities (Bhukuvhani et al., 2010; Czielsk and Barke, 2003; Ndirangu, Kathuri and Mungai; 2003). The situation was made worse by the fact that, "student-teachers leaving the college with bachelor degree are educated in Chemistry but they are not trained to conduct practical work in chemistry in secondary schools" (Czielsk and Barke, 2003, p. 92). Teachers in Africa were not well trained in the use of appropriate pedagogies (Czielsk and Barke, 2003) and lacked confidence to demonstrate or supervise practical work (Ottevanger, de Feitter and van der Akker, 2007). Worley and Owen (2013) report successful practical work in challenging circumstances of Uganda. One possible solution to overcome lack of equipment in laboratories is teaching (student) teachers basic workshop skills that they can use to safely improvise suitable equipment for use in their own school environment (Worley and Owen, 2013). Student-teachers learn to use virtual experiments (Bhukuvhani et al., 2010). However, when student-teachers get to schools and find out that there are no teachers used to improvising and virtual experiments because of lack of basic tools and workshops, they do not use skills gained during training.

2.7.3 A local view of factors that influence learning to teach

In section 1.3.1 the highlights of the Zimbabwean context were discussed and section *2.5.2.4* examined the current university-school partnership model. Zimbabwe has been experiencing political, economic and social challenges since the turn of the century. Literature exists, revealing impact of war and political instability on education in general and specifically teacher education, for example, Save the Children UK (2010) and O'Connor (2014). Conflict is not restricted to Zimbabwe. Examples of cases demonstrating politicisation of education in conflict affected countries are Afghanistan, Colombia, Democratic Republic of Congo, Coted'Ivoire, Iraq, Nigeria, Somalia, and South Sudan (Save the Children UK, 2010). Section *2.7.2.4* examines the contextual factors and how these might influence education in general and specifically teacher education in Zimbabwe.

The period after 2000 has been characterised by political instability as evidenced by increased torture and violence towards elections. The politicised environment impacted on

teacher education in numerous ways from rights and freedom to allocation of resources and relationships among key stakeholders. People feel insecure and conducting research in teacher education means some respondents can deliberately obscure facts in order to protect themselves. Political instability during the pre-election period of 2008 led to the disruption of learning as schools became contested terrain (Association for the Development of Education in Africa, 2012). Often resources are diverted from core social activities like education reducing the quality of teaching and learning.

Political instability and mis-governance resulted in economic decline. Zimbabwe witnessed economic mismanagement, for example, undermining property rights. In an effort to counter the cut-off international aid, the country printed money and this led to hyperinflation. The purchasing power of individuals fell, there were shortages and lower salaries in real terms. The hyperinflation experienced adversely affected provision of education evident in lack of learning materials, textbooks and supplies. The country experienced brain drain and lost over 20,000 teachers (Association for the Development of Education in Africa, 2012), and these were replaced by underqualified teachers. Similar losses of qualified and experienced educators were witnessed in higher education institutions, as well as a general lack of learning materials. The lack of internet facilities was worsened. Further, students were struggling to pay fees, and HEI administrators resorted to withholding certificates as a way of dealing with high levels of defaulting on fees (Association for the Development of Education in Africa, 2012). Attendance tended to be erratic reducing contact and learning time.

Both political instability and economic decline impacted on social services. In education inadequate maintenance and replacement of infrastructure, lack of teaching and learning materials and equipment (ADEA, 2012) was reported as having a potential to decrease quality of teaching and learning. The Zimbabwe Council for Higher Education Act (ZIMCHE) 2006 was put in place to regulate education provided by institutions of higher education and maintain standards of research, teaching and learning, and assessment (UNESCO, 2008). This is not unique to Zimbabwe because the establishment of national councils of higher education has occurred in other African countries, e.g. Uganda (Bunoti, 2011). Lack of adequate resources, for examples, computers and ICT infrastructure was reported by UNESCO (2008) to be a hindrance to achieve the Public Service Commission directive in Zimbabwe that all graduates of tertiary institutions must be computer literate by the time they complete their training or education. Student teachers completed their training

without attaining the required computer literacy. Various factors influence learning to teach, and when these are negative tend to attenuate the kind of learning that occurs. For this reason it was important in my study to find out what contextual factors existed in Zimbabwe and how these influenced learning to teach as reported by lecturers and student-teachers. Now, as a way of summarising this review of related literature, the gaps in the literature worth investigating are now suggested.

2.8 Gaps worth investigating

The literature reviewed suggests that the places of educational theory and practice in teacher education are not contestable. It remains worthwhile; however, to investigate how, for example, the Zimbabwe context determines the contribution of theory and practice.

Zimbabwe was going through difficult times and represented context of a failed state. The research questions are being asked within the context of a troubled society, making the study important because of need to understand how education systems cope in troubled times of unrest/upheaval, little funding and shortages, and uncertainty.

Given the reality of the last 15+ years of being a failed state, and given the reality that things are not going to change enormously in the next 10-20 years, so what can we find out about teacher education in troubled times? What can we do to potentially help develop the teacher education system over these difficulties being faced and what model can work?

Literature suggest that learning to teach occurs in several settings predominantly university, school and boundary crossing between the two. It is interesting to investigate what happens in these settings, and how learning in one setting supports, contradicts and creates tensions with learning in other settings.

In situations characterised by teacher shortages, as has been the case in Zimbabwe, school administrators often give student-teachers full responsibility to act as experts and expect them to maintain standards of their students' performance in public examinations. It is interesting to ask what kind of resolution is possible here and how student-teachers meet the expectations of university despite being full time teachers; whether lecturers and student-teachers see these as opportunities for dialectical interaction between idealised practice learnt

at university and real practice encountered in school, and capable of encouraging professional development occurring in different contexts (Smith, Brisard, and Menter, 2006). Student-teachers and lecturers are actors in various activity systems in different settings where the object is learning to teach, and for this reason activity theory was used to inform my study.

Learning to teach is a complex phenomenon and what is learnt and how it is learnt might be described as situated. Student-teachers' and lecturers' actions are guided by the beliefs they hold about teaching and learning. Secondly lecturers occupy positions of influence, which determine what student-teachers were likely to learn. Studies of learning to teach that look at reflective practice and activity theory tend to be action research studies, whereas some researchers study their own students and courses such as, for example, Postlethwaite and Haggarty (2010), and Wilson (2004). Resemblance with my study is that my focus was on teacher education programme in an institution where I formerly worked as a lecturer, but differs in that during the study I was an 'outsider' because I was not employed by the university. Power relations in my study differ from those in action research.

2.9 Research questions

The goal of my research was to find out student-teachers' and lecturers' perceptions of the complexities of the ways students learn to become secondary teachers. The main objective was to interpret student-teachers' and lecturers' perceptions of learning experiences in different settings and how ideas are reconstructed as students pass from one setting to another. The other objective was to interpret student-teachers' and lecturers' perceptions of changes of students at different stages of training. Student-teacher learning is a complex phenomenon and what is learnt and how it is learnt might be described as situated.

The study was guided by the following research questions
1. What are the student-teachers' and lecturers' perceptions of students' motives of becoming secondary teachers?
2. What are the student-teachers' and lecturers' perceptions of the activities that take place in different settings as student-teachers learn to think and act as teachers?
3. What are the student-teachers' and lecturers' perceptions of the factors shaping learning in and across these settings?
4. How do these factors in and between settings shape student-teachers' learning?

5. What are the student-teachers' and lecturers' perceptions of changes in student-teachers' attitudes, knowledge and skills at different stages of the teacher education programme?

The study was interpretive, largely informed by social constructionism epistemology, and used a qualitative case study methodology. It took the stance that social phenomena are constructed by the participants and the researcher, hence the notion of multiple realities. The story told is but one of many possible realities; others could reveal various alternate meanings and report stories different from that reported here, each illuminating learning to teach from a new positioning. As the study sought answers to research questions, further questions emerged. The aim was to understand learning to teach from the student-teachers' and lecturers' perceptions. The story created and told is my interpretation of the perceptions.

2.10 Summary of review of related literature

The chapter started by looking at why the terms 'teacher education' and 'professional development' were used to describe learning to teach. This was followed by examining socio-cultural theories like cognitive apprenticeship, socialisation, situated learning, activity theory and reflective practice. Learning to teach is a complex phenomenon and what is learnt and how it is learnt might be described as situated. The contribution of reflective practice lies firstly in challenging existing assumptions and beliefs, and secondly as a mechanism for transformation to ensure that practice produces new learning rather than merely conforming to existing understanding and position(ing)s.

The chapter also looked at perspectives of learning to teach and models of teacher learning in order to understand what learning to teach entails, where it occurs, and how it can be structured. In another section partnership models in initial teacher education were examined. Student-teachers' learning was often guided by their motives. It also examined motives of becoming a teacher, particularly as pre-conceived teaching ideas which need to be confronted and transformed into alternative teaching ideas. Further potential factors inherent in various contexts were discussed and how these influenced learning to teach.

At the end of this chapter I have stated my aims and objectives and research questions. In the next chapter I discuss methodology, methods, and data explication strategies.

3 CHAPTER III: RESEARCH METHODOLOGY AND METHODS

3.1 Introduction

To understand the contribution of theory and practice to learning to teach at secondary school, this study sought student-teachers' and lecturers' perceptions to answer the following research questions:

- What are the student-teachers' and lecturers' perceptions of students' motives of becoming secondary teachers?

- What are the student-teachers' and lecturers' perceptions of what goes on in the different settings as student-teachers learn to think and act as teachers?

- What are the student-teachers' and lecturers' perceptions of factors in and among these settings?

- How do these factors in and between settings shape student-teachers' learning?

- What are the student-teachers' and lecturers' perceptions of changes in student-teachers at different stages of the teacher education programme?

The questions guided research methodology and methods.

This chapter examines the philosophical assumptions of the interpretive research paradigm, qualitative case study methodology and strategies used to gather data and interpret meaning of the learning to teach phenomenon. Issues of rigour and how to address these are discussed. The research design and type of data required determined the choice of methods and techniques (Bogdan and Biklen, 1992).

The chapter reports data collection procedures, data analysis, and the limitations experienced. To gather participants' perceptions of learning to teach the study used interviews, biographical questionnaires and document analysis. The choice of interpretive research and qualitative case study methodology shaped the research process. Transcribed interviews were used to produce texts from which perceptions were interpreted. Other useful texts were documents such as 'Applied Science Education Student Handbook'. A questionnaire was used to gather information about gender, age, areas of specialism and work experience.

3.2 Research Design

3.2.1 Research paradigm

3.2.1.1 Interpretive research

The paradigm employed in this study is interpretivist-constructivist, and relies upon participants' views of the phenomenon (Cresswell, 2003) of learning to teach. Accordingly truth is relative and dependent on one's perspective. The constructivist paradigm is built upon the premise of social construction of reality (Searle, 1995). The interpretivist/constructivist researcher tends to rely upon the "participants' views of the situation being studied" (Creswell, 2003, p.8) and recognises the impact on the research of their own background and experiences. The constructivist researcher is most likely to rely on qualitative data collection methods and analysis or a combination of both qualitative and quantitative methods (mixed methods).

The study assumed that understanding perceptions befits the philosophy, strategies and intentions of the interpretive research and views knowledge as a social construction, and multiple constructed realities (Crotty, 1996). The goal was to interpret the descriptions of the social world of learning to teach and reveal new knowledge emerging from the interactions between the researcher and 'researched' (Creswell, 1998). In the study the element of subjectivity was valued, and the research was shaped by values embedded in the questions asked, values held by the researcher, and the ways meanings were generated, negotiated and interpreted (Ajjawi and Higgs, 2007).

3.2.1.2 Social constructionism

This study investigated student-teachers' and lecturers' perceptions of learning to become secondary teachers. Studying perceptions using conversations, and then interpreting the emerging messages can be understood by examining social constructionism;

> the view that all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted in an essentially social context (Crotty, 2003, p. 42).

Meanings are constructed by people as they engage with the world they are interpreting (Crotty, 2003), both the 'subjective' and the 'objective' need to be brought together. Social constructionism is "social construction of reality" (Crotty, 2003, p. 54) and "all meaningful reality is socially constructed" (Crotty, 2003, p. 55), for example, a chair is a 'chair' "only if conscious beings construe it as a chair" (Crotty, 2003, p. 55). The word 'social' describes the mode of meaning-making, not the object.

Social realities are meaningful by virtue of the act that brings them into existence (Crotty, 2003). Social constructionism is "double hermeneutics or interpretation at two levels" (Giddens, 1976, p. 79). One needs to understand the frames of meaning at one level of interpretation like laymen's frames of references in everyday life, then at second level of interpretation to reconstitute these frames in new frames of meaning in the social scientist's world (Crotty, 2003).

Social constructionism is relativist because 'the way things are' is really just 'the sense we make of them', and "historical and cross-cultural comparisons should make us very aware that, at different times and in different places, there have been and are very divergent interpretations of the same phenomena", Crotty (2003, p. 64). Therefore, when we describe something we are, probably, "reporting how something is seen and reacted to, and therefore meaningfully constructed, in a given community", Crotty (2003, p. 64). We describe the real phenomenon and at the same our descriptions constitute our ideas of the phenomenon.

The study reported here looked at initial teacher education as professional development, and sought to understand learning to become secondary teachers through the voices of student-teachers and lecturers. The student-teachers were the best source to establish what they learnt. The study also assumed that lecturers understood what student-teachers learnt, and, it is hoped, by gathering their perceptions factors that shape effective teacher training could be understood and alternatives that were, probably, to be accepted by actors suggested. For these reasons, the study used the qualitative case study methodology described below.

3.2.2 Qualitative case study research methodology

3.2.2.1 Why qualitative case study methodology

The study employed qualitative case study methodology and methods. Qualitative research as defined by Creswell (1994) is

> an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed from words, reporting detailed views of informants, and conducted in a natural setting (p. 1).

Strauss and Corbin (1990) define qualitative research as "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" (p. 17). The term *qualitative* is used to refer to research discourse at two levels; one level being the paradigm describing the nature of knowledge and the second level being methods, that is, how data are collected and analysed (Mackenzie and Knipe, 2006). In this study, qualitative methods were considered most appropriate in reporting and interpreting participants' perceptions (Grundy, 1983) of what goes on in various settings as student-teachers learn to think and be teachers; the factors in and among these settings, and development of student-teachers' ideas. To show the potential of qualitative case study methodology ontological, epistemological and methodological assumptions were examined.

The focus of my study was to collect descriptions of 'lived experience' of learning to teach and stimulate participants to reflect on learning encounters, to gather synergistic and contradictory factors and how these shaped learning that occurred in various settings, and to describe the student-teachers' development of ideas that occurs. The main data collection method was the interview based on the premise that interviewing allowed both participants and I as researcher to share experiences of learning to teach and provide detailed accounts of these perceptions. Interpretations of the conversations led to an understanding of perceptual structures of the participants. My assumption was that participants in this study could describe, in detail, their perceptions of learning to teach.

The case or unit of analysis was the teacher education programme at a university in Zimbabwe as perceived by student-teachers and lecturers. Before embarking on this study I had worked at the university in the department of education, from where I came to know some potential participants and various teacher education models including the one studied. I was aware that my knowledge of the history of the programme studied was going to influence interpretation of participants' perceptions, and proceeded knowing that a qualitative case

study methodology is geared toward collecting and analysing data in ways that engage history and prejudice (Laverty, 2003). Qualitative researchers use "unstructured interviews in which only open ended questions, if any, are asked" and make every effort to ensure that "the themes pinpointed in the data do, in fact, arise out of the data and are not imposed on them" (Crotty, 2003, p. 83), and for that reason the study adopted open-ended interview.

3.2.2.2 Ontological assumptions of qualitative case study methodology

This study sought to understand student-teachers' and lecturers' perceptions of learning to teach phenomenon, something possible through in-depth interviewing and interpreting stories told. Ontology concerns beliefs about what there is to know about the world and examples are realism, materialism and idealism. My study adopted an idealism epistemology. "Idealism asserts that reality is only knowable through the human mind and through socially constructed meanings", Ritchie and Lewis (2003, p. 11). "Most contemporary qualitative researchers maintain that the social world is regulated by normative expectations and shared understandings and hence the laws that govern it are not immutable" (Laverty, 2003, p. 13), hence the idea of many realities. The interpretivist framework of inquiry supports the "ontological perspective of the belief in the existence of not just one reality, but of multiple realities that are constructed and can be altered by the knower" (Laverty, 2003, p. 13). This means that "knowledge is seen as the best understandings we have been able to produce thus far, not a statement of what is ultimately real" (Laverty, 2003, p. 13).

3.2.2.3 Epistemological assumptions of qualitative case study methodology

Epistemology is "ways of knowing and learning about the social world and focuses on questions such as: how can we know about reality and what is the basis of our knowledge?" Ritchie and Lewis (2003, p. 13). One way is through using conversations as in interviews. Three issues are inherent beginning with the relationship between the researcher and the researched. In my study, the relationship between researcher and researched was "subjective, value-mediated, (and) negotiated" to quote Ritchie and Lewis (2003, p. 13). The assumption of qualitative research, is "that knowledge is essentially a relation between the learner and the phenomena being learnt; between the knower and the known, the learner and the learnt", Booth (2008, p. 451). The researcher is 'the learner', and participants and the messages emerging in the conversations, are 'the learnt'.

The second issue addresses theories about 'truth'. The stance adopted in this study was of many realities constructed and altered by the researcher and participants, and that knowledge was the best understanding of phenomenon achieved so far (Laverty, 2003). Further research leads to new understandings. The third issue looks at the way knowledge is acquired. For example, induction is looking for patterns and associations derived from observations of the world; and in deduction, "propositions or hypotheses are reached theoretically, through a logically derived process", Ritchie and Lewis (2003, p. 14). Elements of induction and deduction were used in data analysis, which involved listening to participants, tagging codes, and looking for patterns through an iterative process.

The study investigated the contribution of theory and practice in learning to teach and took the position that key actors in teacher education (student-teachers, teachers and lecturers), based on their 'lived' experiences, could tell stories of learning to teach and changes they witnessed. In turn the study intended to gain insights into learning to teach through interpreting those stories, provided the key actors were asked the right questions and a working relationship was created that allowed them to do so. To the researcher truth was what participants were going to tell as their stories and perceptions, and such stories always had many interpretations.

The research design illustrated in Figure 3.1 shows that decisions about paradigm and methodology were influenced by research questions, and how, in turn, methodology guided selection of methods.
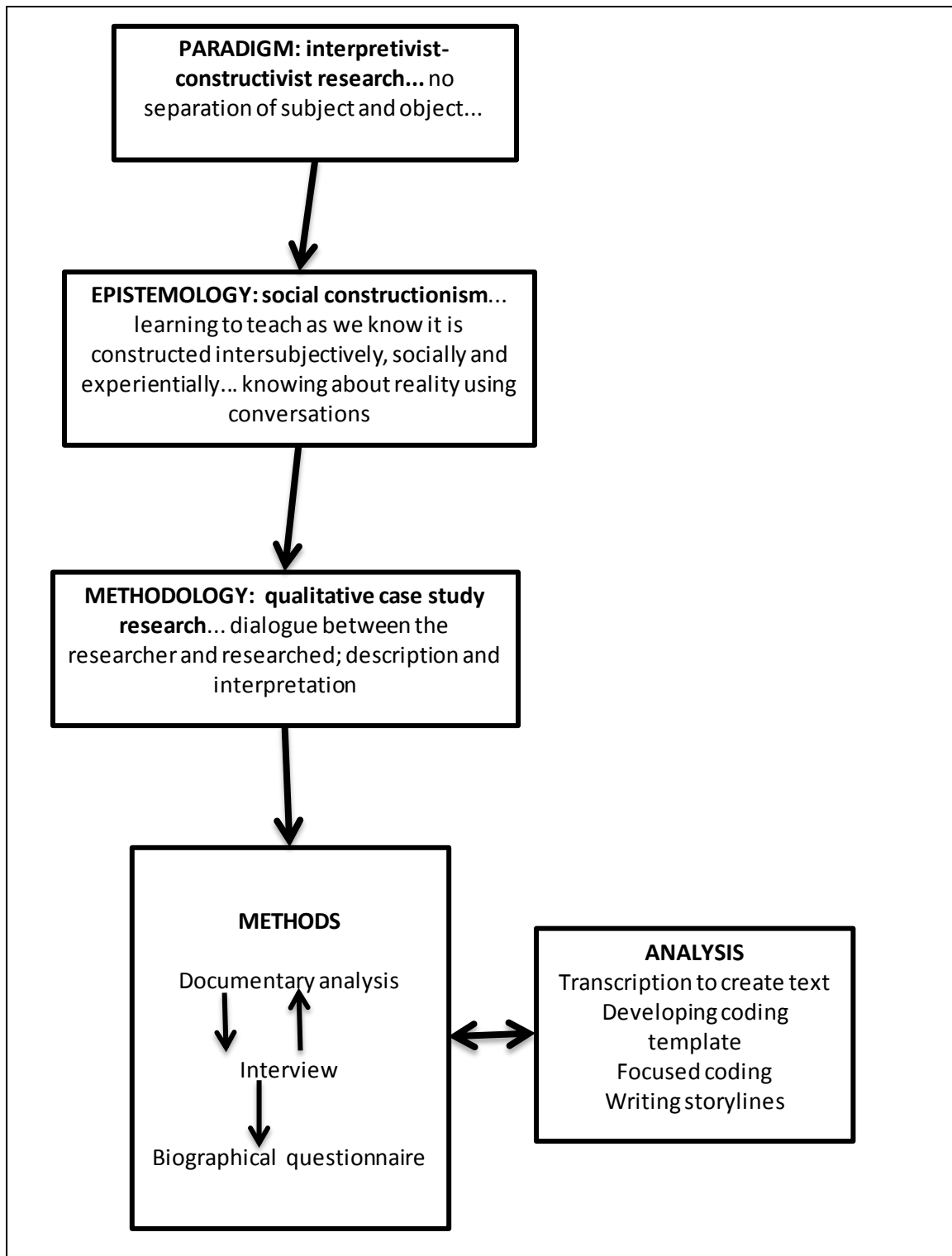
Figure 3.1: Research design

3.2.3 Data collection methods and instruments

3.2.3.1 Document analysis

According to Prior (2003) documents are "fields, frames and networks of action" (p. 2). They involve creators (agents, writers, publishers, publicists), users (readers, receivers, consumers), and settings. "Each and every document stand in dual relation to fields of action … as a receptacle (of instructions, commands, wishes, reports), and as an agent (open to manipulation by others, as an ally, as a resource for further action, as an enemy to be destroyed or suppressed)", (Prior, 2003, p. 3). As a field, documents can influence and structure human agents as effectively as the agents themselves. Documents are "essentially social products, consumed in accordance with rules, they express a structure, they are nestled in a specific discourse, and their presence in the world depends on collective, organized action" (Prior, 2003, p. 12). This study used document analysis to understand learning to teach, a phenomenon assumed to be a social activity, best understood through social products.

When using documents in research, questions about authenticity arise and equally important are questions about how documents are produced and recruited (Prior, 2003). Researchers are accused of "finding in the data only what they wished to see because documents which involve content analysis encourage 'adulteration of the data sources' by imposing pre-organized conceptual grids" (Prior, 2003, p. 21). Prior (2003) posits that schemes of referencing not systems of meaning are crucial because "when we look at the content of documents our emphasis needs to be on the social activities through which texts are appropriated rather than psychological properties of the reader" (p. 23). In this study using document analysis as a data collection tool involved identifying the creators, users and settings; how far the document reflected relationships between the author and the user; and how the document functioned in the everyday life of the users.

The study analysed the 'Applied Science Education (ASE) Student Handbook' produced by the department of education at University of Mashonaland to gather evidence of students' learning and to identify issues to discuss in interviews. Document analysis was used to identify the knowledge, skills and attitudes that were valued by the course designers, and what students needed to do to successfully finish the education programme.

3.2.3.2 The interview

In-depth or unstructured interviews are one of the main methods of data collection used in qualitative research (Legard, Keegan and Ward, 2003). The in-depth interview is "a form of a conversation and has the capacity to present descriptions, explanations, and evaluations about phenomena" (Hammersley and Atkinson, 1995, p. 126). "Different traditions of qualitative research have given rise to a diversity of perspectives on how knowledge is created in-depth interviewing" (Legard, Keegan and Ward, 2003, p. 139), for example the 'traveller metaphor' postulated by Kvale (1996). The 'traveller metaphor' is a constructivist research model in which knowledge is created and negotiated, the "interviewer (traveller) journeys through conversations with interviewees, asking questions that lead participants to tell their stories of their lived world", (Kvale, 1996, p. 4). The researcher is active in the development of data and meaning (Holestein and Gubrium, 1997), inevitably leading to concerns of power relations as discussed in the next paragraph.

Open-ended questions were used for participants to give spontaneous responses. Spontaneity is often threatened by 'meta-communicative norms' which invest interviewers with control over; the referential content of what is said (by posing questions), the length and scope of answers (by deciding when to probe or ask a new question) and the way that all participants construct their positionality with respect to interview and information it produces (Briggs, 2001). Interviews create problems of "misunderstandings, resistance and conflict", (Briggs, 2001, p. 911) and "the power relations that emerge in interviews are embedded in the data they produce" (Briggs, 2001, p. 912). To address these concerns relatively few questions were asked with probes being used to aid depth to the participants' responses. Thus interviewees exercised some control over the direction of the conversations.

According to Legard, Keegan and Ward (2003) in-depth interviews have four key advantages. First they combine structure with flexibility. The interview can be unstructured but the researcher uses themes to create an interview guide that is flexible to allow for probing and exploring issues hat emerge. Flexibility is achieved by "allowing the themes to be covered in the order most suited to the interviewee, allowing a spontaneous response; then probing and exploring issues raised" (Legard, Keegan and Ward, 2003, p. 141). A second advantage is that the interview is interactive in nature. Open-ended questions to encourage spontaneous response are asked and thereafter intervention depends on what the participant

has said. The third advantage is use of 'probing' is aimed at achieving depth through "penetration, exploration and explanation", and exploring "reasons, feelings, opinions and beliefs", (Legard, Keegan and Ward, 2003, p. 141) using follow-up questions. A fourth advantage is that the interview is generative, with knowledge being created and negotiated. Participants prompted by questions proffer new ideas, suggestions and solutions to problems. Another feature is that "the interview data needs to be captured in its natural form" to ensure "depth, nuance and interviewee's language", Legard, Keegan and Ward (2003, p. 142). It can be argued that the best way to conduct in-depth interviews is 'face-to-face' because "a physical encounter is essential context for an interview which is flexible, interactive and generative, and in which meaning and language is explored in depth", Legard, Keegan and Ward (2003, p. 142).

Interviews were used as a data collection instruments because they brought "the interviewer and the interviewee into dialogue around the phenomenon from different directions, approaching it from different concrete or potential contexts", Booth (2008, p. 452). The intention was to conduct face-to-face interviews but due to the practical difficulties of reaching participants the study also employed telephone and e-mail interviews to overcome the time and space barriers that limit face-to-face interviews (Irez and Cakir, 2006). However, e-mail interviewing lacks the spontaneity and exploratory possibilities that the naturalistic interview demands of successful analysis (Akerlind, 2005). The e-mail interview removes the tangible presence of the researcher, so bodily presence like age, gender, ethnicity, hairstyle, clothes and accent become invisible (Madge and O'Connor, 2004). E-mail interviewing also raises issues of authenticity and verification and therefore its use in this study was limited to those cases where face-to-face and telephone interviewing could not be conducted. A mix of face-to-face, telephone and e-mail interviewing was used depending on the participant's preference.

Researchers using qualitative methods often encounter difficulties, for example, challenges of building rapport and interpreting meaning. Talking to people about their lives results in a document of interaction in which the stories told are fundamentally shaped by the nature of the interaction between the researcher and participant (Shepherd, 2003; Angrosino, 1989), the constraints and opportunities involved in qualitative methods need to be understood and accounted for in any report of research (Shepherd, 2003; Angrosino, 1989). To achieve rapport Madge and O'Connor (2004) suggest that the interviewer must be prepared to insert

his or her personal identity in the relationship. In e-mail interviewing rapport can be promoted by posting photographs and biographies. In my study some degree of rapport already existed due to the good relations I had with participants. The participants filled a biographical questionnaire.

The interview was the main data collection instrument. The study asked student-teachers and lecturers to talk about their experiences of learning to teach. Student-teachers and lecturers were asked to describe contexts and settings in which learning to teach occurred including subjects, objects, tools, rules and community of actors. Synergistic and contradictory factors within and between settings emerged during data analysis. Participants were asked to describe incidents when they had felt contradictions, how they had resolved these, the tools and resources they used. Further, the interview schedule was used to prompt participants to talk about the development of student-teachers' ideas resulting from learning to teach. In this study, to highlight once more, student-teachers' and lecturers' opinions about the contribution of theory and practice in learning to become secondary teachers were sought. Data collected was recorded using a Dictaphone and field notes. The data collected using the interview schedule was supported by data collected using document analysis.

3.2.3.3 Biographical questionnaire

Besides the interview, the study used a questionnaire to collect biographical data of participants. As a research instrument, the questionnaire has advantages and disadvantages. The questionnaire can be used to collect factual and opinion-based data. The participant's response can be through tick boxes or free text responses. When compared with other data collection instruments like the interview the questionnaire can be relatively quick and easy to complete. Potentially, a questionnaire can be used to collect information from a large group of participants. Further in a questionnaire standardized answers can be used.

Some disadvantages of the questionnaire include low rate of return. Often participants with positive or negative views were likely to be tempted not to return completed questionnaires. The same can be said of the unbiased participants who tend to think it is not worth it. Further participants may not be willing to answer questions, and may decide to answer superficially.

In my study pencil-and-paper biographical questionnaire was used to collect data about sex,

age, qualifications, specialism, work experience and preferred interview mode. See appendix BQ. The questionnaire was given in advance and collected at the time interview was conducted. Hence a rate of return of one hundred percent return was achieved.

3.3 The Setting

My study collected detailed information by using a variety of procedures during a sustained period (Merriam, 1988; Stake, 1995; Yin, 1989). The research context was teacher education and the setting was teaching degree programmes to train secondary teachers in Zimbabwe, with particular reference to University of Mashonaland. Based on an in-depth understanding of student-teachers' and lecturers' perceptions, the study explored university-based and school-based learning.

3.3.1 The participants

The participants in the study were Bachelor of Science Education Honours student-teachers and some of their lecturers at University of Mashonaland during the period 2008-2011 when the study was conducted. The student-teachers were either pre-service teachers or in-service teachers. Pre-service teachers were students recruited straight from high school with neither teaching qualification nor teaching experience. In-service (student) teachers came to university with some teaching qualification, e.g. diploma in education obtained at a teachers' college, and a minimum teaching experience of two years.

Two routes to becoming a secondary teacher at the university studied were evident. First, candidates with at least two Advanced Level passes used a direct entry to study for Bachelor of Science Education degree for four years. Second, someone with Ordinary level passes (IGCSE), and an Advanced level pass can follow the college-based route to get a diploma in education, and then enrol for a Bachelor of Science Education degree.

The target populations were 57 pre-service student-teachers, 44 in-service student-teachers and 19 lecturers in Department of Education. From these six pre-service students, five in-service students and 14 lecturers were interviewed. Students at the university where field work was conducted were approached, and their voluntary participation was sought. Sampling was therefore convenience sampling because student-teachers selected were those

easily accessible and ready to volunteer participation in the study. The major weakness of the convenience sample is that there is no control over representativeness of the population such that it is difficult to generalize findings. The issues of representativeness and generalizability of findings in qualitative research are examined in section 3.7.2.

3.3.1.1 Convenience sampling

Qualitative research is aimed at providing an in-depth understanding of the world as seen through the eyes of the people being studied. Qualitative research uses non-probability sampling because it does not aim to produce a statistically representative sample or draw statistical inference (Blackstone, 2012). Non-probability sampling refers to sampling techniques for which a person or events likelihood of being selected for membership in a sample is unknown. It is not known (with a non-probability sample) whether a sample represents a larger population. This is acceptable because representing the population is not the goal with non-probability samples (Blackstone, 2012). A convenience sample is an example of non-probability sampling. Other examples are purposive sampling, snowball sampling, and quota sampling. The fact that non-probability samples, for example, convenience sampling do not represent a larger population does not mean that they are drawn arbitrarily.

To draw a convenience sample, a researcher simply collects data from those people to which he or she has most convenient access (Blackstone, 2012). Some examples of drawing convenience samples are stopping people on a street corner as they pass by, and surveying friends, students or colleagues that the researcher has regular access to (Babie, 2001). In my study I was interested in studying the perceptions of student-teachers and lecturers at the University of Mashonaland regarding Initial Teacher Education for secondary teachers in Zimbabwe. I knew most lecturers in the Faculty of Science Education, specifically in the Department of Education and decided to approach the lecturers seeking their voluntary participation in the study. Lecturers available when I visited the university in January-February 2010 and willing to be interviewed made up the convenience sample. I was introduced and given opportunity to talk to pre-service student-teachers who were at the university during my visit, and attending lectures. I explained the purpose of my study and three pre-service student-teachers who volunteered to be interviewed made up my sample. In-service student teachers were on school attachment and could not be selected this way.

However I met one in-service student-teacher who happened to visit their university during this time and was able to interview him. My selection of these student-teachers was based on ease of access and therefore convenient sampling. My research assistant met student teachers when he visited schools at which they were doing their final applied science education (teaching practice), explained the purpose of my study and sought voluntary participation. He managed to interview three pre-service student-teachers and five in-service student teachers. This was convenient sampling because he chose subjects whom he met while visiting schools for a completely different purpose – teaching practice supervision. These were student-teachers easily accessible.

Relying on available subjects does not allow the researcher to have control over the representativeness of the sample. For purposes of my study convenient sampling was justified because other sampling methods were not possible, and the study was aimed at seeking perceptions of student-teachers and lecturers at University of Mashonaland at that particular time. Findings from this study cannot be used to generalise to a wider population.

3.3.2 Researcher's role

"Qualitative methods of research are based on the premise that, when it comes to understanding human experience, the separation between researcher and researched, between subject and object, is a fiction", Hunter (2004). In interpretive research the biases, values, and judgements of the researcher should be stated explicitly by the researcher (Creswell, 1994). See also section 3.4. As the doctoral candidate I took the role of primary researcher responsible for data collection, analysis and abstraction and evaluator of the cases.

3.4 Difficulties in collecting data

Data collection was not straightforward due to the political and economic problems being experienced in Zimbabwe at the time of the study. The problems experienced and measures taken to overcome these are discussed below.

One of the potential difficulties was access. As researcher I needed to be accepted as a member of the university teaching/learning community, by participants, to gather their authentic views. My advantage was that I was a former lecturer at the university, but still

needed to convince the participants that it was worthwhile to conduct a study of this nature and that findings would be useful to teacher education. When I left Zimbabwe in May 2006 my understanding of things was different, and now several years later I cannot claim the same knowledge of the situation and current practices. Many changes occurred, among them high staff turnover, changes in programmes, courses, and regulations. I found out about these changes only through conducting the study.

To address these difficulties consent for the study was sought at three levels: the Ministry of Higher Education and Ministry of Education, Sport and Culture who represented the government, the Faculty of Science Education and Department of Education at the university and the consent of potential participants. In the introductory letter the purposes of my study were described in enough detail to show how successful completion could benefit me and could be useful to the development of Teacher Education in Zimbabwe. Letters from the University of Exeter, Graduate School of Education (formerly known as School of Education and Life-long Learning) and my supervisors were used to support my position. Having been in constant contact with several lecturers in Zimbabwe, both as friends and co-researchers in mentoring and related topics, made it easier to get their help and support to conduct the study.

Zimbabwe attained its political independence in 1980 after which a rapid expansion of its education systems was followed by a period of economic decline. The educational expansion initially in the primary and secondary school sectors was followed in the 1990s by growth in institutions of higher education. The expansion was followed by political instability, socio-economic problems, hyperinflation and 'brain drain' in the new millennium. Such conditions were common in many countries in Africa and a major aim of the study was to investigate and understand teacher education under the circumstances.

I expected the socio-political situation was going to be unsafe and make it impossible for me to visit Zimbabwe to collect data but events in 2009 led to a government of national unity which made it possible to travel to Zimbabwe in January 2010 where I spend 4 weeks at University of Mashonaland gathering data using face-to-face interviews. Initially the plan was to meet participants on three occasions but the expense of travelling from the United Kingdom to Zimbabwe on three occasions was prohibitive. Instead data was also collected through telephone and e-mail interviewing. E-mail interviewing required more time to

complete interview, than was needed in face-to-face interviewing and lead to problems of sustaining the conversations over weeks with participants likely to be busy with their work.

3.5 Data collection and analysis procedures

Data was collected in four phases beginning with designing instruments, then pilot testing, the field work and follow up. The data collection period spanned from May 2009 to June 2011. Pilot testing lasted 24 weeks, field work was conducted in 12 weeks and two weeks were used to make a follow up.

3.5.1 Preliminaries and entry

Once ethical approval from the university had been gained potential participants were contacted using an introductory letter in which the study's goals and research questions were highlighted and the expectations of student-teachers and lecturers who agreed to participate. Those who agreed to take were asked to sign a consent form to show they understood the purposes of the study and their preferred mode of interviewing Tables 3.1 and 3.2 show that all student-teachers opted for face-to-face interviews. All but one lecturers opted for face-to-face interviews. In four cases e-mail interviewing was used to augment face-to-face interviewing.

3.5.1.1 Ethical considerations

The study followed the Graduate School of Education Ethics Policy and ethical approval was obtained from University of Exeter (see appendix EAC) following British Educational Research Association guidelines (BERA, 2004). A consent form (see appendix CF) giving details of research objectives and description of how the data would be collected and used was distributed to all participants.

3.5.1.2 Consent, confidentiality and anonymity

Informed consent was sought and participants signed consent forms. The study ensured confidentiality by using anonymous codes when interviews were transcribed. When using e-mail interviewing, the protection of privacy is difficult because of the open nature of

electronic networks. It was difficult to ensure anonymity because participants' identities (e-mail addresses) were always part of responses. Messages were sent as individual e-mails and not to several participants simultaneously. The participants, who chose to be interviewed by e-mail, were given a choice to create identities and e-mail addresses specifically for the study as one way of protecting their identities but all chose to use their true identities. The context at the time of the study created uncertainty and fear among student-teachers and lecturers, such that it was necessary to be careful and assure participants that discoveries were not released to others. As part of data management, e-mail addresses were removed and replaced with anonymous codes to identify each interview. Participants were assured that the conversations were stored on a computer where only the researcher had access, and that the records would be erased as soon as study was completed.

The participants were given an interview schedule so they could familiarise themselves with the interview items before the actual interview took place. They were also asked to fill a bio-graphical questionnaire before the interview. Participants chose the date and time, the location, and dictated when to end the interview. The conversations were participant-led and probes were used to prompt participants to say more about some topics. The data collection process is summarised in Figure 3.2.

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│        ┌──────────────────────────────────────────────┐          │
│        │ **Prior arrangements**                         │          │
│        │ Identifying potential participants             │          │
│        │ Initial invitation to participate              │          │
│        │ Seeking informed consent                       │          │
│        │ Asking participants to select interview mode   │          │
│        │ Providing interview schedule well in advance.  │          │
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│             ┌──────────────────────────────────┐                 │
│             │ **Data collection**               │                 │
│             │ Invitation to participate          │                 │
│             │ Interview appointments             │                 │
│             │ Actual interviews                  │                 │
│             │ Recording                          │                 │
│             │ Transcription                      │                 │
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│    │ **Data management**                                    │     │
│    │ Audio tapes. Used tape recorder and playback to record │     │
│    │ with Dictaphone and convert into WMA files.            │     │
│    │ Also used Dictaphone to record interviews.             │     │
│    │ Dictaphone stored WMA files. Transferred files onto     │     │
│    │ computer and supplementary storage devices for back-up.│     │
│    │ Playback several times.                                 │     │
│    │ Manual transcription used to convert audio files into  │     │
│    │ text files. Saved on computer as MS word documents.    │     │
│    └──────────────────────────────────────────────────────┘     │
│                                                                   │
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Figure 3.2: Data collection procedures

3.5.2 Interviews

The main period of data collection started in January 2010 during the Southern African Association for Research in Mathematics, Science and Technology Education (SAARMSTE) 2010 annual conference (18-22 January), where I met three potential lecturer-participants, and managed to interview one face-to-face. The other two participants chose not to participate because they were busy.

Between 25th January and 10th February 2010 interviews were conducted at University of Mashonaland. Eleven lecturers and four students were interviewed on site. One participant volunteered to be a research assistant and received training to conduct interviews. He

interviewed seven student-teachers between 15th February and 19th March 2010. One lecturer participated through e-mail interviewing. Three lecturers were interviewed twice; first face-to-face and second by e-mail interviewing. Altogether fourteen lecturers and eleven student-teachers were interviewed.

Permission was sought from each participant to record the interview using a Dictaphone. At the end of each interview the audio file was saved on a memory stick, and later on a personal computer. Then audio files were deleted on the Dictaphone, creating free space for the next interview(s). The same audio files could be transferred from computer back on the Dictaphone with ease.

3.5.3 Transcription

The study used a recording system with flexibility where recorded audio files could be moved from Dictaphone to computer and back, so that the audio interviews could be played. Another useful facility was 'play and pause' because it enabled transcribing by hand, then word-processing the hand-written transcription. Editing involved playing audio and simultaneously reading the text, pausing audio to make amends, additions and corrections. When three interviews of student-teachers and five interviews of lecturers had been transcribed data analysis was started. The analysis involved reading and re-reading the text as a whole or paragraphs, listening and re-listening to audio tapes noting ideas, making links between passages of text, reflecting on the text and recording the reflections.

3.6 Data analysis

3.6.1 Data analysis strategies

Qualitative methods were used to analyse data in the form of documents and completed interview transcripts (Bogdan and Biklen, 1992). Data analysis meant a search for meaning (Stake, 1995), and involved direct interpretation of the instance. Further, it involved categorical aggregation of the instances. Patterns and themes emerged from an on-going and iterative process of data analysis. The study used several steps to carefully describe how data was sorted and synthesized into patterns; describing data in general, deriving a thick description of the participants' perceptions, developing themes and organising themes into

some broader concepts.

Figure 3.3 shows the data analysis procedures. Data analysis began by using literature, research questions and the interview schedule to suggest initial codes and a tentative analysis template. Coding was initially carried out manually using Microsoft word. Coded data was then entered into an Excel spreadsheet and the filter tool was used to help refine the coding. Although the coding was based on *a priori* it was important to create codes for data that did not fit into the *a priori* template codes. Codes which emerged from the data were thus incorporated into the coding scheme. At the third level of analysis expansion was achieved by writing storylines which later included participants' voices as evidence. At a fourth level of analysis the goal was to construct a model of understanding looking for coherence, differences, and hierarchical structures and letting meaning emerge from the data. Further details of each stage of these stages are set out below.

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┌─────────────────────────────────────────────────────────────────────┐
│   ┌───────────────────────────────────────────────────────────┐     │
│   │ Developing template                                        │     │
│   │ Activity theory informed interview questions. Then used    │     │
│   │ research questions,                                        │     │
│   │ interview questions and literature to produce a tentative  │     │
│   │ template.                                                  │     │
│   │ Initial coding (labeling) in Micro Soft word.              │     │
│   │ Revising initial coding several times. Re-reading, sharing │     │
│   │ with my supervisors.                                       │     │
│   │ Searching same messages originally labelled differently.   │     │
│   │ Treating labels as sub-categories.                         │     │
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│                              ↕                                        │
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│   │ Focused coding                                             │     │
│   │ Initial coding in EXCEL followed by higher coding. EXCEL   │     │
│   │ used to capture coding                                     │     │
│   │ in a more robust way. Cut and paste used to move from MS   │     │
│   │ word to EXCEL                                              │     │
│   │ worksheets.                                                │     │
│   │ Spreadsheets for each participant (case by case). Filtering│     │
│   │ A to Z, then filtering                                     │     │
│   │ categories and revising coding.                            │     │
│   │ Spreadsheets category by category. Used cut and paste,     │     │
│   │ Revising coding.                                           │     │
│   │ Revising categories. Two broad groups maintained throughout:│    │
│   │ student-teachers and lecturers.                            │     │
│   │ Re-grouping sub-categories (condensing). Revising labels,  │     │
│   │ sub-categories and                                         │     │
│   │ categories. Sharing with my supervisors                    │     │
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│                              ↕                                        │
│   ┌───────────────────────────────────────────────────────────┐     │
│   │ Summarising                                                │     │
│   │ Memos.                                                     │     │
│   │ Writing storylines for each case, and then for groups of   │     │
│   │ participants                                               │     │
│   │ e.g. student-teachers using sub-categories and categories. │     │
│   │ Sharing with my supervisors and revising.                  │     │
│   │ Comparing and contrasting student-teachers and lecturers   │     │
│   │ Expanding using direct quotes and revising coding.         │     │
│   └───────────────────────────────────────────────────────────┘     │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 3.3: Data analysis procedures

3.6.1.1 Initial coding procedures

Template analysis can be used to analyse any form of textual data from many methodological and epistemological positions, including a 'contextual constructivist position' (Madill, Jordan and Shirley, 2000). A contextual constructivist position makes the assumption that there are always many interpretations made of any phenomenon, for how research should be carried out and how data should be analysed (School of Human and Social Sciences-University of Huddersfield [SHUMAT2], 2010). The chief advantage of template analysis is that initial coding can be speeded up.

Template analysis involves development of a coding template summarising themes identified by the researcher as important in a data set and organising the themes in a meaningful manner (Kent, 2000; King, Caroll, Newton and Dornan, 2002). In this pre-coding "the researcher brings to the research setting an *a priori* construction of the social setting of the research which is considered to be privileged for one reason or another" (Gough and Scott, 2000, p. 340). The *a priori* themes reflect areas highlighted in my research questions and review of related literature. There are disadvantages to using this kind of analysis. Using *a priori* themes increase the chances of overlooking material that is not related to the themes, but is an important part of the data set. Assuming that "the researcher arrives on the scene with preconceived ideas of some kind (Miles and Huberman, 1994)" there is a possibility of either overshadowing or missing the participants' constructions (Gough and Scott, 2000, p. 340). Template analysis is a 'code-and-retrieve' technique which is useful in 'managing data' but there is always the "danger that the code-and-retrieve tail will wag the research dog" (Gough and Scott, 2000, p. 341). It was important to recognise *a priori* themes as tentative subject to re-definition (Kent, 2000; King et al., 2002), and sometimes complete removal. Once an issue relevant to the research question emerged that was not covered by the existing code a new code was created. At times the code was words used by participant. This *in vivo* coding, occurs when the researcher uses the exact words of participants as labels, and involves interplay between theorising of researcher as an 'outsider' and the participant as an 'insider' (Gough and Scott, 2000). To apply coding constantly, a tentative list of codes with definitions was produced (Appendix CT). The code list was a template or coding scheme with codes arranged in a hierarchy.

To summarise, initial analysis had the following steps:
- defining *a priori* themes
- reading transcriptions and initial coding (identifying parts of the transcripts relevant to my research questions and encompassed by *a priori* themes, then attaching the code to the identified section)
- producing an initial template (and grouping into higher order codes)
- developing the template by applying it to the full data set, adding additional codes that emerged from the data and using the final template to interpret findings.

The following labels were examples of *a priori* codes related to the topic and research questions: change, learning, practice, setting, tensions, and theory. Interview questions were based on activity theory and the following labels can be traced to activity theory: object/outcome, relationship (and rules), subjects and tools. Labels which emerged from the data included: motives, context, teacher education model and the interplay between theory and practice.

Once a coding frame was produced each code and its definition were applied in a standard way to the whole text, identifying chunks of text to which the code applied. The chunks could be phrases, sentences or paragraphs. Square brackets and various colours were used to tag the different segments. Below is a transcription of a face-to-face interview with L4 showing manual coding of the text. Using the initial template the study revealed two themes namely 'practice' (pink) and 'relationship' (dark green).

R: **With whom do student-teachers learn during ASE?**
I-L4: The ideal situation is that they will be under a mentor. The reality on the ground is that half the time they are on their own [PRACTICE-ideal situation]. They are in their own because the mentor might not take as much interest in them as we here at university might want. I think the reason that inhibits mentors is that there is no recognition of any form that is accorded to the mentor being by way of small stipend or remuneration or by other means [PRACTICE-no mentoring]. So really it becomes ... it ends being ceremonial mentoring [PRACTICE-ceremonial mentoring].
R: **What efforts have you made to recognise the contribution of mentors?**
I-L4: I personally try ... each time I go out there I first of all I try to get hold of the mentor, and thank him/her for the contribution they make. Sometimes that is the only acknowledgement that we can give them. I think they also appreciate it [RELATIONSHIP-TE_mentor relationship-acknowledging mentor role].

The next step was copying the text with coding from MS word then pasting it into an Excel spreadsheet to enable filtering and bring together transcriptions tagged using the same label. See **Figure** 3.4 below. The category column was selected and filtered to get an alphabetical arrangement of coding and to bring together texts labelled using the same codes to enable comparisons and revise the coding where necessary. At a second level of coding in Excel the label "ideal mentoring" and "no mentoring" were collapsed into "mentoring" a category within the theme 'practice'. The label "acknowledging mentor role" was interpreted to mean a description of the lecturer-mentor relationship.

Figure 3.4: Snapshot showing part of coded interview with L4 in EXCEL

On re-coding "ideal mentoring", "not recognizing mentors materially", and "no mentoring" were used as dimensions of "mentoring", a sub-category of practice under the theme "school learning activity".

In Figure 3.5 below the transcription is from an interview with L4, who was interviewed on two occasions; first face-to-face and then by e-mail. In order to distinguish data from the two interviews the text originating from e-mail interviewing was highlighted in yellow.

Figure 3.5: Snapshot showing part of re-coded interview with L4 in EXCEL

In describing the process of data analysis it might appear that the order of events involved labelling a quotation with a code (e.g. 'training at diploma level') followed by creating a category (e.g. 'work experience') and a theme for related categories (e.g. 'subject'). In actuality, arriving at the final spreadsheet involved moving forward and backward through the data so what might be in one column at one time would change later. Coding was a 'messy' process and it would be wrong to view it as a linear sequence of events.

3.6.1.2 Writing narratives and using activity theory as analytical framework

The next stage of the data analysis involved writing narratives as illustrated below using the example of mentoring in the school activity system.

Mentoring

Student-teachers and teacher educators suggest that there was no effective mentoring taking place because teachers lack training in the support role. Trained teachers in schools were described as 'diploma holders' who felt inferior to the candidates soon to join teaching with higher qualifications than them. The same teachers also felt threatened by student-teachers' new ideas. There was also an issue of lack of

motivation with teachers who acted as mentors being neither recognized nor rewarded for the extra responsibility.

In the final template mentoring was subsumed under "tools" used as a sub-category of the category "school activity system" with the following examples of dimensions;

- (University expectation is) that student-teachers get support from teachers - "the ideal situation is that they will be under a mentor"
- Lack of support from teachers – "half the time they are on their own"
- Reason for lack of support from teachers – "the reason that inhibits mentors"
  - Teachers feeling that they were not being recognised for doing extra work - "is that there is no recognition of any means"
  - Teachers with low motivation - not recognizing mentors "by way of a small stipend or remuneration or other means"
  - Supporting student-teachers not taken seriously - "ends up being ceremonial mentoring"

Activity theory provides a powerful socio-cultural lens to analyse human activity (in my study of learning-to-teach as an activity) and the kinds of activities, who is engaging, what their goals and intentions are, what objects and products, rules and norms (Douglas, 2012; Postlethwaite and Haggarty, 2010; Yamagata-Lynch and Huadenschild, 2008; Wilson, 2004; Jonassen and Rohrer-Murphy, 1999). Researchers using activity theory focus on different things e.g. identifying activities that influence professional development and shared object and analysing inner contradictions (Yamagata-Lynch and Huadenschild, 2008; Tsui and Law, 2006), identifying the main tools and objects in the activity (Douglas, 2012), analysing the (production, consumption exchange and distribution) subsystems coupled with using a grid to analyse interactions within the community (Wilson, 2004); and identifying the subject(s), the context, the purpose and tools as factors which should be taken into consideration to understand teacher learning as an activity system (Postlethwaite and Haggarty, 2010). Data analysis using activity theory involved identifying the different activity systems where learning to teach occurs, and within the systems to search for the subjects, objects, tools, rules, community, division of labour, relationships and outcomes. According to Grossman et al. (2000) activity theory "starts with the assumption that a person's frameworks for thinking are developed through problem-solving action carried out in specific settings", (p. 6). By

choosing to use activity theory the study "(looked) at both the individual's experience, and at how settings are structured by historical forces through actions of individuals", Grossman et al. (2000, p. 7). In teacher education student-teachers engage in social learning contexts that could be seen as activity settings. The formal and informal activity settings include university coursework, field experiences, mentoring and supervision, and concentric settings of school, department and grade level (Grossman et al., 2000). In my study activity theory analysis resulted in identifying two activity systems; the first being the university activity system where student-teachers were learning theory and second, learning from practice in the school activity system. In each activity system analysis involved clarifying subjects, objects, tools, community of practice, division of labour, relationships and rules. See sections 4.3.1, 4.3.2, 5.3.1 and 5.3.2.

Further analysis revealed synergistic and contradictory factors within and between the two activity systems. Using activity theory as an analytical framework it was possible to identify the sub-category "contradictory factors" in the category "factors" under the "school activity system". For, example in the memo above (the memo describing mentoring) it can be suggested that student-teachers' desire to get support from teachers was in tension with the lack of tools in the school activity system for providing the required support. Teachers, who were expected to provide the support did not do so for reasons such as feeling that the importance of their role was not recognised or rewarded leading to lack of motivation to perform a mentoring role.

3.6.2 Further analysis and memoing

Further, analysis was carried out by writing memos of the issues emerging. Memos conceptualize the data in narrative form. According to Charmaz (2006), memo writing roots the researcher in the analysis of data as well as enabling an increasing level of abstraction of the analytical ideas.

Memos are the analytical locations where researchers are most fully present:

> where they find their voices, and where they give themselves permission to formulate
> ideas, to play with them, to reconfigure them, to expand them, to explore them, and

ultimately to distil them for publication and participation in conversation with others, Lempert (2007, p. 247).

Early memos are speculative and may lack coherence and connection to another (Lempert, 2007, p. 247).

When memoing "the researcher generates a set of categories, contrasts, comparisons, questions, and avenues for further consideration which are more abstract than the original topic", Lempert (2007, p. 251). All memos are partial and provisional (Lempert, 2007). Memo writing asks questions of the data: "what is an example of? when does it happen? where is it happening? with whom? how? when does it seem to occur? with what consequences?" (Lempert, 2007, p. 251).

In memo writing participant voices provide the data to use as researcher's evidence; to support the analyses (Lempert, 2007). "In the published document, respondent voices provide the details that enable the reader to draw the same conclusions and make the same inferences that authors do", (Lempert, 2007, p. 257).

In the study writing storylines to develop abstraction was started using a few participants. The initial storylines were then used for more writing, when new messages were added as other student-teachers' and lecturers' voices emerged from the data.

3.6.3 Audit trail

To ensure that analysis of the texts was thorough, and that emerging messages were captured as accurately as possible, an audit trail was conducted. The objective here was to ensure credibility and rigour. The audit trail (Figure 3.6) shows initial coding, focused coding, summarising, expanding and abstraction. The double headed arrows used illustrate that the analysis moved forward and backward many times to go back to the transcription or the audio tape, and check whether messages had either been captured accurately or distorted.

Some initials labels did not accurately capture messages in the text, and these were changed. At times, mistakes were discovered at a second stage and higher levels of coding, and I sometimes revealed mistakes in initial coding. Quoting participants' words sometimes

revealed mistakes in initial coding. To create an audit trail of the analytical process, a documentary record of the steps taken was created, and decisions made moving from raw transcripts to final interpretation were noted. Successive versions of the coded transcripts, memos, notes, and case summaries were saved.

Initial coding in MS Word. Highlighted transcript using a colour reserved for the broad category, for example, for practice I used pink. Quoted words, phrase or paragraph and gave it a label. Sometimes the label used was *in vivo*, exact words quoted.

Focused coding: Filtering in EXCEL. Used 4 columns: transcription, quotation, open coding label, and category. The next step was to use the category column to 'filter', then using alphabetical arrangement to bring labels belonging to the same category together.

Summarising: Reduced labels by grouping and re-grouping**.** I scanned the long list of labels and for each wrote a higher code. Sometimes I had to go back to manual coded documents to understand the open code or change the code and category

+   **Expanding:** I wrote storylines for each participant, then for all participants. Next I expanded the writing by including direct quotations. Then I summarised emerging issues.

Abstraction: Constructing a potential model (theory) and taking this to participants for checking.

Figure 3.6: Audit trail.

3.7 Rigour

Rigour addresses reliability and validity in qualitative research. Reliability, in qualitative research, is the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions (Hammersley, 1992). Validity is the extent to which an account accurately represents the social phenomena to which it refers (Hammersley, 1992)

3.7.1 'Reliability' and 'validity'

Interpretive research seeks illumination and understanding. Extrapolation is possible to similar situations. In interpretive research the aim is to understand phenomena in context-specific settings, as such, concepts of reliability and validity as defined in quantitative research are not suitable. In order to attend to reliability interest is on 'confirmability' of findings; 'trustworthiness' (Glaser and Strauss, 1967), 'consistency' (Hammersley, 1992; Robson, 2002), and 'dependability' of evidence (Lincoln and Guba, 1985). Important questions to answer are;

- Was the sample design and selection without bias or symbolically representative of the target population?
- Was the fieldwork carried consistently?
- Was the analysis carried out systematically and comprehensively?
- Is the interpretation well supported by the evidence?
- Did the design and conduct allow equal opportunity for all perspectives to be identified?

In my study various methods were used to enhance reliability. Informed consent was used as a way of ensuring credibility through informing participants about my interests and clarifying my bias as researcher. In the consent letter, objectives of the study were stated and supported by an explanation that the study was conducted as doctoral study at the University of Exeter. A rich, thick and detailed description of the study highlighting purpose of the study, researcher's role, participants' positions and bases for selection, and the context from which

data is gathered (Goetz and LeCompte, 1984) was given. In reporting the study a detailed narrative description of the responses is made.

It was very important that each participant understood the questions in the same way and that answers could be coded without the possibility of uncertainty (Silverman, 1993). This was achieved through pre-testing of the interview schedule. One research assistant was engaged and trained before being asked to conduct some interviews.

Although the study used convenient sampling (see also section 3.3.1), 'inclusivity' of student-teachers and lecturers was ensured. The target population was pre-service student-teachers, in-service student-teachers and lecturers in the Education department at University of Mashonaland. Participants on campus when the fieldwork was being conducted, who were willing to be interviewed made up the sample. The study aimed at understanding participants' perceptions of learning to teach, and interview questions covered background and motives, activity systems where learning to occurs, synergistic and contradictory factors encountered and how these shaped learning to teach, and development of student-teachers' ideas. To this extent the sample and interview items were inclusive (Silverman, 1993) of the various issues and experiences defining learning to teach.

To establish rigour in the analysis of interviews participants' statements are described in as much detail as possible so that reading the report should provide a full picture of the process. Further, efforts were made such that the interview was consistent with the research and methodology and as open ended as possible.

'Credibility' and 'transferability' were addressed to ensure that analysis of the texts was thorough, and that emerging messages were captured as accurately as possible. The transcriptions were read many times to check whether codes accurately labelled the messages as described above.

Validity in qualitative research is achieved by attending to 'credibility' and 'transferability' (Lincoln and Guba, 1985). It is about validity of representation, understanding and interpretation. The key question to attend to is "is the researcher accurately reflecting the phenomena understudy as perceived by the study participants" (Ritchie and Lewis, 2003, p.

274) through sample coverage, capturing of the phenomena, identification or labelling, interpretation, and reporting the findings.

Literature suggests that internal validity in qualitative research can be enhanced using a 'constant comparative' method (Silverman, 2000), checking accuracy of fit (Glaser and Strauss, 1967) and 'deviant case analysis'. External validity in qualitative research is achieved through triangulation using different sources of information to confirm or improve clarity), and member/respondent validation (Ritchie and Lewis, 2003, p. 275).

Clear documentation of the research methods used and of the findings gained to aid checks on validity by others is critical (Ritchie and Lewis, 2003). Four key principles in generalising from qualitative data are;

- Full and appropriate use of the evidential base (use of the original data, encompassing diversity and nature not number) (ibid, p. 277)
- Display of analytic routes and interpretation (levels of classification, assigning meaning and interpretation) (ibid, p. 278)
- Research design and conduct (checks on research design and conduct, display of research methods, and noted limitations) (ibid, p. 278)
- Validation of the inference (ibid, p. 278).

To understand learning to teach from several viewpoints different groups of participants, lecturers and student-teachers; were interviewed using the same interview questions about the same phenomenon of learning to teach.

One of the dangers of interpretive research is that the researcher puts their own interpretation on events - but it is a danger a qualitative researcher cannot avoid. An important question to address is "how do I check and justify what I am writing?" The details of *representing information as accurately as possible* are discussed to reveal the ways used in the study to ensure confirmability. Examples of potential checks on the quality of an interpretation are independent scrutiny of analysis (where members of a research team coding separately or using an outside expert to code separately) and defending analytical decisions to an 'expert

panel'. In this study, some expert checks occurred when spreadsheets were read by my supervisors, then got feedback in meetings.

There are two layers of interpretation taking place regarding interpretations of the 'real' situation that the study seeks to describe. Initially participants gave their interpretation of the situation they are in and this was followed by me interpreting participants' interpretation. The researcher can never get back to the real situation because the 'real' situation would be different for everybody in it. To help confirm that the interpretation being made by me was appropriate the study used informant checking through asking participants to read my reports at various stages of the study to comment critically on the findings of the analysis and on the analytical process. In this study there were two potential means of checking: either going back to Zimbabwe and talk to my participants or sending text of relevant parts of my dissertation to participants by e-mail. In my study it was impossible to return to Zimbabwe. Instead I asked four participants to give feedback and three responded to my e-mails.

3.7.2 Generalising from qualitative research

Generalisation "concerns the application of findings from qualitative research studies to populations or settings beyond the particular sample of the study" (Ritchie and Lewis, 2003, p. 264). Three forms are representational generalisation based on a representative sample, inferential generalisations afforded by a representative setting or context, and theoretical generalisation. Generalising from qualitative research requires attention to two issues: firstly, the accuracy with which the phenomena have been captured and interpreted in the study sample (the quality of fieldwork, analysis and interpretation), and secondly inclusivity - whether the sample provides symbolic representation by containing the diversity of dimensions and constituencies that are central to explanation (Ritchie and Lewis, 2003).

Since I used a convenience sample it does not seem possible to achieve both representational and inferential generalisations from my study. Qualitative research often involves relatively small samples which are not selected to be statistically representative and (Ritchie and Lewis, 2003):

> it is not the prevalence of particular views or experiences, nor the extent of their
> location within particular parts of the sample, about which wider inference can be

drawn. Rather it is the context or 'map' of the range of views, experiences or other phenomena under study, and the factors and circumstances that shape and influence them, that can be inferred to the researched population (p. 269).

However Ritchie and Lewis (ibid) argue that it is still possible to "generate hypotheses which can inform and be tested in further research" (p. 266) and generalisation can take place at the level of categories, concepts and explanations.

A thick description of the researched context and phenomena found is required to attend to inferential generalisation. This involves "providing sufficient detail of the original observations or commentaries, and the environment in which they occurred to allow the reader to gauge and assess the meanings attached to them thus making it possible for degree of similarity, or congruence, between two contexts to be assessed by others" (ibid, p. 268). Generalisation is a matter of judgement and although my research was not specifically designed to be generalizable the findings may potentially be transferred to similar contexts.

3.8 Summary

My study used qualitative case study methodology to elicit student-teachers and lecturers' perceptions of learning to teach using interviews, biographical questionnaire and document analysis. This chapter described preliminary arrangements and entry, interviews, recording and storage, transcriptions and coding. It described how the analysis process was based on literature, template analysis and activity theory and discussed issues relating to the rigour, validity and generalizability of the findings. The next chapter presents the data analysis using extracts from documents and direct quotations from the interview transcripts to support the analysis.

4 CHAPTER IV: DATA PRESENTATION, ANALYSIS AND FINDINGS

4.1 Introduction

Data analysis and findings were divided into five sections; participants' background, activity systems, factors both within and between the university and school activity systems, how these factors shaped student-teachers' learning, and development of student-teachers' ideas about teaching.

4.2 Participants' background and motives for becoming a teacher

Section 4.2 is made up of 2 parts. Section 4.2.1 presents data describing participants' background in terms of gender, age, work experience and identity. Their motives for becoming teachers or lecturers are presented in section 4.2.2.

4.2.1 Participants' background

Participants were asked to fill in a short biographical questionnaire in which they described their gender, age, qualifications, specialism, work experience and preferred mode of interview.

4.2.1.1 Gender

25 participants were interviewed: six pre-service students, of whom one was female; five in-service students, of whom two were female; and 14 lecturers, six being female.

4.2.1.2 Age

The students interviewed were either pre-service or in-service student-teachers. Pre-service student-teachers were generally younger than in-service students. Most students were in the age group 21-30 years. The majority of lecturers were aged 41-50 years.

4.2.1.3 Work experience

In-service students had a minimum of two years' work experience as this was one of the requirements to enrolling at UoM. Pre-service students came straight from high school

without work experience and needed two A-Level passes. Lecturers had diverse work experience. Most lecturers had been classroom teachers, others had been trainers at diploma level in teachers' college and some had been education administrators. They had experience of supervising teachers in schools and students on teaching practice.

4.2.1.4 Identity

Student-teachers and lecturers were prompted to talk about their background using the open questions 'tell me about yourself', 'what did you bring to teacher education?' 'why did you (your student) decide to become a teacher?' The code 'subject' came from activity theory, where it means the individual or sub-group whose agency is chosen as the point of view of analysis, for example, student, teacher and lecturer.

Figure 4.1 shows the structure of Faculty of Science Education in 2007. For clarity only two of seven departments are included. Other departments were Biological Sciences, Computer Science, Geography, Mathematics and Physics. By 2012 the university had increased in size to four faculties because a new Faculty of Science Education was created and had seven departments: Biological Sciences, Chemistry, Computer Science, Geography, Physics and Mathematics, Sports Academy, Health Sciences. (The departments of Physics and Mathematics merged into one and Sports Academy and Health Sciences was created). The Faculty of Science Education remained as three departments: Education, Social Sciences, and Social Work. The change meant that Department of Education was now separated from where student-teachers were learning specialist subjects). In 2012 the three specialists were teaching in 2 faculties; science lecturers in FS, science education lecturers and educational theory lecturers in FSE).
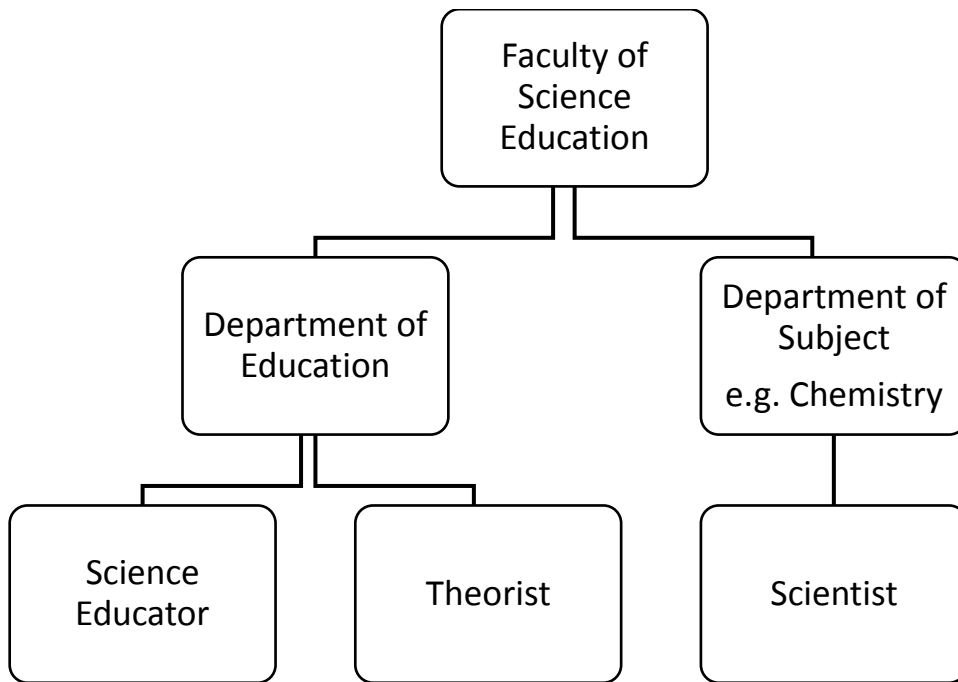
Figure 4.1 The structure of Faculty of Science Education in 2007 showing 2 of 7 departments. Other departments were Biological Sciences, Computer Science, Geography, Mathematics and Physics.

Lecturers in the department of education could be divided into two groups; science educators, who had studied science education to get Bachelor of Education and Master of Science Education degrees, and educational theorists who had studied philosophy in education, psychology in education, and sociology in education at postgraduate level. Among these educational theorists there was a group of lecturers, who taught support courses, for example, communication skills, citizenship education and health education. These had specialised in languages and humanities before doing a postgraduate study in education. Science educators were teaching pedagogics and saw themselves as specialists in mathematics and science content, as well as pedagogical content knowledge. Non science educators (or educational theorists) were described as specialists in theory. Further, there was a third group of lecturers, 'scientists', found in subject-specific departments where student-teachers where learning subject matter knowledge.

Student-teachers assumed various identities. Some described their specialism, for example, Chemistry teacher. Others talked about the stage of their training that they had completed and were waiting for their results. At university lecturers treated student-teachers as adult learners, and identified them as either pre-service student-teachers (if they were coming straight from high school), or in-service student-teachers (when they had some teaching qualification and work experience). Lecturers believed that student-teachers assumed various identities depending on the context. In one instant they would be identified as student-teachers and in another as teachers during ASE. The student-teachers were treated like any other teachers in school (interview with L15). School heads gave student-teachers full classroom responsibilities. Parents and pupils did not differentiate between student-teachers and their teachers and expected student-teachers to perform as effectively as any other teachers.

> Here they are just students. They are learners and adult learners… They are student-teachers. The parents do not differentiate. The secondary students, yes they are quick to pick. But the way they are treated by school heads they take exactly what I call the responsibility of the classroom like any other teachers. So their students understand that the student-teachers are as good as any other teachers… (interview with L15).

In short participants were identified using their positioning(s) at university or school; student-teacher and lecturer. In schools student-teachers were 'teachers'.

4.2.2 Motives for becoming a teacher

Participants talked about motives of student-teachers. Comments describing low Advanced Level grades e.g. two Es, and failure to enter preferred profession were coded as 'no choice'. They talked about influence from family, teacher and others and all these were coded 'important other'. Others talked about job security, and in this study the code 'extrinsic motivation' was used. Salary was coded 'remuneration'. Some participants mentioned student-teachers' genuine interest and passion of teaching job and this was coded 'calling (vocation)'. Data about these motives is discussed below.

4.2.2.1 No choice

My data suggest that some student-teachers felt that they were forced to become teachers because of their circumstances they had no choice. L14 seems to suggest that when students got low grades at A-level career their choices were limited and they ended up teaching.

At the time the study was conducted, industries were downsizing and shutting down (see also section 4.2.2.3). There were no jobs in industry and teaching offered opportunity for employment, although pay was low. The programme studied offered student-teachers an opportunity to get a university education in mathematics and science subjects they were learning to teach. According to S8, most students became teachers because they had no choice, and the competitive nature of alternative careers.

> In Zimbabwe many people do not want remuneration paid teachers and therefore do not want to train as teachers. Those who come here mostly…. the students' attitudes… most students who come here do not want to become teachers. I would say they are forced to join the profession by various situations (interview with S8).

4.2.2.2 Important other

Conversations suggest that student-teachers were motived to become teachers by 'important others'. These included spouses, brothers and sisters, and parents and important teacher in their lives. L7 had become a teacher because of the influence of her father and L6 was inspired to become a teacher by her geography teacher and believed the same applied to her student-teachers.

4.2.2.3 Extrinsic

Participants talked about reasons that could be described as extrinsic. These reasons ranged from remuneration, a route to employment, job security and life-long learning. L2 describes teaching as a profession offering job security and thinks this explains why her students chose the teaching career.

> Well... the job... It offers job security… You are aware that some companies do very well and pay very well but eventually they fold up. But teaching is one job which will always be there. Children are born and so there will always be someone coming to school. As long as you are always able to teach, teaching offers a job security (interview with L2).

4.2.2.4 Teaching as a calling (vocation)

L1 and L4 joined teaching because of passion and for the love of teaching. Others had a particular interest in science teaching. The reasons given seem to suggest seeing teaching as a calling, something that could be described as altruistic, to contribute to society by helping people learn and for the love of children.

4.2.2.5 Work experience

Participants talked about prior knowledge, training and work experience. Student-teachers, with some training, talked about their prior teaching experience, interpreted to mean that they were influenenced to study B.ScEd. because of work experience. Some lecturers, for example L8, who had been motivated by working as unqualified teachers to realise that the teaching job was interesting after all, believed the same happened to their student-teachers.

4.2.3 Summary of participants' background and motives

The story emerging was that student-teachers had actual and designated identities (Sfard and Prusak, 2005a). They were adult learners; mostly males in the age range 21-30 years, as people learning to teach they were student-teachers, and during school experience (applied science education) - they were 'student-teachers' to their supervisors, and 'teachers' to pupils and parents.

4.3 The perceptions of student-teachers and lecturers about what happens in different settings as student-teachers learn to think and act as teachers

This section is divided into sub-sections; what happens in the university activity system, what happens in the school activity and interactions between the university and school activity systems. Student-teachers learn about teaching (teacher knowledge) in the university activity system and are afforded opportunities to think and act as teachers in the school activity system. In each activity system the subject of interest is the student-teacher and the data presented concerns objects, tools, community, the division of labour, relationships and rules. Data about interactions between the university and school activity systems provides insights into knowledge transfer occurring at the boundaries between the systems.

4.3.1 The university activity system

Student-teachers' motives have already been examined in section 4.2.2. These need to be considered in conjunction with the goals of teacher education. For this reason section 4.3.1.1 discusses the aims (or objects) of teacher education at UoM.

4.3.1.1 Objects

University-based learning at UoM aimed to help student-teachers acquire the knowledge, skills and attitudes necessary to become effective mathematics and science teachers, and attain a teaching degree. This was evident in the website, prospectus and ASE Student Handbook. Conversations with participants demonstrated that they felt these objects affected the model of teacher education that was in place. However, the conversations demonstrated that the lecturers had not, in practice, define the kind of teacher targeted.

4.3.1.2 Tools

Student-teachers engage in the activity of learning to teach using various tools. The data revealed four groups of tools; equipment, the internet and library, other people and educational theory.

Participants talked about educational technology as equipment and the need to improvise when using apparatus in schools because of the impoverished contexts of the schools. Lecturers like L10 indicated an urgent need for computers and computer projection equipment for university teaching, and for student-teachers to learn to use these tools in the classroom. The idea of 'tools as means' was the common notion of teaching and learning equipment.

The data suggests that the internet and library were important tools in learning to teach. L2 described the internet and library as the main learning resources from where students got books and space to read, electronic resources, and access to research projects. L8 thought student-teachers used the internet and library to a large extent. However, student-teachers and lecturers were frustrated by limited access to the internet and lack of books in the library, a consequence of the stressed economy of the country at the time study was conducted.

Participants also talked about other people as tools. Student-teachers wanted their lecturers to be well prepared, confident and resourceful. S1 talked about lecturers who were good models. She knew some, from whom there was nothing to admire in terms of dress and conduct, and these were mostly lecturers in subject matter knowledge. Student-teachers found support from others like lecturers and other students helpful in a variety of ways. They viewed lecturers as sources of direct information and guides to learning resources. Since the university was failing to attract highly qualified and experienced lecturers, viewing them as sources of information was problematic and therefore directing student-teachers to reliable sources of information was even more critical (interviews with L4 and L8).

Some student-teachers believed that learning theory was like being equipped with the technical know-how, similar to what L15 called 'means to an end'.

> Learning theory is like being equipped with skills, the technical knowhow that is going to be helpful. Also theory itself is for changing any mind as a student, removing un-useful knowledge, misconceptions, and being put with useful skills (interview with S12).

Further, available tools were not efficiently utilized. L4 thought that lecturers were not using available resources like books effectively for the benefit of student learning.

> … Of cause the outcry is that there is a shortage of books and we have a shortage of resources. But I think it's more to do with our inability to use those resources that are available effectively, even more important to effectively, even more important to make these available to students. Lecturers may have more access to books which they keep to themselves. But, I mean these are of no use if they do not get to students. I think it is important that we empower students by giving them access to resources (interview with L4).

The already impoverished context with inadequate teaching and learning materials was worsened by a lack of consideration to share and use efficiently whatever was available.

Student-teachers and lecturers talked about tools ranging from equipment, to documents, people and ideas. However, the context was characterised by both a lack of tools (interviews with S1, S3, L8, L14 and L15) and poor quality resources (interview with S3).

4.3.1.3 Community of practice

The term 'community' refers to both the social and physical environment in which activity occurs. In this study it included the context and groups of people who supported student-teachers. Data suggests that participants believed that in the university activity system people who mattered were student-teachers, lecturers and library staff. These groups of people constituted the university community of learning (interviews with S1, S2 and S6). However, lecturers' quality of support was negatively affected by a number of contextual factors; the emigration of experienced lecturers, the stressed socio-economic situation characterised by hyper-inflation and low salaries, corrupt tendencies when making new appointments, and the politics of recruitment. Working teams kept changing their composition and this had a negative impact on teaching (interview with L14).

The conversation with L7 reveals the "politics of recruitment", where she believes there was a lack of fairness, openness, and transparency. She believed that the advertisement of vacancies and selection process were characterised by irregularities and corruption because people selected and appointed were often near-relatives of those involved in the appointment process.

> Yaa-a! It might be recurring. But probably it might be politics of recruitment… Eeee-e you flight an advert when you already have somebody in mind… Or you are not very eager to look for someone with the right qualifications ... you are not ... into

these nit gritting ... things which are important and we end up stuck with a person who does not have the right qualifications. That is my little observation (interview with L7).

The integrity and transparency in hiring staff at UoM were an issue with staff not involved in recruitment procedures having no faith in the system. Things were complicated by economic hardships. Sentiments expressed by L7 are understandable because it is during periods of lack of employment opportunities when favouritism, nepotism and corruption tend to occur. On the other hand it is also possible that the 'brain drain' meant that suitable candidates, who had options to get employment elsewhere, left the university with no option but to hire people with neither experience nor the required qualifications.

Data suggests that the university was failing to attract enough prospective students to train as teachers. In order to remain viable, entry standards were lowered although some (e.g. L7) believed that falling numbers of students enrolling was because the university had not marketed its programmes well.

4.3.1.4 Division of labour

The 'division of labour' is concerned with who is responsible for what when carrying out activity and how those roles are organised. The key members in the university activity system were lecturers and student-teachers. Data suggests that, in terms of *division of labour,* lecturers determined what student-teachers were learning.

L2 described her role in peer teaching and L3 talked about his role in lectures. In the university activity system lecturers determined the curriculum and student-teachers demonstrated competence through coursework and examinations. Learning was teacher-centred. Agentic action among student-teachers to shift from 'transmission modes' to learner-centred approaches was not apparent.

4.3.1.5 Relationships

Relationships were considered essential to understand the community of practice, and division of labour. If relationships are good in the community efficiency is increased because

energies are directed towards the achievement of objects. Data suggests three key relationships among student-teachers, lecturers and non-academic staff.

Friction was evident when participants talked about relationships among staff. L2 felt there was friction among lecturers and that this had resulted in others leaving the university. She specifically mentioned that juniors lecturers felt unfairly treated when seeking financial support and believed those more senior had better access to research funding. L7 talked about gossiping and nepotism among lecturers, and thought those in leadership positions felt threatened by available talent in the department of education. L6 felt that lecturers were not seriously engaging with other lecturers.

> We do not have enough interaction between lecturers. Things being normal I should be aware of it, but then I am not sure because it appears everybody stick to their course. You see they do not really mind. They do not try to find out what is happening in other courses (interview with L6).

According to participants, the relationship among lecturers ranged from excellent to hostile, and they preferred to work individually rather than collaboratively.

Data suggests that strained relations exist between lecturers and administrative staff. L13 was not happy with how non-teaching staff related with teaching staff. She thought that non-teaching staff did not know what happens in courses like Applied Science Education. The friction was often over allocation of resources. Administrative staff controlled use of resources, and lecturers were frustrated when they did not get what they requested.

Participants talked about relationships between student-teachers and lecturers. L14 talked about student-teachers and lecturers relating in professional ways.

> Department of Education … if you look at the relationship with students … it is quite cordial. We do not want students to be afraid of their lecturers, neither do we want lecturers to intimidate nor treat students unfairly. We want a relationship which is cordial … that will culture growth on the part of the student (interview with L14).

L2 was always available for consultation when student-teachers needed help. She gathered reading materials and made these available to her students. As reported by L8, students consult lecturers when they needed help with coursework and toward examinations. L3 found

it difficult to know all his students and believed that not knowing student-teachers created problems. He taught student-teachers in large groups, and met each group just once a week.

At the beginning when S2 was new to lecturers he did not get enough help. With time lecturers came to know him and he received more guidance. S2 believed that when lecturers do not know student-teachers they did not relate well but this changes once they came to know one another. S2 believed that being known by lecturers made a difference and motivated him.

> My lecturers only started to know me in Part II. The reason was because I was then participating much. In the third year I was very active and lecturers knew me very well. In the first year I think they came to know my name when they were marking my assignments (interview with S2).

L13 talked about how to overcome strained relations with student-teachers. She believed student-teachers wanted to be treated fairly, to get feedback on time, and to explain to them why they were going to get their marked coursework and feedback late.

Data suggest that student-teachers and lecturers related well and in ways consistent with their expectations. One can infer that good relationships among student-teachers and lecturers provided a basis for productive engagement and increased learning.

Participants also described relationships among student-teachers. S1 believed there was mistrust between student-teachers. Some students did not like class discussions thinking their contributions were not valued. Contrary to S1, S9 reported that in class discussions students gave others chance to contribute. Student-teachers generally related well with others.

Relationships were negatively affected by the political environment. L14 felt that the political environment neither supported growth nor academic freedom. He believed that there was too much political interference in teacher education.

> We also have politics coming to play. The political scenario in the country is not conducive to promoting professional growth especially in teacher education (interview with L14).

People did not feel free and safe to try new ideas because of the volatile political environment. Further, people belonging to different political parties did not trust each other.

4.3.1.6 Rules

Data suggests four issues about rules in the university activity system. Firstly, commonly quoted rules were regulations about coursework. L15 talked about setting deadlines for their student-teachers to submit coursework and penalising late submissions. On their part lecturers had flexible deadlines to give coursework feedback to student-teachers but had strict deadlines for examinations.

Rules were put in place to regulate teaching and learning e.g. to minimize malpractices and to ensure timely processing of results.

L15 talked about how rules were made in the department of education using suggestions from student-teachers. At university there were sub-committees responsible for drafting policies. The disciplinary committee set rules in good faith and such rules were communicated to students during orientation.

> The University, the department, the faculty and when it is done it is quite democratic because in each and every committee the students are represented. They are in the Senate, in the Faculty committee, in the Department Committee. So when rules are set they are set in good faith so that one does not exploit the system. In other words we are saying we are utilitarianists; the greatest good for the greatest number of people (interview with L15).

Despite L15 describing process of making rules as democratic student-teachers felt marginalised. S1 said that she had found rules in place. She had not been given opportunity to make a contribution although she would have wanted to be involved in devising rules.

Rules also impinged on power relations between student-teachers and lectures. To protect student-teachers from unfair treatment, there was a disciplinary committee, with a broad representation of the university community. Lecturers mentioned student-teachers' rights like 'right to learn' and 'right to fair representation'. Because student-teachers were represented in the disciplinary committee L14 thought that there was fair representation.

S1 saw rules as regulations stopping students from doing whatever they would have wanted and they often found themselves surrendering to the rules. S1 felt powerless. She thought that sometimes the rules were not fair to students and benefitted lecturers. S1 thought rules were often used to punish students.

4.3.2 The school activity system

4.3.2.1 Objects

Data suggests that student-teachers' objects of participating in school activity system fall into two groups; university and school expectations. From the university perspective, participants believed that student-teachers' objects in ASE were to develop into "experts at providing meaningful teaching and learning environments for their learners" (ASE Student Handbook, 2010, p. 5), to develop pedagogical content knowledge, and to demonstrate teaching competence.

Considering that student-teachers in the university activity system had been learning innovative and progressive ideas about teaching in general and science in particular, the object of school experience described by L14 and L15 as putting theory into practice could also mean experimenting with the new ideas. However, from the school perspective student-teachers were used as cover teachers to ensure that pupils covered the school curriculum topics and were prepared for examinations (interview with L2 and L8).

> one of the university's expectation is that we sent a student so that he/she develops into a complete teacher. But with the schools they want to use our students as a sort of machines who would help students to pass examinations (interview with L8).

Schools used student-teachers to reduce teacher shortage. In short student-teachers participated in ASE to fulfil university requirements, and simultaneously satisfy school expectations.

4.3.2.2 Tools

Data reveals four groups of tools in the school activity system: documents, educational theory and subject matter knowledge, other people and equipment. L1 talked about documents as

mediating tools, for example, the ASE Student Handbook was a useful tool used by student-teachers and to induct less experienced lecturers. He described the ASE Student Handbook as a pedagogy course and the ASE file each student was supposed to create and keep as a basic tool for learning to teach. L1 saw lesson planning as a crucial tool, and students who had no lesson plans failed teaching practice because they were seen as teaching without adequate preparation.

The ASE Student Handbook as a tool provided student-teachers with guidelines, rules, exemplars of schemes of work and lesson plans, copies of ASE assessment instruments, and lists of resources from pedagogy lectures that were useful during teaching practice. Student-teachers used the guidelines to produce teaching and learning artefacts like schemes of work, lesson plans, and practical work.

Student-teachers used educational theory and other tools acquired during university-based learning to guide decision making in the school classroom. Such decisions included sequencing topics/concepts, grouping learners and selection of teaching/learning strategies.

> We first of all empower them by making available to them all materials and instruments which they require to scheme, plan and draw out all the daily activities that are part of classroom life (interview with L4).

Student-teachers were supported by teachers who acted as mentors and lecturers who acted as supervisors. Teachers, as practitioners, were best placed to support student-teachers through modelling good practices, making sure practice was appropriate for promoting learning, and providing feedback based on their knowledge of contextual factors. Ideally lecturers planned to visit each student-teacher a minimum of 3 times to support student-teachers to access theoretical knowledge and develop a tradition of questioning practice. However lecturers were not able to visit each student on school attachment the minimum three times required because of lack of resources like transport. This limited lecturers' support of student-teachers during applied science education.

Schools provided student-teachers with available resources and equipment. Mentors had knowledge of the context in terms of, for example, pupils, constraints and opportunities. Conversations revealed that most schools were poorly resourced and could not afford to purchase chemicals and equipment required to conduct practical work in the laboratory. One

example is S1, who when she needed chemicals was referred to the school head by her subject head. Student-teachers neither got the curriculum materials they needed nor support from teachers on how to circumvent shortages.

> The Head of Science instructed me to place an order through the Head of the school. Then when I approached the Head, she said that we do not need sulphuric acid in the school. There were other things more important than sulphuric acid (interview with S1).

My data has revealed that student-teachers on ASE used tools developed during university based learning (documents, educational theory and subject matter knowledge). They also got support from teachers; often not suitably qualified and limited by a general shortage of curriculum materials in schools. School contexts were characterised by lack of funding, equipment and learning materials.

4.3.2.3 Community of practice

In the school activity system student-teachers, lecturers, and teachers constituted the community of practice. As revealed by L14 mentors made their classes and rooms available to student-teachers. They provided immediate support because of their proximity to where student-teachers were learning. Teachers, as mentors, were there to support student-teachers through modelling good practices (what to do, how to do it) and giving feedback.

Lecturers visited schools to supervise and assess student-teachers on practice. They were both supervisors and assessors. However, lack of adequate funding and transport resources meant that lecturers were not able to visit each student-teachers the required number of times and resorted to acting as assessors. Supervision was superseded by assessment.

4.3.2.4 Division of labour

The ASE Student Handbook spelled out the role of various groups of people (student-teacher, peer, teacher and lecturer) and their powers. Teachers acted as mentors. University lecturers had two roles; to act as supervisors and assessors. Student-teachers were learning to teach through practice, at times with full teaching load. They were both learning to teach and practicing as teachers.

4.3.2.5 Relationships

Data reveals three key relationships in the school activity system; student-mentor, student-supervisor and supervisor-mentor relationships.

S2, contrary to saying that relating well with school and teachers helped students, thought that some experienced teachers despised them as novices. It was important for student-teachers to relate well with teachers, because they made their classrooms and pupils available to student-teachers. Further they helped student-teachers to get resources, where these were available. Student-teachers wanted guidance from mentors and got frustrated when teachers could not provide the needed guidance. Teachers' advice is important to deal with student-teachers' immediate needs. It is also needed to promote student-teachers' learning through access to teachers' thinking. Student-teachers found out that former students of the university provided most assistance because they knew the mode of training at university. This to me means that student-teachers were concerned with immediate need of successfully completing their training and former students were perceived as better placed to provide that guidance than other teachers.

Supervisors (lecturers) related well with mentors because, as L3 said, knowing teachers helped to foretell the kind of help student-teachers were going to receive. L4 expected mentors to help student-teachers and hence believed it was necessary to see teachers as equal partners in order to realise the synergies. He suggests mutual trust and respect between university lecturers and school teachers.

> the university or college where student-teachers are enrolled, the schools where they do their practicum (i.e. teachers and administrators in those schools), the parents of the learners and community/society at large, all have an input directly or indirectly in the quality of preparation of the teachers and hence in the calibre of the teacher produced eventually. It behoves lecturers to actively engage these other contributors. In my view, the tendency has been to denigrate or at least underplay the role that could be played by the other parties I have mentioned. (interview with L4)

Although participants described supervisor-mentor relationships as positive, the partnership was tilted in favour of the university, because lecturers determined interaction with teachers. The notion of partnership based on mutual trust and respect hinted at by L4 did not exist but

when fully realised promotes creation of a climate for constructive development of student-teachers.

4.3.2.6 Rules

In the Applied Science Education Student Handbook, there were rules about scheming and planning, consequences of not doing so, dress code, communication with the university, relationships with others and professionalism (absence from duty, sick leave, moral and cultural values and use of corporal punishment). In schools student-teachers used government published Public Service Regulations, professional booklets, and school policies to guide them in teaching practice.

Student-teachers and lecturers referred to documentation each time they tried to resolve disputes. As an example, a student-teacher who failed to plan had to produce documentary evidence, to support such claims of being ill otherwise the student would fail the course. Some student-teachers found rules to be constraints because of the situation in schools which made it diffcult to meet the requirements. At times student-teachers were given full teaching responsibilities and extra curricular duties, something they were not yet ready to cope with. This was exacerbated by an environment where transport to and from school was problematic such that production of daily lesson plans for each class taught became a burden difficult to achieve, yet if found with no lesson plan a student-teacher was deemed to fail. It was clear in the ASE Student Handbook (2010) that rules were meant to safeguard teaching profession by ensuring that the right candidates were certified. Most rules about teaching practice were contained in ASE Student Handbook, a document authored by the ASE coordinator and science educators.

Up to this point data presented suggests that learning to teach occurred mainly in two settings; the university and the school. Student-teachers were subjects in both the university activity system and school activity system. Section 4.3.3 presents data suggesting that there was potential for student-teachers to learn more about how to teach as they move between the two activity systems. The movement can be termed boundary crossing and requires negotiation of, for example, reconstituting objects.

4.3.3 Interactions between the university and the school activity systems

My data suggests that there were various interactions between the university and the school activity systems. As indicated in sections 4.3.1 and 4.3.2 student-teachers participate in the two settings to pursue the same object of learning to teach – both the university and school are learning sites. However, different objects arise because the school has at its core the goal of promoting education of children. Literature e.g. Hagger and McIntyre (2006), has revealed the dichotomy between HEI (university) designed for the education of adults and school activity systems where adults focussing on their own professional education may feel out of place. Data revealing contradictory factors between what happens in the university and the school activity systems is examined in secction 4.4. The focus in this section is on relationships and power issues between university and school.

4.3.3.1 School-university relationships

Hagger and McIntyre (2006, p. 65) argue that "whatever happens in university is dependent on its significance to student-teachers for their practice in schools". In order for continuity of learning that begins in university communication between the university community and the school community plays a central role. L4 believed that the purposes of applied science education must be communicated because the university used schools for practice.

> The school provides the setting or context in which student-teachers practice their teaching. Heads, teachers, pupils and other interested parties in the school need to be aware of the objectives the university has in the process of teacher preparation. It should not only be awareness of such goals and objectives, but an acceptance, or sharing, of the same goals. This is imperative if the teaching practice is to be effective… (interview with L4).

L8 thought that schools host students, giving them opportunity to learn from practice, to try innovative and progressive ideas learnt at university. Schools need a clear understanding of how the university expects student-teachers to be supported during the time they spend in the classrooms. However, in the absence of a common understanding of these different expectations, student-teachers were likely not to get adequate support from schools and conversation with L8 reveals that student-teachers were regarded by teachers as extra help in schools. The university and schools were considered by some to be partners in training student-teachers. L15 believed that training was a responsibility of many partners each with a role to play, what he described as a "smart partnership".

> Now the trainee teacher is in the hands of the university for a limited period of time, and then he is handed over to the Ministry. Eeee-e after that training entrusted by society to ensure that the goals are really as agreed ... so it is ... that language was meant to portray a picture that is not wholly owned by an individual, neither is it wholly owned by a single institution (interview with L15).

Data suggests that power relations favoured the university. For example, S1 believed that the university has authority to tell school head-teachers what to do and how to support student-teachers. The university had the responsibility to manage teacher education programme. L19 believed that schools regarded the university highly and saw it as more powerful than the school. Data suggests that the university was more powerful than schools in determining student-teachers' participation in school activity system. This is understandable considering that the main purpose of the university was to train teachers, and that lecturers were generally more knowledgeable about learning to teach than teachers in schools.

However, schools were likely to contribute more in supporting student-teachers' learning if they were considered as equal partners. As mentioned earlier in section *4.3.2.5*, mutual respect and equality of esteem between lecturers and teachers is paramount and helpful to decide 'who can do what best'. L2 believed that the university should not set or impose its expectations on the school. L13 saw the school and university as equals. L7 believed that lecturers should respect school heads, as opposed to the tendency of being negative about schools. She thought that some lecturers did not know school heads well and based their attitudes on experiences they had as secondary teachers. It seems lecturers did not respect school heads, yet these were people more conversant with what happens in schools.

In short data suggests the school-university relationship was skewed and university-led. However, some participants believed a complementary partnership could be more fruitful in helping student-teachers to learn through practice.

4.3.3.2 Communication

Data revealed possible reasons for lack of communication between university and schools, and why it was necessary to improve the flow of information between the two learning domains. L7 blamed lecturers for the poor communication between university and schools. In

both the school system and university things keep changing so communicating such changes was necessary if a better understanding of each other's expectations was to happen. L4 believed that student-teachers were prepared for a typical school, yet each school was unique.

> I think that is one of the problems: where half the time we have assumed that since all schools use Public Service Regulations we know their expectations. Yet each school is unique: has got its own ethos, which we need to know (interview with L4).

Data suggests that schools did not know university expectations and had to rely on what they learnt from student-teachers. S7 revealed that lecturers, who were claiming to know what happens in schools, in reality were out of touch. She believed that teachers in schools do not know the model of teacher learning at UoM. S7 thought that school-university relationships could be improved by talking to each other, so that what student-teachers were learning is more relevant to current practices in school.

> In general I think the schools should have input on the curriculum of teacher training courses, and also the university should also consult. When undertaking various decisions university should also consult the schools. This is because the programmes they offer are meant to enhance the quality of teaching and learning in schools (interview with S7).

Schools and university needed to share information about student-teachers, how the students were supposed to be supported, monitoring progress and informing each other of challenges faced. High quality support and guidance of student-teachers in practical reasoning depends on both lecturers (supervisors) from the university activity system and teachers (mentors) in school activity system.

4.3.4 Summary of what happens in different settings as student-teachers learn to think and act as teachers

In summary two activity systems were evident; the university and the school activity systems. My data suggest that student-teachers were learning in the university activity system, and demonstrating competence and understanding of educational theory in the school activity system. Both settings faced challenges because of stressed economy at the time of the study and the impoverished contexts negatively impacted on student-teachers' learning. The influence of impoverished contexts is revisited in sections 4.4 and 4.5. My data reveals

existence of a third learning space boundary crossing, that is, learning to teach opportunities provided by interactions between university activity system and school activity system.

4.4 Factors shaping student-teachers' learning within and between the university and school activity systems

Section 4.4 examines data shaping student-teachers' learning and is divided into two parts; potential synergistic factors and contradictory factors. My data presentation of synergies uses three themes, namely; three specialisms, reflective practice, and partnership (university-based learning and school-based learning). Data about contradictory factors follows locations of where these occur and reveals five contradictions in the university setting, four contradictions in the school setting and four contradictions at the university-school boundary.

4.4.1 Potential synergistic factors

Three potential synergistic factors to support students' learning emerged clearly from the data: lecturers with various specialisms working collaboratively; learning to engage in reflective practice as a mediating tool; and the development of links between university-based and school-based learning.

4.4.1.1 Three specialisms as a synergy

My data suggest that there were three groups of lecturers in the university; 'scientists', 'science educators' and 'educational theorists' (see section *4.2.1.4*). Data suggests that student-teachers were learning subject matter knowledge in subject departments, and theoretical foundations and teaching methods in Department of Education. There was potential for a synergy between learning subject matter knowledge and learning how to teach the subjects. Science specialists can provide a deep understanding of science concepts, science educators and educational theorists can help student-teachers to understand the nature of teaching science and the processes through which teaching expertise is developed. Although there are subject specialists, science teaching specialists and education specialists they are all part of the education of teachers so they share expertise in teaching of children.

4.4.1.2 Reflective practice as a synergy

My data also revealed that student-teachers learning 'Curriculum Issues in Science Education' through student-teacher-led discussions of school experiences (interview with L13) had opportunity to reflect on what happened in the school activity system. This reflection covered what the student-teachers had learnt during university-based learning prior to final teaching practice, their experiences during applied science education, and their new understanding of educational theory. Data suggest that student-teachers limited reflection to one education course and two lecturers teaching that course. L5 believed that sequencing of education courses meant that student-teachers did not re-visit educational foundations course taught in first year after teaching practice.

> Because I do not know what happens to my students after the first year when I teach them educational sociology. If may be I were to teach other higher courses, or even attend other courses I would see if they are able to make links from sociology to curriculum to pedagogics. If I were to see that they were not doing it properly I would come back to my Part I work and teach it differently (interview with L5).

Here was potential for reflection in the university activity system where student-teachers can deepen their understanding of educational theory through discussion of experiences in educational practice.

A potential synergy in the school activity system was reflective practice. While conversations with participants did not reveal a lot about reflective practice, in the ASE Student Handbook it is clear that the university wanted student-teachers to learn how to be reflective practitioners. There is evidence showing that student-teachers were encouraged to reflect when writing evaluations of lesson plans and through post-lesson discussions. The ASE Student Handbook (2010) gives guidelines to student-teachers on reflective practice and ASE assessment (p. 27) awards 20% of the marks to the evidence of RP as shown in Figure 4.2. Here was a potential synergy between learning about reflective practice in the university activity system, and then getting a chance to be a reflective practitioner in the school activity system.

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ASE ASSESSMENT OF DOCUMENTS
INSTRUMENT

Reflective Practice: (20)
  • Depth/ scope of lesson & scheme
    evaluations
  • Assessment of attainment of objectives
  • Highlight of weaknesses/strengths in
    lessons
  • Suggestions for improving on basis of
    evaluation.
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Figure 4.2: Weighting on reflective practice (ASE Student Handbook, 2010, p.27)

4.4.1.3 Interplay between theory and practice as a synergy

One potential synergy across the university and school activity systems, evident from conversations with participants e.g. L1, was that student-teachers were learning educational theory in the university setting, and then later, had opportunity of learning from practice in the school setting.

> I think that theory informs practice in that what the student-teacher learns as theory can and should be used to guide practice… This is notwithstanding the fact that practice can and does inform theory or the trend along which theory develops (interview with L1).

The message evident in conversation with L1 is that student-teachers' learning is increased when university learning of theory and school based practice are combined. Student-teachers were learning innovative and progressive ideas informed by theoretical knowledge and research-based knowledge, and to question educational practice critically in the university activity system. In the school activity system the same student-teachers had opportunities to experiment with innovative and progressive ideas supported by teachers' knowledge of contextual factors. In order to fully exploit this synergy a collaborative partnership, where there is mutual trust and respect, is required between school and university, and among student-teachers, teachers and lecturers.

My data suggests that potential synergies existed in and between different settings. However deliberate efforts to exploit the synergies were not revealed in the conversations. This argument is revisited in section 4.5.

4.4.2 Contradictory factors

My data about contradictory factors is presented in three parts; contradictory factors in the university activity system, contradictory factors in the school activity system, and contradictory factors between the two activity systems.

4.4.2.1 Contradictory factors in the university activity system

Data reveals five contradictory factors in the university activity system. First, conversations with student-teachers suggest that teaching was not their first career choice and hope to get a different job after getting their teaching degrees. S3 believes that teaching is for those who did not do well at A-Level. If he had done well in the science subjects he studied at A-Level, S3 could have become a medical student. He did not get the required grades, and was left to take up teaching degree. Others like S6 believed that a teaching degree eventually led to a better non-teaching job. L15 believed that some student-teachers were more interested in getting a degree, than to find out what teaching is all about.

> The problem is many of our students come to college with a mind-set of wanting to obtain a degree and go into the country and help themselves. It is an issue of wanting to have a certificate, wanting to have a degree and move away from college… So they learn not in order to use it, they learn in order to fulfil the requirements of the degree… But more emphasis is on certificates, emphasis on qualification, more than emphasis on the trained person, the skills, and the output (interview with L15)

On one hand S8 believes that the goal of teacher education is acquisition of knowledge and skills for teaching. On the other hand he bemoans lack of leadership and management courses. This interest in leadership and management is understandable when one considers S8 was an in-service student-teacher. However it was not the purpose of the teacher education programme to train leaders and managers, rather the target was classroom teaching of mathematics and science subjects.

My data suggests that some people join the teaching profession to please others important in their lives like parents and former teachers. Learning to teach is not about learning to please the 'important other'. Rather student-teachers, who take up teaching to please others, may find learning professional courses difficult and boring. There is a clear contradiction between student-teachers' motives for doing a teaching degree and their objects in the university activity system.

Second, the model of teacher learning was officially 'concurrent' but my data suggest that the educational practice was 'consecutive' with no exploration of concurrent learning. L4 described the model of teacher learning as concurrent.

> The teacher education programme that we offer here is in two parts. We have got the content area where the student's subject could be Biology, Chemistry, Mathematics or Physics, Geography or Computer Science. Alongside that we have got pedagogical content knowledge, where the students are taught about what learning is all about and how to impart content that they have. Basically those are the two thrusts we have here (interview with L4).

S2 described the model as concurrent because he was learning subject matter knowledge and theory courses at the same time. However, the two components were taught in different departments whose interaction was limited to collating marks in order to determine grades. According to S1 student-teachers were learning subject matter knowledge alongside education courses, not in an integrated way.

> We have courses in education and my subject, Chemistry. I do theory courses and then I have other courses in Chemistry… would say there was an interaction only to a limited extent. Generally the two were separated; we learnt education at this campus and Chemistry at the other site… What happened in the Department of Chemistry did not influence anything really in the Department of Education (interview with S1).

The educational practices at the university studied suggest a 'consecutive' model because student-teachers learnt educational theory separate from learning subject matter knowledge. The courses were not fully integrated. Data suggest a contradiction between wanting to integrate learning subject matter knowledge and pedagogical content knowledge as in the concurrent model and actual practice where learning the two forms of teacher knowledge were linear as in consecutive model.

Data also suggests that concurrent learning of subject matter knowledge and education courses was problematic. When clashes between courses in subject matter knowledge and education courses occurred on the timetable, students were left to resolve this on their own, such that some like S2 felt unfairly treated. Often, it meant student-teachers had either to decide to defer a subject course until a later date or make excuses for missing some lectures, because all education courses were compulsory.

Student-teachers who were learning theory and subject matter concurrently, talked about disliking learning theory. L19 believed that student-teachers liked to learn subject matter knowledge more than pedagogical knowledge.

> There is a tendency and more inclination toward subject matter knowledge. They learn content (subject) and pedagogical content material. They seem to dislike pedagogical study (interview with L19).

Student-teachers given a choice preferred learning subject matter knowledge to educational theory. Within the department of education student-teachers preferred to learn teaching methods than theoretical foundations.

L15 believed that the concurrent model was better than the consecutive model because it blended subject specialism and professional courses. However, the concurrent model of teacher learning resulted in what L15 describes as "the relevance (of theory) issue", where student-teachers did not see the importance of making the learning of professional courses compulsory. Another issue was timetabling, where clashes had subject matter courses against professional courses. L7 would prefer the consecutive model to increase contact time between lecturers and students.

As reported by L3 people lacking experience, sometimes under-qualified and who did not have the relevant qualifications, were hired as lecturers; all these hindered learning pedagogical content knowledge. According to L13 student-teachers ended up learning general pedagogy instead of subject-specific pedagogy because of lack of the right number of science educators.

> But it has been difficult sometimes. For all the years, the Geography educator would take all students-Mathematics, Geography, Biology, Chemistry and Physics together

and yet we need an educator to teach how a particular subject can be taught (interview with L13).

It seems the context had given rise to questions about recruitment. Participants gave several explanations from economic to political and social reasons. Data suggests inconsistence between (lack of) tools, that is, failure to attract high calibre science educators and the object "to produce (teachers) who are equipped with cutting edge pedagogical skills in science and mathematics".

Lecturers also reported that the stressed economy affected resources required in initial teacher education. Most reported shortages of books. Available books were foreign publications, outdated and obsolete. Lack of resources affected teaching and learning. L15 reported that when lecturers did not get the resources required they resorted to less than ideal teaching approaches, for example where student-centred approaches would have been more appropriate they used lecturer-centred methods, contrary to what they wanted student-teachers to do during teaching practice.

> Here I am also hindered because educational technology is also nil whereas I am supposed to teach by example. I am doing exactly what I am discouraging them to do. I am going into the lecture room and the only tool I have is the chalk and the board (interview with L15).

Student-teachers were learning in an environment characterised by limited resources, no space to study, no equipment, no materials, and no internet. Student-teachers had to pay extra money to get internet access, and they also needed computers. When internet access was available student-teachers faced the problem of unreliable connectivity and found this to be frustrating. Here was a contradiction between the desire to provide expert tuition through innovative research-based instruction and contextual factors inhibiting that kind of tuition.

4.4.2.2 Contradictory factors in the school activity system

My data suggest four contradictory factors in the school activity system. Participants reported that in schools there weren't adequate books, for both pupils and teachers such that student-teachers could not try out constructivist approaches. Schools also lacked computers and internet access. According to L14 student-teachers could not experiment in schools with innovative and progressive ideas they had learnt at university because of limited resources.

According to S5 the context was characterized by large classes, lack of space, poor services and being far from the university.

> You find that I am down in Rushinga and the university is 137 kilometres away. There are some information searches I may want to carry out especially searches on Internet. In such a case there is a hindrance in terms of long distances to travel, costs and general development with regards to the geographical area. Rushinga is underdeveloped and one of the poorest districts in the country and that one is a problem in secondary schools we find in rural areas (interview with S5).

Student-teachers who wanted to learn through observing teachers in action found this difficult for a number of reasons. S1 thought that observing teachers in action made teaching artificial. She believed teachers 'stage-manage' when they are observed and suggested video recording, which had ethical connotations.

L4 commented that there was no mentoring at all. To promote ideal mentoring teachers needed training, to be recognized materially, not to ask them to do the extra duty without getting any reward.

> The ideal situation is that they will be under a mentor. The reality on the ground is that half the time they are on their own. They are on their own because the mentor might not take as much interest in them as we here at university might want. I think the reason that inhibits mentors is that there is no recognition of any form that is accorded to the mentor being by way of small stipend or remuneration or by other means (interview with L4).

S2 felt that student-teachers did not get support from mentors because mentors were threatened by students' knowledge of new ideas, and the realisation that students were going to graduate soon, with higher qualifications than them. In schools there were no graduate teachers to be mentors, and teachers who had a diploma as their highest qualification had no confidence in supporting student-teachers, contrary to the reality that they were the professionals best suited to show students how to motivate and teach particular pupils and classes in particular schools. Student-teachers who participated in school activity systems hoping to get support from mentors found out that teachers were not always eager to act as mentors.

S2 thought that teachers received low salaries and found mentoring an extra job for which they did not receive any remuneration, and therefore lacked motivation to provide student-teachers with necessary support.

> It was interesting. My Head of Subject had spent a long time with school students but they did not see her as a good teacher. She seemed to have given up and was displaying an 'I do not care' attitude. I did not blame her for that considering the difficulties teachers were experiencing because what they earned was not able to buy basic commodities. I looked at the situation and I said to myself it was being human to behave the way she was behaving… I learnt much from teachers. Some would decide to stay away from work because they had not been paid as much as they would have wanted or because they had failed to get their pay from their banks. Others were saying I must fulfil my 'being willing to teach' (interview with S2).

Data also suggests teachers who were prepared to act as mentors did not receive due recognition from lecturers visiting student-teachers. L3 reiterated that recognizing mentor's contribution was important.

> I would love a situation where we would also take into account the supervisions of our mentors perhaps without the marks. Sometimes the marks are exaggerated… I have always asked "Why do we ask them to supervise our students? What exactly do we want to achieve?" If we are saying we want the assistance of mentors how are they going to regard us if they know that their marks are not going to be taken into account (interview with L3).

Further, according to L3, supervisors failed to meet head-teachers who were too busy to do so, and at other times teachers who were mentors seemed unwilling to meet supervisors. S1 observed that, often, there was no contact between supervisors and mentors.

Usually, student-teachers were not supervised by mentors, and when they were, lecturers did not use the marks. Some student-teachers felt that mentors were better placed (than supervisors) to provide them with feedback that was a true reflection of their performance. Since they knew all the contextual factors relevant to the provision of helpful feedback, were the people on the spot able to monitor student-teachers on daily basis, knew their classes, and knew the constraints of space, time and resources.

4.4.2.3 Contradictory factors between university activity and school activity systems

My data suggest four contradictory factors between the university activity and school activity systems. The university wanted student-teachers to learn from practice by trying innovative and progressive ideas they had learnt in the university activity system. In contrast schools wanted student-teachers to fill teacher shortage gaps and ensure continuity of secondary pupils' learning. The interview with L8 below exemplifies different agendas between university and school. See also section *4.3.2.1*

> For example we had an incident this morning with one of the schools in Bindura Urban. Eee-ee we wanted to deploy some student-teachers to this school and the authorities were not really happy to receive our students. They pointed out that the student-teachers who were previously at their school did not complete the syllabus. And to them this was a crime… (interview with L8).

Lecturers viewed teaching practice as applied science education (ASE), and wanted students to be supernumerary. Student-teachers reported that they were given full teaching loads because they thought schools viewed applied science education to be teaching practice. Often student-teachers found themselves in awkward positions when what they were told by their university lecturers is not what happens when they get to schools, and were powerless to refuse extra duties. Student-teachers viewed ASE as an evaluation course, and therefore, seem to be concerned with getting good grades. When lecturers wanted students to learn from practice, and reflect on theory, schools (not used to reflective practice) were interested in maintaining standards as judged by performance of pupils in examinations, and to complete syllabuses on time.

L2 believes that differences sometimes worked well for both parties. Schools benefitted from the extra help, in turn the students received support. Lecturers, for example, L5 thought that students, who often acted as cover teachers were doing a good job in schools, based on the reports from school heads. In short my data reveals student-teachers' desire to participate as supernumeraries in the school activity system contradicted their actual experience of being used as cover teachers in the school.

University lecturers visiting schools as supervisors placed emphasis on assessment contrary to their supervisory role of supporting student-teachers learning through practice. Further, a lack of suitably qualified lecturers meant educational theorists with no adequate subject matter were acting as supervisors. When it came to the process of assessment the majority of

student-teachers and some lecturers preferred science educators to carry out the task. L1 described ASE as a form of subject specific pedagogy and as such felt supervision was best left to science educators. Contrary to such a view L3, without denying the importance of knowing subject content, held the view that a good lesson should be easy to follow even for non-specialists who sometimes were called in to supervise students.

> Ummm... we have argued that a good lesson is a good lesson. When I go out there and I do not know Biology, I should be able to see whether the Biology topic has been taught well. If it was a new topic that was being taught, then I should also be able to follow. My ability to follow and to learn something determines whether I can safely say this is good lesson or a bad lesson or it has been done well. But some argue that how are you going to be able to see whether a Maths topic has been taught well if yourself you do not know that particular topic in Maths (interview with L3).

S1 wanted to be supervised by lecturers with relevant subject matter knowledge, for example, she wanted to be supervised by a lecturer with a background in Chemistry when teaching chemistry, and not someone with a background in history. She felt let down when supervised by someone without the subject content because she thought one could wrongly be penalised by someone who did not know the subject well. She also believed such lecturers seem generous with marks.

> I feel that is bad; the fact that the supervisor does not understand what I will be teaching. Sometimes they would think that I needed to elaborate not because it was necessary, but because my supervisor might not understand the content. To some extent it is better if you want to get marks. You really need to use the Chemistry jargon. The supervisor will not understand it and you easily get marks for waffling. But for the benefit of my professional growth I think it is better if my supervisor has a background in Chemistry (interview with S1).

S1 said that sometimes supervisors checked ASE file, schemes and plans, and did not observe live lessons. Considering that S1 was referring to L3, who was an educational theorist, she may have wanted to be observed teaching a live lesson by someone with a good understanding of chemistry who was better placed to help her develop pedagogical content knowledge.

The question of who was best suited to supervise and assess student-teachers remained contentious. The issue was complicated by combining supervision, a learning process, and assessment, a performance process.

There was a clear contradiction between what student-teachers expected to do in the school activity system and what actually happened. Although L2 believes that it was rare for students to be cover teachers, often students, for example S1, found themselves with full teaching loads.

> I was at GHS and I taught LVI Chemistry and some O-Level Integrated Science classes. I had some 8 periods a week for the juniors. I was also involved in sports. I was both coaching cricket and a member of the Girl Child Club. I would go to work at 8 am and knock off at 4pm. There was a need for science teachers. The whole department was made up of temporary teachers and student-teachers. The only experienced and trained teacher was the Head of Science (interview with S1).

S1 felt overloaded because she had to do many duties, working all day and planning in the evening. The contradiction evident is that student-teachers, who went to schools expecting to be learners found themselves overloaded, doing extra duties and powerless to refuse extra duties. Yet both the university and school expected the same student-teacher to fulfil their requirements.

Some participants believed that there was always gap between theory and practice, for example, espoused theory, as what you plan to do was not what happened in practice. Lecturers also saw practice as experimenting with theory, and as such it was common that sometimes things did not work as planned. They knew of the anomaly between expectations and reality on the ground. One reason suggested by the participants, to explain the anomaly, was that learning at university was theory-laden and divorced from practice. Another reason given for the theory-practice gap was that theory had been imported from developed nations without sufficient contextual considerations. Student-teachers saw ASE as "putting theory into practice", and believed that if things did not work out as planned then there was an anomaly in how the two ought to relate. S2 saw this as the gap between theory and practice. He believed that some ideas suggested in theory do not work in practice.

> I find the relationship not very much far away. Some of the things or theories you learn at university are to a certain degree useful, and we are giving room for researchers to develop more useful theories. We, as teachers should also research, and academics as professional researchers should also create practically useful knowledge. There is need to understand how theory and practice relate. At the same time there is something which makes the two repel each other slightly (interview with S2).

Lecturers, in the university activity system, provided student-teachers with access to bodies of theoretical and research-based knowledge and tradition of critical inquiry central to the development of student-teachers' thinking (Hagger and McIntyre, 2006). When immediate application of theory was not obvious to student-teachers as revealed by S2, it was the responsibility of supervisors to help them develop a tradition of questioning practice. Some student-teachers believed that knowing the context, specific school and classroom situation helps to understand how theory and practice relate.

4.4.3 Summary of factors shaping student-teachers' learning within and between the university and school activity systems

My data revealed specialisms of lecturers, reflective practice, and partnership (between university learning and school-based learning) as potential synergistic factors.

The interviews revealed contradictions in the university activity system; between student-teachers' motives and objects, between officially 'concurrent' model and 'consecutive' educational practice, between concurrent learning and dislike of professional courses and between low enrolments that led to lack of the right number of science educators being hired and object of teaching pedagogical content knowledge.

In the school, participants reported system contradictions between student-teachers' object to experiment with innovative and progressive ideas and commonly used didactic approaches in contexts with limited resources; between teacher shortages and student-teachers' object of learning through observation; between student-teachers' object of getting support from teachers and lack of teacher motivation; and between lecturers' expectation of teachers to act as mentors and lack of recognition of support received from teachers.

Contradictions across the university and school activity systems included those between university goals of sending student-teachers on attachment and eagerness of schools to host students as cover teachers; between student-teachers' object of learning through participation and the evaluative nature of teaching practice; between student-teachers' expectations of being supernumerary and work overload; and between beliefs of how theory and practice ought to interact and what happens in educational practice.

4.5 How various factors were shaping student-teachers' learning

In section 4.5 data is presented about how factors revealed in section 4.4 shaped student-teachers' learning in the university activity system, the school activity system, across the university and school boundary. The data is organised in terms of the locations of student-teachers' learning.

4.5.1 How various factors were shaping student-teachers' learning in the university activity system

My data reveals that in the university activity system factors shaped student-teachers' learning in four distinct ways:

- a lack of consensus among participants on what student-teachers were learning,
- student-teachers valuing subject matter knowledge more than other courses,
- student-teachers were learning education for certification and not understanding the complexities of teaching and learning, and
- an examinations oriented curriculum and student-teachers preferring transmission modes when learning to teach.

4.5.1.1 Lack of consensus on 'what' and 'where' student-teachers were learning

Student-teachers were learning subject matter knowledge, educational theory, pedagogical knowledge and support courses. However, when participants described what student-teachers were learning there was a lack of consensus on what student-teachers were learning. Lecturers' comments were about student-teachers learning educational theory. Among lecturers differences were noted linked to their specialisms; educational theorists believed student-teachers were learning educational theory (e.g. interviews with L8, L10 and L15), science educators (e.g. interviews with L1, L2, L7 and L14) talked about student-teachers learning pedagogical knowledge, and those teaching communication skills talked about student-teachers learning support courses.

L7 mentioned all sort of things when asked to talk about what students took out of her course, ranging from knowledge, skills, theory and practice.

> Knowledge... teaching knowledge and skills after teaching them. Knowledge and skills ... because when they are here ... though we are concentrating on theory... but because of the experience I have talked about, my teaching is slightly different and whatever I do is quickly translated into practice in the same lecture. So I feel when they go out they are equipped with knowledge to use and why to teach and they also have skills to handle dynamic and unique situations because no none classroom is the same (interview with L7).

Lecturers talked about student-teachers learning general teaching skills, for example, how to manage classroom situations. Each lecturer talked about the course(s) he or she was teaching, and student-teachers talked a lot about learning subject matter knowledge (e.g. interviews with S1, S6 and S7). S1 mentioned learning curriculum development, pedagogy, educational theory and Chemistry. S6 and S7 talked about learning Geography. Generally there was no consensus on what student-teachers were learning.

4.5.1.2 Valuing subject matter knowledge more than other courses.

My data revealed that student-teachers were valuing subject matter knowledge more than other courses. L19 believed that student-teachers preferred learning subject matter knowledge to learning educational theory. S2 (and S1) confirmed that given a choice, student-teachers would not do education courses.

> On the other hand, here we are at a university offering science education, and yet the general feeling among students is that they do not like the education component of their degree programme. Students dislike education courses… I also found the education courses difficult. It was my first time to learn philosophy, psychology and sociology of education. The generally feeling among students was that education lecturers were there to make life difficult for us (interview with S2).

L15 believed that student-teachers did not see relevance of learning theoretical foundations.

> The freshmen are still figuring out the relevance of Piaget, or when we talk about of Dewey, Bruner and other theories, when we talk about curriculum, Tyler; is it not too much. 'Why do we not just take …' they move all the way through the corridors saying why not just teach me physics. 'If I know the atom I can just go and teach and talk about the atom' (interview with L15).

It is evident that student-teachers valued their learning of subject matter knowledge more than theoretical foundations and other teacher education courses. Both S1 and S2 reiterated

that theoretical foundations was something new to student-teachers and they found the course difficult; a view also reinforced by L15. Further, as mentioned in section 4.2, to most student-teachers teaching was not a first choice and this could have been the reason why student-teachers disliked learning professional courses.

4.5.1.3 Learning education for certification and not understanding.

Conversation with S1 revealed that student-teachers believed that they were forced to learn teacher education courses.

> When I was here at UoM, even when I wanted to do some things I was incapacitated. It wasn't ... may be it was because of the regulations… Well if I want to leave out a course in education I couldn't because the courses were all compulsory. I was forced to do the course (interview with S1).

Later in the conversation S1 believes that she had to please her supervisors in order to complete her training successfully.

> Since my marks are going to come from the university I think I would just go against the school directives so that I can please my supervisors. So that when my supervisors come they will find me acting in their interests. When I leave university to join the teaching profession I will abide by the school directives (interview with S1).

S1 does not talk about resolving contradictions in order to deepen understanding of teaching rather she did so to fulfil university assessment requirements.

L15 believed that student-teachers did not take theoretical foundations courses seriously because all they wanted was a qualification. He explains lack of interest in learning educational theory as a relevance issue which needs to be addressed.

> They need to fix the relevance in the minds of the student-teachers so that they are keen and see the learning of theory as useful… Other than that they realise that when they have finished because you have … that is because you have not passed the course you shall not be given a certificate. So they learn not in order to use it, they learn in order to fulfil the requirements of the degree (interview with L15).

4.5.1.4 Examinations-oriented curriculum and preferring transmission modes when learning at university.

Conversations with participants revealed perceptions of an examinations-oriented curriculum, and student-teachers preferring transmission modes when learning at university. Student-teachers and lecturers commented that various teaching methods were employed. The single dominant approach was the lecture. Participants' use of the lecture method, probably, was linked to a culture of lecturing, though student-teachers and lecturers knew that the lecture method was not always the best approach. They knew the weakness of the lecture method but still believe that they learnt most from the lectures. The lecturers' role was perceived to be the giving information often in the form of notes, explaining, giving examples, posing questions and sometimes providing answers. The student-teachers' role was listening, answering questions, and taking down notes. Student-teachers liked lecturing because what lecturers said mattered, to them, to do well in examinations. Lecturers preferred lecturing because it saved time to reach many students, and using the approach was convenient in a context characterised by shortages of learning and teaching materials. Participants were agreed that lecturing had weaknesses. Students learnt by memorizing, perhaps, to increase their chances of passing examinations as suggested by S3. Lecturers knew that students engaged in rote learning, but did not blame themselves for promoting rote learning.

> But for purposes of me (laughing) passing my examinations (laughing) I also need the lecturer to include the lecture method because it helps me much to prepare for examinations. It directs me on some of the ... you... the important texts to remember for the examinations (interview with S3).

Some participants wanted students to take a leading role in their learning. There were lecturers who described teaching as a subjective endeavour and thought that this was evident in differences among themselves when selecting teaching approaches. Lecturers' use of various teaching approaches was consistent with student-teachers' use of various activities when learning. L4 describes two contrasting beliefs of role of teacher; as transmitter of knowledge, and as facilitator with the responsibility of helping students to construct own knowledge. He liked being a facilitator and using student-centred, interactive and participatory methods. When these approaches were employed the lecturer's role was initiating the discussion, making presentations, and debating; all these methods made use of prior knowledge.

> Let me start by telling you what I hope I do not do. I hope in my lectures I do not stand there and pretend that I know everything and that my students are simply there to absorb what I say. I think my job is, what I try to do is to provoke my students into learning. Yes they might not know what to learn but then my job is to expose them to possibilities that they have, that they should explore. I think my job is to enable them to learn how to teach by leading them to sources of literature, by creating activities that might enable them to want to learn more (interview with L4).

Among student-teachers and lecturers group-work was popular. One lecturer reported that students liked to learn in groups. Consistent with the idea of learning with others was the lecturer's plan to use mixed groups, for example, having young and old teachers in the same group so they can discuss how to marry theory and practice, using their various experiences. Lecturers seem to suggest that student-teachers learn through interacting among themselves and with others. Most student-teachers talked about interacting with others through discussions in and outside the lecture room. L3 believed that students learnt to be professional mostly through this hidden curriculum, and therefore, modelling good practices was important.

L3 talked about various roles of student-teachers in his lectures that changed when he used various approaches. He believed that student-teachers' role was reduced to listening and taking notes in lectures but became more active participation when he used discussion,

> Of course there are various roles that they play; to take part in discussion, to answer probing questions, ummmm… to write notes… to ensure that they are there, that they are taking part in group discussions. They listen and react to what others are saying. The role is actually when you are using the lecture method to listen and to write notes. But during discussions they are also (active) participants (interview with L3).

Student-teachers talked about the opportunity to research when asked to make presentations, and used the Internet and library. They brought new ideas to the lecture room for discussion. Most students liked presentations, though these were less frequently used.

Student-teachers and lecturers had the same understanding of various teaching and learning methods. From this study it was not clear whether student-teachers' and lecturers' understanding was simply literature driven (there is evidence in literature of need for differentiation in the lecture room) because reasons quoted did not go beyond that people were different, or that "variety was better than no variety".

4.5.2 How various factors were shaping student-teachers' learning in the school activity system

My data reveals that in the school activity system factors shaped student-teachers' learning in three ways:

- only demonstrating knowledge of reflective practice but not being reflective practitioners,
- student-teachers believed that the school curriculum was examinations-oriented, preferring transmission modes during teaching practice, and
- impoverished contexts meant that student-teachers used transmission modes when teaching in schools.

4.5.2.1 Demonstrating reflective practice but not being reflective practitioners.

As revealed in section *4.4.1.2* the ASE assessment instrument clearly indicates that 20% of marks are awarded towards evidence of reflective practice. The areas credited are evidence of evaluating scheming, planning, and implementing the plans (achievement of objectives) (ASE Student Handbook, 2010, p. 27). Student-teachers are required to describe areas where they are doing well and where they need improvement. In particular they are required to provide evidence of making use of previous evaluations in future planning and teaching.

In conversation student-teachers and lecturers did not mention what it means to be a reflective practitioner. However, S2 believed that being reflective was something he learnt at university and reveals what he perceived it means to be a reflective practitioner means.

> First of all I was going wild when I did philosophical foundations of education. The course opened the doors of being critical. That was the best thing I learnt. I learnt to be reflective, open-minded and to look critically at things (interview with S2).

L4 clearly states that while the university has not articulated the kind of teacher targeted, assessment of ASE emphasizes being a reflective practitioner

> We have not been able to pronounce the kind of teacher we want to produce. Perhaps I am sure we need to define our area of interest. What is our strength as a department? What kind of teacher are we trying to produce? Are we trying to produce a

practitioner, an academic, or a critical thinker? ... I think we are trying to go for the reflective teacher, because we emphasize this end in assessment and evaluation of ASE (interview with L4).

L19 perceived ASE as fulfilling many objects including reflective practice because he believed that it was a reflective activity.

Students learn to develop teacher identity. They translate theory they learn into practice during teaching practicum. Students who do not learn education courses cannot be effective school teachers. I believe that teaching practicum should/can be reflective activity not a mere routine activity (interview with L19).

Officially reflective practice was an agenda for those learning to teach but in educational practice it was not fully integrated. L6 bemoaned the failure to get students' feedback of ASE experiences, when they came back to university, across all theory courses. She felt that having one course dedicated to ASE experiences was not enough. L10 discouraged supervisors and students from challenging teachers, and wanted problems encountered in schools to be discussed by lecturers when they were back at university, and not at schools where the contestations occurred. From conversation with L10 it seems 'conformity' was encouraged in the name of professionalism and student-teachers were not encouraged to question practices.

My data suggest that student-teachers learnt about reflective practice, and were demonstrating knowledge of reflective practice during ASE when evaluating scheming, planning and teaching. However, it appears opportunities for reflective practice were not fully exploited.

4.5.2.2 Examinations-oriented curriculum and preferring transmission modes when teaching in schools.

Data reveals that student-teachers believed that the school curriculum was examinations-oriented and as such preferred using transmission modes to cover the syllabus at the right pace, and hopefully increase their pupils' chances of doing well in examinations. S1, while talking about lack of money to purchase chemicals for practical work, revealed that in schools student-teachers were under pressure to teach for examinations.

> At the end of the day you are expected to produce good results. Pupils are supposed to pass examinations. If they do not pass your performance assessment is going to be something else (interview with S1).

Later in the conversation, S1 clearly states that examinations determined teaching and learning in schools.

> I think according to the Zimbabwean context they are very powerful. They direct whatever you are going to be teaching and at what pace you are going to be teaching. As much as you would want to dwell much on certain topics so that your students understand, you still have to bear the syllabus in mind. The time frame to cover the syllabus is 2 years. You still have to cover the whole syllabus, and so you leave behind some students who are not quick to understand the concepts. You just aim for that in the Zimbabwean context (interview with S1).

According to S4, the common classroom discourse was transmission, and teachers' main focus was teaching content. Teaching entailed giving notes, assignments and answers, discussing what the students found difficult and displaying solutions in Mathematics. In a typical Mathematics lesson during ASE student-teacher S4 introduced new concepts, then gave tasks to pupils to practice, and checked answers.

> I normally gave an assignment to the students. During the first 20 minutes I gave the students solutions to the assignment. They used these to mark their work. If there were any problems the students had experienced we discussed these. Some students displayed their solutions on the board. I then asked the students to write corrections. Then I introduced new concepts say for 15 minutes by explaining and lecturing. I then gave students a task to do and go round checking progress. Often I interjected to give explanations (interview with S4).

Student-teachers preferred to use transmission modes because of pressure of examinations. They believed that since the goal was to cover the syllabus and this could best be achieved by use of teacher centred approaches.

4.5.2.3 Impoverished contexts meant that student-teachers used transmission modes when teaching in schools

In section *4.3.2.2* conversations cited revealed that in schools student-teachers could not get materials needed to design preferred teaching and learning activities. In these impoverished

contexts student-teachers were forced to abandon experimenting with innovative and progressive teaching ideas e.g. S1

> Since I was just a mere student-teacher ... like a student and when you are a student you are supposed to act the way you are told. So there was no way I could have gone ahead and argued my case, her decision was final. In that case I was left to improvise, maybe to change the practical lesson all together (interview with S1).

My data suggest that student-teachers were using teacher-centred approaches because of limited resources in schools. For example, S3 had this to say

> In our context of Zimbabwe, especially in rural areas we have limited resources, especially in terms of books… In terms of learning materials: in that context I use the teacher-centred approaches. If I want to use the student-centred approaches I would be wasting my time because students do not have those ... they do not come with their own knowledge. They do not have anywhere to study during their spare times and when they are in their homes. They do not have any materials to read. So they have to wait for their teacher to give them information. So I usually employ the teacher-centred methods (interview with S3).

Impoverished contexts influenced student-teachers to prefer transmission modes when teaching in schools. However, as evident in conversation with S3, some student-teachers employ teacher centred approaches not because they are the most suitable methods but based on their beliefs that pupils "do not come with their own knowledge".

4.5.3 How various factors were shaping student-teachers' learning across the university and school activity systems

My data reveals that across the university and school activity system factors shaped student-teachers' learning in two main ways. Student-teachers perceiving learning theory as more important than learning from practice and conforming as a way to resolve any contradictions they encountered.

4.5.3.1 Perceiving learning theory as more important than practice.

Student-teachers and lecturers talked about where learning to teach mostly occurred and the study coded descriptions of university or lecture room as 'university setting' and classroom, teaching practice and school as the 'school setting'. For descriptions of other settings, for

example, "everywhere" the label 'other setting' was used. The pattern seems to suggest that students were learning mostly at university. The pattern changes across the sample of comments from lecturers because there were equal numbers of comments about students learning at school and at university.

L4 believed that students learn in the lecture room, library, where they resided and social settings, for example, informal groups.

> Traditionally students I think they learn in the lecture, in the library, and when they are reading. I would also think those are the major areas but we encourage students to learn cooperatively in informal groups, that they form. I also think they learn as they are in places of residence as they discuss in small groups (interview with L4).

L6 believed that students learnt most in school during teaching practice.

> The classroom, day-to-day living, interaction with teachers... I would say in schools when they do ASE… You know when you are at university … you memorize. When they go out during ASE they are trying to put into practice what they have learnt at university and see that this does not work, and this work (interview with L6).

S8 believed that student-teachers learnt most in the lecture room at university. Further, data suggest that learning to teach occurred everywhere, for example, where students live, outside lecture rooms, during spare time, during vacation, and during school attachment and during classroom teaching.

S3 seems to suggest that what happens in the lecture room ultimately determines what he was going to learn in other places like the library.

> I learn in the lecture room, and in the library and the computer laboratory… But in the lecture room I think that is where I get most of the knowledge and most of the curiosity to go and search further… In the lecture that is where what happens there prompts me to go and search further. It directs me what to learn. It gives me the zeal, the force, the push to want to learn… It pushes me and then I go to the library to search for information, and later discuss with my colleagues in small groups as a team. The lecture is essential to trigger me to want to learn. It is essential (laughing) and so is the library. They are inter-dependent (interview with S3).

The student-teachers and lecturers talk about students learning everywhere. The majority of participants seem to suggest that most learning occurred at university and a minority believed

that student-teachers learnt most in school. The latter was consistent with student-teachers' belief that the lecturer was the source of knowledge, and that knowledge received from lecturers was needed to attain good grades in examinations.

Student-teachers were learning theory in the university activity system and through practice in school activity system. My data suggest that student-teachers and lecturers believed that theory was more important than practice evident in the notion of practice as application of theory.

L14 believed that theory and practice were like "egg and hen", not definite about the sequence, and that, probably there is no consensus on what comes first. The programme structure at university studied showed theory coming first. L14 thought that starting with experience also sounded reasonable.

> It is an egg-chicken thing… Because theory is important for practice… I am taking practice as say practical work. In order for you to carry out a practical you need theory. But sometimes theory can confuse practice, in the sense that what you put on paper, in the form of theory, when you get on the ground might not apply… And then on the other hand (10 seconds pause) it is important to start from practice and then you come to theory such that there must be a coordination or link I am dreaming of a situation whereby before even students come to university they get into schools and study the situation, they feel it and then after they come to university and learn theory (laughing) (interview L14).

Lecturers looked at theory and practice as separate and seem to rank theory as superior, that is, perceiving university based learning as more important than school based learning. Student-teachers had similar views. They learnt theory in the lecture room, followed by practice in the classroom.

4.5.3.2 'Conforming' rather than confronting preconceived ideas.

My data reveals that when student-teachers encountered contradictions between university expectations and school expectations they tended to resolve these through conformity rather viewing these as problems worth solving. At times student-teachers produced two artefacts e.g. scheme of work; one for the university supervisors and the other for the school. Similarly when student-teachers encountered contradictions between experiences in schools and their

own preconceived ideas about teaching and learning they opted to conform to either university expectations or school expectations.

4.5.3.2.1 Competing goals

The interview with L8 (see sections *4.3.2.1* and *4.4.2.3*) exemplifies different agendas between the university and the school. School heads wanted students to complete the school syllabus; a problem implied by S1 when describing pressure of examinations. University lecturers wanted the student to learn by trying new ideas. For, some lecturers e.g. L5, extra-curricular activities should not take much of student's time, yet the school assigned the same student extra-curricular duties to do.

4.5.3.2.2 Work overload

My data suggest that student-teachers, who had learnt the importance of planning schemes and planning lessons in advance at university, at times could not do so during ASE in schools because of work overload. Supervisors looked for evidence of adequate planning because to them planning was necessary for good teaching. L4 said that university-based learning empowered student-teachers with decision making tools.

Student-teachers schemed and planned as stated in the ASE Student Handbook. They were expected to complete everyday planning a day in advance, and failure to do so was heavily penalised. While S1 managed to meet the university expectations of scheming and planning she sympathised with some student-teachers who could not do so. Despite acknowledging the importance of lesson planning, when asked about being found teaching without a lesson plan S1 had this to say:

> If I did not have a lesson plan... I would say I am going to make one; it does not take much time, say 20 minutes (interview with S1).

S1 still believes she can teach effectively with planning in advance.

> I am able to but it's not really effective… That is (laughing) eee-e; I really do not think you should fail. You know what lesson plans ... maybe you have 4 lessons a day and you have to evaluate. You have to travel going back home at 4 pm. You need to

rest and you need to come back to work the following morning. I do not think really people need to make a fuss over lesson plans. They are very important but I do not think really someone should fail because they do not have a lesson plan (interview with S1).

S1 felt overloaded because she had to do many duties, working all day and planning in the evening. She felt powerless because university wanted her to follow orders from the school. L2 talked about conformity as a way to resolve contradictions.

Ummm... basically our approach was that do whatever you are required to do by the school. But remember our requirements. You do not go against the storm because that is the institution where you are supposed to survive (interview with L2).

Although L2 believes that it was rare for students to be cover teachers, often student-teachers, for example S1, found themselves with full teaching loads.

My data suggest that student-teachers were conforming because of various reasons including stressed contexts and lack of resources required for trying out progressive ideas, conflicting university and school goals, and work overload that inhibited adequate planning.

4.5.4 Summary of how factors shape student-teachers' learning

Data suggest that factors in the university activity system shaped learning to teach in many ways from lack of consensus on what student-teachers needed to be effective teachers, seeing subject matter knowledge as more important than professional courses, learning directed by the motive of getting a qualification, examination oriented teacher education curriculum, and preferring transmission modes of teaching and learning.

In the school activity system contradictions meant student-teachers focussed on knowing reflective but not being reflective practitioners, believing that school curriculum was examinations oriented and preferring transmission modes of teaching, and thinking in impoverished contexts the best way to teach is using transmission modes.

Contradictory factors across the university activity system and the school activity system shaped learning to teach in two ways; student-teachers tended to perceive learning theory as

more important that learning through practice, and conform rather than confront their own preconceived ideas.

4.6 The development of student-teachers' ideas as they progress through the teacher education programme

Pin pointing where development of student-teachers' ideas occurs is difficult and for this reason this section uses thematic headings. The section is divided into four parts; recruiting teacher education candidates and resourcing; knowledge, skills and attitudes; resistance to change, and new assessment instruments. The data presented includes changes reported beyond student-teachers' ideas, that is, inputs and university assessment changes.

4.6.1 Recruiting teacher education candidates and resourcing teacher education

The label 'recruiting' was used when participants mentioned the quality and calibre of student-teachers and lecturers. Sourcing means identifying suitable candidates to join and 'resourcing' implies identifying were these candidates can be effectively utilized. Resourcing is providing (a person of department or organisation) with materials, money, staff and other things required for effective operation. L4 believes that the university was changing in terms of the calibre of student-teachers and lecturers it was attracting. Such changes were not the making of the university, but a response to the contextual factors making it difficult to recruit consistently high performing student-teachers and experienced lecturers with appropriate qualifications.

> What changes occur? Changes do occur over time in any situation. These may be with respect to the quality of student-teachers in terms of their qualifications, age and experience… There may also be changes in the level and experience of teacher educators (interview with L4).

The university had to play a balancing act when selecting student-teachers; to look for good A-Level grades but not necessarily too high to end up with no candidates. Recruiting lecturers with appropriate qualifications was still problematic, and worsened by unattractive working conditions.

4.6.2 Knowledge, skills and attitudes

One object of teacher education was student-teachers' development of knowledge, skills and attitudes. L7 believed that student-teachers gained knowledge and skills from her lectures. In the conversation L7 did not provide details of the knowledge and skills. On the other hand L10 was specific and believed student-teachers showed development in writing assignments.

> from the way they wrote the first assignment to the way they write assignments now, to how they attend lectures and the importance they attach to the lectures, sometimes with most of them you find that they would have changed a lot (interview with L10).

Data suggests that student-teachers were learning different teaching methods, both familiar and unfamiliar. It is evident that lecturers, e.g. L14, believed student-teachers were learning child-centred approaches and encouraged to use such approaches in classrooms. S5, an in-service student-teacher, reported learning to use simulations in the classroom. Teachers can use simulations for specific experiments or to create virtual environments and these can improve learners' understanding. S5 had access to computers and the internet at university, and hence could easily get access to web-based simulation resources. However, in schools as reported earlier computers and the internet were lacking and most likely S5 never got the chance to use the simulations in the classroom.

> I never knew that there was something called simulations and when I got at UoM I learnt that one can actually use simulations in place of practical work. Like now I was looking at how I can use simulations to teach mechanical work at A-level. It is very difficult to come up with practical work in Mechanics at A-level. But with simulations you can simulate the practical work and students can see movement… (interview with S5).

Student-teachers, e.g. S9, believe that their understanding of subject matter knowledge had increased beyond A-Level.

> I feel confident about the content of my subject area. I have acquired information which I did not have when I did my A-Levels (interview with S9).

Student-teachers revealed that their understanding of theoretical foundations and teaching methods had increased e.g. knowledge of differentiation (interview with S1), decision making informed by educational theory (interview with S6) and understanding pupils (interview with S7).

An interesting development of teaching ideas is evident in conversation with S12, indicating understanding the role of a teacher in the classroom to be facilitator of learning, not the traditional teacher as source of knowledge.

> I initially thought as a teacher I was there to impart knowledge but I have learnt that it is about guiding. It is about managing, acting as a classroom manager… My stay has moulded me into a confident person. I feel empowered. I feel imparted with skills, which I feel if I go outside I will be practising very well (interview with S12).

L18 witnessed changes in student-teachers' knowledge and skills for information search and computer literacy.

> In the first year they are raw, if I may use that word... how to use the library. Some of them have not used the library... you know the constituencies of our students... they come from all over Zimbabwe. Some of them have not have access to school libraries. So using the library to them when they come here is a bit of a challenge… By the time they get to the end of the first year, it is a bit better, you can see that they know how to find information… But normally when they get to writing the research projects I think the research skills are somewhat ... eee-e. By the time they finish writing the project I think in the Department of Education, Faculty of Education, the projects are up to standard (interview with L18).

Data suggests that student-teachers experienced an increase in their understanding of teaching and learning through participation in the school activity system. Through ASE student-teachers' perceptions of learners changed as reported by L19.

> Students have changed perceptions about learners and teaching. Their attitudes and ideas about teaching and learning have changed… (interview with L19).

The changes reported can also be attributed to socialisation as revealed by L13. Student-teachers were learning through participation.

> Knowledge, skills and also other things which are may be in the hidden curriculum, social relations and also things like building confidence (interview with L13).

Conversation with S9 shows development of confidence, through actual classroom teaching.

Data suggests that student-teachers showed marked change in their attitudes toward teaching as a profession. Some student-teachers, who initially lacked interest in becoming teachers, toward the end of their programme had come to realise that the most realistic goal was to become teachers (e.g. "I might as well like it" Interview with S1 and S2 who developed interest with time). These student-teachers developed interest in learning education courses. L14 reported witnessing such a change.

> The major change I have noticed is on attitude… During the first year they would have negative attitudes especially towards the professional component of their degree programme. As they move on they realise that they are in it and they need to be part of it fully (interview with L14).

Possibly, instead of looking at change reported as resulting from the teacher education programme, student-teachers change because they grow older as they move from Year 1 and reach their training end point as suggested by L14.

My data suggests development of student-teachers' ideas about teaching. Student-teachers reported increased understanding of teaching and learners, subject matter knowledge, teaching skills and positive attitude towards teaching profession. However, as shown in the next section (4.6.3), my data also reveals that at times student-teachers' changes were temporary and short-lived.

4.6.3 Resistance to change

S1 believes that university requirements restricted student-teachers' choice of decisions, and once they attain their qualified teacher status can be guided by contextual factors. S1 would seem to suggest that she was learning to do things differently from what currently happens in schools, and she did so to fulfil university requirements and get her degree. However, once she gets her teaching degree and starts practicing as a qualified teacher she would be tempted to do things as she saw fit.

> But the good thing is that when you get out of the place (UoM) like I will soon be doing after getting my degree, I can now go and apply what is applicable and leave out what is not, so that the students benefit (interview with S1)

This would seem to suggest teacher education had a temporary impact on development of student-teachers' ideas about teaching and learning. Similarly, L5 believes student-teachers are eager to implement what they learn at university during ASE but resort to their preconceived ideas about teaching and learning once they become practicing teachers.

> When they go out to schools as student-teachers they practice... they try to put what they learnt here into practice. The moment they graduate and remove the gowns they also forget what they learnt here and do whatever other teachers are doing in schools (interview with L5)

My data suggests that some student-teachers were generally weak e.g. L13 believes that some student-teachers show no development at all and L19 believed that some student-teachers did not bother to develop strategies to engage poorly motivated pupils. Data suggests that what seems to be resistance to change can be attributed to student-teachers' strongly held preconceived ideas about teaching and learning. Conversations with participants did not reveal that the prior beliefs were sought, challenged and alternative views discussed. Therefore it is not surprising to find student-teachers e.g. S1 who were ready to fall back onto preconceived ideas and teach the same way as they were taught. Lecturers did not talk about mechanisms in place to support weak student-teachers, likely to find courses difficult.

4.6.4 New assessment instrument for ASE

ASE assessment occurs in the school activity system; however the instrument used is developed in the university activity system. Therefore data pertaining to development of the instrument is examined here. My data suggests that subjective nature of assessment often resulted in wide discrepancies between marks awarded by assessors for the same student-teacher's performance. Both lecturers and student-teachers mentioned this as a problem. In addition lecturers revealed that in order to increase agreement among assessors, through a common understanding of supervision and assessment requirements, a new assessment instrument was developed.

> Remember I have told you that we have made sub-committees for the ASE assessment document. We used to have one... and we also developed a separate document for assessment… We have said let us have a marking document in a bid to have a common understanding and common ground. Again we have tried to interpret this assessment document so that we all use it in the same way (interview with L13).

In developing a new assessment instrument an attempt was made to differentiate scoring performance in a 'live lesson' and checking documents only. The new assessment instrument for ASE is quantitative in nature. There are 25 things to assess, each with 4 possible scores 1, 2, 3 or 4. However, as pointed out by L3, the instrument is still problematic because there is much more to learn about teaching than the score or grade.

> yes we need to give them marks so that we grade them but we must also rely on the qualitative. We must be able to discuss with the student... their strengths, their weaknesses and the way forward. What makes them to be better teachers? Why is a certain aspect on the assessment schedule very important? What is the importance of the introduction? What is the importance of the progress of the lesson? What is the importance of all those steps assessed? What is the importance of the students in your classroom interacting among themselves? (interview with L3).

On one hand the university has developed a new ASE assessment instrument. On the other hand it is important to have the right mix of quantitative and qualitative assessment of student-teachers' performance. This is an area the university still has to resolve.

4.6.5 Summary of development of student-teachers' ideas as they progress through the teacher education programme

At the time the study was conducted the quality of student-teacher recruits and the resourcing teacher education was declining because the university was failing to attract high performing students and experienced lecturers. Student-teachers and lecturers believed that student-teachers' knowledge, skills and attitudes changed positively as they progressed through the teacher education programme. Student-teachers' knowledge and skills of teaching increased, and there was evidence of more positive views of the teaching profession and increased interest in learning educational theory. My data also suggests evidence of resistance to change, where student-teachers did not change preconceived ideas about teaching despite having been exposed to innovative and progressive ideas about teaching and learning. The university had also changed the teaching practice assessment instrument in an effort to increase reliability, validity and rater-rater agreement.

5 CHAPTER V: DISCUSSION

5.1 Introduction

In this chapter, attention is on the research questions using the data, literature and personal experiences to seek answers and pose further questions. Emerging issues directed me to further literature. This study sought to answer the following research questions:

1. What are the student-teachers' and lecturers' perceptions of motives to become secondary teachers?
2. What are the student-teachers' and lecturers' perceptions of activities that take place in different settings as student-teachers' learn to think and act as teachers?
3. What are the student-teachers' and lecturers' perceptions of the factors shaping learning in and across these settings?
4. How do these factors in and between settings shape student-teachers' learning?
5. What are the student-teachers' and lecturers' perceptions of changes in student-teachers' attitudes, knowledge and skills at different stages of the teacher education programme?

The chapter is divided into five main sections beginning with a discussion of the participants' background and motives for becoming a teacher. Second and third generation activity theories are then used as frameworks for the subsequent discussion. Section 5.3 addresses the second research question, focussing on the activities which take place in the various settings where learning to teach occurs and considers findings about the community, context, division-of-labour, relationships, rules and tools, within the 'learning to teach' activity systems. Section 5.4 examines the factors shaping learning in and between the settings. Section 5.5 then considers how these factors affect student-teachers' learning. Finally, section 5.6 examines findings relating to the intended student-teachers' changes in attitudes, knowledge and skills and addresses the fourth research question concerning transformation of the system.

5.2 Participants' background and motives for becoming a teacher

Data came from lecturers, and pre-service and in-service student-teachers doing the same courses and this section discusses findings relating to participants' biography, identity and motives. In common with the situation in many countries (Lynch and Feeley, 2009) more

males trained as mathematics and science teachers than females at UoM. The majority of student-teachers were in the age group 21-30 years, with pre-service students generally younger than in-service students, and coming straight from high school, whereas in-service students had some training and work experience.

As would be expected, the in-service student-teachers had more work experience than pre-service student-teachers did although some pre-service student-teachers had been temporary teachers before joining UoM. In Zimbabwe, schools employ job seekers as unqualified teachers if they have a minimum of five O-Level passes. Other temporary teachers could be A-level school leavers and graduates. The common perception of participants was that work experience shaped students' ideas about teaching as a profession as also reported by Bruinsma and Canrinus (2012). Bruinsma and Canrinus (2012), motivated by growing shortages of teachers in OCED countries, investigated importance ascribed by pre-service teachers to multiple motives for becoming a teacher and the motives were related to their commitment to teaching. The study was conducted in the Netherlands and used findings to distinguish adaptive and maladaptive motives. Adaptive motives were those factors positively related to effort, involvement and commitment to teaching, whereas maladaptive factors were negatively related to these constructs. Bruinsma and Canrinus (2012) found out that the most important motive for becoming a teacher was pre-service teachers' teaching abilities, and the least important was their perception of teaching as a fallback career.

The majority of participants identified themselves with their positions in the university and school systems. The positioning(s) used were 'student', 'teacher', 'lecturer', 'chairperson and coordinator', 'science educator' and 'educational theorist'. These identities indicate power relationships because they show a hierarchy of authority, where a lecturer (who knows) is regarded as more powerful than a student (who has much to learn). My findings were consistent with Gee's (2005) notion of an 'institutional perspective' of identity. That is, to be a student or lecturer is a position authorised by the administration of the university. The university also defines the role of the students and lecturers in the university and school activity systems. Lecturers have power "in terms of holding a set of rights and responsibilities that goes with that position" (Gee, 2005, p. 102), and the same is true of student-teachers – they have rights and responsibilities as students. However, the identities of student-teacher and lecturer have implications for learning to teach since the implicit power relations suggest that the lecturers determined the 'what', 'where', 'when', 'how', 'with whom', and 'why'

students were learning. However, student-teachers also determine many of these things since they too can choose 'what', 'where', 'how' and 'with whom' to learn and thereby may generate conflict with their lecturers' expectations

Student-teachers had varied motives for wanting to become qualified teachers. The majority of participants stated that it was largely a matter of chance rather than a deliberate decision to want to teach. My data suggest that lack of choice was a long term problem. For example L8 who trained as a teacher in the 1970s talked about limited career choices, L2 trained in the early 1980s and points out lack of choices then, and so did L14 who trained in the 1990s, and student-teachers who were training after 2000 like S3. So for those who wanted university education but did not get places in degree programmes of interest because of low A-Level points teaching was better than nothing (Interviews with S1, L8 and L14). Others believed that getting a degree in education increased their chances of getting a better job than teaching (Interview with L13). My findings concur with what is available in literature e.g. a stepping stone to other careers (Low, Lim, Ch'ng and Goh, 2011), teacher education as an alternative means of getting university education (Chan, 2004) and teaching as a fallback career (Canrinus and Fokkens-Bruinsma, 2011). See also sections 2.5.1 and 4.3.2.1. Chivore (1986b) found out that secondary pupils and their parents in Zimbabwe regarded teaching as a 'last resort'.

My data suggest that some students joined teaching because of influence from an important person in their lives like a parent as in the case of L7 and a teacher e.g. S2. My findings confirm what literature describes as influence from others (Chan, 2004) and inspiration from role models (Low, Lim, Ch'ng and Goh, 2011). The others or role models were often parents and teachers (Chan, 2004; Low, Lim, Ch'ng and Goh, 2011). However, 'important others' tend to influence pre-service student-teachers (who might not have made up their minds) than the older and more experienced in-service student-teachers (Chan, 2004; Low, Lim, Ch'ng and Goh, 2011).

Some participants e.g. L2 believed that student-teachers were motivated by the good chance of gaining employment, the job security and opportunities for life-long learning. Although many participants considered that teaching was not paid well, there were some who were motivated by remuneration. Similar reasons are available in literature e.g. financial reasons (Low, Lim, Ch'ng and Goh, 2011), extrinsic factors or job conditions like salary, holidays

and job security (Chan, 2004; Hobson and Malderez, 2005). Fokkens-Bruinsma and Canrinus (2012) found out that people were motivated by 'perceptions of the task'; being motivated by teaching job demands and returns like salary and social status. In Zimbabwe, secondary pupils who wanted to become teachers came from families of low socio-economic status and rural areas (Chivore, 1986b).

My data suggest that some student-teachers saw teaching as a 'calling' or 'vocation' e.g. Interviews with S2, L1 and L4. Such descriptions of motives are found in literature as concern for children (Chan, 2004), a desire to work with people in particular with children (Andrews and Hatch, 2002) and to answer a higher calling (Low, Lim, Ch'ng and Goh, 2011). Trainees wanted a vocational degree because they could enter teaching on graduation (Hobson and Malderez, 2005).

My data suggest that some student-teachers were motivated by work experience. Literature shows that work experience affects people differently e.g. Low, Lim, Ch'ng and Goh (2011), reported that student-teachers with "no teaching work experience were significantly more motivated by altruistic reasons because of their previous work encounters" (p. 2). Fokkens-Bruinsma and Canrinus (2012) classify prior teaching and learning experiences as one of three first-order constructs of socialisation influences (a higher order construct) in their Factors Influencing Teaching Choice (FIT-Choice) model. Andrews and Hatch's (2002) found that that people became teachers because of their positive experiences as learners. Further, Andrews and Hatch's (2002) found out that "working with people, rather than an explicit desire to work with subject, (to be) an important motivator for many" (p. 1999).

Therefore, as supported by literature, in third world nations like Zimbabwe student-teachers were influenced by extrinsic motives (Low, Lim, Ch'ng and Goh, 2011; Chivore, 1986b) whereas in developed nations prospective teachers were motivated more by altruistic and intrinsic factors (Canrinus and Fokkens-Bruinsma, 2011; Chan, 2004; Hobson and Malderez, 2005; Andrews and Hatch, 2002).

Although motives are important determinants of engagement my data suggest that prospective student-teachers did not get places based on their motivation to become teachers. Pre-service students got places to train as teachers based on A-Level grades and not work experience. In contrast, in-service students must have both A-Level grades and a minimum of

two years post diploma qualification work experience. This study suggests that the university, for consistency and fairness, should help all students, particularly potential pre-service students, to gain work experience before enrolling to train as teachers. The impact of work experience on motives and readiness to learn educational theory is revealed in the conversation with L15 who had this to say about in-service student-teachers "they understand better and they are more eager and keen to listen because they have seen it, they have experienced it, unlike the freshmen". Another example is L14 who says "I am dreaming of a situation whereby before even students come to university they get into schools and study the situation, they feel it and then come to university and learn theory". The current selection of student-teachers, solely based on A-Level and O-Level grades (and work experience for in-service teachers), would need to be supplemented with interviews to establish the motives of potential candidates because these influence learning. While student-teachers had motives for training as teachers similar to those found in literature, at times, these were in conflict with the objectives of the teacher education programme studied, "to help student-teachers develop into effective teachers" (ASE Student Handbook, 2010, p. 5) who are "experts at providing meaningful teaching and learning environments for their learners" (p. 6).

In the section 5.3 that follows, the discussion refers to characteristics of participants and focusses on perceptions of what goes on in the various settings where learning to teach occurs.

5.3 The perceptions of student-teachers and lecturers about what happens in different settings as student-teachers learn to think and act as teachers.

My data suggests that student-teachers were learning in two settings and that potential of learning across the settings was not fully exploited. Activity diagrams (**Figures** 5.1, 5.2 and 5.3) provide highlights of what was happening in the university and school activity systems, and across the two settings.

5.3.1 Learning about teaching in the university activity system

Figure 5.1 shows the university activity system. In the university activity system, student-teachers were the *subjects* of interest. As pointed out earlier there were two groups of student-

teachers: pre-service and in-service teachers. The subjects' background and motives for becoming a teacher have been discussed earlier in section 5.2.

The main *object* of the university activity system was to help student-teachers learn and develop knowledge, skills and attitudes needed to become effective mathematics and science teachers (ASE Student Handbook, 2010). The object is articulated in the mission of department of education and its ideals "to educate for critical consciousness, reflection and problem solving in humble service to society" (ASE Student Handbook, 2010, p. 5). See also section *4.3.1.1*. The other *object* was to help student-teachers gain certification as qualified teachers. Providers of initial teacher education elsewhere pursue the 2 goals as well, e.g. the PGCE secondary science course at University of Exeter is designed to help student-teachers to understand how people learn science and how to teach effectively, safely and in an interesting way to secondary pupils of all ages and abilities, and secondly to achieve qualified teaching status (QTS)
(socialsciencs.exeter.ac.uk/education/pgce/secondarypgce/specialisms/science/).

My data suggests differences between student-teachers' motives and objects of the university activity system. As expressed by L15 some student-teachers were more interested in advancing subject matter knowledge and getting degrees in order to seek jobs outside teaching; so take teaching as a stepping stone (Interview with L10) to get jobs in private sector (Interview with L13). On the other hand, the objects of university activity system were focussed on knowledge, skills and attitudes needed to become effective science and mathematics teachers (ASE Student Handbook, 2010). The differences in motives and objects of teacher education created contradictions in student-teachers' learning experiences.

Student-teachers, lecturers and library staff made up the learning *community*. Student-teachers got support from others (Interview with S2), peers (Interview with S4, S6 and S12) and lecturers. For example S1 believed that people important to her in the university activity system were "my lecturers and of course my colleagues and myself". Another example is S6 who said that "library mostly and lecturers, the Internet, experienced educators and my peers give me support". At University of Exeter the learning *community* is made of PGCE student, key university members (specialist lecturers, personal tutors, and technicians), subject support groups and peers
(socialsciencs.exeter.ac.uk/education/pgce/secondarypgce/specialisms/science/).

Student-teachers and lecturers interacted following *rules* spelt out in the university learning and assessment system. These rules were contained in the university prospectus and ASE Student Handbook. One example of rules was stated by S1 that a late assignment would be marked at 50%, and she thought that the rule was not fair to students. However L15 said that this rule was aimed at controlling malpractices and stop cheating by a student likely to be tempted to get a friend's marked assignment and plagiarise. The *rules* at University of Exeter can be divided into external and internal regulations: The Department of Education, through Teaching Agency sets the minimum standards and professional, literacy and numeracy skills tests required in order to attain QTS, and provision of initial teacher education is also regulated by OfSTED; and The University of Exeter has its own regulations and guidelines about teaching and learning and assessment.

(socialsciencs.exeter.ac.uk/education/pgce/secondarypgce/specialisms/science/).

In terms of *division of labour*, student-teachers' responsibility was learning and lecturers were responsible for determining what student-teachers learnt. Lecturers set coursework and examinations, and were responsible for marking and grading (Interview with L2, L3). Student-teachers took notes, answered questions and conducted information search (Interview with L2, L3). The subjects' dispositions and power inherent in the *division of labour can* be explained using Bourdieu's theory. Lecturers had power bestowed on them by university to determine what student-teachers were learning. However, as argued by Hodkinson and Hodkinson (2005) such relations restricted expansive learning possible because student-teachers became more interested in successfully completing training, limiting learning to those aspects likely to be examined. At University of Exeter clear details of *division of labour* are articulated in course documentation; The Secondary PGCE Programme Handbook and PGCE Science Course Handbook and these documents are easily accessible on the Exeter Learning Environment

(socialsciencs.exeter.ac.uk/education/pgce/secondarypgce/specialisms/science/).

My data suggests that *relationships* between student-teachers and lecturers were professional (Interview with L2, L8 and L14), and this assured that student-teachers received the support they needed, that is, being professional raised *relationships* to a more productive level (Interview with L2, L8). Relationships were described as "cordial" (Interview with L14), "friendly but firm" (interview with L2), and S2 believed that being known by lecturers

ensured that he got enough help and this motivated him as a student. Student-teachers related well and respected each other in class discussions (Interview with S9), and feeling valued increased participation in class discussions (Interview with S1).

In the university setting, student-teachers used the following *tools*: educational theory, subject matter knowledge, others (peers and lecturers), Internet and library (Interviews with S1, S3, L2, and L15). However, the stressed economy and unstable political environment in Zimbabwe when the study was conducted meant poor funding of teacher education and that the context was impoverished and characterised by lack of experienced and highly qualified lecturers (Interview with S3), unreliable Internet (Interviews with L1, S3), lack of books in the library (Interview with L8), and a general lack of equipment and learning facilities (Interviews with S1, S3, L14, L15). Student-teachers' learning was likely to be attenuated by the existing context at the time of the study. My findings are consistent with literature e.g. cuts in education funding (Kapungu, 2007), lack of information technology infrastructure (Kanyongo, 2010) and loss of qualified teachers and lecturers (Association for the Development of Education in Africa, 2012) stalled daily operations (Murwira, 2013) in institutions of higher education.

TOOLS
Learning (educational) theory
Learning subject matter
knowledge
Mostly lecturing and discussing
Context limiting what is possible
Lack of funding meant
impoverished contexts

OUTCOME
Effective
mathematics and
science teachers

SUBJECTS - student teachers
More males than females
Pre-service students younger
than in-service
Age group 21-30 majority
Varied motives
Hold pre-conceived ideas
about teaching

OBJECTS
Increasing knowledge, skills and
attitudes
Developing competences
Qualified teacher status
Increasing pedagogical content
knowledge

RULES
regulations that
constrain
interactions,
university
requirements of
the assessment
system

COMMUNITY
De-motivated, poorly paid lecturers
(at times lacking experience),
university setting - department
structures, lecture-rooms, library,
available support systems, different
groups of lecturers e.g. theorists

DIVISION OF LABOUR
role of student , role
of lecturer - theorist,
role of lecturer -
science educator,
role of librarian

Figure 5.1: The university activity system

In the university setting, student-teachers were learning "in the lecture (-room), and in the library and the computer laboratory" (Interview with S3), and S3 thought that he learnt most in the lecture room. He gives several reasons, one of which was that lecture method used helped students to prepare for examinations. My findings demonstrate a major difference of learning to teach in Zimbabwe and what happens in other nations like England. For example, in the University of Exeter model, PGCE students participated in the Secondary Science Programme (Science Lecture Programme, National Curriculum Courses, Main Subject Sessions, Subject Support Groups, Peer Teaching and ICT for Science Teaching), Tutorials, Directed Study, School-Based Work, and Seminar Days. At Exeter, university-based learning and school-based learning were fully integrated in lectures, workshops, meetings and seminars.

(socialsciencs.exeter.ac.uk/education/pgce/secondarypgce/specialisms/science/).

Another finding about university-based learning was how lecturers were teaching. My data suggest that the majority of participants perceived lecturing to be the dominant discourse for various reasons e.g. lack of funding for ITE at the time of conducting the study and the impoverished learning contexts that are a consequence of this. My findings are consistent with literature describing the dominant classroom discourse in Africa as authoritarian, teacher-centred and transmissive (Bunoti, 2011; Akyeampong, 2000; Akyeampong et al., 2000). However, the same literature reports that teachers and lecturers are conscious of the benefits of using progressive teaching and learning methods, constructivist and child-centred approaches (Nziramasanga, 1999; Akyeampong, 2000; Akyeampong et al., 2000; Maringe, 2005; Nyaumwe and Mtetwa, 2010; Zezekwa et al., 2012). In my study lecturers who wanted to use novel ideas, e.g. field trips, failed to do so because there was no funding available to meet the travelling costs, and those who wanted student-teachers to research and lead discussions found lack of reading materials prohibitive. Two examples are cited here; L1 who reported that there was no educational technology (equipment) available and he encouraged his students to 'read about it', and L15 was 'hindered by lack of resources' and used teacher centred approaches despite discouraging student-teachers from using such approaches. This left lecturers getting access to information sources (few books in library and access to Internet) and 'telling' student-teachers. There is also evidence in literature suggesting that universities rely much on lectures and textbooks (Laurillard, 2002) for various reasons. One possible reason is that there is much content to learn and time does not permit use of time-consuming constructivist approaches. The teacher education programme studied was targeted

at pre-service and in-service student-teachers who were learning university subject matter knowledge for the first time (Hardman et al., 2011). In-service student-teachers had knowledge of educational theory learnt at teachers' college but pre-service student-teachers were learning educational theory for the first time. Teacher education in Zimbabwe and other African countries is unique in that student-teachers' subject matter knowledge is often poor and requires much development. Student-teachers were enrolled in many educationally focused courses which reduced the time available to study subject matter and pedagogical knowledge. It may explain why student-teachers lack confidence to use constructivist approaches in practical work (Czielsk and Barke, 2003; Ottevanger, de Feiter and van der Akker, 2007; Bhukuvhani, 2010). Another reason could be that student-teachers were mature and capable of learning through abstract means. Learning at university was ultimately the students' responsibility and much of it took place outside lectures and other formal classes (Ramsden, 2003). However, as revealed by L14 student-teachers needed to learn how to teach using constructivist approaches because pupils in secondary schools needed these. Hence, lecturers were using teaching and learning approaches likely to contradict the teaching and learning approaches they recommended student-teachers to use in the classroom during practice.

Student-teachers were learning to teach science in ordinary lecture-rooms, and not science laboratories; through discussions and not practical work. Lecturers were not modelling the novel pedagogical practices they advocated student-teachers to adopt for secondary school teaching, though they could do so within the existing resource constraints e.g. L13 illustrates how she turned round lectures and discussion to be student-centred by asking student-teachers to research, present, and debate issues.

5.3.2 Learning about teaching in the school activity system

Figure 5.2 shows the school activity system. In the school activity system student-teachers were the *subjects*. In the school activity system numerous activity systems exist. Examples include learning to teach (student-teachers' learning), mentoring, supervision and assessment of student-teachers, teaching, learning and assessment of pupils. My findings resonate with literature for example Tsui and Law (2007) who describe mentoring and supervision activity systems in the school setting. For the purposes of my study the focus was on learning to teach; an activity encompassing mentoring, classroom teaching, supervision and assessment

of student-teachers. It is in the learning to teach activity system where student-teachers were the subjects.

The main *object* of applied science education was to help student-teachers learn through reflective practice and develop into effective teachers "who are experts at providing meaningful teaching and learning environments for their learners" (ASE Student handbook, 2010, p. 5). The other *objects* were to help student-teachers develop pedagogical content knowledge, professional competences, teacher identity and prove readiness to gain qualified teacher status. A commonly stated *object* was to put theory into practice (e.g. Interview with L5, L14). My data suggest that the *object* of the school activity system was to ensure that pupils' learning was not disrupted in order to complete school curriculum topics and maintain performance standards in the national tests. When there were shortages of qualified teachers the *object* of the school activity system was to use student-teachers to fill the gap. Again differences in teacher education and school *objects* created contradictions that negatively impacted on student-teachers' learning in the school activity system. Contradictions and how they impacted on learning to teach are discussed in full in section 5.4 and 5.5. Wilson (2004) reported two objects of the university-school partnership from the perspective of the student-teacher; opportunity to develop pedagogical content knowledge, and to be critically evaluative of teaching and learning in the classroom. Another example is Douglas (2012) who studied ITE in four departments in a school in England and saw the motives of the school-based ITE in many different ways evident in various objects; improving student-teacher learning, teacher recruitment, creating new department affiliations with HEIs, and creating better teachers. In the mentoring activity system Tsui and Law (2007) identified 4 objects; to teach competently, to cover the curriculum content adequately, learning to teach and to help STs to relate theory to practice in the classroom. However, Tsui and Law (2007) found out that learning to teach wasn't often the priority in the school activity systems.

Student-teachers, together with lecturers who acted as supervisors, teachers who were mentors, and secondary pupils made up *the community of practice* (Interview with S1, S2). The finding resembles Wilson (2004) whose community in the university-school partnership comprised of university department including structures and lecturers, school support systems available to staff and pupils, and access to a dedicated mentor. Douglas (2012) identified the community made up of student-teachers, university teacher educators, school mentors and school departments (including social practises and relationships of the teachers). Others like

Tsui and Law (2007) refer to three communities of mentor teachers (MTs), university teachers (UTs) and student-teachers (STs). My findings show that the community in the school activity system was typical of those found in studies of school-university partnerships elsewhere. Whether we choose to talk of a *community of practice* (Wilson, 2004; Douglas, 2012) or *communities of practice* (Tsui and Law, 2007) the key stakeholders in teacher education are student-teachers, teacher mentors and lecturers.

Student-teachers reported that relating well with school heads and teachers helped them to get maximum support (Interview with S2). At times student-teachers got frustrated when they could not get guidance from teachers for reasons like lack of suitably qualified teachers in schools or because teachers were too busy to support the students. For teachers to be effective mentors they need to be qualified teachers, knowledgeable about teaching subject, well experienced and have time to work with student–teachers on a daily basis in the school context. In this study student-teachers were not guaranteed teacher mentors and often were left on their own. Lecturers related well with teachers (Interview with L3 and L4). However, time was a concern for lecturers too busy to talk to teachers about how to support student-teachers (Interview with S1). Wilson (2004) reveals relationships when she reports that the new pedagogical tool encouraged dialogue between student-teachers and teacher mentors. She observed that "science teaching remains a highly individual activity with teachers tending to work alone in their classrooms" (p. 606) such that as soon as "beginning teachers are deemed to be competent in managing resources they are frequently left to work very much on their own". Douglas (2012) revealed different relationships experienced by student-teachers in different school departments. Because Douglas (2012) studied one school, the differences reported could be attributed to different personalities and not subject areas. My findings resonate with Douglas (2012) in that student-teachers' relationships with school staff determined the kind of support and learning available. Student-teachers' ideas of pedagogy were lost or detached from original meanings when the motive was to fit in the school system (Douglas, 2012; Postlethwaite and Haggarty, 2010). Tsui and Law (2007) studied lesson planning as boundary crossing and use 2 cycles to show impact of power relations. The first cycle failed to achieve intended outcomes because student-teachers perceived relationships with mentors to be "master-apprentice" relationships, between lecturers and student-teachers as "teacher-student" kind, and they saw mentors and lecturers as "assessors". The lessons were collectively planned and powerless student-teachers adopted suggestions of the more experienced mentors and the more knowledgeable lecturers without gaining ownership.

Student-teachers then enacted the lesson plans, and discussion of what worked and did not became evaluations of teaching efficacy of student-teachers so much that highly critical evaluations made student-teachers defensive in their response. Power relations can restrict student-teachers' opportunities to learn.

The members interacted following *rules* as set up by the university and contained in the ASE student handbook, that is, the university assessment system of teaching practice (Interview with S1, L14, L15). At the same time the school policies, departmental policies, procedures, and requirement to teach curriculum for success in national examinations guided student-teachers (Interview with L8). My data suggest that when the university and school rules were conflicting student-teachers had to meet both expectations (Interview with L2). Contestation was not entertained but compliance. At times it is necessary to change the rules "about which teaching strategies are acceptable and appropriate" such that "beginning teacher becomes controller of production system, and influence pupils' learning and motivation" (Wilson, 2004, p. 606). In Wilson's (2004) study mentor teachers were willing to change rules and "allow experimentation because the 'same content could be covered' within the existing structure of the curriculum" (p. 597). On the other hand while Douglas (2012) does not explicitly discuss changing rules, there was evidence that relationships allowing free discussion of conflicting views were more productive than others in improving student-teachers' learning. According to Tsui and Law (2007) student-teachers given "autonomy and flexibility" (p. 1299) in the enactment of the collectively drawn up lesson plans showed they were better able to examine their own practices in terms of how they could help their pupils instead of how they could live up to expectations of mentor teachers and university teachers. Mentor teachers and university teachers were more focused on how the lesson could be effectively taught, irrespective of whether pedagogical strategies were collectively planned or initiated by student-teachers. In my study participants did not mention any change of rules, similar to Wilson (2004) and Tsui and Law (2007) possibly because school heads and mentors did not have confidence in student-teachers' abilities to cover the curriculum at the required pace if allowed to experiment with teaching strategies.

In terms of *division of labour* student-teachers acted like any other teachers within the school, but remained students of the university (Interview with L15). Some had full teaching responsibilities (Interview with S1). My finding is not something new because schools in Zimbabwe have been using student-teachers to fill gap created by teacher shortages for a long

time (Mtetwa and Thompson, 2010; Ndawi, 1997; Maravanyika, 1990). However, the ideal situation was that experienced teachers acted as mentors. Lecturers supervised and assessed student-teachers during teaching practice (Interview with S1, L2, L3, L13, and L14). Student-teachers were learning to teach (Interview with S5, S6, and S9) as well as proving competence to teach (Interview with S7). The roles of various groups of people were spelt out in the ASE Student Handbook (2010). In terms of division of labour all the members (student-teachers, lecturers and mentors) focussed on student-teachers' learning when lecturers visited schools. In my study the division of labour was university-led as defined in the ASE Student Handbook thus limiting participation of mentors. However, school objects always took priority when visiting lecturers left e.g. teaching to the curriculum to ensure completion of the syllabus (Interview with L8). The mentors in the study by Wilson (2004), despite acknowledging that use of the new pedagogical tool increased pupils' learning and motivation, did not use the tool to develop reflective practice. Wilson (2004) discovered that her new pedagogical tool did not trigger change in the mentors' perception of their role; suggesting that mentors who were happy with their own teaching performance did not see any need to change. Douglas (2012) found out in some departments like modern foreign languages (MFL) and science the objects of school activities determined division of labour, and object of ITE was a secondary concern.

Tools available to student-teachers were educational theory, subject matter knowledge and resources they acquired during university-based learning (Interview with L2, L4, and L14). The school contexts determined other *tools*, and my data suggests lack of equipment and other essential curriculum materials, and at times student-teachers did not have mentors to support them (Interview with S1, L1, and L15). Time was also a concern for student-teachers who had large classes and were often too busy to try out innovative ideas (Interview with S1). In my study participants referred to educational theory and this matches Wilson's 'research literature' tool. Wilson (2004) argues that adverse budgets have meant that teachers' contact time in the classroom has risen, leaving little time for critically evaluating their own lessons (p. 606), and lack of time inhibits reflective practice. Teachers in England shape tools they use like lesson plans but have access to government websites were they can download easily accessible materials saving a lot of time. Tsui and Law (2007) used "lesson study" as a tool, and this is similar to Wilson's (2004) planning protocol tool to reflect on practice. In Hong Kong, as exemplified by Tsui and Law, teachers produce their own lesson plans. In my study student-teachers used general guidelines to produce lesson plans. While student-teachers

were conscious of the need to use university tools, mentors did not do so for various reasons. One reason was they had never been trained to use the tools; another reason was that teachers saw no need to change when they were achieving school goals, and thirdly they could have seen planning as time-consuming in their busy schedules. Such sentiments were evident in the study reported by Douglas (2012) and Wilson (2004). The major difference between literature cited and my findings is that the tools readily accessible in other contexts were not available in Zimbabwe, and student-teachers had to produce their own materials in stressed situations.

Tools:
theory of teaching and learning, induction from teachers, information about school setting, equipment, facilities and resources

Outcome:
change in beliefs about teaching and learning, understanding how theory and practice interact, reflective

Subject:
student teacher

Object:
professional development, developing PCK, teacher identity, competence, qualification

Rules:
regulations that constrain interactions, university requirements of the assessment system, school policies and requirement to teach curriculum for success in examinations

Community:
school setting - department, classroom, teachers, pupils working with student teachers. available support systems, university department structures and lecturers as supervisors, lack of equipment, facilities and resources

Division of labour:
role of student , teacher, lecturer. university provides students and developmental training, school provides authentic supportive setting

Figure 5.2: The school activity system

Student-teachers, on attachment known at the university as Applied Science Education (ASE), were learning in the school activity system. Learning to teach was negatively affected by contextual factors in Zimbabwe. As reported by S3, student-teachers could not learn through observation because at times, no experienced teachers were present to support them, and when they were available, they were not innovative to demonstrate how to teach in impoverished contexts, how to improvise and overcome shortages of materials.

My data suggest that a majority of student-teachers were using transmission modes of teaching during teaching practice. For example, S1 wanted to conduct practical lessons but could not because the school had no adequate funding, and purchasing equipment and chemicals was lower down on the head-teacher's priority list. S3 and S6 reported similar experiences in schools with limited resources and teaching pupils who did not have reading materials. Student-teachers under these circumstances used teacher centred methods. One reason could be that a teacher's priority in the school was to complete the syllabus and get pupils ready for examinations. Therefore, student-teachers opted to use those approaches like 'chalk and talk' rather than take the risk, for example, of pupil-led discussions which are likely to be time consuming. Another reason could be that because of lack funds, equipment and materials student-teachers had no choice but to rely on low cost transmission modes of teaching. In fact, there is literature suggesting that poorly resourced settings adversely impacted teaching and learning (Kasozi, 2006). Possibly, as echoed in literature, participants' own learning may have been heavily centred on rote learning (Mulkeen, Chapman, DeJaeghere, and Leu, 2007), and they were repeating their own experience (Condy, 1998). Teachers in Africa were not able to do practical work because of lack knowledge, skills and equipment (Bhukuvhani et al., 2010; Czielsk and Barke, 2003; Ndirangu, Kathuri and Mungai; 2003). In schools student-teachers were learning to use transmission methods and not constructivist teaching approaches. A possible, but unwanted, synergy was that student-teachers taught the same way their lecturers were teaching. A problem here is that the student-teachers did not understand why the lecturers were choosing to teach in this way and therefore overgeneralised the experience.

5.3.3 Learning about teaching as students move across university and school activity systems

The model of partnership at the university studied was heavily university-led, hence the need to employ second generation activity theory analysis. This has long been changed in other

countries, for example, England (unless you were to go back to the 1980s), where now there is a strong partnership between universities and the schools involved in initial teacher education. At the very least, teachers generally can tell students how to do things with particular classes in specific schools; they also have broader issues to discuss with students rather than just a particular context. Certainly, student-teachers can gain learning opportunities available in teacher if a fuller sense of partnership was to become possible. The school activity system has much to contribute and there are both synergistic and contradictory links between university and schools settings.
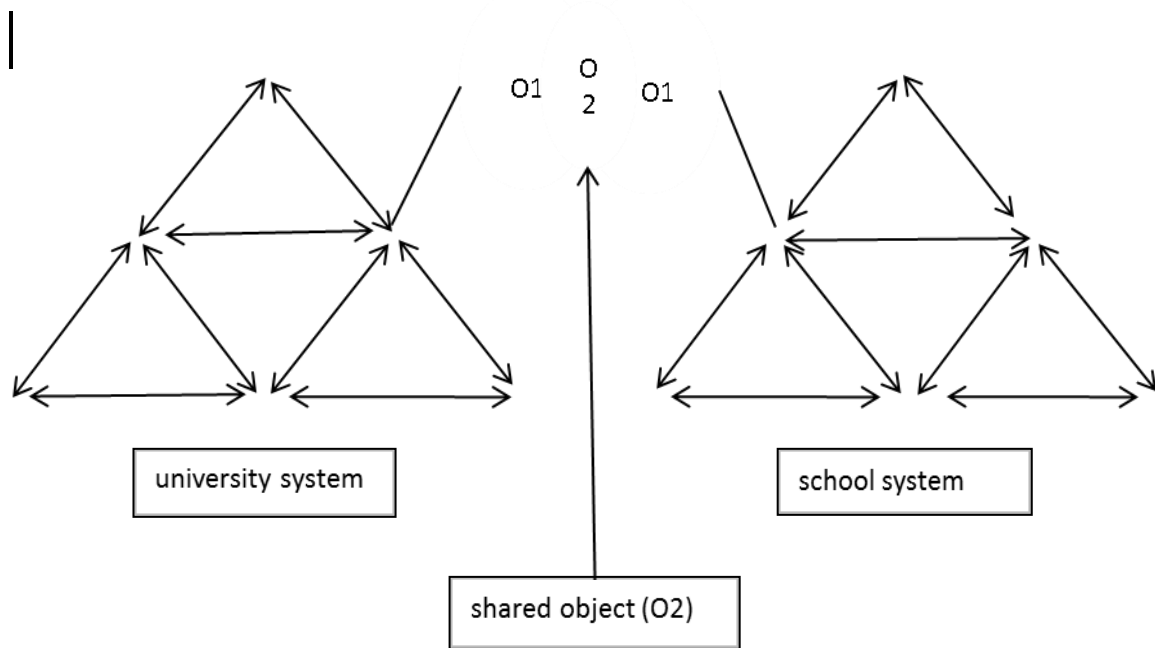
Figure 5.3: Third generation activity theory showing how interacting university system and school system produces a shared object.

Teachers in schools were the professionals. They might be neither highly qualified nor rich in educational theory but they know how to teach on a day-to-day basis. Students' learning to teach can improve if they understand what both university based learning and school based learning can offer. Both students and teachers have much to gain. Students can get practical knowledge through participation and socialization, and teachers can develop the expertise of mentoring, simultaneously filling gaps in their training.

In **Figure 5.3** the university activity system (see also **Figure 5.1**) selects prospective teachers, provides high quality assurance in training and assessment of potential teacher candidates, can offer new ideas about teaching and learning, giving training support to teachers and additional help to the school of student-teachers as employees (who already have some training to fill gaps in staffing), and also provides students as supernumeraries, and teaches formal theory. This forms object 1 (O1) of the university system. The school activity system (see also **Figure 5.2)** on its part can offer authentic contexts to practice, try out new ideas, translate theory into practice, support, and help student-teachers to settle, and opportunity for students to work as cover teachers. This forms object 1 (O1) of the school system. Both the

university and the school systems can provide a shared object 2 (O2) where students and teachers can carry out joint activities to identify and solve problems together, such as how to make learning mathematics and science more interesting and relevant to their lives. In the joint activities, student-teachers, lecturers and teachers are both learners and their relationship is not based on superiority in knowledge. The university system has something to gain if student-teachers understand how to get pupils interested in learning. The school system stands to gain when pupils' interest in learning is increased and consequently they do well in national examinations.

Many participants argued that student-teachers *learnt* at university and *demonstrated their ability* in the school. This is consistent with the 'theory into practice' or traditional model (Laursen, 2007; Hodkinson and Harvard, 1995; Eraut, 1989), discipline-oriented approach or applied science model of teacher training (Kostoulas, 2011; Swan, 1993; Wallace, 1991) and what Schön (1983) criticized as the 'technical-rationality' model. The applied science model gives rise to the metaphor of teacher educator as a transmitter of knowledge (Swan, 1993). Literature cited above discusses weaknesses of believing that knowledge is acquired during time spend at university and comes out during classroom teaching. Some researchers have questioned the nature of knowledge acquired in one setting and then applied in another e.g. Roth and Tobin (2001) because of real and perceived gaps between preparation and practice (Russell and McPherson, 2001). Others, in support of practice as demonstration, argue that during teaching practice "expertise of being a teacher is enacted", Samuel (2009, p. 752). Accordingly, the practitioner is

> the interpreter, creator, user, evaluator and re-creator of theory in both tacit-intuitive and formal-explicit forms, that is, the dialectic. It is through such interpretive and reflective processes, integral to practice, that practices are achieved, perpetuated and transformed. Practices are changed by changing the ways in which they are understood (Carr and Kemmis, 1986, p. 91).

This view of the relationship between theory and practice really challenges the idea that you learn the theory then apply it.

An alternative view would be that student-teachers learn through participation - teaching experience and professional practice. Recently there has been a drive to professionalization of teacher education in England (Furlong, 2000), situating teacher learning in the workplace (Imants and van Kleen, 2008), and increased provision of authentic learning experiences in Australia (Watson et al., 2008). The argument being that knowledge becomes professional

when enacted in the crucible of the field (Shulman, 1998). Literature is available to support this e.g. engaging in community of practice of teachers assisted in the development of pre-service teachers' professional knowledge (Sutherland, Scanlon and Sperring, 2005). Imants and van Kleen (2008) argue that although six groups of factors (the learning potential of the task; opportunities for feedback, evaluation and reflection on the work actions; formalization of work processes; employee participation in handling problems and developing work processes; learning resources; and shared norms) are essential for learning to occur, there is always a potential of problems. My findings suggest that during teaching practice lecturers placed more emphasis on assessment than on helping student-teachers learn how to teach, something evident in conversation with L14. One reason for this could be that student-teachers were keen to demonstrate what they know and can do whereas they should focus on what pupils are learning rather than their teaching performance; inevitably, this leads to contradictions.

Learning to teach, whether perceived as an academic or professional endeavour, is complex and characterised by controversy (Imants and van Veen, 2008; Yüksel, 2008). Another way of conceptualising university-based and school-based learning is to consider learning to teach as contextualised with these settings being seen as 'spaces of enclosure' (Edwards, 2005) where learning to teach occurs in one setting and the practice of teaching in another. When student-teachers viewed learning to teach as happening in the lecture room it means that they did not realise the value of learning resources in other settings like the school and classroom (Edwards, 2005). This could then explain why student-teachers did not seem to see creative opportunities when they experienced contradictions between 'educational theory' and 'educational practice'. In their model, student-teachers see such contradictions as evidence of a failure in their preparation or evidence of the inadequacy of theory.

From my findings, majority of student-teacher participants perceived gaps between theory and practice encountered when on teaching practice as impeding their learning. For example, S1 said, "you find out that what you are supposed to be doing as directed by the university is not what was supposed to be done according to the classroom situation". S1 could have meant scheming and planning as directed by university, and use of constructivist approaches. Another example is S2 who thought that, "in a particular community and setting… theories do not apply", and S5 and S10 expressed the same sentiments. Therefore, to some student-teachers educational theory as a decision making tool was something applicable in certain

contexts and not others. Similarly, some lecturers e.g. L14 said there was evidence of student-teachers at times "believing theory can confuse practice" and L8 knew students who were "finding theory does not work". Here was another learning opportunity; boundary crossing, when student-teachers experienced gaps between university-based learning and school-based learning and had to decide how to resolve the competing and sometimes, conflicting messages from the two settings. However, data suggest that student-teachers did not consider these to be opportunities to change and develop new understanding and better practice contrary to evidence in literature that contradictions were opportunities for expansive learning (Goodchild and Jaworski, 2005; Engeström, 2001; Yamagata-Lynch and Haudenschild, 2009; Warmington, et al., 2005). Therefore, for successful movement between settings (Postlethwaite and Haggarty, 2010) student-teachers may require 'boundary brokers' (Tsui and Law, 2007; Wenger, 1998), support through reconceptualising the theory/practice relationship and clear opportunities to learn in various settings (Wilson, 2004).

In short, my study highlighted at least five things about student-teachers' and lecturers' perceptions of what was happening in various settings. Firstly, student-teachers' were learning in the university setting and proving competence in the school setting. Secondly, student-teachers, lecturers and teachers made up the learning communities and, at times, including secondary pupils. Each group of people had various roles to play in supporting student-teachers' learning to teach. Thirdly, relationships among members were important, and often determined the quality of support student-teachers' were receiving. Fourthly, in the school setting student-teachers' were filling gaps created by shortages of teachers. Lastly, student-teachers' and lecturers experienced shortages of 'tools' , for example, equipment and facilities, because of poor funding at a time when the economy was stressed, and limited choice of teaching and learning approaches.

5.4 Factors shaping student-teachers' learning within and between the university and school activity systems

My data reveal that there are some factors that aligned and that could be seen as synergistic factors. Synergy refers to the value added by cooperative interaction of parts. By working together two or more parts of a system create a combined effect that is greater than the sum of the efforts of the parts. In simple terms synergy means working together as in teamwork. Synergies increase *production*, in this case student-teachers' learning. My data reveal that

some factors are antagonistic, that is, pull in opposite directions and could be seen as contradictory factors. Contradiction is a statement that is at variance with (itself or another). Contradiction refers to a situation in which inherent actions or propositions are inconsistent. The disagreement between two things means that both cannot be true simultaneously, and therefore creates dilemma of what to do to resolve the differences. Student-teachers who see contradictions as problems worth solving are afforded expansive learning opportunities.

5.4.1 Potential synergistic factors

Three potential synergies shaping student-teachers' learning emerged clearly from the data: lecturers with various specialisms working collaboratively; the development of links between university-based and school-based learning; and learning to engage in reflective practice as a mediating tool.

5.4.1.1 Three specialisms as a synergy

My data suggest that there were two groups of lecturers; 'science educators' who had specialised in science and could provide the needed subject matter and pedagogical knowledge, and 'educational theorists' who had specialised in the disciplines like psychology, philosophy and sociology of education and were teaching theoretical foundations of education. S2 describes his lecturers as people with different areas of specialism. L1 and L14 talked about lecturers who had subject specific content and believed that such lecturers could teach both content and methods courses. L6 makes a distinction between lecturers of pedagogy who specialised in science education and lecturers of subject knowledge, describing the latter group as more competent to teach subject matter knowledge. Ideally, a third group of lecturers – 'scientists', who had a strong background in mathematics and science, were best placed to teach subject matter knowledge. However, these mathematicians and scientists taught in subject specific departments and not the department of education. Science educators, within the department of education, were not mathematicians and scientists in the true sense and normally would not be found teaching subject matter knowledge in subject specific departments because they studied science education, not science *per se* in their postgraduate studies. Educational theorists, whose teaching subject backgrounds were neither mathematics nor science in a majority of cases, could provide support in learning theoretical foundations working side by side with science educators,

competent to support student-teachers to learn pedagogical content knowledge. In my view, these differences in specialism provide a rich diversity of knowledge, and a community of participants who could share their individual experiences and knowledge to promote student-teachers' learning. This exemplifies what Wenger (1998) and Goodchild and Jaworski (2005) described as a community of practice, each member with something to contribute. On one hand, a teacher could be identified as someone knowledgeable about their teaching subject (and lecturers in subject specific departments and specialists in mathematics and science could provide that knowledge and training). On the other, a teacher could be someone who knows how to make subject content knowledge accessible to learners (and science educators together with educational theorists were best positioned to provide knowledge of how to motivate learners), meaning that both science educators and theorists have a role to play in grooming effective teachers. Therefore, the potential synergy within the department of education, where student-teachers were learning to teach, is sufficient overlap between subject matter knowledge, pedagogical understanding and the discipline-based psychological insights into teaching.

5.4.1.2 Reflective practice as a synergy

From the data, a majority of participants believed that student-teachers were learning reflective practice as an object in the university setting, and proving knowledge of reflective practice in the school setting, but participants were not talking about student-teachers using reflection to question practice. One participant, L2 talked about post-mortem of the lesson observations, where she highlighted strengths, weaknesses and what the student-teacher could do to improve. Consequently, I felt there was potential synergy of 'being empowered to reflect', and simultaneously reflecting to empower oneself, that is, using reflective practice as a mediating tool for learning theory from practice and practice from theory (Alsop, 2000; Spaldin, 1998; van Manen, 1995; Reid, 1994; Schön, 1987), which is empowering (van Manen, 1995; Dewey, 1933).

My data suggest student-teachers reflected, as private activity (Farrell, 2001; Hung, 2008; Orland-Barack, 2005; Zeichner, 1994), mainly when writing evaluations of lesson plans and discussing observed lessons with supervisors. Student-teachers, teachers and supervisors held social and public activity of reflection (Farrell, 2001; Hung, 2008; Orland-Barack, 2005) through post-lesson discussions on few occasions.

My data also revealed that student-teachers reflected on their school experiences, when back at university, and learning the course 'Curriculum Issues in Science Education' through student-teachers-led discussions of school experiences, and this was consistent with dialogic reflective practice (Orland-Barack, 2005). The potential synergy was that student-teachers, who were learning reflective practice through formal instruction at university could, later, in context specific responses to hands-on school experiences reflect (question conventional practices) and when back at university engage in dialogic reflection. It seems that student-teachers, in the university setting, limited reflection to one education course and two lecturers teaching that course, and did not extend to others e.g. theoretical foundations, because student-teachers did not re-visit the course after teaching practice. The course was taught in the first year and it was left to lecturers teaching other courses in subsequent years to either bring up ideas or not, from theoretical foundations into their lectures. L6 did not know whether her student-teachers continued to make connections between sociology of education and other education courses, because student-teachers learnt her course in Part I only. She demonstrated how all other courses build on theoretical foundations but was not sure whether student-teachers "keep this in mind for the whole duration of training". One reason why student-teachers viewed reflective practice as an 'object' demonstrated through practice could be that lecturers did not extend the kind of reflection encouraged in one course to all education courses. Another reason was that university assessment system required evidence of reflective practice, and therefore students showed what they did to get a pass grade and not to improve their understanding of teaching and learning. Here was a potential synergy between learning reflective practice as an object, and later assessment of student-teacher's knowledge and understanding of reflective practice during applied science education. For a more extensive discussion of reflective practice, see discussion of findings that addresses question three (*section 5.5.2.1*).

5.4.1.3 Interplay between theory and practice as a synergy

Another synergy, evident from conversations with majority of participants, was that student-teachers were learning educational theory in the university setting, and then later, had opportunity of learning from practice in the school setting. It seems student-teachers learnt in a de-contextualized situation (Smith, 1999), and supplemented this by learning in authentic contexts (Watson et al., 2008; Brown, Collins and Duguid, 1989). The synergy here is that

student-teachers were learning educational theory in university activity system and were afforded opportunities to make classroom decisions in the school activity system informed by educational theory. However, my data suggest that student-teachers were using the school setting as platform to show mastery of what they learnt in the university setting. Many studies have looked at arguments for integrating university-based learning and school-based learning (Lewin, 2008; Watson et al., 2008; Mulkeen et al., 2007; Wilson, 2004; Roth and Tobin, 2001; Russell and McPherson, 2001; Darling-Hammond, 2000b; Furlong, 2000; Hodkinson and Harvard, 1995; Lester, 1995; Benton, 1990; Eraut, 1989; Carr and Kemmis, 1986). Unfortunately, most of the time the teaching experience and theoretical components of training are disconnected (Wilson, Floden, and Ferrini-Mundy, 2001; Gaynor, 1998). In order to resolve such a disjuncture, Samuel (2009) argues for a university-school "relationship that goes beyond placement to build sustainable and meaningful partnership" (p. 752), that is truly collaborative (Kruger, Davies, Exkersly, Newell and Cherednichenko, 2009).

5.4.2 Contradictory factors

This study used second generation activity theory as an analytical framework to examine findings of contradictions in the university activity system and the school activity system because in both settings, student-teachers' learning was university-led. Then, third generation activity theory was used to examine findings of contradictions between university activity system and the school activity system cognisant of the fact that the partnership was university-led.

Conversations with study participants revealed contradictions in the university activity system, for example, student-teachers' motives for training as teachers contradicted the objects of the training programme, and contextual factors like a lack of subject specialists were in tension with the need to learn pedagogical content knowledge that is necessarily a subject-specific issue. Examples of contradictions in the school activity system were shortage of 'tools' like resources and students' desire to get support from experienced teachers, teaching practice assessment in tension with learning through observation and practice, and using student-teachers to fill gap created by shortage of teachers in tension with learning from practice. Examples of contradictions between the two activity systems, are reasons for hosting student-teachers in contradiction with purposes of applied science education, and rules for performance in tension with trying new ideas.

5.4.2.1 Contradictory factors in the university activity system

My data suggest five contradictions in the university activity system. First, student-teachers' *motives* contradicted *objects* of the training programme e.g. student-teachers whose motive for joining teaching was to please other people did not like learning educational theory. S1, who had chosen a teaching degree by chance, liked studying Chemistry more than education courses. It was only later that she found educational theory interesting and enjoyed reading to understand educational jargon. It seems she did not see education courses as critical in what she was training to do, to teach science. Other researchers have revealed that among prospective teachers who were induced into teaching by third parties some soon found learning to teach experiences boring (Canrinus and Fokkens-Bruinsma, 2011; Low, Lim, Ch'ng and Goh, 2011; Bruinsma and Jansen; 2010; Hobson and Malderez, 2005; Chan, 2004; Andrews and Hatch, 2002), and other prospective teachers surprisingly develop interest with time. Another possible reason is that pre-service student-teachers, who were learning educational theory for the first time, found education courses difficult. This makes sense in an examinations oriented curriculum where grades are important, and difficult courses are likely to mean low grades. My findings are consistent with contradictions evident in prospective student-teachers' motives of opting to join teaching because of job security but disliking the low salaries paid to teachers (Chireshe and Shumba, 2011; Marist International Solidarity Foundation, 2011; Chivore, 1988; Chivore, 1986b). Teaching jobs were readily available even in countries facing economic problems, and one would expect the low pay to be seen as better than no pay at all. However, to gain qualified teaching status one has to develop an interest in learning educational theory and demonstrate the requisite professional competences.

Second, a majority of participants knew that the model of teacher learning was officially 'concurrent' but my data suggest that their educational practice was 'consecutive' with no exploration of concurrent learning. Student-teachers, each semester, were learning subject knowledge and studied education courses aimed at learning to teach. However, conversations with S1, S2, L4 and L15 reveal that student-teachers were learning subject knowledge separately from learning how to teach, and this meant that in the university setting educational practice was 'consecutive'. A possible explanation is that lecturers in the department of education taught education courses without referring to what happened in

subject departments e.g. the department of chemistry where student-teachers learnt subject matter. My findings show similarities with criticisms that have been levelled at the structure of teacher education by academic areas and compartmentalized orientation of both schools and universities (Britzman, 2012). The unintended consequence is that there is no integration of content and pedagogy (Fischler, 2002) and other researchers found out that subject content takes up 80% percent of teacher preparation time (Lewin, 2000). By adopting, the concurrent model lecturers respond to increasing pressure to integrate subject knowledge and pedagogical knowledge; the two main components of teacher education (Watson et al., 2008; Robinson, 2006). In fact, as pointed out by McEwan and Bull (1991) "locating subject mastery in the various academic departments and pedagogy in the schools of education is not only an artificial division but a potentially harmful one" (p. 333). Ideally, lecturers in academic departments expected to demonstrate how to teach (communicate) science ideas, and lecturers of pedagogy to understand (science) ideas to be taught (communicated) because failure to do so creates its own problems as suggested by the tensions in my findings.

Third, student-teachers' learning of subject matter knowledge and educational theory concurrently created tensions. A majority of participants held the view that it is more important to learn subject matter knowledge than educational theory. One example is S1, who believed that "my colleagues, given a choice would not do education courses because they find them boring and difficult". L7 and L15 bemoaned student-teachers who would rather learn 'physics' than be bothered with 'Piaget'. Student-teachers' desire to learn subject matter knowledge is something similar to position held by Grossman (1994). Lecturers and some student-teachers e.g. S7 and S8 valued learning educational theory, consistent with Monk (1994), and Ferguson and Womack (1993). There were others who thought the two forms of teacher knowledge were equally important (similar to Watson et al., 2008; Darling-Hammond, 2000b). My data suggest that a majority of student-teachers would have opted for a different profession than teaching. Perhaps this explains why majority of student-teachers regarded subject matter highly. Considering that most student-teachers had an interest in being scientists, and only joined teaching because they had failed to get into study areas of interest, it means that learning teaching subjects helped them live in harmony with their original interest. For some, perhaps, becoming mathematics and science teachers was second best to being mathematicians and scientists. My findings indicate a tension between access to higher education, learning pedagogical knowledge, and a new discipline (Maravanyika, 1990,

Hardman et al., 2011; Schäfer and Wilmot, 2012). Students who otherwise could not gain entry to university education opted to become teachers as a secondary choice.

A majority of participants suggested that science educators were better suited to train science teachers than educational theorists yet the science educators interviewed were not confident enough to teach theoretical foundations themselves, and felt the theorists taught foundations better than themselves. L7 believed a BA holder with a postgraduate qualification in sociology of education was better training teachers of humanities and not mathematics and science. L14, acknowledging that science educators could not teach theoretical foundations, believed theorists who did not have a background in mathematics and science needed bridging courses to gain minimum subject matter knowledge essential to support student-teachers. Contrary to the perceptions of some participants that lecturers with subject matter knowledge qualifications were more effective than those who were educational theorists, there is literature suggesting that having good subject matter knowledge does not guarantee ability to stimulate students to think (Bain, 2004). It is possible that lecturers who specialised in education understand how to motivate student-teachers better than subject specialists do. The contradiction between science educators and educational theorists is similar to Yüksel's (2008) between "academicians' belief that general education and knowledge of discipline should be required to be a teacher and lecturers stating that teachers must acquire a common body of knowledge about teaching and learning".

Scrutiny of science educators' background, who described themselves as specialists in mathematics and science, suggests that they were neither mathematicians/scientists nor educational theorists. On a continuum from theorists to mathematicians/scientists, science educators would sit in the middle. A majority of science educators in my study held B.Ed. qualifications in their teaching subjects and not B.Sc. qualifications. Further at postgraduate level they studied science education e.g. M.Ed. Physics Education, as opposed to M.Sc. Physics. L14 believed that as a science educator he could collaborate with lecturers in the department of physics. However, looking at his background he would be inferior to physicists.

The tension highlighted above remains valid. With respect to professional competence, good teachers generally, have sufficient knowledge of the content area(s) in which they teach (Minor, Onwuegbuzie, and Witcher, 2000; Segall and Wilson, 1998; Skamp, 1995;

Weinstein, 1989; Witcher, Onwuegbuzie, and Minor, 2001). In one particular view of teaching and learning, good teachers are further able to impart, clearly their knowledge to their students (Minor, Onwuegbuzie, and Witcher, 2000; Reed and Bergemann, 1992; Segall and Wilson, 1998; Skamp, 1995; Weinstein, 1989; Witcher, Onwuegbuzie, and Minor, 2001). Some researchers have shown that lack of thorough understanding of subject matter can impede good teaching (Fajet et al., 2005; Darling-Hammond, 2000a; Goldhaber and Brewer, 2000; Guyton and Farokhi, 1987; Monk, 1994). On the other hand, some researchers found out that pedagogical preparation e.g. theoretical foundations of education and instructional methods has positive effects on teacher performance and ultimately student achievement (Adams and Krockover, 1997; Darling-Hammond, 2000a; Fetter, 1999; Grossman, 1989; Hawk, Coble and Swanson, 1985). Thus, the two forms of teacher knowledge are equally important; hence, both science educators and educational theorists must be available to support student-teachers.

Fourth, my data suggest contradictions between lack of *tools* (e.g. science educators/lecturers) because the university could not hire the required numbers and the *object* of teaching and learning pedagogical content knowledge. Because of low enrolments in subjects like physics, it meant that employing a physics educator to teach one student did not make economic sense where university survived on tight budgets, thus contradicting the object of learning pedagogical content knowledge in small groups (or classes), according to student-teachers' areas of specialization. Student-teachers were learning pedagogical knowledge as one large class despite training to teach different subjects, and at times, they divided into three groups: Geography, Mathematics (including Computer Science) and Sciences. While sciences (biological sciences, chemistry and physics) share similarities, there are things unique to each when it comes to learning how to teach the subjects. Student-teachers could not fulfil object of learning pedagogical content knowledge because the department of education had neither lecturers who could teach PCK in all subject areas available, nor the financial capacity to hire them. The problem of low enrolments has also been cited in literature, for example, Zezekwa et al (2012).

Fifth, my data suggest contradictions between a shortage of *tools* and the *object* of modelling good practices e.g. constructivist teaching approaches. Most lecturer participants' accounts e.g. L1, L14 and L15 revealed that because of lack of equipment, impoverished resources and lack of support they could not model constructivist approaches for their student-teachers to

learn pedagogical content knowledge, and only used the basic transmission modes. While lack of resources was used to explain use of transmission modes, other reasons could be lack of creativity and lecturers' questionable knowledge of constructivist approaches. Higher education institutions were better placed than schools in terms of resources, for example, Bhukuvhani (2010) reveals that student-teachers were learning to use virtual experiments at university but could not use these in schools because of lack of ICT infrastructure.

5.4.2.2 Contradictory factors in the school activity system

My data suggest four contradictions in the school activity system. First, shortages of *tools* e.g. lack of equipment and curriculum materials reported in schools meant that student-teachers could not fulfil the *object* of trying new ideas (such as using constructivist approaches) they had learnt in the university setting. An example is S1, who reported that her head-teacher had more important things to finance than buying sulphuric acid, and therefore she could not do practical work. S3 wanted to use computer technology but could not because these were lacking in schools. Further, where S3 needed to vary activities and carter for individual differences, he could not do so because of lack of resources. Because student-teachers lacked opportunities to try new ideas, (and there was no evidence in my data to show that student-teachers got much help to do so), this therefore contradicted the object of learning pedagogical content knowledge through practice. This finding echoes Mays (2011), in South Africa, who revealed that some student-teachers are found doing their teaching practice in dysfunctional schools where attempts at innovation are not possible because of lack of equipment and curriculum materials (Bhukuvhani et al., 2010; Czielsk and Barke, 2003; Ndirangu, Kathuri and Mungai; 2003).

Second, collation of my data reveal that, in schools there were no suitably qualified teachers in schools, such that student-teachers could not get support to learn pedagogical content knowledge. S1 was at a school where the head of science was the only qualified teacher in the department, and could not get help when she needed it. Similarly, S3 who was training to teach computer science could not get help because there were no suitably qualified teachers in schools to support him. This was an example of contradictions between *object, division of labour* and *context*. During applied science education, teachers were mentors on the understanding that they were going to provide students with the needed support, as specified

in the ASE student handbook. However, support from teachers was either low or non-existent because, in contexts where schools had shortages of teachers, student-teachers had full teaching. Participants did not talk about what they could do to maximize learning during school attachment when student-teachers were alone.

Third, my data suggest that some student-teachers paired with teachers who had low motivation to act as mentors contrary to student-teachers' *object* of getting help to learn how to teach from qualified teachers. Student-teachers, e.g. S2, reported that teachers had low morale because a stressed economy, hyperinflation and low salaries frustrated them. According to S2, there were times teachers did not report for duty because they could not get their salaries from banks. Further, S2 believed that the school paid his mentor to teach and not to help student-teachers like him.

Fourth, some student-teacher participants believed that teachers in school seemed unconcerned to support their learning because lecturers did not recognize teachers' role. Lecturers were more powerful than teachers were. This is an example of contradiction between *community relationships* and university practices of *division of labour*. My data suggest that teachers seemed unconcerned with their new role to support student-teachers, probably because of skewed power relations in favour of lecturers. A majority of participants stated that university supervisors on school visits hardly engaged mentors to get feedback and share information, and when they did it was telling mentors in what way and how to help student-teachers. An example is S1 who talked about lack of contact between lecturers and her mentor. My data reveal teachers' lack of support to play a critical role of mentoring, yet literature reveals that teachers need to be trained, supported and monitored to ensure that they live up to the professional expectations of their roles as mentors (Mays, 2011; Mabunda et al., 2009; Maphosa, Shumba and Shumba, 2007).

5.4.2.3 Contradictory factors between university activity and school activity systems

My data suggest four contradictions between university activity and school activity systems. First, majority of participants revealed that school head-teachers' reasons for hosting students are different from university purposes of applied science education. On one hand, lecturers and student-teachers want to use schools for experimentation and demonstration of competence, and on the other as revealed by majority of participants, school head-teachers

use student-teachers to fill gaps created by teacher shortages and ensure that pupils maintained their learning and performance standards in the national tests. L8 believed that schools saw student-teachers as extra help, and treated student-teachers like any other teacher. According to S8, head-teachers were disappointed when student-teachers failed to get pupils ready for examinations. What participants revealed is a secondary level contradiction because here are at least two value systems attached to the same element of learning through practice.

In the eyes of the lecturers and student-teachers the school experience was aimed at putting educational theory learnt at university into practice, try out new ideas and develop a deeper understanding of teaching and learning. However, to the school heads and teachers, student-teachers provided a helping hand, and reduced shortages. They were like any other teacher and provided continuity in preparing secondary pupils for examinations. This meant priority was on covering all the topics and enhancing good performance in examinations. It means student-teachers had no opportunity to find out how best to motivate pupils learning mathematics and science, and experiment with a variety of teaching and learning strategies. The differences in conceptualising school experience e.g. viewing teaching practice as integrating the world of work and learning (Schäfer and Wilmot, 2012) or education with production (Kiggundu, 2007; Maravanyika, 1990) and as legitimate peripheral participation (Lave and Wenger, 1991) may lead to tension between leaving student-teachers on their own and giving them support to access the tacit knowledge of experienced teachers.

Student-teachers were in the middle; they know that it is important to meet the university requirements if they want to get qualified teacher status, and at the same time, they know that eventually they will seek employment in schools. Student-teachers encountered a contradiction between 'rules' (for example, the school requirement to teach pupils to prepare for examinations) and the 'object' of learning from practice (trying out new ideas as muted by university). A possible reason is school head-teachers and teachers perhaps see purposes of teaching practice as predominantly *pupils'* learning. If so then they are only interested in the student-teacher maintaining progress of the class; not changing things even if it were possible. However, if the purpose of teaching practice is about learning of the *student-teacher* then inevitably it is about trying different things some of which do not work at all. That becomes a real problem because the school head and teacher are accountable to parents and the school systems as well as to the university and the student-teacher. The school head-

teacher looks up to the student-teacher as any other new teacher or substitute teacher, particularly where there are staff shortages. Similar contradiction observed by Wilson (2004) was between "university's desire for beginning teacher to have autonomy and scope for experimentation with the curriculum against the school's need to deliver the national curriculum" (p. 208). Elsewhere Grossman et al (2000) revealed tension experienced by student-teachers who must strike a balance between aiming to earn a good grade and trying new strategies.

Further, findings suggest that student-teachers do what they think ought to be done even if it is against their beliefs. As supported by my data, student-teachers and lecturers knew that failure to cover the curriculum content at the same pace as is normally done by qualified teachers disappointed school head-teachers. From the perspective of the teacher, the pupils need to get through the curriculum topics and do well in examinations. Parents are going to complain if pupils do not get through the curriculum topics. Therefore, it is not easy to say teachers were behaving inappropriately. Rather the issue at stake is the nature of the role of the student-teacher in the school that university lecturer and teacher need to sufficiently explore, discuss, explain and negotiate. If there is a situation, where the university lecturer and teacher are going to sit down and explain what is going to happen, then the teacher can build into the programme some redundancy (some time) that gives student-teacher an opportunity to move more slowly. The teacher, for example, is going to cover deliberately some sections faster than normal and that gives the student-teacher spare time at the end of the topic to take lessons more slowly and try out new ideas.

Second contradiction between the university and the school activity systems was that university *rules* for applied science education sometimes contradicted the *object* of learning through practice, for example, supervision and assessment of teaching practice. Because supervision and assessment were combined, to cut costs by reducing number of school visits, the tendency was for both student-teachers and lecturers to focus on assessment. Student-teachers focused on performance and on how to pass the course. Lecturers for numerous reasons were always in a hurry to assess and get marks to report at university. According to L13 and L14, the ideal was to support student-teachers at first visit, but economic situation forced lecturers to combine supervision and assessment, even on first school visit. Because the university placed priority on assessment, student-teachers viewed applied science education as aimed at proving competence not learning. Supervision and the inherent learning

opportunities played a secondary role to assessment. In the conversation, participants neither mentioned student-teachers taking a leading role to discuss the sort of help they needed and the difficulties they encountered, nor mentioned supervisors seeking feedback from student-teachers. The contradiction inherent could be several value systems attached to the same activity of ASE supervision and assessment; and is an example of secondary contradictions. During ASE supervision and assessment, lecturers were under pressure to meet targets and therefore prioritized assessing over supporting student-teachers who were learning from practice. My data suggest that lecturers were not able to visit each student-teacher the required number of times as stated in ASE Student Handbook. It was also the university assessment policy that to award BScEd degree only to a candidate who got a pass grade in final applied science education. For these reasons, teaching practice supervision became assessment of teaching competences. Chivore (1986a) reported inadequate supervision of student-teachers by lecturers in Zimbabwe for similar reasons of lack of resources like funding and transport.

Clearly, student-teachers go on school attachment to learn how to teach. As mentioned earlier in the discussion of what happens in different settings, teaching practice assessment overshadows learning. It is important for student-teachers to demonstrate what they know when being assessed. A possible reason why 'learning through practice' is underplayed is what others, e.g. Robinson (2003) have revealed; that teacher education courses tend to focus on certification rather than developing practice, contrary to recognition that teaching practice is at the core of initial teacher education (Mays, 2011, Samuel, 2009).

Further, to complicate matters, student-teachers were learning through practice in contexts characterised by lack of adequate funding, controversy of supervisors' qualifications, and lack of qualified teachers in schools. When it came to the process of assessment majority of student-teachers and some lecturers preferred science educators to carry out the task. For example, S1 had this to say about being supervised by someone who is not a science educator "I feel it is bad; the fact that the supervisor did not understand what I will be teaching". This is understandable. Surely when student-teacher's goal is developing subject matter knowledge and pedagogical content knowledge, a chemistry student-teacher stands to benefit more getting feedback from chemistry educators than from educational theorists whose understanding of science concepts was weak. However, student-teachers who wanted to learn classroom management and how to develop pupils' interest in learning chemistry were more

likely to get better support from educational theorists than science educators whose understanding of educational foundations was weak. Student-teachers needed support from both; science educators to deepen understanding of subject matter (Grossman 1994) and educational theorists to help them develop knowledge of processes of teaching and learning (Monk, 1994; Ferguson and Womack, 1993; Darling-Hammond, 2000b).

Participants reported that there were times when student-teachers were supervised and assessed by lecturers who did not have a good knowledge of the subject being taught. Thus, the participants believed student-teachers were supported in learning general pedagogy skills as opposed to pedagogical content knowledge. In university-based learning student-teachers had been learning general pedagogy because of lack of enough science educators to teach, pedagogical content knowledge in every specialist subject, and the same happened during school experiences. The role of the university supervisor needs to be clarified before a decision can be made to identity the best person placed to provide the required support to student-teachers during ASE supervision and assessment; whether science educator or educational theorist. My findings, on one hand, echo concerns about validity and reliability of teaching practice assessment and marker agreement observed by Nyaumwe and Mavhunga (2010), and on the other, as Connelly (1994) reveals classroom assessment is interpretive and subjective so that marker agreement is not an issue. On the one hand, science educators were there to provide support in learning pedagogical content knowledge, and on the other educational theorists provided the needed help in learning classroom management and motivation. Therefore, if the focus of supervision and assessment was development of teaching and learning science concepts, the best person placed to do so was the science educator. However, the educational theorist could support student-teachers to develop classroom management skills and general motivation of pupils.

A majority of student-teachers found themselves alone and without any mentors to support them because of lack of qualified teachers in schools. S1's mentor was the Head of Science who taught Integrated Science and could not support S1 because "she did not have much knowledge of Chemistry". Some qualified teachers lacked confidence to support student-teachers and others lacked motivation to do so because mentoring was unrewarded extra work e.g. S2 believed that "mentors were simply saying they were paid to teach and not to act as mentors" and therefore did not create time to support student-teachers. Again, student-teachers could not get support to learn pedagogical content knowledge from suitably qualified

and experienced teachers. It seems student-teachers completed training with a weak grasping of pedagogical content knowledge.

Third, student-teachers went to school neither prepared to teach examination classes nor participate in extracurricular activities, yet majority of them were required to do so in the school system. One school asked S1 to take examinations classes as a Part II student-teacher and she felt overloaded because she had a full teaching load. It seems the student-teacher's role during applied science education was problematic. The contradiction pits the *object* of applied science education, *community of practice* and *division of labour*. Student-teachers' object of learning by observing experienced teachers was in conflict with being relief teachers required to do extra activities like teaching examination classes and extra-curricular work. Secondary teachers do not teach their subjects only, they also partake extra-curricular activities. Therefore, when student-teachers go on school attachment they do extra-curricular activities. My data suggest that university did not prepare student-teachers to take extra-curricular activities. Where the student-teacher was eager to take part in say sports, such extra duties did not cause a problem. However, when the student-teacher felt overworked, this created resentment. Again, the probable cause was that school heads see student-teachers as solution to teacher shortages and treat them like any other teachers. Student-teachers found participating in ASE activities conflicting with adjacent activities; and this is an example of quaternary contradictions. Surely, student-teachers needed someone to discuss contradictions encountered. One would expect teachers to provide the support and through joint activities help the student-teachers to find ways of resolving the contradictions. However, most of the time student-teachers had no mentors to support them. Further, there was no evidence in my data of a culture of joint activities among student-teachers, experienced teachers and lecturers. So student-teachers left alone saw contradictions as impediments to their own learning and professional growth.

Fourth, my data suggest that student-teachers, left alone to resolve contradictions encountered between theory and practice, construed these to be impediments to their learning and abandoned theory in favour of practice (or what works). This exemplifies perceptions of theory and practice interplay. One example is S1, who encountered contradictions between university requirements and pupils' interests. She resolved the contradictions by doing what she considered best for the pupils. Student-teachers show misconceptions of how theory and practice ought to relate, for example, describing theory as research results that apply only to

the particular contexts studied (S2) whereas a more correct idea is that educational theory is concerned with justifiable claims about educational practice (Hirst and Carr, 2005). Another example is S4 who thought that ideas and concepts learnt at university do not apply when it comes to teaching mathematics. Discrepancies between theory and practice are inevitable (Anagnostopoulos, Smith and Basmadjian, 2007; Carr and Kemmis, 1986; Postlethwaite and Haggarty, 2010; Tobin and Kincheloe, 2007) because of differences in values, identities and tools found in the different settings, and yet being disillusioned with theory is wrong (Carr, 1992). Student-teachers need both theoretical and practical knowledge to become effective teachers (Wilson, 2004). If student-teachers started seeing contradictions, in and between settings, as challenges and agents of transformation (Engeström, 2001; 1987; Yamagata-Lynch and Haudenschild, 2009; Warmington et al., 2005), then they may begin to appreciate seeking support to develop problem-solving skills. However, in the absence of argentic action as the case in my findings, conformity reduced student-teachers' learning.

In short, the interviews revealed contradictions in the university activity system, such as student-teachers' motives for training as teachers and the objects of the training programme; lack of 'tools' and teaching pedagogical content knowledge; and among low enrolments, lack of the right number of science educators and teaching pedagogical content knowledge. In the school, participants reported system contradictions between student-teachers' object of trying new teaching ideas and the commonly used didactic approaches; why schools were eager to host student-teachers' and purposes of applied science education; and finally between teacher shortages and student-teachers' object of learning through observation. Contradictions across the university and the school activity systems included those between tools, for example, theory of teaching and learning and educational practice, goals of sending student-teachers' on attachment and school goals, and learning through participation and the evaluative nature of teaching practice.

5.5 How various factors were shaping student-teachers' learning.

In section 5.4 three potential synergistic factors were discussed and these were groups of lecturers with different specialisms, reflective practice, and university-school partnership. Contradictory factors encountered in the university activity system, the school activity system and boundary crossing were also discussed. In section 5.5 how all these factors shaped student-teachers' learning is discussed.

5.5.1 How various factors were shaping student-teachers' learning in the university activity system

My data reveals four factors which shaped learning in the university activity system; lack of consensus on what student-teachers were learning, valuing subject matter knowledge more than other courses, learning to gain a qualification rather than understanding, and the examinations-oriented curriculum influencing student-teachers to prefer transmission modes when learning at university.

5.5.1.1 Lack of consensus on what student-teachers were learning

First, my data suggests that there was lack of consensus on what student-teachers were learning. Lecturers who were science educators reported teaching 'pedagogics' (e.g. interviews with L1, L2, L7 and L14) and educational theorists mentioned 'curriculum theory' (e.g. interviews with L8 and L10) and 'theoretical foundations' (e.g. interviews with L1, L2, and L15) and student-teachers e.g. S6 and S7 described learning subject matter knowledge. Perhaps when asked to describe what student-teachers were learning, the tendency was for lecturers to talk about what they were teaching, e.g. L15 mentioned theoretical foundations because he was teaching philosophical foundations of education. Thus, different lecturers would mention different things. Conversations with lecturers revealed that they found it difficult to specify what student-teachers' were learning. The tendency was to mention formal instruction; that is learning educational theory in the university setting. The study found out that the term 'theory' meant different things to different people. Teachers were, probably, to mention getting pupils started and focused, and assessment of learning or the practical aspect of teaching. One possible conclusion the study draws is that ideas of learning could well be limited because there is no common language of 'what' student-teachers were learning and 'why'. There does not seem to be a language (a new set of concepts and expressions) to make clear about learning how to learn to teach, something which the student-teachers' can take away and apply in their career and on-going professional development.

Data suggests that what was being taught and what student-teachers were learning were different making it imperative for having a programme wide understanding of what student-teachers are learning so that lecturers and student-teachers understand how the different

courses fit in. Student-teachers need to know *what* to teach, *how* to teach it, and *why* they teach *what* and *why* they teach it *how* they do it. Teaching is a profession rooted in subject matter knowledge, pedagogical content knowledge, professional studies and teaching practice. Different expressions have been used to describe *what* student-teachers learn, for example, areas or components (Lewin, 2008; Watson et al., 2008; Kennedy, 1997), a typology of domains (Grossman, 1995), forms of teacher knowledge (Shulman, 1986), and commonplaces of education (Schwab, 1964). They need specialist subject knowledge and pedagogic knowledge (Young, 2011) as tools for "recontextualisation" of content and make it accessible to pupils, for evaluating practical experiences in schools and access to educational theory for reflective practice. Therefore 'science educators' and 'educational theorists' from the faculty of education, and 'scientists' from the faculty of science (departments associated with specialist subjects) all have a contribution to make. However, even in literature there is no agreement on the best balance of the teacher education curriculum (Grossman, 1994; Monk, 1994; Ferguson and Womack, 1993; Darling-Hammond, 2000b).

5.5.1.2 Valuing subject matter knowledge more than other courses.

Comments from student-teachers revealed that they were learning mostly subject matter knowledge in the university setting. It is possible that student-teachers saw some courses, such as subject matter knowledge, as more important than others, such as educational theory and when talking about what they were learning, they were quick to mention their subjects of specialism. My data suggests that student-teacher participants did not like learning education courses (e.g. interview with S1) because they did not consider educational theory as important as subject matter knowledge. Another possible reason to explain why student-teachers were more interested in subject matter knowledge than education courses could be that the model of teacher learning was not educationally concurrent making it difficult for student-teachers to integrate what they were learning from different courses of subject knowledge and pedagogy. In addition, as pointed out by S1 and S2, most student-teachers would not register to do education courses because they found learning educational theory to be boring and difficult. There is literature in favour of putting emphasis on subject matter knowledge (e.g. Fajet et al., 2005; Darling-Hammond, 2000a; Grossman, 1994) as well favouring learning educational theory (e.g. Darling-Hammond, 2000b; Monk. 1994) and literature arguing for equally both forms of teacher knowledge (Watson et al., 2008; Darling-Hammond, 2000b). See also section *5.4.2.1*. Teacher educators and student-teachers need a

common understanding of the objects of teacher education – 'what' and 'how' people learn to teach.

5.5.1.3 Learning education courses for certification and not understanding.

My data suggests that student-teachers were learning education courses for certification, not for understanding teaching. As mentioned by S1 and S2 given a choice student-teachers would not learn educational theory. However, student-teachers were learning education courses because these were compulsory. Therefore, in a way student-teachers were learning education courses simply to fulfil requirements for the teaching degree as opposed to understanding teaching and learning. In fact, L15 described this lack of interest to learn educational theory as a 'relevance issue', originating from student-teachers' motives to use teaching as a 'stepping stone'. Literature is available showing contradictions between motives and what student-teachers saw as important to learn (Chivore, 1988; Chivore, 1986b; Hardman et al., 2011). To promote deep understanding of educational theory it is necessary to begin by bridging student-teachers' motives and the objects of teacher education through, for example, some form of 'negotiation' (Wilson and Berne, 1999). This study did not get evidence to show that such kind of negotiation was taking place.

5.5.1.4 Examinations-oriented curriculum and preferring transmission modes when learning at university.

My data, e.g. Interview with S3, suggests that student-teachers believed that teaching and learning in the university activity system was examinations oriented and preferred didactic transmission methods. Examinations tend to have a negative effect on teaching and learning when curriculum is narrowed down to the test and excessive practice (Xie and Andrews, 2012). While Xie and Andrews (2012) studied language testing, their study based on expectancy value motivation, focussed on *washback* on learning and the notion of *washback* can be extended to exam-oriented curricula as was the case in my study.

Further, a majority of participants mentioned lack of funds, equipment and resources in university activity system and this could be the reason why student-teachers received limited support. It also explains why lecturers commonly used didactic transmission methods and that despite knowledge of alternatives they tended to use the lecture method (Nziramasanga,

1999; Akyeampong, 2000; Akyeampong et al., 2000; Maringe, 2005; Nyaumwe and Mtetwa, 2010; Zezekwa et al., 2012).

Discussion so far makes it imperative for having a programme wide understanding of what student-teachers are learning so that lecturers and student-teachers understand how the different courses fit in, and how best student-teachers can learn to teach.

<u>5.5.2 How various factors were shaping student-teachers' learning in the school activity system</u>

My data reveals 3 ways factors shaped learning in the school activity system; demonstrating reflective practice but not being reflective practitioners, examinations-oriented curriculum and impoverished contexts influenced student-teachers to prefer transmission modes when teaching in schools.

5.5.2.1 Demonstrating reflective practice but not being reflective practitioners.

My data suggest that student-teachers learnt about reflective practice, and kept evidence of reflection e.g. lesson evaluations but they did not seem to internalise reflective practice as a way of being. The ASE Student Handbook on page 5 mentions reflective practice as one key component of classroom instruction and on page 8, the same document highlights why it is important to be a reflective practitioner. However, student-teachers using both pages do not get details of how they can learn to be reflective practitioners. L1 also mentions that the role of teacher education is "producing well equipped teacher in terms of… reflective practice". The ASE instrument for assessing student-teachers' documentation, that is, scheming, planning and keeping records (ASE Student Handbook, 2010), clearly indicates that supervisors award 20% of marks to evidence of reflective practice. The supervisors look for evidence of reflection such as "evaluations of schemes and lesson plans, assessment of attainment of objectives, highlights of weaknesses and strengths in lesson, suggestions for improving based on evaluation, and use of feedback from evaluation" (ASE Student Handbook, 2010, p. 27). So, in terms of ASE assessment, student-teachers were expected to demonstrate knowledge and understanding of the 4 minimum elements of reflective practice (plan-theorise, implement-observe, reflect-evaluate, revise plan-theory) (Schön, 1983; Reid, 1994; Skinner, 2010). Knowing 'what' is reflective practice and demonstrating such

knowledge is not enough, unless student-teachers are supported to becoming reflective practitioners they were likely to stop reflecting once they attained qualified teacher status.

Some participants believed that student-teachers were interested in knowing reflective practice because it was a training requirement but did not change into reflective practitioners. Participants mentioned neither what reflective practice entails nor the kind of support available to help student-teachers develop into reflective practitioners. One example is S2, who mentioned that from theoretical foundations he learnt to be "reflective, open-minded and to look critically at things" but did not give details. Another example is L4, when talking about the kind of teacher targeted by UoM programme, acknowledges that it is not clear and can only be inferred to be "reflective teacher, because we emphasize this in assessment and evaluation of ASE". My findings echo criticisms of reflection (Wilson, 2004; Farrell, 2001), and barriers to reflective practice, for example, that it is often seen as an academic endeavour and not way of being e.g. reflective practitioner (Schön, 1983), is time consuming, and is seen by novices as way of exposing one's weaknesses (Hatton and Smith, 1995). The tendency was for student-teachers to remain at technical and practical levels of reflection focussing evaluation of teaching on classroom management (Wilson, 2004; van Manen, 1995; Marton, Dall'Alba and Beaty, 1993), and not raising the evaluation of teaching to critical reflection – in dialogue about pupils' learning. Learning to be a reflective practitioner portrays a dialogic image and a process of scrutiny of into what one's doing and who one can become (Britzman, 2012). Student-teachers' knowledge of reflective methods alone is not sufficient; rather the object must be habit of reflective thinking and practice (van Manen, 1995; Schön, 1983; Dewey, 1933). See also discussion of findings of synergies (section *5.4.1.2*).

5.5.2.2 Examinations-oriented curriculum and preferring transmission modes when teaching in schools.

My data reveals that participants believed that teaching and learning in school activity system was examinations oriented and in turn this influenced student-teachers to prefer didactic transmission methods. Student-teachers preferred transmission mode perhaps because of the nature of examinations e.g. Interview with S1; the notion of 'washback' (Messick, 1996). Washback implies that there is a connection between the way a test is designed, and the way teachers teach and students learn. If examinations are facts-oriented then transmission mode

might be useful not because it is the best way of teaching and learning but because it is the best way of meeting examinations requirements. Literature is available revealing that standardized tests have been criticized for promoting exam-driven and superficial learning approaches (Xie and Andrews, 2012). A further area for future study is how to create productive relationship between processes of examinations and processes of (teacher) education.

5.5.2.3 Impoverished contexts meant student-teachers used transmission modes when teaching in schools.

My data reveals lack of funds, equipment and resources in school activity system. This could be the reason why student-teachers received limited support e.g. interview with S1. It also explains why student-teachers commonly used didactic transmission methods. My findings are comparable to pedagogical tensions described by Nyaumwe, Ngoepe and Phoshoko (2010) when student-teachers conscious of intended curriculum methods needed to make decisions to abandon these in favour of teaching methods that help them to meet learners' needs.

In fact, there is data suggesting that student-teachers were learning to teach in poorly resourced settings and teaching in schools with very poor resources, and available facilities did not match number of learners, adversely impacting teaching (Kasozi, 2006). Possibly, as echoed in literature, participants' own learning may have been heavily centred on rote learning (Mulkeen, Chapman, DeJaeghere, and Leu, 2007), and they were repeating their own experience (Condy, 1998).

In the discussion, of data about how factors shaped student-teachers' learning in the school activity system three key issues emerged. First, it was evident that student-teachers viewed engaging in reflective practice as an end and not a step towards transforming into being reflective practitioners. Second, the examinations oriented curriculum encouraged student-teachers to use transmission methods in the classroom. Third, impoverished contexts compelled student-teachers to use traditional transmission methods in the classroom because lack of equipment and resources inhibited trying out innovative and progressive approaches.

5.5.3 How various factors were shaping student-teachers' learning across the university and the school activity systems

My data reveals 2 ways factors shaped learning across the university and school activity systems; perceiving learning theory as more important than practice, and conforming rather than confronting preconceived ideas.

5.5.3.1 Perceiving learning theory as more important than practice.

Data suggests that student-teachers perceived formal learning of theory as more important than learning through practice. According to S7 "you need to have theory for your practice, and you also need to think about theory when it comes to practice" (Interview with S7). Participants' perceptions of how theory and practice ought to relate complicated learning to teach. By believing that most learning occurred at university, student-teachers probably miss learning opportunities available in the school setting, because they come unprepared. Theory and practice were difficult to separate because, though university-based learning and school-based learning are distinct; student-teachers needed both to develop into effective teachers. Theory and practice though different (Carr, 2005; Saugstad, 2005) are interdependent (Carr and Kemmis, 1986); theory informs practice, and practice informs theory (Usher and Bryant, 1987). To exploit the dialectic interplay between theory and practice, student-teachers needed knowledge and skills to use reflective practice (Wallace, 1991) as a mediating tool that will itself result in cross-fertilisation of ideas between theory and practice. For a more extensive treatment, see discussion of research question (sections 5.3.1 and 5.3.2) one where participants believed that student-teachers were learning at university and demonstrated understanding through practice, and see also discussion of third contradiction in the university activity system (section *5.4.2.1*).

The notions of 'profession' and 'craft' can also be useful to show that theory and practice are equally important. Teaching can be viewed as a profession. *How* do student-teachers learn teaching as a profession? As a profession the university element of teacher education is important for studying educational theory (Young, 2011; Durkheim, 1977) to develop conceptual understanding of subject matter knowledge, a sound understanding of development, learning and assessment. Teaching can be viewed as a craft. *How* do student-teachers learn teaching as a craft? As a craft practical experience is important when student-

teachers learn pragmatic problems of teaching on-the-job, from other practitioners and reflection (Lawes, 2011) that is, the classroom is seen as the place to learn how to teach (Chiromo, 2007; Zindi, Nyota and Batidzirayi, 2003). Teaching as both a profession and craft requires one to learn theory and through practice.

5.5.3.2 'Conforming' rather than confronting preconceived ideas attenuated learning of innovative and progressive ideas about teaching and learning

Participants did not mention confronting preconceived ideas, and this may have attenuated learning of new ideas about teaching and learning. One reason why preconceived ideas 'limit' (Carr, 2005) new learning is that student-teachers who believe they know all it takes to be a good teacher are likely to 'filter out' (Kennedy, 1997) new ideas considered contradictory to their beliefs. As supported by literature, student-teachers enter teacher training with beliefs about teaching and learning, and subject matter at times inconsistent with current ideas about the nature of science knowledge. Many examples are available in literature e.g. science as fixed collection of facts learnt through repeated practice (Kennedy, 1997; Bruner, 1996; Feiman-Nemser, 1990; Grossman, 1990; Ball, 1988) and belief that they had nothing new to learn from initial teacher education (Britzman, 2012; Lortie, 1975). Thus, if we consider learning as changing one's conceptions about teaching (Kennedy, 1997), and preconceived ideas are not confronted, then chances are that new learning is attenuated. It is for this reason that Ball (1991) posits that personal histories and biographies were starting points for learning to teach, and reflective practice played a critical role to challenge existing assumptions (Moore and Ash, 2002).

My data suggest that when most student-teachers encountered experiences that challenged their beliefs and understanding, they conformed rather than question conventional practices. One example is S1, when faced by a situation where implementing what she had learnt at university contradicted what her "classroom situation" dictated, she resolved this by being "as practical as possible", that is, "to put children's interest first" and to S1, pupils' interests were "to pass examinations". However, when S1 could not get money from her head-teacher to buy materials for her practical work, she took head-teacher's decision as final and was "left to improvise, may be to change the practical altogether". Conversations revealed that students adopted ways of being, which they thought the university and school systems wanted them to adopt, rather than what they believed to be the right thing to do.

Some participants perceived student-teachers on teaching practice as predominantly concerned with completing their training successfully by meeting university assessment requirements and simultaneously 'fitting-in' to the school system. Student-teachers behaved differently when university supervisors visited them on their placements because as exemplified by conversation with S1, she would "go against school requirements in order to please her supervisors" aware that when she joined teaching profession as a qualified teacher "she would abide by school directives". Other researchers have revealed that student-teachers cope through 'conformity' (Postlethwaite and Haggarty, 2010; Wilson, 2004; Billet, 2001). In my study, participants did not consider using the *problem space* to creatively resolve differences or suggest joint activities among student-teachers, teachers and university lecturers to address tensions that arose. It is possible for the student-teacher to find out alternative ways of teaching for understanding and how to cater for individual differences, simultaneously focusing on completing curriculum topics at the right pace. Student-teachers were likely to see gaps between theory and practice as unresolvable in the absence of explorations of how to resolve contradictions. Yet, there was a possibility to reconstitute the object and produce a new and shared object (Yamagata-Lynch and Haudenschild, 2009; Avis, 2007; Engeström, 1987). My findings confirm the myth of unbridgeable gap between educational theory and practice of teaching (Tobin and Kincheloe, 2007), and the tendency to perceive classroom practice as un-theorized (Britzman, 2012; Postlethwaite and Haggarty, 2010; Carr, 1992).

Discussion of data on how factors shaped learning across the university and school activity systems suggests that student-teachers perceived learning theory as more important than learning from practice. Student-teachers believe that they learn at university and demonstrate competence in the school activity system. Discussion also reveals that student-teachers, on encountering contradictions, opted to conform than take problem solving initiatives.

5.5.4 Summary of how factors shape student-teachers' learning

In summing up, the factors - synergistic and contradictory, shaped student-teachers' learning in many ways. First, because of various views on what was learned, student-teachers perceived learning subject matter knowledge as more important than any other part of their education course. The model of teacher learning, which was not truly educationally

concurrent, meant that student-teachers' learning of subject matter ran parallel to learning education courses, such that student-teachers undervalued the latter. Therefore, participants' perception of a teacher as someone knowledgeable in teaching content meant they did not regard other courses as vital. Second, student-teachers' view of theory and practice as separate and sequential led them to relate the two using the applicative notion, and perceiving theory more important than practice. Third, in both university and school settings the exam-oriented curriculum and shortages of equipment, and resources led to heavy reliance on didactic transmission methods. Fourth, student-teachers learned reflective practice as object, and this limited its use as a mediating tool to shape learning to teach. In schools shortage of qualified teachers resulted in student-teachers being assigned full teaching responsibilities without mentors to support them, and university-led partnership reduced support to teachers who often were less knowledgeable about reflective practice than student-teachers. Fifth, by not confronting pre-conceived ideas student-teachers attenuated their learning. Sixth, student-teachers resolved contradictions through conformity.

5.6 The development of student-teachers' ideas as they progress through the teacher education programme

The discussion presented in section 5.5 revealed the factors shaping student-teachers' learning. The synergistic and contradictory factors, compounded by the contextual factors shaped student-teachers' learning from 'what', 'how' to 'why'. Despite this there was evidence of the development of student-teachers' ideas as they progress through the teacher education programme. Section 5.6 discusses participants' perceptions of the development of student-teachers' ideas as they progress through the teacher education programme in the university and school activity systems, as well as changes that can be attributed to interactions between the two systems. Instead of locating changes in different settings, a thematic approach has been used to discuss findings about student-teachers' professional growth and lack of such development.

5.6.1 Recruiting teacher education candidates and resourcing teacher education

My data suggests that contextual factors, particularly the stressed economy, had resulted in negative changes, for example, there was an increase in inexperienced lecturers because of high staff turnover. The quality of sourcing and resourcing was falling. The term (personnel)

'sourcing' is borrowed from business, where it means recruiting talent using search techniques. The term resourcing comes from economics and means asset used in production of goods and services. The university was hiring people, sometimes, without a postgraduate qualification, and who did not have teaching experience at university. The assistants were teaching classes without help from lecturers. Because of low enrolments, the department was accepting student-teachers with low passes (Interview with L4). It seems contextual factors were decreasing the quality of teaching and learning at the university. There was need to discover ways of attracting student-teachers with good A-Level passes and to create conditions to reduce drop-outs. There was also need to attract and retain highly qualified and experienced lecturers.

5.6.2 Knowledge, skills and attitudes

Participants reported changes in student-teachers' knowledge, skills and attitudes. Students joined the teacher education programme to gain knowledge of their subject areas and a teaching qualification with the intention of becoming a teacher. My data reveal increased understanding of teaching and learners (e.g. conversations with S6, S7, S12, and L7), subject matter knowledge (e.g. Interviews with S1 and S9), teaching skills and positive attitude towards teaching profession (Interviews with S1, S2, and L14).

Majority of participants reported change in professional growth; that is, knowing school rules, regulations and policies and 'conforming'. Conversations suggest that most student-teachers had developed professional attributes such as becoming teachers who knew subject matter, good classroom management, teachers who displayed outstanding pedagogical content knowledge and participated in extra-curricular activities. Therefore, most student-teachers had developed teacher identity. Student-teachers and lecturers talked much about subject matter and classroom management but less concerning the rest of the attributes. However, it is possible that many participants may have taken understanding pedagogical content knowledge and participating in extracurricular activities for granted and saw no need to mention them.

Majority of participants believe that at the beginning of the course student-teachers had negative attitudes toward learning educational theory and near the exit point, conversations with some participants e.g. S1 and L14 reveal that the same student-teachers had developed a

more positive attitude toward teaching and to learning educational theory and appreciated the essence of teacher education such as connecting with children and creating a successful learning environment.

As in literature, professional development activities are targeted at change in attitudes, knowledge and skills (Guskey, 2000), and professional competence (Stenhouse, 1975). My data suggests that student-teachers had begun to develop the dispositions of teachers evident in increased knowledge and skills of teaching. What participants perceived as changes in student-teachers was the differences in characteristics of students between entry and exit (Chisaka and Mavhundutse, 2006). There is need to exercise caution when looking at the impact of the teacher education programme. In the absence of quantitative measures of relationships between educational processes and the changes reported it might not be possible to decide on the 'value-add' (Dobson, 1999) caused by training because naturally student-teachers grow and develop during their teacher education years through interaction and new experiences (Noel, 1998) unrelated to their learning to teach experiences.

My data reveals that student-teachers came to university for various motives, some contradicting the objectives of teacher training. Conversations reveal that toward the end of their training student-teachers had transformed in several ways. Interview data shows that most student-teachers joined teaching because they had not done well at A-Level and because of wanting to please people important in their lives like family and high school teachers. They had a feeling of failure and disappointment of not getting into career programmes like medicine and engineering (e.g. S3), but then getting a better job than teaching, probably, was an unrealistic goal considering the context of Zimbabwe. Their disappointment was also shared by the university because teaching did not attract many candidates such that minimum entry points were lowered creating a tension between recruiting enough candidates and the quality of the recruits (Interview with L4). It seems teacher training provided student-teachers with opportunity to fulfil goals of getting university education in their subjects of specialism and professional qualification. The professional qualification afforded student-teachers opportunity to give back to society by filling in gaps of teacher shortages and to contribute to national development by becoming teachers responsible for educating children. The university, by lowering entry points, managed to enrol enough student-teachers to sustain the training programmes.

5.6.3 Resistance to change

Some participants believed that student-teachers did not change their prior beliefs about practice and only displayed temporary changes to fulfil degree requirements. It is entirely possible that student-teachers soon learn rewarding system in the school, so take on ways of working in order to integrate successfully into the school community, as data suggests that student-teachers did not use reflective practice as a useful tool for re-examining existing beliefs or to approach experience reflexively.

There is neither data nor evidence of student-teachers changing because of recognizing tensions between the university activity system and the school activity system. In fact as suggested in the previous sections they tend to become part of the university system when they are in the university, and part of the school system when they are the school. By being different people in the two settings they hide behind the contrast to themselves. Therefore they need help to be comfortable in engaging with reflective practice.

My finding that some participants perceived that there was no change in ideas about teaching is echoed by literature where it has been reported that pre-service teachers did not adopt new methods of teaching mathematics and science learnt at university when on their placements (Postlethwaite and Haggarty, 2010; Zevenbergen, 2006). As mentioned earlier the established ideas about teaching and learning that student-teachers bring with them tend to have a 'filtering' effect on what they think it is important to learn and new learning may be inhibited (Pring, 2000; Hodkinson and Harvard, 1995), and could be viewed as resistance to new learning. One reason often suggested to explain resistance to change is student-teachers' failure to contest old practices (Postlethwaite and Haggarty, 2010; James and Biesta, 2007; Zevenbergen, 2006; Haggarty and Postlethwaite, 2003; Lave and Wenger, 1991; Lacey, 1977).

Another possible explanation why student-teachers do not change could be their dislike of learning educational theory as has been suggested earlier. In fact, there is literature suggesting that student-teachers see little or no reason to study pedagogy (Fajet et al., 2005; Bird, Anderson, Sullivan, and Swidler, 1993; Book, Byers, and Freeman, 1983; Doolittle, Dodds, and Placek, 1993; Holt-Reynolds, 1992) and they believe that their own schooling experiences are prototypical and generalizable towards the teaching profession (because they

expect their teaching context to be no different from their pupils' contexts). Further, other researchers found out that student-teachers' perceptions about teaching and learning persist throughout the period of training (Doolittle et al., 1993; Griffin, 1989; Lermen, 1997; Tabachnick and Zeichener, 1984; Taylor and Sobel, 2001). Thus, student-teachers do not take education courses seriously, and only study these courses to fulfil requirements of teaching qualifications. As soon as they finish their training student-teachers either forget or abandon new ideas they were learning, and revert to their own preconceived ideas of teaching. In fact, student-teachers underestimate the complexity of teaching when they assign greater importance to their personal characteristics and less importance to pedagogical training (Britzman, 2012; Fajet et al., 2005).

5.6.4 New ASE assessment instrument

The university assessment system also changed. The study found out that lecturers had designed a new assessment instrument for applied science education aimed at increasing reliability and reducing variation among supervisors. Lecturers, in the university activity system, designed ASE assessment instrument and once the instrument was adopted it was used in the school system. Conversations with student-teachers suggest wide discrepancies when assessed by various supervisors using the previous tool. Student-teachers and lecturers show consensus that assessment of teaching practice was subjective and still characterised by wide variations. Participants hoped that the new instrument, quantitative in nature, would reduce the discrepancies. However, the new assessment instruments was quantitative but not objective because though it required supervisors to score 25 attributes it was not clear what criteria were used to score 0-4. Some participants reported witnessing discrepancies between qualitative comments and scores suggesting that assessment was still difficult. It seems there was need for clear assessment criteria and a realistic assessment regime by reducing 100 things (25 items by four); to a reasonable number of judgements, for example, five items at each visit.

5.6.5 Summary of development of student-teachers' ideas as they progress through the teacher education programme

The Zimbabwean context negatively affected changes in student-teachers, for example, lack of experienced and suitably qualified lecturers attenuated teaching and learning. The

university was also finding it difficult to attract candidates and had lowered entry requirements.

There was evidence of student-teachers' increased knowledge and skills and a change of attitude. In conclusion, here, it seems that student-teachers who, at the time when they enrolled, felt disappointed that they had nothing better to do than teaching, nevertheless emerged at the end of their course being happier, as they had acquired a university education and a teaching qualification.

Student-teachers who had started motivated by extrinsic factors, like getting a degree qualification, emerged at the end transformed because they were now interested in intrinsic factors, such as understanding the complexities of teaching and learning. At the end, student-teachers identified themselves as professional teachers.

Despite evidence of positive developments in student-teachers' ideas, my data also suggests resistance to change. Conversations revealed student-teachers' awareness of what they needed to successfully complete their training and to be effective teachers yet some showed eagerness to fall back onto their preconceived ideas about teaching and learning once they had attained their qualified teacher status.

5.7 Summary

Teacher education in Zimbabwe as typified by my findings from the university studied, shows similarities to initial teacher training elsewhere. Firstly, the main purpose of teacher education curriculum was learning educational theory and learning through educational practice (Schwab, 1964; Grossman, 1994; Kennedy, 1997; Kennedy, 2006; Carr, 2005; Saugstad, 2005; Wilson and Demetriou, 2005; Wilson and Demetriou, 2007). Secondly, the idealised concurrent model of teacher learning was an attempt to make students appreciate the contribution of learning educational theory in the teaching job. The kind of partnership between providers of teacher education and secondary schools in Zimbabwe supplemented the model.

Training teachers in Zimbabwe was intriguing and unique considering factors such as the socio-economic and political context. At the time of the study, Zimbabwe's political situation

was volatile. Teachers, like other professionals, lived under fear and did not trust strangers. They were widely labelled often as belonging to the 'wrong' political party, then victimized. Student-teachers were therefore learning in contexts where practitioners were not free to try new ideas as they would have been had there been a firmly established rule of law at the time. Furthermore, because of the brain drain and lack of lecturers capable of teaching pedagogical content knowledge, student-teachers developed such skills alone.

The idea of the concurrent model of teacher learning, for example, though a good one, was hindered by a community of practice where people were not used to working collaboratively. Lecturers teaching subject matter knowledge and those teaching education courses did not speak to one another. Whether they belonged to the same faculty or not they left interaction to the time when they shared marks to determine final degree classification for the students.

In the department of education, collaborative work was limited to a few teaching a particular course, and not across courses. Opportunities, for example, to learn about constructivist approaches and science concepts simultaneously were there, but without collaboration, there was no exploration of how teachers can use these approaches to plan and teach science concepts at secondary school.

6 CHAPTER VI: LIMITATIONS, CONCLUSIONS AND IMPLICATIONS-questions, answers and more questions

6.1 Introduction

The study reported here explored student-teachers' and lecturers' perceptions of learning to teach experiences in different settings, and how ideas were reconstructed, as student-teachers pass from one setting to another. The factors shaping learning in and between the different settings were investigated, and how these shaped learning to teach. The other objective was to interpret student-teachers' and lecturers' perceptions of development of ideas as student-teachers moved through the different stages of training. This chapter highlights limitations to the study. Then the data presented in Chapters IV and discussed in Chapter V are compared to the initial questions to seek answers and pose further questions. The implications of the findings for teacher education in Zimbabwe are discussed and suggestions made for further research.

6.2 Limitations

Many challenges were encountered and these gave rise to certain limitations, essentially four; potential bias, methods chosen, difficulties of conducting research in Zimbabwe at this time and generalizability of findings. These were the perceived limitations of the study and are examined below. (See also Chapter III Section 3.4)

6.2.1 Potential bias

One limitation was the tendency by participants to respond in a way they thought was the most acceptable and wanting to provide me as researcher with kind of information they thought was needed, instead of expressing personal opinions. In order to minimise this limitation, open-ended questions were used and participants were reminded from the onset that the study was seeking their own opinions and experiences, and that there were no right and wrong answers. Furthermore, clarification was sought using more probing questions as a way to minimise such a bias.

On my part there was a tendency to be guided by my own beliefs, knowledge of participants and setting, my preconceived ideas and assumptions acting as filters. The coding process was used to minimise personal bias together with, and augmented by, my returning to participants to check whether my interpretation of what they said really represented their intended

meaning. Other than that, the research methodology that was used was one which incorporated the researcher's background and history, and thus my subjective view of reality was part of the story told here.

6.2.2 Methods: data gathering instruments

The study relied heavily on the interview, and to a limited extent biographical questionnaire and document analysis, as data gathering instruments. The interview devised was considered, in retrospect sufficient enough in eliciting participants' perceptions, given the above reservations on its inherent subjective nature. Open ended questions were used, and the perceptions emerging came from my interpretation of the subjective viewpoints expressed in the conversations.

6.2.3 Conducting research in Zimbabwe

The study was carried out at a time when the Zimbabwean context was characterised by political, economic and humanitarian crisis. It was a time when student-teachers and lecturers could not trust 'outsiders'. They did not trust people who were not part of the university community. In order to minimise the limitation, the study made use of past working relations, experience and my knowledge of the university, staff and student-teachers, and their education programme, having previously worked at the university. Consequently, participants felt safe to be interviewed because they accepted me as part of the university community and an 'insider', and this helped me to reach the participants. At the same time, technically, I was an 'outsider' because during the study I was not employed by the university. The situation in school was also similar; teachers were apprehensive and did not trust strangers because of the volatile political environment. Consequently, it was not possible to interview teachers.

6.2.4 Generalizability of findings

This study involved a small number of participants, and a small university in terms of size and enrolment. It is not the intention of this study to generalize because it is impossible to extrapolate findings beyond their specific context. However, other readers may wish to examine how my findings compare with other studies in countries facing similar challenges but are advised to apply the lessons with caution (Lincoln and Guba, 1985). The Zimbabwean

context reported in this study was representative of poor nations in Africa, who often share similar problems. Beyond Africa, things were rapidly changing at the time of the study and the global recession was even causing economic instability in the Western community of nations. As such my findings may have relevance in understanding factors present when learning to teach in unstable, rapidly changing circumstances where politics and policies are constantly in a state of flux as was the case in the Zimbabwean situation.

6.3 Conclusions

The conclusions of this study are presented in five sections:

- Participants' background and motives for becoming a teacher.
- What happens in various settings as student-teachers learn to think and act as teachers?
- Factors shaping student-teachers' learning within and between the university and school activity systems,
- How various factors were shaping student-teachers' learning and
- The development of student-teachers' ideas as they progress through the teacher education programme.

6.3.1 Participants' background and motives for becoming a teacher

The participants identified themselves using positions they held within university and school activity systems, for example, student, lecturer or teacher. They used institutional positions (Gee, 2005). Lecturers could be divided into 'scientists', 'science educators' and 'educational theorists' on the basis of what they were teaching. Student-teachers were either pre-service or in-service based on whether they had some form of training or not. The study discovered that at UoM, student-teachers and lecturers had varied backgrounds and different motives for participating in teacher education. Student-teachers participated in teacher education for various motives; for example, 'no choice', influence from 'important other' and 'passion'. However, selection of student-teachers was not based on motives; rather performance at A-Level and work experience (in case of in-service students) were used. Both student-teachers and lecturers came to university with prior knowledge about teaching, which can be traced back to schooling, prior training, and work experience.

The study found that some changes in the department were retrogressive, for example, there was an increase in number of inexperienced lecturers because of high staff turnover. The quality of resourcing was falling. The university was hiring lecturers in some cases with lower than a postgraduate qualification and who did not have teaching experience at university. The teaching assistants were found teaching classes without help from lecturers. Because of low enrolments the department was accepting student-teachers with low grade passes. There was urgent need to find out ways of attracting student-teachers with good A-Level passes and to create conditions to reduce drop outs. There was also need to attract and retain highly qualified and experienced lecturers.

6.3.2 What happens in various settings as student-teachers learn to think and act as teachers?

Student-teachers at UoM were learning to teach in mainly two settings: the university and school settings. They were learning mainly theory at the university setting, and proving competence in the school setting. In both university and school activity systems relationships among members of the community determined the kind of support student-teachers received. Resource constraints negatively impacted on learning to teach. Another learning opportunity was boundary-crossing when student-teachers experienced gaps between university-based learning and school-based learning and had to decide how to resolve the competing and sometimes conflicting messages from the two settings.

Differences were evident between student-teachers' motives e.g. wanting to use teacher education as stepping stone to better jobs and objects of the university activity system e.g. to develop student-teachers into effective mathematics and science teachers. Members of the learning community in the university activity system were student-teachers, lecturers and others e.g. library staff, all with different but clear roles to support students learn to teach. Relationships were described as professional and interpreted to be productive, that is, conducive to expansive learning. Members of the university community were guided by rules contained in the prospectus and ASE Student Handbook. The mediating tools available to student-teachers included educational theory, the internet and library resources. The impoverished context meant that there was a general lack of high quality tools. As such lecturing was the dominant teaching discourse.

In the school activity system student-teachers were learning through classroom teaching, mentoring, supervision and assessment. Data suggests differences between student-teachers' reasons for participating (learning through practice or legitimate peripheral participation) and the objects of the school activity system (using student-teachers to overcome teacher shortage and maintain perform results). The learning community in the school activity system was made up of student-teachers, teachers (mentors), lecturers and secondary pupils. The members had different roles to support student-teachers' learning. Data suggests that relationships in the school activity system were generally good, but were negatively affected by the stressed economy and teachers lacking motivation. Participants were guided by university assessment rules, school rules and Public Service Regulations. Being a university-led partnership, university rules were dominant. Student-teachers used the following tools; educational theory, subject matter knowledge and ASE Student Handbook. There was a general lack of equipment, curriculum materials and lack of suitably qualified teachers to support student-teachers because of the stressed economy. Student-teachers tended to use teacher-centred methods, and believed they could not experiment with new ideas because of lack of resources.

6.3.3 Factors shaping student-teachers' learning within and between the university and school activity systems

6.3.3.1 Potential synergistic factors

The study concluded that synergies were possible in terms of diversity of qualifications among lecturers, each with something to contribute. Lecturers who had specialised in science, 'scientists', could provide subject matter knowledge, those who had specialised in science education ('science educators') were best placed to provide pedagogical knowledge while those who had specialised in the disciplines like psychology, philosophy and sociology of education ('educational theorists') would teach educational theory; all as equals.

Another synergy possible was developing strong links among courses in education; theoretical foundations, curriculum, pedagogy, and applied science education courses. Training might be necessary for this because it requires asking people who are probably only used to working as individuals to think about working in teams, sharing information, and putting their own ideas to scrutiny by others. It seems possible to thread a theme through the

different courses and show how an understanding of educational theory informs curriculum decisions, selection of teaching and learning methods, and classroom practice. As long as lecturers remain wary of doing so, student-teachers are likely to find it difficult to learn where no examples exist to emulate.

Synergies were also possible between university-based learning and school-based learning. Student-teachers learnt teaching skills through formal instruction at university, and later, using context specific responses in hands-on school experience, could develop a better understanding of teaching. Student-teachers and lecturers were also able to examine lessons from formal instruction and teaching practice experiences. Towards the end of training, student-teachers had one course taught by two lecturers who encouraged student-teachers to reflect experiences during teaching practice. This was good practice that could be extended to other aspects of teaching and learning at university, for example, the teaching of theoretical foundations could be re-visited and re-examined after teaching practice.

Student-teachers were introduced to the use of reflective practice in the university activity system and assessment of teaching practice sought evidence of reflective practice. This was a synergy between knowing about the use of reflective practice and becoming a reflective practitioner.

Joint activities could also be designed where student-teachers and teachers work and learn together; student-teachers providing insights into new understandings of theory (such as why it is necessary to pay more attention to pupils' general well-being) and teachers talking to student-teachers about what they found important from their own classroom experiences. Another possibility, where teachers can learn from student-teachers as well as student-teachers from each other, is to ask student-teachers to present their best practical ideas that they had on teaching practice to other student-teachers and to teachers.

6.3.3.2 Contradictory factors

This study revealed five contradictions in the university activity system. Firstly, student-teachers' motives contradicted the objects of the training programme and influenced learning. As suggested in literature (e.g. Hobson and Malderez, 2005; Chan, 2004; Andrews and

Hatch, 2002), where motives contradict programme goals, student-teachers tend to find courses boring and difficult.

Secondly, the model of the teacher learning programme at the university studied is structurally 'concurrent' yet practice was 'consecutive', and so was not fully integrated. Student-teachers were attending education courses in one department and subject specialist courses in other departments; and to that extend the programme was 'concurrent'. However, lecturers in the education department did not liaise with lecturers in subject departments such that what student-teachers were learning in education courses was not connected to the subject matter in specialist subjects. There were no links between documentation of the model of teacher learning programme (for example, in the prospectus and departmental policies) and what was practised (actual teaching and learning). There seemed to be no exploration of concurrent learning. Lecturers in senior positions promoted concurrent model but awareness of this did not seem to be present among those who were teaching. Less senior lecturers who did most of the teaching, were not encouraged to make arrangements to liaise and teach with lecturers from other disciplines.

The study also exposed contradictions in student-teachers' comments about learning subject matter knowledge and pedagogy concurrently. Student-teachers did not seem to value courses in the education disciplines yet the same student-teachers believed teacher education was vital to become a teacher. Student-teachers spoke against learning their chosen subject matter knowledge to a level far beyond what was required for them to teach in school, but then did not see why it was necessary to study school-level curriculum subjects. Lecturers also showed similar contradictions. Lecturers valued subject matter knowledge (which they did not teach) more than educational theory that they were teaching. Science educators were thought to be 'superior' to educational theorists yet the former did not have confidence in teaching educational theory. Sometimes lecturers reported teaching theory and student-teachers, reporting on the same university activity, thought they were learning subject matter knowledge rather than educational theory.

The lack of tools and the failure of the university to hire the required number of science educators contradicted the object of teaching and learning pedagogical content knowledge. Lack of resources was a result of the impoverished and politicised context. For example, student-teachers specialising in different subjects were learning general pedagogy as one

group and not subject specific pedagogical knowledge because the university could not hire enough science educators.

The shortages of equipment and materials meant that lecturers could not achieve their object of modelling good practices e.g. constructivist teaching approaches. At the time of the study the Zimbabwe context exemplified a failing state (Kovacs, 2012; Rivero, 2008; Department for International Development, 2005) and in teacher education the evidence was loss of experienced educators through emigration to other countries and reduced funding resulting in shortages.

The study revealed four contradictions in views about school-based learning. Firstly, student-teachers believed that when there are shortages of teaching and learning equipment, materials and resources means that that they could not experiment with innovative and progressive ideas they had learnt at university.

Secondly, the study also found that student-teachers believed that teachers who were meant to support them as mentors were not suitably qualified and lacked experience and did not know how to support students learning to teach. It seems student-teachers were expecting mentoring (or help from teachers) to be in the format of mini lectures (formalized instruction) as opposed to receiving advice based on the 'hands-on' experiences of context specific knowledge about schools, classrooms, children and a particular community. Student-teachers believed that teachers whose highest qualification was a diploma lacked confidence to help student-teachers who were soon to be graduates. Yet these were the practitioners best placed to support the student-teachers to fit into the school system which lecturers could not do.

Teachers' lack of motivation contradicted the object of being mentors expected to support student-teachers' learning. Teachers did not receive extra remuneration for being mentors. A contradiction also existed between lecturers wanting mentors to help student-teachers during teaching practice and supervisors failing to value and recognize teachers' contribution as mentors.

The study revealed four contradictions in the interactions between university and school activity systems. The first contradiction was a result of the university and school having different understandings of their roles. One example was the university thinking that school

attachment was 'applied science education' whereas those in schools thinking it was 'teaching practice' giving rise to tension resulting from being both a 'student-teacher' as well as a cover teacher filling gap in staffing the school system. The contradiction pitted the student-teachers' object of learning through practice against being expected to participate as cover-teachers in the school activity system.

Secondly, combining supervision and assessment to cut costs resulted in student-teachers and supervisors focussing on assessment than learning through practice.

The student-teachers' object of learning through practice was compromised because student-teachers often found themselves with the same responsibilities as qualified teachers with no time and space for learning through observation.

Student-teachers who were working alone rather than being supported by mentors construed the gaps that they experienced between theory and practice as unresolvable contrary to the object of challenging practices through reflective practice.

6.3.4 How various factors were shaping student-teachers' learning

6.3.4.1 University activity system

Contradictory factors shaped 'what', 'where', 'with whom', 'how' and 'why' student-teachers were learning. Student-teachers talked extensively about learning subject matter knowledge yet lecturers maintain it was more of educational theory. Student-teachers were more interested in learning subject matter knowledge than educational theory courses because they had always wanted to study their specialism at university. To them some teacher education courses were more important than others. Lecturers knew that as teachers, students required an understanding of educational theory and pedagogical content knowledge. Student teachers were learning the less popular courses because it was the university assessment requirement – otherwise they would not get qualified teacher status. In a way the contradictory factors attenuated learning because what student-teachers said they were learning was not what lecturers said they were teaching. Contradictory factors also shaped how student-teachers were learning. Student-teachers liked strategies in which they were actively involved and often the impoverished context and lecturers' sometimes fossilised

beliefs meant student-teachers were learning through basic transmission approaches e.g. 'chalk and talk'.

6.3.4.2 School activity system

In the school activity system student teachers were expected to demonstrate competence of what they had been learning in the university activity. They had learnt reflective practice as an object - something to aim for and in the school activity system they provided evidence that they knew what reflective practice was through records they kept. Participants hardly mentioned that student teachers were using reflective practice as a 'mediating' tool – to put to scrutiny their assumptions and beliefs about teaching and learning. It would be more fruitful for them to have embraced the notion of reflective practice not only as an object but as a tool for professional growth.

The examinations-oriented curriculum in schools influenced student-teachers to prefer transmission modes. They preferred strategies that they believed would help their pupils to cover the curriculum in time for examinations despite knowing that those were not the most effective learning approaches. Further, student-teachers preferred transmission modes when teaching in impoverished school contexts. These factors influenced student-teachers not to experiment with the new ideas they had learnt during university-based learning.

6.3.4.3 Interactions between university and school activity systems

First, the dominant view was that theory and practice were separate entities. Theory was seen as superior and something required by practitioners. The two were seen occurring in different settings; the university as place where theory was learnt and later practice occurred in the school. The tendency to view theory as superior and coming first, meant that if things did not work smoothly the likely conclusion drawn was that practice was at fault, instead of questioning their conventional assumptions.

Second, student-teachers understandably came with established pre-conceived ideas when they went to university to train as teachers. There were, however, no reports of challenging their pre-conceived ideas producing a dampening effect on new learning and weakening their development of new ideas. Lecturers and student-teachers tended to view teaching practice as

an evaluation course (assessment) more than as learning through practice and the competing goals attenuated what student-teachers were learning. Once again, student-teachers did not see this as an opportunity to question conventional practices and to reflect on their practice. Thus, student-teachers by conforming rather than confronting preconceived ideas attenuated own learning of innovative and progressive ideas about teaching and learning.

<u>6.3.5 The development of student-teachers' ideas as they progress through the teacher education programme</u>

The study found out that there were links between student-teachers' motives and ITE objects. Participants talked about student-teachers wanting to acquire knowledge and skills, to develop appropriate attitudes, wanting to get a qualification, and about professional and personal growth. They reported changes in student-teachers' knowledge, skills and attitudes. Student-teachers witnessed changes in maturity, physical and professional attributes. Student-teachers reported an increased understanding of theory and changes in their attitude towards teaching.

There were reports of resistance to change. Some student-teachers admitted they had not changed their prior beliefs about practice during their whole training period and some admitted to have only displayed temporary changes in order to fulfil degree requirements. This may suggest that student-teachers soon learn what is valued in the school system and so take on ways of working perhaps in order to be rewarded and promoted in the school community. If that is the case then these student-teachers did not use reflective practice as a useful tool for re-examining existing beliefs and to approach experience reflectively.

The study found out that a new assessment instrument for applied science education had been developed and was aimed at increasing reliability and reducing variation among different supervisors. Student-teachers made comments suggesting wide discrepancies when assessed by different supervisors. But it is possible that, as they were still learning to teach, student-teachers' lessons may have varied quite considerably in their effectiveness from lesson to lesson and also that the presence of different supervisors observing them might have affected the performance of student-teachers differently, which none of the student-teachers seemed to have considered. There seemed to be more or less a consensus among participating student-teachers and lecturers that assessment of student-teachers' teaching practice was quite

subjective and characterised by wide variations. The discrepancies reported between qualitative comments and scores might well suggest that the new assessment, like the old is still problematic, but these may just be teething problems that can possibly be resolved.

6.4 Implications

<u>6.4.1 Teacher education</u>

6.4.1.1 Harmonising concurrent learning model envisioned and educational practice

Since the concurrent learning model envisioned at the university was different from actual teaching practices, the study recommends that university management should harmonise actual practice with the model espoused. If the concurrent model of teacher learning is the vision then activities at the university, and in teaching practice must be consistent with the notion of concurrent learning. Furthermore the university should decide on the kind of teacher that the teacher education programme seeks to develop and shape teaching and learning towards meeting the kind of teacher orientation (Feiman-Nemser, 1990) required. This would require a commitment to hire lecturers highly qualified and experienced in teacher education.

6.4.1.2 Supporting student-teachers to reveal their pre-conceived ideas about teaching and learning

Student-teachers join university with well-established preconceived ideas about teaching and learning developed over years of schooling. This is not unique to Zimbabwe. Some examples of pre-conceived ideas from literature are: student-teachers begin training with the view that teaching requires reproducing what is in the quality assurance systems of the national system (Edwards, 2002), see the curriculum as sets of teaching targets or Schwab's (1964) category of substantive knowledge, believe that the teacher's role is to 'deliver the curriculum' (Bridges, 2001), and that authoritative dialogue (Wilson, 2004; Leach and Scott, 2001) aimed at transmitting knowledge using didactic approaches to passive pupils is an appropriate way of teaching. Without acknowledging the existence of tacit knowledge about teaching lecturers may not be able to help student-teachers and adopt new ways of thinking about teaching and learning. It is recommended that student-teachers be treated as adult learners who join the

teacher education programme with some knowledge of teaching. They need opportunities to articulate, share and expose their pre-conceived ideas of teaching.

6.4.1.3 Supporting student-teachers to adopt new ideas of teaching and learning

Student-teachers were learning new ideas, different teaching and learning techniques, and ways to create productive learning environments during the university-based part of their teacher education programme. However, when they go on teaching practice as part of their training and encounter contradictions between the new ideas and their pre-conceived ideas of teaching and learning student-teachers often resolve the tensions by reverting to their prior knowledge. Much literature exist to explain the resistance to change, for example, seeking compliance or conformity (Wilson, 2004; Postlethwaite and Haggarty, 2010), concern with self-image and classroom management (Wilson, 2004), and delivering the curriculum because they are pre-occupied with national examinations (Briggs, 2001). It is recommended that lecturers and teachers find innovative ways to support student-teachers to meet these school goals. Further, student-teachers should also be provided with problem-solving skills in order to be professional decision-makers able to respond to pupils as learners (Edwards, 2002), confident to try out effective practice emerging from recent research (Wilson, 2004) and experiment with new ideas. Student-teachers need adequate preparation to learn in settings where they are likely to encounter conflicting messages and competing goals. Problem-solving must be a key component of initial teacher education.

6.4.1.4 Supporting student-teachers to use socialization as a stepping stone for the development of their ideas about teaching and learning

School-based learning at the university studied was consistent with cognitive apprenticeship, situated learning and socialisation. However, it was not clear from the study's findings what kind of school-based learning was targeted as teaching practicum. Cognitive apprenticeship means that student-teachers learn from (the more knowledgeable) experts within real-world contexts through modelling, coaching and scaffolding, articulation, and exploration (Brown, Collins and Duguid, 1989; Merriam and Caffarella, 1991, Smith, 1999). The study recommends joint planning between student-teachers and teacher-mentors of activities at each of the four steps mentioned above.

Socialisation does not quite match the notion that student-teachers reinforce ideas from their educational experiences at university, rather it matches the notion that current practices in schools are reinforced (Postlethwaite and Haggarty, 2010). The student-teacher joining the school staff was always aspiring to be an expert in that community. Therefore, there should be much supporting that person in taking on ways of working that resonated with that school community in as painless process as possible. The personal needs of the novice teacher were often met because the student-teacher was becoming accepted amongst the group of people he or she was aspiring to join. The institution's needs were met because the new-comer was adopting the conventional working practices at the school and not challenging them. These processes make the notion of socialisation understandable and inevitable.

However, socialisation being a conservative mechanism, is a limiting process; it reduces the chances of student-teachers' new ideas influencing things, and it reduces chances that the institution could change as new people bring in new ideas of working. Student-teachers could get more out of socialisation during school experience if they recognize it as a stepping stone in a process and not an end in itself. As revealed in my study, the temptation is to treat student-teachers as experts and let them get on, stopping all support and thought of further teacher learning. Encouraging people to 'fit-in' was important, but once they were comfortable it was more fruitful to open the discussion of what good teaching is; what they might be able to do that they were not doing yet. Reflective practice among teachers can then lead to the development of both student-teachers and teachers' ideas. Student-teachers get opportunity through socialisation to develop teacher identity (Lave and Wenger, 1991), to participate in joint activities and discussions with teacher (Cumming and van Zee, 2005).

6.4.1.5 What kind of university-school partnership

Considering that it was not clear from the study's findings what kind of school-based learning was targeted as teaching practicum, it is recommended that concerted efforts be made between the university and schools to decide on the kind of partnership required and how to support the type of partnership chosen. Lecturers would need to take the initiative. The government would need to be involved as it provides funding for teacher education. At present the partnership is skewed in favour of the university making it difficult to share information, to help teachers to explore knowledge, to elicit teachers' experiences, to re-define supervision and assessment, and to determine the curriculum of teacher education.

The kind of university and school partnership existing in Zimbabwe was largely what can be termed 'university-led' (Furlong et al., 2000; Brisard et al., 2005; European Commission, 2007; Mutton and Butcher, 2008). Students seem to use the school as 'laboratories' where they did clinical practice following detailed guidelines form the university. Schools liked the arrangement because when they did not have trained teachers, students, who already had some basic training, came in to fill the gap. Teacher education in Zimbabwe may be unique in this respect. Student-teachers went on school attachment and schools employed them as teachers with full responsibilities. Furthermore, student-teachers schemed and planned what they were teaching because no, pre-prepared, bought-in curriculum materials, were available. In addition, the university insisted on student-teachers producing their own schemes and plans as in the ASE Student handbook. The situation was exacerbated by the fact that the fragile economy meant schools did not have adequate resources and equipment in the laboratories and classrooms.

Considering that higher education institutions and schools in Zimbabwe see school attachment differently from many other countries, there would be much, I think, to gain if a full partnership were to be adopted, that is, a complementary or collaborative partnership (Furlong et al., 2000; Brisard et al., 2005; European Commission, 2007; Mutton and Butcher, 2008). Teachers can contribute much in the professional development of student-teachers if they are recognised as potential teacher educators, and given freedom and opportunities to shape and support school-based learning.

6.4.1.6 Supporting student-teachers to understand and use reflective practice as both object and tool

Reflective practice remains an espoused theme in teacher education and in practice was not taken seriously. Although reflective practice was an object of the activity system it was not viewed as a 'mediating' tool. Literature suggests that reflective practice could be used to challenge pre-conceived ideas and to link theory with practice (Moore and Ash, 2002). In both university-based and school-based learning student-teachers and teachers need clear directions and help in how to use reflective practice to grow as professional teachers. Further research is required to find out whether reflective practice is consistent with current practices in schools since it seems likely that current practices do not support reflection by

practitioners. Teachers need the agency to be able to make decisions and change ways they are teaching, and academics need to be challenged to provide the necessary support for both student-teachers and teachers.

6.4.1.7 Supporting student-teachers to use the theory-practice 'gap' as 'transformation space' for the development of their ideas about teaching and learning

It seems that, although lecturers knew about how theory and practice ought to relate, the university could not help student-teachers apply the ideas in school. Theory and practice do not always match; what is possible in the classroom often is not what theory suggest should happen. Student-teachers should be helped to understand the theory-practice gap as the 'transformation space' for the development of their teaching ideas. In the context that student-teachers find themselves, they might need to modify their ideas for things to work, raising the problem of how to adapt, refine, and select them. The reality that the classroom was a relationship involving student-teachers, secondary pupils and teachers complicated trying our new ideas learned at university, and therefore to change things requires altering these relationships. To do this, the process has to be gradual and reflective so student-teachers might need to introduce change in a series of steps, and to negotiate with the teachers and secondary pupils. However, there is no doubt in my mind that change needs to be aimed at the whole system.

6.4.3 Training and professional development

The university should invest in staff development programmes and identify ways of strengthening programmes through targeted professional development. Working conditions for lecturers should also be reviewed so that the university keeps abreast of changes in the market and economy. Incentives that were used to attract lecturers 10 or more years ago may not be appropriate for today's academic staff.

The university should work closely with government to make teaching attractive to high ability student-teachers. Student cadetship where student-teachers received sponsorship and on graduation worked for the government for a period equivalent to their training was a good idea and other similar innovative schemes are needed.

Working conditions for teachers also need to be revised to keep pace with change in the wide community. Teachers need to feel respected and go to work assured that they are going to earn enough to meet their basic day-to-day needs. They need to be confident that they can make decisions within their professional work without fear of victimization. Therefore policymakers must put in place legal frameworks to safeguard the safety of workers so that teachers can do their work as professionals without fear.

Associations and unions of teachers do not currently play a role in teacher education. It is recommended that the associations and unions should set up a teaching council and keep a register for teachers in Zimbabwe. The council could play an important role in teacher training and staff development, rather than leaving everything to academics in universities and the government. The same council could also have the mandate to monitor its members and regulate negotiations for good working conditions.

6.4.4 Conducting research in Zimbabwe

Conducting research in Zimbabwe, typical of undeveloped nations, faces many challenges. These included poor communication networks, data bases which were difficult to access and difficult to verify, and problems in accessing schools, universities and government offices. There were reports about lecturers, teachers and student-teachers in Zimbabwe being victims of political harassment and intimidation, and as such there were serious concerns about working in an environment where teachers feared for their own safety. The obvious effect of this for research was that the same people were much less likely to provide information in interviews or questionnaires since they were concerned about how it may be used.

6.4.5 Future research

Future research is needed using similar methodology but utilising more than one data gathering method, increasing the number of interviews in order to interact with participants more than once. This would enable a better recording of when and how qualitative changes and insights took place as well as why, where and what problems arise, and how resolutions are sought and implemented. It would also be useful to interview teachers in schools in order to include their perspectives in any future study.

Further research is also required to investigate how student-teachers can successfully negotiate university-school boundary crossing, and what sort of boundary brokers are needed. At present no deliberate efforts are made to help student-teachers overcome the challenges of learning across contexts.

6.5 My journey so far

One of my objectives when I began this research was to find out about and understand changes in student-teachers resulting from engaging in activities where they were learning to teach. In seeking changes in others, transformation was also occurring in me.

I began by asking myself "why did I opt to become a teacher?" and this is a question that all student-teachers should be asking themselves. I fear that few do. Many seem to choose teaching because there is nothing else better – they feel that they have no choice. Often interest develops with time. My question should have been "how can we make prospective student-teachers develop interest in teaching from the beginning?" Seeking student-teachers' interests, prior knowledge and beliefs matter. Learning to teach should require student-teachers to confront their preconceived ideas in order to reconstruct ideas of teaching and learning consistent with the present and future practice. Many changes are taking place in the classroom, the school system and the university system in response to new ideas of teaching and learning.

I have developed a better understanding of the complexities of learning to teach, particularly why the theory-practice debate remains relevant, and maybe always will, despite an acknowledgement that both contribute to learning to teach. Furthermore, I have come to appreciate that displaying a deep and extensive knowledge of one's subject is just one quality of an expert or master teacher. It is not only subject matter knowledge that counts, an expert teacher must show understanding of pedagogical content knowledge (Exley, 2011). As a teacher one needs passion for the subject as well as ability to develop rapport with learners.

My greatest change was learning to listen in such a way that I put aside my bias so that I did not see what I was looking for, but hear voices of those telling their stories and what they are trying to tell me.

6.6 Contributions to knowledge: the impact of ITE programmes on beginning teachers' professional development

Much knowledge relating to the impact of ITE on beginning teachers already exists in relation to Western contexts but little is found in the African / Zimbabwean context and my study makes a contribution for the latter. In Chapter I section 1.7 I discussed the potential contributions to knowledge of my study. In this section I reflect on my findings to discuss the extent to which potential contributions to knowledge have been realised. As reported in section 1.7 the key organisations that are stakeholders in Initial Teacher Education are institutes of higher education, schools, and the government. All share the goal that ITE should aim to produce effective teachers. Such a shared goal requires collaborative partnerships, characterised by trust, mutuality and reciprocity (Kruger et al., 2009). This can only be achieved through staff development programmes to train student-teachers, lecturers and teachers to work collaboratively.

My study was carried out in Zimbabwe at a time when the political and economic situation had resulted in mistrust between communities and lack of funds for education. Despite the challenges that this situation brought, student-teachers were being trained to become teachers and lecturers in ITE were doing their best to support their needs. The model of ITE that was revealed by the perceptions of student-teachers and lecturers indicated that there was little collaboration between university lecturers who viewed themselves either as 'subject specialists' or as 'education specialists'. There was little collaboration between schools and university in the design and implementation of the ITE programme. These findings are important for developing effective ITE partnerships in contexts in which there are teacher shortages and lack of funds because the limited funds that are available should be targeted at the development of collaborative partnerships since without such partnerships the quality of ITE will not be improved.

My study revealed that there is clear potential to use boundary crossing between university and school settings to enhance professional development. In order to exploit this potential, ITE systems need to encourage problem solving activities, such that when student-teachers encounter contradictions they get support to find solutions to the problems and do not simply conform to the *status quo* and abandon new ideas. Furthermore, lecturers need to design learning tasks, such as coursework that require student-teachers to take a leading role in their

learning, to observe experienced teachers, plan joint activities, implement, discuss, and revise the activities. These suggestions need not necessarily require extensive investment of funding but would require investment of time and commitment on behalf of the university and school staff involved in ITE. Such developments might help student-teachers to adopt reflective practice as a tool for improving their practice.

ITE in Zimbabwe is clearly influenced by contextual factors such as teacher shortage, restricted employment opportunities and lack of funding. These factors tend to decrease the quality of learning to become a teacher. Instead of hoping for economic, political and social improvements to occur, there is a need to consider ways of improving the quality of training in the existing impoverished conditions. The challenge is to find innovative ways of using scarce resources to produce high quality teachers. I hope that my study has revealed some potential strategies for achieving this goal.

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APPENDICES

Appendix EAC: Ethical Approval Certificate

UNIVERSITY OF
EXETER

Graduate School of Education

Certificate of ethical research approval

STUDENT RESEARCH/FIELDWORK/CASEWORK AND DISSERTATION/THESIS
You will need to complete this certificate when you undertake a piece of higher-level research (e.g. Masters, PhD, EdD level).

To activate this certificate you need to first sign it yourself, and then have it signed by your supervisor and finally by the Chair of the School's Ethics Committee.

For further information on ethical educational research access the guidelines on the BERA web site: http://www.bera.ac.uk/blog/category/publications/guidelines/ and view the School's statement on the 'Student Documents' web site.

READ THIS FORM CAREFULLY AND THEN COMPLETE IT ON YOUR COMPUTER (the form will expand to contain the text you enter). **DO NOT COMPLETE BY HAND**

Your name: Young Mudavanhu

Your student no: 530029292

Return address for this certificate: 33 St Johns Road, Exeter, EX12HR

Degree/Programme of Study: 4-year PhD in Education

Project Supervisor(s): Dr Nigel Skinner, Professor Keith IPostlethwaite

Your email address: ym224@exeter.ac.uk

Tel: 07906235935 or 01392 202319

I hereby certify that I will abide by the details given overleaf and that I undertake in my dissertation / thesis (delete whichever is inappropriate) to respect the dignity and privacy of those participating in this research.

I confirm that if my research should change radically, I will complete a further form.

Signed:..date:..20.10.09......

NB For Masters dissertations, which are marked blind, this first page must **not be included** in your work. It can be kept for your records.

Chair of the School's Ethics Committee
last updated: August 2009

Certificate of ethical research approval

Your student no: 530029292

Title of your project: The contribution of theory and practice to the professional development of students learning to become secondary teachers in Zimbabwe

Brief description of your research project: The goal of my research is to understand teacher educators' perceptions of the complexities of the way students learn to become secondary teachers. The main objective is to interpret teacher educators' perceptions of learning experiences in different settings and how ideas are reconstructed as their student teachers pass from one setting to another. My other objective is to interpret perceived changes of student teachers at different stages of training. Student teacher learning is a complex phenomenon and what is learnt and how it is learnt might be described as situated. Socio-cultural theory, activity theory and reflective practice are useful in understanding the phenomenon of learning to teach. Hearing student teachers' stories of their learning would be most appropriate; alternatively teacher trainers' perceptions of student learning could be the second best. I plan to use face-to-face, telephone, online and e-mail interviewing together with documents and online focus group discussions to elicit teacher trainers' perceptions of student teachers' learning. The use of unstructured interviews is consistent with hermeneutic phenomenology. I will then seek to develop the emerging theory using semi-structured interviews until saturation by asking questions, which have a focus upon the salient categories within it. I am going to use activity theory to provide a conceptual map to help describe and analyse the findings.

Give details of the participants in this research (giving ages of any children and/or young people involved):   My participants will be teacher trainers and student teachers. All the participants are adults aged 18 years or more. They are capable of making informed consent to participate or not and to withdraw whenever they feel like. My study neither involves any children nor young people.

Give details regarding the ethical issues of informed consent, anonymity and confidentiality (with special reference to any children or those with special needs) a blank consent form can be downloaded from the SELL student access on-line documents: My study neither involves any children nor those with special needs. I am going to explain the purposes of my study and seek informed consent of the participants. I will assure participants of anonymity and confidentiality. I will not identify or name participants in the ensuing reports. Information collected will be used for academic purposes only.

Give details of the methods to be used for data collection and analysis and how you would ensure they do not cause any harm, detriment or unreasonable stress: I am going to ask participants to choose the mode of interviewing they prefer among face-to-face, telephone, online and e-mail interviewing. At any stage of the study the participants are free to opt out or to choose an alternative mode. Participants are free to decide when they want to be interviewed, and I will adapt my itinerary to suit their needs.

Give details of any other ethical issues which may arise from this project (e.g. secure storage of videos/recorded interviews/photos/completed questionnaires or special arrangements made for participants with special needs etc.):   Information collected will be used for academic purposes only. I will also assure participants that their responses will be saved on a secure computer where I am the only one with access. Such records will not be kept more than necessary, and will be destroyed as soon as my study has been successfully completed.

Give details of any exceptional factors, which may raise ethical issues (e.g. potential political or ideological conflicts which may pose danger or harm to participants): In my study there are no political or ideological conflicts which may pose danger or harm to participants, and findings will not be used for such purposes.

This form should now be printed out, *signed by you on the first page and sent to your supervisor to sign. Your supervisor will forward this document to the School's* **Research Support Office** *for the Chair of the School's Ethics Committee to countersign. A unique approval reference will be added and this certificate will be returned to you to be included at the back of your dissertation/thesis.*

N.B. You should not start the fieldwork part of the project until you have the signature of your supervisor

---

This project has been approved for the period: Nov 2009   until: October 2010

By (above mentioned supervisor's signature): _____   date: 22/10/09

N.B. To Supervisor: Please ensure that ethical issues are addressed annually in your report and if any changes in the research occurs a further form is completed.

SELL unique approval reference: .... D|09|10|6

Signed: .... date: 27/10/2009
Chair of the School's Ethics Committee

This form is available from http://education.exeter.ac.uk/students/

Appendix CF: CONSENT FORM

I have been fully informed about the aims and purposes of the project.

I understand that:
- there is no compulsion for me to participate in this research project and, if I do choose to participate, I may at any stage withdraw my participation
- I have the right to refuse permission for the publication of any information about me
- any information which I give will be used solely for the purposes of this research project, which may include publications
- If applicable, the information which I give may be shared between any of the other researcher(s) participating in this project in an anonymised form
- all information I give will be treated as confidential
- the researcher(s) will make every effort to preserve my anonymity

..............................……………….. ....
(Signature of participant) (Date)

……………………
(Printed name of participant)

One copy of this form will be kept by the participant; a second copy will be kept by the researcher(s)
Contact phone number of researcher(s):……………………………………..
If you have any concerns about the project that you would like to discuss, please contact:
………………………………………………………………………………………
OR
………………………………………………………………………………………
Data Protection Act: The University of Exeter is a data collector and is registered with the Office of the Data Protection Commissioner as required to do under the Data Protection Act 1998. The information you provide will be used for research purposes and will be processed in accordance with the University's registration and current data protection legislation. Data will be confidential to the researcher(s) and will not be disclosed to any unauthorised third parties without further agreement by the participant. Reports based on the data will be in anonymised form.

Appendix R: Research Permit Department of Education University of Mashonaland

25th January 2010
Dean, Faculty of Science Education
Chairman, Department of Education
University of Mashonaland
Mashonaland, Zimbabwe.

Dear Sir,

RE: Application for permission to conduct research in Faculty of Education at University of Mashonaland

I write to seek permission to conduct academic research in Faculty of Education. I want to conduct my research studies at University of Mashonaland and would like the faculty to host me. I plan to spend 2-3 weeks interviewing teacher educators (lecturers) and where possible, student-teachers. I will also be seeking commitment of participants for the same duration.

I am a former lecturer in teacher education at University of Mashonaland. I am currently pursing doctoral studies in education at the University of Exeter, under the supervision of Dr Nigel Skinner and Professor Keith Postlethwaite. The title of my thesis is *the contribution of theory and practice to the professional development of students learning to become secondary science teachers in Zimbabwe.*

I am aware that your staff and students are often busy, and therefore will be cautious about the amount of time I will be taking from the participants. This shall be the minimum necessary. I would like to assure you that my study adheres to research ethics, in line with University of Exeter, Graduate School of Education ethics policy and the British Educational Research Association. I have attached the following documents: a brief description of my study and interview items.

Your faculty would benefit in several ways. You could use the findings of the study to improve your programmes. Hosting me affords you opportunity to develop links with University of Exeter. I am prepared to share the expertise and knowledge I have acquired here in ways you may find suitable, for example contributing in educational research workshops and teaching practice supervision. I could also help you to get resources your faculty might find difficult to access like identifying literature in teacher education of particular interest and then writing summaries. I could also compile abstracts of interest and write commentaries.

I am grateful for your support and special consideration.

Yours sincerely

Young Mudavanhu ym224@exeter.ac.uk, 33 St Johns Road, Exeter, UK, EX1 2HR.

Appendix I-L: Interview protocol for lecturers

1. What do your student-teachers learn?
2. How do your student-teachers learn?
3. Where do your student-teachers learn?
4. What helps your student-teachers to learn?
5. What hinders learning?
6. Why do what your student-teachers learn matter?
7. How do school and university relate?
8. How do theory and practice relate?
9. What do your lecturers bring to teacher education?
10. What do your student-teachers bring into teacher education?
11. Are you able to do things you feel you should do?
12. What is teacher education for?
13. Are there any helpful synergies?
14. Are there any awkward contradictions?
15. What changes occur?

Appendix I-S: Interview protocol for student-teachers

16. What do you learn?

17. How do you learn?

18. Where do you learn?

19. What helps you to learn?

20. What hinders learning?

21. Why do what you learn matter?

22. How do school and university relate?

23. How do theory and practice relate?

24. What do you bring to teacher education?

25. What do you bring into teacher education?

26. Are you able to do things you feel you should do?

27. What is teacher education for?

28. Are there any helpful synergies?

29. Are there any awkward contradictions?

30. What changes occur?

Appendix BQ: Biographical questionnaire

Please tick the box that closely describes you.

1. Sex

  ☐ Male

  ☐ Female

2. What is your age in years?

    ☐ 21-30

    ☐ 31-40

    ☐ 41-50

    ☐ 51+

3. Highest academic qualifications

  ☐ O-Level

  ☐ A-Level

  ☐ Degree

  ☐ Masters

  ☐ Doctorate

  ☐ Other (specify) _____

4. What is your teaching qualification? Tick all that apply.

  ☐ Certificate/Diploma

  ☐ Degree

  ☐ Masters

  ☐ Doctorate

  ☐ Other (specify) _____

5. Subject specialism, for example, Chemistry/Geography _____

6. What job are you doing now?

  ☐ Secondary school teaching

  ☐ Teacher education

  ☐ Other (specify) _____

7. Teaching experience at secondary school in Zimbabwe

  ☐ 0 years

  ☐ 1- 5 years

  ☐ 6-10 years

  ☐ 11+ years

8. Other working experience in Zimbabwe

    ☐   0 years

    ☐   1- 5 years

    ☐   6-10 years

    ☐   11+ years

Please state the job you were doing _____

9. Working experience as teacher educator in Zimbabwe

    ☐   0 years

    ☐   1-5 years

    ☐   6-10 years

    ☐   11+ years

10. Preferred interview mode

    ☐   Face-to-face

    ☐   Telephone

    ☐   E-mail (Please state e-mail address to be used) _____

Thank you.

Appendix AT-S: Audit trail of student-teachers-participants

Table 3.1: Audit trail of student-teacher participants IDs, interviewing, transcribing and coding

	ID	Sex	Pre-/ In-	Inter-view	Time (s)	Transcription Word count	Specialism (BScEd)
1	I-S1	F	Pre-	Ftf	3735	06916	Chemistry
2	I-S2	M	Pre-	Ftf	4882	05640	Chemistry
3	I-S3	M	Pre-	Ftf	2020	02645	Comp Science
4	I-S4	M	In-	Ftf	2064	02637	Mathematics
5	I-S5	M	In-	ftf_R2	1927	02144	Mathematics
6	I-S6	F	In-	ftf_R2	2263	01814	Geography
7	I-S7	M	Pre-	ftf_R2	2330	02974	Mathematics
8	I-S8	M	In-	ftf_R2	1489	01819	Mathematics
9	I-S9	F	In-	ftf_R2	1984	01891	Biology
10	I-S10	M	Pre-	ftf_R2	1362	00568	Maths/Comp Sc
11	I-S11	M	In-	ftf-R2	----	00000	----
12	I-S12	M	Pre-	ftf-R2	2280	02313	Biology

The audio file of participant S11 was corrupted and not transcribed, reducing the sample size to 11.

Appendix AT-L: Audit trail of lecturer-participants

Table 3.2: Audit trail of lecturer participants IDs, interviewing, transcribing and coding.

	ID	Sex	ScEd/ Theorist	Inter-view	Time (s)	Transcription Word count	Specialism Under/Post
1	I-L1	M	ScEd	ftf+e-	3262	04407/00631	Chem/Curr
2	I-L2	F	ScEd	Ftf	4376	06437	Bio/Curr
3	I-L3	M	Theorist	Ftf	3570	07193	Hist/Sociology
4	I-L4	M	ScEd	Ftf	2240	03300/00826	Bio/Curr
5	I-L5	F	Theorist	ftf+e-	3589	06467/00577	Hist/Psychology
6	I-L6	F	Theorist	Ftf	1831	03613	Eng/Sociology
7	I-L7	F	ScEd	Ftf	3317	06122	Chem/Chem Ed
8	I-L8	M	Theorist	Ftf	5212	07312	Hist/Teacher Ed
9	I-L9	M	ScEd	xxxx	xxxx	00000	Maths
10	I-L10	M	Theorist	Ftf	6573	09781	Geo/Curr
11	I-L11	F	ScEd	xxxx	xxxx	00000	Chemistry
12	I-L12	M	Theorist	xxxx	xxxx	00000	Geo/Psychology
13	I-L13	F	ScEd	Ftf	5418	09073	Geo/Curr
14	I-L14	M	ScEd	ftf/e-	2892/-	04923/00185	Physics/Phy Ed
15	I-L15	M	Theorist	Ftf	6052	10796	Philosophy
16	I-L16	F	Theorist	xxxx	xxxx	00000	---
17	I-L17	F	Theorist	xxxx	xxxx	00000	---
18	I-Li18	F	Theorist	Ftf	2109	03509	Library Science
19	I-La19	M	ScEd	e-mail	----	00000	Biology

The following participants initially agreed to participate but eventually pulled out due to other commitments L9, L11, L12, L16 and L17. The sample size was therefore 14.

Appendix CT: Final Coding Template

1. Motives
   a. no choice
   b. important other
   c. extrinsic
   d. calling
   e. work experience
2. Objects
   a. knowledge
   b. skills
   c. attitudes
   d. certificates
   e. pedagogy
   f. professional
   g. subject matter
3. Learning to teach in university activity system
   a. Subjects
      i. student-teachers
         1. pre-service
         2. in-service
      ii. lecturers
         1. scientists
         2. science educators
         3. theorists
      iii. library staff
   b. objects
      i. develop knowledge, skills and attitudes to become effective teachers
      ii. develop pedagogical skills in science and mathematics
      iii. student-teachers attain qualified teacher status (teaching degree)
   c. tools
      i. learning educational theory
      ii. learning subject matter knowledge
      iii. others - peers and lecturers
      iv. Internet and library
      v. (lack of) equipment and learning facilities
   d. rules
      i. university learning and assessment system
   e. community
      i. lecturers
      ii. library staff
      iii. student-teachers
   f. division of labour
      i. lecturers - determining curriculum
      ii. library staff - support
      iii. student-teachers - learning theory
   g. relationships
      i. professional student-teacher-lecturer relationships
4. Learning to teach in school activity system
   a. subjects

   i. student-teachers
   ii. lecturers (supervisors)
   iii. teachers (mentors)
  b. objects
   i. learning reflective practice
   ii. developing pedagogical content knowledge
   iii. developing professional competence
   iv. demonstrating readiness to gain qualified teacher status
   v. to reduce teacher shortage
   vi. to maintain and improve pupils performance in national examinations
  c. tools
   i. educational theory and subject matter knowledge acquired during university base learning
   ii. (lack of) equipment and other curriculum materials
   iii. (lack of) qualified teachers to act as mentors
  d. rules
   i. university learning and assessment system
   ii. school learning and assessment system
   iii. public service regulations
  e. community
   i. student-teachers
   ii. lecturers (supervisors)
   iii. teachers (mentors)
  f. division of labour
   i. student-teachers - learning through practice
   ii. lecturers (supervisors) - supervision and assessment
   iii. teachers (mentors) - support through mentoring
  g. relationships
   i. relating well with teachers to get maximum support

5. Factors
  a. synergistic factors
   i. three specialisms of lecturers
    1. scientists
    2. science educators
    3. theorists
   ii. reflective practice as an object and as a way of being
   iii. partnership - university based learning and school based practice
  b. contradictory factors
   i. contradictory factors in university activity system
    1. student-teachers' object versus teacher education objects
    2. official concurrent model versus educational practice consecutive model
    3. concurrent learning of subject matter knowledge and education courses versus importance attached to education courses
    4. lack of tools versus object of learning pedgagogical content knowledge
    5. lack of tools versus modelling constructivist approaches
   ii. contradictory factors in school activity system
    1. lack of tools in school versus object of trying innovative and progressive ideas

          2. lack of qualified teachers versus object of getting support from mentors (teachers)

          3. teachers with low motivation versus object of getting support from mentors

          4. lack of recognition of teachers acting as mentors versus object of getting support from mentors

    iii. contradictory factors in interactions between university and school activity systems

          1. object of learning through practice versus participating as cover teachers in school

          2. combining supervision and assessment to cut costs versus focusing on assessment

          3. object of learning through practice versus work overload e.g. teaching examination classes

          4. construing gap between theory and practice as unresolvable (conformity) versus experimenting with new ideas

6. how factors were shaping student-teachers' learning
   a. lack of consensus on 'what' and 'where' student-teachers were learning
   b. valuing subject matter knowledge more than other courses
   c. learning education for certification and not understanding
   d. examinations-oriented curriculum and preferring transmission modes when learning at university
   e. demonstrating reflective practice but not being reflective practitioners
   f. examinations-oriented curriculum and preferring transmission modes when teaching in schools
   g. impoverished contexts meant that student-teachers used transmission modes when teaching in schools
   h. perceiving learning theory as more important than practice
   i. conforming rather than confronting preconceived ideas

7. development of student-teachers' ideas
   a. sourcing and resourcing teacher education
   b. knowledge, skills and attitudes
   c. resistance to change
   d. new ASE assessment instrument to increase reliability

Appendix ASE: Applied Science Education Student Handbook

APPLIED SCIENCE EDUCATION (ASE)
STUDENT'S HANDBOOK

TABLE OF CONTENTS

PREFACE

This booklet was written to help student-teachers develop into effective teachers. The booklet was not designed to be a course in pedagogics. Its effort places the student-teacher at the interface of professional judgment and subject knowledge, recognizing school-based experience for the student-teacher as a smart partnership involving the university, the school, the community, and the student-teacher. Roles, responsibilities and expectations of each member of the partnership are highlighted. Focus is directed at those aspects of educational practice that will enable the student-teacher to flow through the phases of self-development and become a competent teacher.

INTRODUCTION

The guide to Applied Science Education (ASE) is a student's reference document for use although on teaching practice in schools. It provides some general rules and regulations governing your activities as a learner teacher developing to become a competent practitioner. Different schools will have additional regulations that are determined by responsible authorities. It is important that the student-teachers observe the specific requirements of the school where they find themselves even if they are over and above what University gives.

The components of the guide are:

- **Classroom Instruction** -various aspects of classroom practice such as lesson introduction, development, conclusion, evaluations, action research, reflective practice and management of learning environments.
- **Assessment and Evaluation** - testing, test construction, test analysis, records of pupils' performance etc.
- **Files and documentation** -appearance, contents
- **Professional growth and development** -Public Service regulations, dress and general deportment, leave of absence, teacher discipline and teacher involvement in co-curricular activities.
- **Communication with the Department** -procedure to be followed when communicating with the A.S.E. office although you are on Applied Science Education.

It must be emphasised that the Department of Education is the one that deals with the matter of your professional development. The Department thus, wishes to see you develop to become not just a good teacher, but a competent one too; an expert who provides meaningful learning atmospheres to the pupils entrusted into your care. Good teachers are experts at providing meaningful teaching and learning environments to their learners. Competent teachers go a step further. They ensure that the desired results of learning are produced. The University of Mashonaland (UoM) strives to produce students at this higher level of achievement.

As a department we therefore wish to see you involved in action research and reflection because we believe that in this way the intended objectives of teaching will be m et

As you go on ASE, you will be an ambassador of University of Mashonaland. You are as such expected to live up to the ideals of the department and the institution:

To educate for critical consciousness, reflection and problem solving in humble service to society.

1. PREPARATION FOR APPLIEDSCIENCE EDUCATION

Student-teachers must visit their practicing school before finally assuming duty. The early visit enables the student to familiarize with the requirements of the school. This is when one organizes accommodation, familiarizes with the school environment, makes transport arrangements with the school administration and makes prior arrangement for ASE in their school.

1.1 The Preliminary Visit

The preliminary visit should be made at the end of the term preceding the ASE term so that the student can use the whole holiday to prepare. This visit will enable the student-teachers to meet the teachers they will be attached to, acquaint themselves with the school, get resources such as books and syllabuses in use at the school, and any other materials they may deem necessary to enable scheming during the holidays and thorough planning for the term ahead.

Ideally, the information to collect from the school can be listed as follows:
- The school in general.
- The school mission statement.
- The school's expectation of student-teachers. School policies and other relevant documents.
- Timetables.
- Size and range of library and laboratory facilities. General information about students 'abilities, special needs etc.

1.2 Professional Readiness

When going on ASE, the student should possess some professional attributes necessary to carry out his or her duties. Professional readiness is necessary to develop:
- An understanding of the school as an institution and its place in the community.
- Working knowledge of pastoral and administrative responsibilities as a teacher.
- Ability to develop effective working relationship with colleagues and parents.
- A self critical approach to diagnose and evaluate pupils' learning.
- A readiness to promote the moral and spiritual well being of pupils. Equipped with this and any other information, the student should be ready to teach. Any serious problems which arise must be brought to the attention of the University immediately.

1.3 Cross Curricular Requirements

It must be understood that there are sometimes very artificial boundaries between subject areas. This subject overlap calls for the student-teacher to liaise with other subject teachers so as to link up the development of similar concepts. A good example is the development of some basic principles of calculus, which may be necessary for doing a calculus approach to mechanics in physics, or reaction kinetics in chemistry. To this end the student-teacher should:

- Where necessary go and sit in classes conducted by other teachers to bring related experiences into their subjects.
- Consult other science teachers before scheming so that the scheme of work avoids repetition.

2. PROFESSIONALISM

The teaching profession is bound by rules and regulations and so student-teachers are bound by the same regulations as qualified teachers. The following rules should be observed:

- Males should be in formal jacket and tie. At any rate, the dressing should be professional and not fanciful. Jeans are not allowed. Females have no specific format but what they put on should be formal and decent. No jeans, no miniskirts, tights etc.
- Under no circumstance should a student-teacher have an improper relationship which can bring the profession into disrepute.
- The student-teacher acts in *loco parentis* when on ASE and so is expected to guide the pupils in good moral and cultural values.
- Leave of absence from duty can only be granted by the Head of the school.
- Sick leave can only be requested with the support of a letter from a medical doctor.
- If extended sick leave is necessary then the University must be informed immediately through the Head.
- Student-teachers are expected to perform all duties as prescribed by the school Head and any other senior members of staff.
- A student-teacher shall not administer corporal punishment unless authorized to do so by the Head.

3. CLASSROOM TEACHING

The main task of a teacher is to help pupils develop skills in the processes and methods of inquiry that enable them to understand science rather than give them as much specific content as possible. The teacher should also be a reflective practitioner.

3.1 Reflective Practice

A teacher is a researcher who should always read widely in his / her subject area from journals, magazines and textbooks. Thus, being a reflective practitioner helps the student-teacher to:

- Ask questions and reflect on the correctness in a hypothetico-deductive manner.
- Internalize important patterns of argumentation.
- Provoke pupils to reflect on their declarative and procedural knowledge.
- Consider alternative theories pertaining to a phenomenon and reason out their standpoint.
- Allow pupils to come up with diverse approaches to similar tasks and evaluate the reasonableness of each approach.
- Uses a variety of methods in their lessons at appropriate stages of lesson development.
- Foster creative and critical thinking skills in the pupils they teach.

3.2 Lesson Introduction

A good lesson introduction should

- Motivate pupils to learn the content planned by the teacher.
- Link pupils' prior knowledge with new content to be covered in the lesson.
- Evoke pupils' curiosity to want to know what happens next in the lesson. This usually happens when relevant and suitable media are used.
- Be lively and cheerful, drawing the attention of the learner and avoiding routine and boring techniques.

3.3 Lesson Development

Stages, in which lesson content is to be delivered, should be logically arranged in order not to confuse pupils. The student-teacher is expected to know all the objectives of the lesson before hand to select the appropriate learning experiences. This may be achieved if the student-teacher:

- Selects the appropriate order in which the pupils organize the learning experiences,
- Organizes suitable group work, demonstration or experimentation for particular learning activities.
- Adjusts the pace of the lesson to suit the capacity of the learners,
- Establishes a classroom atmosphere that is conducive to effective learning,
- Maximizes pupil participation by varying teaching strategies. Asks relevant and balanced questions from time to time that keep pupils focused on the lesson objectives.

3.4 Concluding a Lesson

During the progression of a lesson, the reflective teacher notices pupils' conceptions and misconceptions in the feedback quoted from the pupils. In the conclusion of a lesson the teacher should highlight the intended objectives of the lesson, being sensitive to the feedback from the pupils to consolidate what they must internalize; and correcting the misconception that may have arisen.

Feedback is often obtained through questioning and discussion where the teacher studies the level of command of the subject matter and written exercises.

3.5 Evaluating a Lesson
The purposes of a lesson evaluation are to:

- Improve future lessons.
- Design remediation for weak performers and extension work for fast ones.
- Identify the strong aspects which must be repeated in subsequent classes.
- Connect lesson taught with the following one.

A self-critique must not be seen as an admission of pedagogic incompetence but an indication of the astute nature of a teacher who is continually evaluating himself / herself to generate corrective measures. Thus, a balanced evaluation should clearly state the teacher's weaknesses and any other developments during the lesson which may have derailed the expected development of the lesson. The following important steps must be borne in mind when making an evaluation:

Lesson Plan
    -compare the set objectives with the lesson outcomes.
    -Were the objectives too high or too low for the learners?

Introduction
Comment on whether the introduction was relevant to the content taught, and pupils' preconceptions. Assess also if the introduction motivated and encouraged the pupils enough to keep them interested in the lesson.

Rapport
Elucidate the interaction between the teacher and the pupils and between pupils themselves. Comment on the class management and any unplanned work that took place. Usually through interaction with the pupils the teacher may find out that some pupils exhibit lack of prerequisite knowledge necessary for building up higher order concepts. This makes it imperative for the student-teacher to revisit them.

Activities

At times a good lesson is ruined by activities which do not take cognizance of pupils' abilities. Differentiated exercise to suit the range of abilities of the pupils should be organized. Too easy activities may be finished too early and students become undisciplined, although too difficult activities may cause discouragement of some students. Thus, the student-teacher must know his/her pupils individually enough to be able to set work that will stretch their abilities to levels higher than before they attended the lesson. At times teachers may set work that may not be appropriate, for instance group work, when individual work could have been ideal. It becomes imperative for lesson evaluation to comment on the suitability of activities set.

Media

The use of media (learning aids) anticipates that pupils may have easy insights into the concepts under study and may make generalizations easily. At times novice teachers may choose media which are not relevant to the concepts to be developed and help pupils make different conclusions from those intended by teacher. It is therefore expected that the teacher makes an evaluation of the quality of his/her teaching aids. In making a lucid evaluation, the student-teacher should bear in mind that excellence is born out of knowing one's weaknesses and how to overcome them.

4. ASSESSMENT AND EVALUATION

Assessment and evaluation are integral functions of any teaching and learning situation. To carry out these functions effectively one needs to be clear about the differences in the meaning of the terms evaluation, assessment, testing, judgment, measurement, grading and reporting.

Assessment and evaluation are necessary to give the teacher the required feedback on the progress of each pupil as a result of the learning experience facilitated by the teacher. The purposes of evaluation can be achieved by a combination of different types of assessments such as homework, tests, oral questioning, examinations, practical tests, observational scales, student checklists etc. The instrument used should provide a variety of means of assessing data based on which evaluative decisions are made.

In carrying out the assessment and evaluation functions you will need to reflect on what objectives you need to achieve - cognitive, affective and psychomotor and how you possibly can achieve them. The next step will be how to assess and evaluate the extent to which these objectives have been met. This involves critical decision making choices regarding aspects such as:

What to assess

Knowledge, skill, attitudes and values i.e. outcomes and processes.

When to assess

Observation schedules and scales, oral interviews, practical, role playing, debates etc

Why assess

Diagnostic, formative, summative, selection, certification, accountability.

Giving a test should not be done on an *ad hoc* or *impromptu* basis. Tests should be thorough. After deciding on the what, when, why and how much, then you are ready to design your test.

5. ESSENTIAL STEPS IN DESIGNING A TEST.

Draw up a specification grid. This specifies the objectives - cognitive, affective or psychomotor, which you intend to assess and the content to be used for this. The grid facilitates your achievement of a balance of test items among the objectives and across all the content areas. Unbalanced tests will give incomplete feedback information to you regarding:

      a) The effectiveness of your teaching b) Whether the students:

          -will benefit from instruction.

          -have understood what they learnt.

          -are making sufficient progress toward your intended goals.

          -have achieved what was expected of them.

- To formulate your test items on the various content areas at their specified level of demand
- Sequence these items from the simplest to the most difficulty
- Draw up the answering key with details of expected key points, labels, solution steps and the marking scheme indicating mark allocations and total marks per item and for the whole test.
- Indicate the marks per item on your test question.
- Administer the test on the agreed date and time to the class.
- Mark using your scheme and give constructive comments in each script.
- Return the papers to the students as soon as you can go over the test with the class, clarifying confusing concepts and re-teaching completely misunderstood ideas.
- Carry out an item analysis for indices of difficulty and discrimination. Improve on the poor items - those that are either too easy or too difficult and items which do not discriminate students who are most able from those who are least able.
- Keep up to date records of your work.

Reflect on your original questions:
      a) What progress have individual students made?
      b) How effective was your instruction?
      c) What do you need to change regarding the approach you took?

Send meaningful reports/notes to parents on their children's performance. Check on the school policy on reports to parents.

Remember, tests are not to be used as 'time fillers' or as threats to students. Students must perceive tests as a learning experience which facilitates their self-assessment of what they have understood well and what they need help and assistance with.

6. THE APPLIED SCIENCE EDUCATION FILE

It is both the University and professional requirement that a student-teacher keeps an Applied Science Education file. The ASE file is a very important document for the student-teacher, your university lecturers, school authorities and any of those who might be interested in knowing what the student-teacher is doing in his/her practice. It goes without saying that the student-teacher's personality, sense of professionalism and the manner and nature of his/her organization in the classroom can all be exhibited by the way in which the student-teacher organizes his/her Applied Science Education file. Indeed one educationist made the remark, "By looking outside and inside the file, much can be said about the student-teacher's attitude, commitment, grasp of basic principles of pedagogics and the sense of discipline and professionalism."

Generally as much detail as possible, about the student-teacher's activities in implementing the curriculum, should be included.

There is a large variety of ways in which the Applied Science Education file can be organized. The guiding principle is that the file should be user friendly, both in terms of its owner and others.

Neatness and clarity form the bottom line. One format of organization of an Applied Science Education file is given here. The file is divided into the following sections:

    Cover
    A. Contents page
    B. Lesson Plans
    C. Schemes of Work
    D. Syllabi (National and School)

E. Records of Work. (Mark lists etc.)
F. Assignments and Tests
G. University Applied Science Education Handouts. [Resource Materials]
H. Records of Peer Observations
I. Supervisors' and Assessors' records
J. Miscellaneous

An examination is made below of what each section should include in detail

6.1 The Cover

On the cover of the file write the following:
UNIVERSITY OF MASHONALAND
STUDENT-TEACHER'S NAME
NAME OF SCHOOL
CLASSES/SUBJECTS:

6.2 Contents Page

On this page the contents of the file are given.
Contents
A. Contents page
B. Lesson Plans
C. Schemes of work
D. National and school syllabi......and going on up to Section J.

6.3 Lesson Plans

Lesson plans should be filed according to subject and class. As an example you could subdivide this section into two.
B1 Lesson Plans 3A-General science
B2 Lesson Plans LVI -Physics

The plans should be arranged such that the most recent lesson plan appears first in chronological order.

Ensure that the number of lessons appearing in your scheme of work per week is the same number of lessons you have in your file for that week, for that class, for that subject.
If you are taking the same subject for two classes, for example, 3A and 3C, then use only **one** lesson plan. You should however have separate evaluations for the two classes.

REMEMBER:
1. Never walk into the classroom without a lesson plan.
2. With **no** lesson plan student is marked at zero.
3. Ensure that your lesson plans are of the right quality.
4. Do not forget to write down lesson evaluations. For not evaluating a previous lesson a student is marked zero.
5. The lesson plan formats for the different subjects should be as per University requirements.
6. You should have samples of the lesson plans in your file under section G - University Applied Science Education Handouts.

6.4 Schemes of work

A separate scheme of work should be made for each subject and for each form level.

This section can also be subdivided and schemes filed according to subject and form as shown in the example below.

C1 Scheme of work. O' Level Physical Science 3A

C2 Scheme of work LVI Chemistry

The scheme of work format to be used is the UoM format. A handout of the format was given and should appear in the Section- University Applied Science Education handouts.

Different schools normally have different formats for the schemes of work. Whilst you are required to teach in line with a school syllabus, the University expects you to scheme according to its format.

<u>You are not expected</u> to make two schemes of work, one for the school and one for the university. It is envisaged that the scheme of work you make using the university format can be duplicated and a copy kept by the school for records' sake.

Scheme of work records, comments and evaluations must always be up to date. The records, comments and evaluations are for the work covered during the week. If you are behind or ahead of schedule according to your scheme plan, there must be reflection of this under the records, comments and evaluations section.

6.5. Syllabi – National and School

In this section, various syllabi for the subjects you are teaching are filed. Copies of school syllabi for the subjects are also filed in this section.

6.6. Records of work

- Mark schedules
- Records of performances by individual students
- Performance graphs

This section deals with keeping of marks for each pupil from marked assignments, homework and tests. The date the written work was given should be shown as should the title of the marked piece of work.

MARK LISTS-4A-INTEGRATED SCIENCE

NAME	ASSIGNMENT		HOMEWORK		TESTS	
Title	Osmosis Diffusion	Atomic structure	Diffusion	Atomic Osmosis Structure	Diffusion	Atomic structure
Date	10/7	13/8	13/7	10/8	12/9	17/10
Work Number	ASS 1	ASS 2	Hw 1	Hw 2	Hw 3	Test 1
Muuyu Pious	41	20	67	71	72	82
Gudo Marry	39	58	58	29	58	43
Johan Kachi	67	57	59	73	53	80
Maximum score	100	100	100	100	100	100
Class Average	59	61	60	73	59	68

You must also carry out an analysis of pupils' performance in tests and write down the summary. For "A" levels, it is important, in addition to the record of marks as given above, that you follow each student's profile over the year. This can be done graphically.

This will allow you to quickly follow each student and give guidance and counseling where required. In addition comments can be written for each student under the graph. This is helpful when compiling school reports for the student.

Whenever a guidance and counselling session occurs with a student it is important to record proceedings briefly in writing

6.7. Assignments, Homework and Tests

For this part, keep a record of each major assignment, each test you give, together with marking scheme. For tests, there is need to show an item analysis of the test items. The cognitive levels / domains being tested, the allocation of marking points and the test objectives must accompany the test. Your **test lesson plan** must appear together with other lesson plans in section B of your file.

In selecting test items do as much consultation of texts, examination reports and past examination papers as possible. You could also consult experienced teachers and get input from them.

6.8. University Handouts in Applied Science Education

Handouts from Advanced Pedagogics course should appear in this section of the file. Included also in this section should be all resource materials that can be filed.

The following is a list of some University Applied Science Education handouts which are helpful to your practice:

- Aims and Objectives
- Assessment and Evaluation
- Classroom Management
- Peer Observation Schedule
- Safety
- Teaching Methods
- Acts of misconduct
- Problem Solving
- Lesson Planning -mathematics
- Differentiation
- Media
- What is teaching?
- Teaching methods
- Lesson Presentation
- UoM-Scheme of Work Format
- Lesson Plan -Biology
- Lesson Plan -Chemistry
- Lesson Plan -Physics
- Lesson Plan -Geography
- Lesson Plan -Mathematics
- ASE supervision/assessment form

These handouts are not in your file to make it appear thick, but for you to refer to and help yourself in your planning and lesson presentation. The handouts should be referred too often and enable you to revisit and reflect on all the pedagogical principles covered during lectures at the university.

6.9. Records of Peer Observations

You are required to sit in teachers' classes at least **once** every fortnight to observe how others teach. As a result of this sit in, you should complete a lesson observation schedule. The more peer observations you make the more you can learn and develop your teaching skills and the better for you and the learner. At the end of your practice you are required to summarize your experience in peer observation on a page or two highlighting the major gains you made from the peer observations. Records of all peer observations should be filed in this section of your Applied Science Education file.

6.10. Supervisor's and Assessor's Schedule

During your Applied Science Education, you will be supervised/assessed several times by your university Applied Science Education lecturers. On observing your work, the supervisor/assessor will write down comments, suggestions, etc, in duplicate. The original copy is kept by the supervisor/assessor and the duplicate is the one you should file. Supervision/assessment is also going to be done by school authorities, Heads of Departments and Headmasters. The supervision/assessor will also produce his/her critique in duplicate with the original being posted to college. The duplicate is filed by you in this section. Supervision/Assessments reports by university Applied Science Education lecturers should be filed separately from reports by school authorities.

6.11. Miscellaneous

In this section the following should appear:
- Copies of regulations, for example, Public Service Regulations.
- Outlines of co-curricular activity participation
- Professional Associations Booklets etc.
- Examination papers and reports.
- Any other information relevant to your practice and to the profession.

7. THE ROLE OF THE MENTOR

Your mentor is one of the most important people in the school you will practice. Ideally the mentor is a qualified and experienced member of staff who will "show you the ropes." If you will think you are more 'learnt' than your mentor then you will be precluding yourself from learning what may be called 'tricks of the trade.' The mentor is the clinician and you will understudy how the theories learnt in the university are operationalised in the classroom. Therefore it is important that you establish a good professional relationship with the mentor, so that you can benefit; in some cases the benefit is mutual.

To this end you will, under the mentor's watchful eye, teach some or all of his/her lessons. It is important that you experience as much work as possible in this short time although you are still under tutelage. The mentor will guide you and supervise you in every aspect of your

professional practice. Discuss all professional matters with your mentor so you are guided in:
- the content to be schemed.
- the plans to be made.
- the detail to which you go.
- the assessment tools.
- how to mark.
- what practical work to do according to the scheme of work.

Remember you are simply going to be attached to the mentors and not to replace them. The free reign they may give you to make decisions will vary from place to place. At any rate it is important that you will be able to work as a self-starter rather than a 'pest' on the mentor.

You may not even have a mentor in your specific subject area and this should not stop you from operating because you are expected to be able to. There will always be someone to help you in your work. Remember, you can always contact other subject specialists or even the University for Help.

During your attachment to the mentor, he/she will be required to make constructive professional assessment of your work to be sent to university.

In the cases of the student-teacher being completely unprofessional and immoral, the mentor is expected to alert the head of the institution who will contact university immediately. It must be understood clearly that teaching is a very high responsibility and as such cannot be given to any undeserving person. Failure to comply with the expectations of the profession will mean that no matter how intelligent a student may be, the university will not be able to certify the student. Ideally, mentors should be able to give you a very useful and constructive induction into the profession; work politely and diplomatically with them.

8. COMMUNICATION WITH THE UNIVERSITY

Students will need to be in contact with the university for the entire period they are out on attachment. For all Applied Science Education matters, communication has to be done (in writing) through the ASE coordinator in the Education Department. Students will need to make sure that school lesson critiques are sent to the department. By the end of the term, the university must be in receipt of **six** copies of different school based lesson critiques in both subject areas. For all other issues pertaining to Applied Science Education, communication must be done in writing to ASE coordinator - Education Department, University of Mashonaland. Other matters should be addressed to relevant departments of the University.'

In the event of an emergency, students can phone the Department of Education but

communication in writing must still follow. The university will communicate with students through the Heads of schools in all cases of a professional nature. **All** students must make sure that their personal teaching timetables are sent to the university in two weeks of the start of the term.

The student cannot transfer to another school without the express authority of the university.

CONCLUDING REMARKS

By now, you have a good idea of how your Applied Science Education should be organized. Organize it in the way explained.

NB. IF THERE IS NO ASE FILE THE STUDENT IS MARKED AT ZERO.

Keep your file in a place convenient to you, and also where it can easily be reached even when you are not available at the school.

ENJOY YOUR A.S.E. LET IT BE A FRUITFUL LEARNING EXPERIENCE. SO GO AND EXPERIMENT USING DIFFERENT APPROACHES, METHODS AND TECHNIQUES TO BRING ABOUT EFFECTIVE TEACHING AND LEARNING. CONSULT EXPERIENCED TEACHERS AND BE ADVISED FRUITFULLY.

9. APPENDICES

      9.1 UoM Scheme of work format.

      9.2 Lesson Plan format.

      9.3 Supervision and Assessment instrument.
      9.4 Assessment of documents instrument

9.1 UoM Scheme of Work Format

l. Name of school:
2. Subject: _____
3. Level: _____ **Class(es):**_____

4. Particulars of student:
Give a brief outline of the students class by class. Your outline should include inter alia: composition of the class i.e. total in class, no. of girls, boys, average age, special cases, students' background etc.

5. Students' prior knowledge/ experiences
Give brief academic achievement students have made so far, for example, previous level students have completed. Mention skills students possess that will be built upon to develop new skills that are being schemed for. Indicate ability of students and possible teaching/learning methods that will be suitable for the class(es).

6. List of topics
Make your tentative time budget for the term in weeks/periods. This time frame work should account for the period you will be at the school. An example of the format is given below:

	Estimated duration
Coordinates and the straight line	2 weeks = 20 periods
Functions	3 weeks = 30 periods
Quadratic equations and complex numbers	1 week = 10 periods
TOTAL	**6 weeks = 60periods**

7. Concept flow chart
Make a concept flow chart that gives a logical link of the topics and major concepts to be covered in the term.

8. Scheme Aims
State the goals/aims of the schemes for the period schemed for. What cognitive, affective and psychomotor skills do you intend to develop in students for the period schemed. These should not be copied from the syllabus because this will be inferred as saying students have completed the syllabus and are ready to sit for the summative examinations at the level schemed. Wherever possible, link the aims with the topics schemed to show that you know when and how to achieve the stated aims.

9. Scheme Objectives
Scheme objectives are more general than the lesson plan objectives because they can be achieved after several lessons or weeks. A number of these scheme objectives may build one

scheme aim Again do not reproduce assessment objectives stated in the syllabus and claim that the fit the period you are scheming.

10. General Strategies

Give an outline of the general strategies that will enable you to achieve the goals you have stated in 7 and 8 above. Do not lose sight and contradict yourself with what you stated in 5 above. The strategies you state should utilize your knowledge of the foundations of education by showing a clear understanding of how you are going to cater for students' individual differences (differentiation) and -your understanding of the nature of the concepts you are going to develop in students. It is hoped that your perception of scientific knowledge and how it can be generated and validated will be shown here.

11. Main body

Week ending	Topic/ Content	Methods and Learning experiences	Resources i.e. media, apparatus, chemicals etc	References	Evaluation
14/02/10	The content given here should match the periods mentioned in 6. **, for example, Coordinates and the straight line** will have the following lessons: **Lesson 1** Coordinates **Lesson 2** Length of a straight line **Lesson 3** Mid-point of a straight line **Lesson 4** The gradient of a straight line **Lesson 5** Parallel lines **Lesson 6** Perpendicular lines **Lesson 7** Equations of the form $Y = mx + c$ **Lesson 8** Equations of perpendicular and parallel lines **Lesson 9** Points of intersection	State the general methods you will use to develop different concepts.	State the resources you will use to develop different concepts.	State at least 3 reference books to have evidence that you consulted and know many approaches to teaching the concepts on the topic.	You should highlight students' weaknesses and strengths on the topic. Identify specific concepts students found easy or difficult and suggest ways in which gifted students could receive extension work and weak ones remedial work. Make sure that your comments do not contradict your lesson plan evaluations and students mark lists.
21/02/10	Functions				

Your scheme of work should fit on double sheets spread out.

9.2 Lesson Plan Format

Name of student _____ School _____

Date(s): _____ Time(s): _____

Class(es): _____No. of pupils: _____

Topic: _____

Lesson Topic: _____

Lesson objectives: By the end of the lesson students should be able to:

i) _____

ii) _____

iii) _____

At least three objectives to cover the cognitive, the affective and the psychomotor domains.

Assumed knowledge: _____

Anticipated difficulties: _____

Media:
  i)   Apparatus:

  ii)   Materials (chemicals etc)

  iii)   Other media (work sheets, charts etc)

References:
1.
2.
3…

Lesson structure

	Content	Teacher activities	Student activities
Introduction (5 minutes	Motivate students to learn the new content and assess then" assumed knowledge.		
Step I (10 minutes)	i) Content to match objectives mentioned. ii) Math students' to show worked example of work to be covered in the lesson		
Step II			
Lesson closure (5 minutes)	i) Highlight major concepts covered in the lesson. ii) Check attainment of objectives		
Further student activities (I minute)	State extension work students are to do after the lesson to consolidate concepts learnt in the lesson		

Self-evaluation:

Comment on

i)   Suitability of the content planned and students' attainment of objectives of the lesson.

ii)   Give a reflective evaluation of the degree to which objectives were achieved commenting on suitability of teaching methods employed, degree of difficulty of questions, classroom management, (philosophical, psychological, sociological decisions and actions) made during the lesson etc.

iii)   Highlight professional strengths and weaknesses inherent in the lesson (admitting weaknesses should not be construed as failure, but acknowledgement of integrating theory with practice. This in fact depicts professional growth in the teacher learner.

iv)   Suggest ways of improving the same lesson anticipating that you will teach the same content to the same class

v)   Suggest ways of teaching the same content to a second class in cases where you teach two streamed classes.

vi)   Connect the current lesson to the next one.

UNIVERSITY OF MASHONALAND
ASE ASSESSMENT OF DOCUMENTS INSTRUMENT

Name of Student: _____   Reg. Number: _____   Class: ____ School:
_____ Date: _____
Subject_____ Topic: _____
_____ Mark Awarded: _____%

	Rate					Comments
	0	1	2	3	4	
Introduction						
Link to pupils' knowledge						
Appropriateness						
Lesson Development						
Questioning technique						
Communication						
Sequencing of content						
Mastery of content						
Student learning						
Differentiation						
Level of participation						
Classroom interaction						
Teaching strategies						
Media						
Suitability						
Effectiveness						
Learner explorations						
Classroom management						
Responsiveness						
Organisation						
Lesson closure						
Feedback						
Exploration						
Assessment of written work						
Frequency and effectiveness						
Test dossier						
Record of pupils' work						
Documents						
File appearance						
Lesson planning						
Clarity of objectives						
Lesson evaluation						
Schemes of work						
Total marks per column						

Key to Rating: 0 – no competence at all, 1-Poor, 2- Average, 3-Good, 4- Excellent

ASE ASSESSMENT OF DOCUMENTS INSTRUMENT

Name of Student: _____ Reg. Number: _____ Class: _____

School: _____ Date: _____

Subject_____ Mark Awarded: _____%

	0	1	2	3	4	**Comments**
Lesson Planning: (32)						
Relevance of introduction						
Clarity of objectives						
Sequencing of content						
Clarity of teacher activities						
Pupils' activities/experiences						
Suitability of teaching strategies						
Media selection						
Format and frequency of lesson planning						
Scheming: (20)						
Clarity of scheme aims and objectives						
Specification of content/ lessons						
Methods and learning experiences						
Resources-suitability to concepts						
References-variety and relevance						
Assessment & Evaluation (24)						
Test designing and marking						
Assignments and marking						
Remedial work						
Extension work						
Pupils' mark profiles/ reports						
Records and evaluation of peers						
Reflective Practice: (20)						
Depth/ scope of lesson & scheme evaluations						
Assessment of attainment of objectives						
Highlight of weaknesses/strengths in lessons						
Suggestions for improving on basis of evaluation.						
Evidence of use of feedback from evaluation						
File Appearance: (4)						
Relevant sections and contents						
Total marks per column						

Appendix I-L4: Full interview with L4 showing coding

Quotation	Subcategory	Category	Theme	ID
I think teacher training should be placed at the centre of all teaching and learning	Training teachers is centre of all teaching and learning	teacher training	UAS-object	L4_f
because I believe the kind of learning that we desire to see in schools depends on a very large extent on the kind of teacher or facilitator of learning	Teachers determine the quality of learning in schools	teachers support students' learning	SAS-tools	L4_f
University and college life or rather teaching at college and university ee-ee demands two different types of personality or ways of looking at life	Teaching university student is different from teaching college student	student teacher	UAS-subject	L4_f
The college student is more of a learner... is one who takes instruction, who follows what the lecturer or tutor says	College student is a learner	student teacher	UAS-subject	L4_f
But I think it is at university where now the critical aspect of the student is paramount. You are trying to reach a student who is a critical thinker, who can look at life and question things which can be looked at and thought to be true	University student is a critical thinker	student teacher	UAS-subject	L4_f
I believe that, personally the role of teacher education is not necessarily to occupy the student with content but how to facilitate...	Some teacher educators do not see their role as teaching content	subject matter knowledge	UAS-object	L4_f
at times I think there is less emphasis on pedagogy and more on the subject matter. I think there is that tension	Some teacher educators emphasize subject matter knowledge more than pedagogical knowledge	SMK versus PCK	UAS-object	L4_f

So you find that there is a situation where my colleagues might think that eee-ee they are better off emphasizing content aspect, the knowledge aspect for purposes of general knowledge and not necessarily how to teach	Some teacher educators emphasize subject matter knowledge more than pedagogical knowledge	SMK versus PCK	UAS-object	L4_f
I think that tends to be always there but we need to narrow our focus and agree that our core business is to help students learn to teach	Some teacher educators see their core business as teaching how to teach and not content	pedagogy	UAS-object	L4_f
I still believe that placing equal emphasis from the word go, placing equal emphasis in our interaction, not underplaying one aspect over the other. Not underplaying education courses at the expense of the hard science courses	Some teacher educators would like to place equal emphasis on subject matter knowledge and pedagogical knowledge	SMK versus PCK	UAS-object	L4_f
It is sad scenario. I think probably they learning that one aspect of being a teacher is not as important as the other aspect	Some teacher educators think that students learn that subject matter knowledge is more important than pedagogical content knowledge	SMK versus PCK	UAS-object	L4_f
Because a teacher ... definitely a teacher must have content but the teacher must also be able to facilitate the students to acquire the content which, I think is more important because often times people think that they can simply read books and get the knowledge	Some teacher educators see pedagogical knowledge as more important than subject matter knowledge	SMK versus PCK	UAS-object	L4_f
I think teaching is more than content absorption	Being a teacher is more than knowing subject matter knowledge	SMK versus PCK	UAS-object	L4_f

We must see someone's artistry and that must be facilitated to develop. I think is important that we emphasize this	Teaching is an art	helping students to develop as individuals	UAS-tools	L4_f
Let me start by telling you what I hope I do not do. I hope in my lectures I do not stand there and pretend that I know everything and that my students are simply there to absorb what I say	TE must not pretend to know-it-all	specialism	UAS-subjects	L4_f
I think my job is, what I try to do is to provoke my students into learning. Yes they might not know what to learn but then my job is to expose them to possibilities that they have, that they should explore	TE has a job to motivate STs to want to learn	helping students to want to learn about teaching	UAS-tools	L4_f
I think my job is to enable them to learn how to teach by leading them to sources of literature,	TE has job to lead STs to resources	helping students to get resources	UAS-tools	L4_f
by creating activities that might enable them to want to learn more.	TE has job to lead STs to resources	helping students to get resources	UAS-tools	
I think more importantly, I have always said this, that the critical student can only be produced by critical teaching.	critical teaching	supporting students to develop critical thinking	UAS-tools	
In my lessons I tend to emphasize critical thinking	critical thinking	supporting students to develop critical thinking	UAS-tools	
Eeee-e! Yes. I think one thing we talked about is something lacking, not because of anyone's fault in particular or incompetence. I think it is something which we overlooked: our orientation in teacher education	Some teacher educators think the university has not defined the kind of teacher it wants	undefined kind of teacher	UAS-object	L4_f
I understand that we need awareness, consciousness that a teacher educator has vis-a-vis what we do. In other words what kind of a teacher do we aim to produce?	Some teacher educators think the university has not defined the kind of teacher it wants	undefined kind of teacher	UAS-object	L4_f

As a department we may have a mission statement, but I do not think it translates into our activities, into our courses. When I look at our courses I ask myself what kind of a teacher is targeted. I do not know what to do at the moment but it is an area I would want to see being addressed	Some teacher educators think that the mission statement has not been translated into teaching activities	mismatch between mission and teaching activities	UAS-object	L4_f
Yes. If we are conscious of that, then we should be able to answer and say this is what we do to produce that kind of teacher. I think our efforts become more focused	Some teacher educators think the university documents describe a teacher who knows content	academic orientation	UAS-object	L4_f
Of cause the outcry is that there is a shortage of books and we have a shortage of resources	outcry for books	economic	UAS-tools	L4_f
But I think it's more to do with our inability to use those resources that are available effectively, even more important to effectively, even more important to make these available to students	inability to use resources effectively	human	UAS-tools	L4_f
Lecturers may have more access to books which they keep to themselves. But, I mean these are of no use if they do not get to students. I think it is important that we empower students by giving them access to resources	inability to use resources effectively	human	UAS-tools	L4_f
In my lecture they come prepared to say something, not just out of textbooks but to think through, to reflect on whatever topic we are looking at	STs encouraged to think through	reflecting	UAS-learning	L4_f
Often I tell them well in hand what we are going to do and they come prepared to participate, to criticize what others and I have say and also to give their own views	STs come prepared to participate	discussing	UAS-learning	L4_f
At the end of the day I want my students to think that they understood a concept because of their own effort	student own effort	discussing	UAS-learning	L4_f

I must confess that initially when I got here I was given more of the lecture method. I think I got the impression that I must be seen to be lecturing	more of the lecture method	lecturing	UAS-learning	L4_f
But I soon realised that lectures, in fact they are very boring by nature. You cannot imagine a 2-hours long lecture and one has to listen throughout	lecture not the best	lecturing	UAS-learning	L4_f
So what I normally do is to structure my teaching content into topics, sub-divide topics and give these to my students well in advance. I ask them to make short presentations followed by quick mindful discussions and rounded up by establishing a position or by not establishing a position at all. In other words some issues can be left for further inquiry	presentations followed by discussions	discussing	UAS-learning	L4_f
Traditionally students I think they learn in the lecture, in the library, and when they are reading. I would also think those are the major areas but we encourage students to learn cooperatively informal groups, that they form	learning everywhere	learning sites	UAS-learning	L4_f
I also think they learn as they are in places of residence as they discuss in small groups	learning in social settings	learning sites	UAS-learning	L4_f
I think and hope my students leave with that desire to learn more and that desire to learn beyond the textbook	desire to learn beyond the textbook	motivating	object	L4_f
Because they always in the lecture try to go beyond the classroom and to see that whatever we say in the lecture room is not always fruitful if it is not transferred to the outside world	go beyond the classroom	transferring	object	L4_f
Lastly teacher education is about maximising students' learning, because, I think that students' learning, not teacher teaching, is at the centre of formal education inclusive of teacher education	maximising students' learning	student learning	object	L4_f

This is particularly true in Zimbabwe at the moment where the country is losing experienced manpower to other countries because of economic hardships. The sum total of such changes may be reflected in the quality of teacher preparation and hence in the calibre of the resultant teacher	changing quality of lecturers	resourcing teacher education	subject	L4_f
However the assessment instrument can put some restrictions on the parameters I may think should be included in the assessment	being restricted by supervision instrument	agentic action	practice	L4_f
Aaah, that is an interesting area, in that it gives students opportunity to translate… university experience through the theories taught into the real world of teaching... the theories they learn into practice during teaching practice	translating theory	applicative	practice	L4_f
What normally happens is that when we send our students to teaching practice we refer to it as Applied Science Education	teaching practice	naming	practice	L4_f
We first of all empower them by making available to them all materials and instruments which they require to scheme, plan and draw out all the daily activities that are part of classroom life	empowerment with decision making tools	preparation	practice	L4_f
When they go or they are assigned to mentors, who make sure that they have lessons and classes	assigning STs to mentors	mentoring	practice	L4_f
They teach classes normally for 12-13 weeks that is the length of our practicum	live teaching	teaching	practice	L4_f
The ideal situation is that they will be under a mentor. The reality on the ground is that half the time they are on their own	ideal mentoring	mentoring	practice	L4_f

They are in their own because the mentor might not take as much interest in them as we here at university might want. I think the reason that inhibits mentors is that there is no recognition of any form that is accorded to the mentor being by way of small stipend or remuneration or by other means	not recognising mentors materially	mentoring	practice	L4_f
So really it becomes ... it ends being ceremonial mentoring	no mentoring	mentoring	practice	L4_f
I personally try ... each time I go out there I first of all I try to get hold of the mentor, and thank him/her for the contribution they make. Sometimes that is the only acknowledgement that we can give them. I think they also appreciate it	TE acknowledging mentor role	TE_mentor relationship	relationship	L4_f
I believe so. I think that is one area we need to sit down and talk about. Even to the extent of acknowledging that the mentors out there are part of the team. They are to a very large extent	TE acknowledging mentor role	TE_mentor relationship	relationship	L4_f
Generally we have cordial relationships with schools because very few schools would decline to host our students. They, schools, think thank our students are hardworking	cordial relationships	SCH_UNI relationship	relationship	L4_f
Yes we do. One way we do so is to make expectations available to schools in the documents that we have... the ASE handbook	using ASE handbook to communicate expectations	SCH_UNI relationship	relationship	L4_f
I think that is one of the problems: where half the time we have assumed that since all schools use Public Service Regulations we know their expectations. Yet each school is unique: has got its own ethos, which we need to know	knowing typical SCH yet each school as unique	SCH_UNI relationship	relationship	L4_f
I would probably suggest that we have a sit in with the school and administration before we even or soon after sending our students to the school	knowing SCH through communicating	SCH_UNI relationship	relationship	L4_f

We then put our cards on the table and let our expectations be known, also get to know their expectations	being open	SCH_UNI relationship	relationship	L4_f
It behoves teacher educators to actively engage these other contributors	TEs engaging others	collaborating	relationship	L4_f
In my view, the tendency has been to denigrate or at least underplay the role that could be played by the other parties I have mentioned	TEs not seriously engaging others	collaborating	relationship	L4_f
In fact our students are expected to comply with Public Service Regulations	complying with Public Service Regulations	professional conduct	rules	L4_f
The schools that serve us are quite conversant with Public Service Regulations. We also try to meet them half way	knowing regulations	professional conduct	rules	L4_f
Well punishing becomes a relative issue in the sense that because there is a framework and if one is found not to be within the framework he or she is deemed not to have done what is expected. That is the kind of thinking because students are expected to have lesson plans at least for a number of lessons. If a supervisor comes and finds out that the student does not have lesson plans then the student may be penalised in that particular aspect of lesson planning	ST penalised for no lesson planning	planning	rules	L4_f
(laughing) It is very interesting and it has happened. It happens with some students. The position is that if there are no lesson plans then there is no teaching, or whatever the student is doing does not count. Well, I think this is the position	no lesson planning means no teaching	planning	rules	L4_f

I would like the situation where a degree of flexibility is allowed. Sometimes a student could be in a situation where he could not plan, which is very extreme, perhaps he had to go away and attend to social problems for the last 2 days. Then perhaps we could understand that and we do not credit anything for lesson planning for as long as it planning only and perhaps this only time it comes	allow degree of flexibility	planning	rules	L4_f
Yes they have to tell us and must have documents to substantiate their claims. If we do not do so some students are likely to take advantage and simply tell as stories that they did not get chance to plan. So as long as there is a document to support a student's situation	STs need to produce documentary evidence to substantiate claims for not planning	documentation	rules	L4_f
I think all is fair as they say in "All in love is fair"-Steve Wonder	both ST and TE using	users	rules	L4_f
I think after all one of the best ways to teach someone is by doing. What they see me do with them in the lecture creates a more lasting impression on them. They are going to try to emulate the way I do. If I am inclined to teach using lecture method, they are likely to do the same. I think at any level learning is easier done when one is looking at something	modelling good practice	modelling good practice	learning	L4_f
Well ... briefly I am a lecturer in this university ... Bindura University of Science Education	I am a lecturer in this university	identity	subject	L4_f
I lecture in curriculum theory, research methods and eee-e take courses in pedagogics	I lecture in curriculum theory...	identity	subject	L4_f
So in turn the teacher educator should play a central role. I thought I could make a contribution	I thought I could make a contribution	career choice	subject	L4_f
I *(pause)* became a teacher for a number of reasons	for a number of reasons	career choice	subject	L4_f

One of them is that I love to see people learning and I think teaching places one in a better place to help people learning	help people learning	career choice	subject	L4_f
Because I think learning is life or part of life and so I get involved not only in my life but in other people's lives. I think I can make a difference	make a difference	career choice	subject	L4_f
One reason is economic. As far back as we can tell... teaching used to be attractive, not very lucrative but it kept one with provisions of basic needs and it was the only viable alternative route to employment. That is way most people became teachers	route to employment	career choice	subject	L4_f
A few may have become teachers because of the intrinsic love of teaching	love of teaching	career choice	subject	L4_f
I came here five years ago now. I came from a teachers' college where we were training teachers at diploma level	training at diploma level	work experience	subject	L4_f
Coming to university was not really an extension of college although I may have thought at one point it was a mere extension	university not extension of college	work experience	subject	L4_f
Aaa-ah! However I still think that I brought something useful ... the experience I had training, supervising students especially on teaching practice, and also in general organisation of teaching and learning. I think eee-ee a very strong component of teaching practice, is one think I brought to BUSE	supervising, training and organising skills	work experience	subject	L4_f
I am coming in, yes I have a background in science, but here I am mainly engaged in curriculum instruction	a background in science	entry qualifications	subject	L4_f
I think it is also an issue of attitude	Attitude	attitude	subject	L4_f
I think there is that aspect of the personal attitude of the teacher, and of cause what I might call .... I think there is this idiosyncratic attitude that must be seen	idiosyncratic attitude	attitude	subject	L4_f

Eeee-e! Yes that is a very interesting question which I think ... requires a follow up. The model that we espouse in the department is undefined. We have not been able to pronounce the kind of teacher we want to produce	undefined TE model	kind of teacher	TE-model	L4_f
Perhaps I am sure we need to define our area of interest. What is our strength as a department? What kind of teacher are we trying to produce? Are we trying to produce a practitioner, an academic, or a critical thinker?	need to define area of interest	kind of teacher	TE-model	L4_f
Well we have not said any in as many words. But if you look through our documents you may perhaps see that we are implying not one orientation. I think we are trying to go for the reflective teacher, because we emphasize this end in assessment and evaluation of ASE	not one orientation in documents	kind of teacher	TE-model	L4_f
I may not go through each course. But I think I am more on the professional aspect. I think our aim as teacher educators is to teach our students, not to teach but rather to help them learn how to teach and how to interface, how to facilitate learning	more on the professional aspect	relevance	theory	L4_f
To date I have taken courses at undergraduate level in research methods and this means exposing them to research paradigms, research designs. But I think to help them in research, by helping them to come up with research topics and literature search lists primarily of methods in the course. But primarily I hope as a tool they can use	teaching research	researching	theory	L4_f
I do but I always wish I could do more	Researching	researching	theory	L4_f
My areas of interest are in assessment, and of course issues that have got to do with learning, all pedagogical issues-teaching and learning issues	areas of interest	researching	theory	L4_f

No. Although that is one area I think still I can make a contribution	writing materials for SCH still unexplored	researching	theory	L4_f
Aaaah! Mmmmm! Let me start with support that they can get at institutional level. I am thinking of the library of course we still need more books, the Internet, the computer laboratory. I also wish they could have more access to computers and Internet	supporting with reading materials	institutional level	tools	L4_f
At a personal level I tend to support my students by directing them to resources. I access the Internet regularly. I also download materials from the Internet. Even personal books that I have I make them available to my students	supporting with reading materials	support from TE	tools	L4_f
Yes! It is important. It is some form of empowerment. How do you expect students to learn when there are no resources	support as empowerment	empowering	tools	L4_f
The ASE handbook is something akin to a manual which give guidelines on how to carry out those cardinal activities. It is not itself prescriptive but it sets out a frame along which a student ... for example he or she would know how to scheme and plan. We have tried to match those guidelines with examples. We have also included in the handbook how we are going to assess teaching practice, the competences, and the criteria for assessing these. So that the agency is clear	guiding STs in handbook	documentation	tools	L4_f
I think that theory informs practice in that what the student teacher learns as theory can and should be used to guide practice	seeing theory as guiding decision making	informed decisions	T-P interplay	L4_f

Are you able to do things you feel you should do? As a teacher educator, there is an extent to which I have autonomy in terms of doing things I feel I should do	Teacher educators have autonomy to decide grade to award a student during teaching practice	assessment	SAS-practice	L4_m
For example, I can make my own observations about a student's performance and decide what grade to give without having to consult with a colleague or any other person	Teacher educators have autonomy to decide grade to award a student during teaching practice	assessment	SAS-practice	L4_m
For example, I can make my own observations about a student's performance and decide what grade to give without having to consult with a colleague or any other person	Teacher educators have autonomy to decide grade to award a student during teaching practice	assessment	SAS-practice	L4_m
I think this is important because preparing teachers is not the same thing as preparing truck drivers	Teaching is more than competences	assessment	SAS-practice	L4_m
What changes occur? Changes do occur over time in any situation. These may be with respect to the quality of student teachers in terms of their qualifications, age and experience	STs changing in various dimensions	biographies	change	L4_m
There may also be changes in the level and experience of teacher educators	differing experiences	biographies	change	L4_m
What is teacher education for? The main goal of teacher education, in my view, is to prepare pre-service teachers to become teachers	preparing teachers	preparation	object	L4_m
It is recognition of the idea that people can be deliberately and formally assisted to become teachers	TE makes a difference	TE matters	object	L4_m
It also encompasses practising teachers who may need to enhance the effectiveness of their practice as teachers	in-service training to improve performance	student learning	object	L4_m

all have an input directly or indirectly in the quality of preparation of the teachers and hence in the calibre of the teacher produced eventually	actors with common goals	synergy	object	L4_m
Practice on the other hand is what the teacher does and how he/ she does it, so that learners can learn effectively	defining practice	teaching practice	practice	L4_m
I also think that practising teachers who participate in teacher preparation as mentors should be considered as 'off campus' members of the department of teacher education/education as the case may be	mentors as TEs	partnership	practice	L4_m
To this end there is a limitation. On the whole, however, I feel that as a teacher educator I am not under undue pressure to conform to a rigid format of teaching or assessing	being free to make decisions	agentic action	practice	L4_m
Are there any awkward contradictions? Some contradictions do exist and arise especially in the assessment of student teachers during their practicum	believing there are contradictions	contradictions	practice	L4_m
The assessment that seems to carry more weight is that carried out by university or college lectures that may make two or three occasional assessment visits	UNI supervision carries more weight	weighting	practice	L4_m
Assessment made by school mentors, head/deputy head are not accorded significant weighting, if at all	not using school supervision	weighting	practice	L4_m
This is a contradiction in that the student teacher spends far more time with mentors and heads than with the university/college lecturers	STs spending most time with mentors	weighting	practice	L4_m
and yet the assessment of what occurs everyday is based on snapshot assessment done in the course of one hour or less	TE making snapshot assessment	weighting	practice	L4_m

How do school and university relate? The school provides the setting or context in which student teachers practice their teaching	using schools for practice	SCH_UNI relationship	relationship	L4_m
It should not only be awareness of such goals and objectives, but an acceptance, or sharing, of the same goals	sharing same goals	SCH_UNI relationship	relationship	L4_m
This is imperative if the teaching practice is to be effective. As such universities need to ensure that schools which accept to host student teachers are 'taken along' and are quite conversant with their expectations	ensuring schools are "taken-along"	collaborating	relationship	L4_m
the university or college where student teachers are enrolled, the schools where they do their practicum (i.e. teachers and administrators in those schools), the parents of the learners and community/society at large,	partnership community	partnership	relationship	L4_m
all have an input directly or indirectly in the quality of preparation of the teachers and hence in the calibre of the teacher produced eventually.	ensuring schools are "taken-along"	partnership	relationship	L4_m
Heads, teachers, pupils and other interested parties in the school need to be aware of the objectives the university has in the process of teacher preparation	people in SCH knowing UNI objectives	SCH_UNI relationship	relationship	L4_m
Are there any helpful synergies? There are, in that the university or college where student teachers are enrolled, the schools where they do their practicum (i.e. teachers and administrators in those schools), the parents of the learners and community/society at large	key actors in different settings	community	subject	L4_m
Some intakes may have students with better entry qualifications than others	differing cohorts	entry qualifications	subject	L4_m
The teacher education programme that we offer here is in two parts.	two thrusts-in two parts	concurrent	TE-model	L4_m

We have got the content area where the student's subject could be Biology, Chemistry, Mathematics or Physics, Geography or Computing Science.	subject matter knowledge	concurrent	TE-model	L4_m
Alongside that we have got pedagogic content knowledge, where the students are taught about what learning is all about and how to impart content that they have. Basically those are the two thrusts we have here	pedagogical knowledge	concurrent	TE-model	L4_m
How do theory and practice relate? Theory in teacher education refers to pedagogic content i.e. the repertoire of cognitive knowledge student teachers need to have in order to practice effectively as teachers	defining theory	theory content	theory	L4_m
Such knowledge includes facts, ideas, theories about how learning occurs, how concepts are formed, how the context of learning can be facilitated etc	defining theory	theory content	theory	L4_m
This is notwithstanding the fact that practice can and does inform theory or the trend along which theory develops	practice informing theory	understanding	T-P interplay	L4_m
What one observes during practice can generate theory	practice generating theory	understanding	T-P interplay	L4_m