A Case Study of Science Student Teachers' Experiences of Teaching Practice in the Faculty of Education of University of KwaZulu-Natal in 2005

by

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ABSTRACT

The study aimed at exploring science student teachers' experiences of teaching practice and in particular, it focussed on five areas related to: (a) the science student teachers' practices and views of teaching practice; (b) the science student teachers' benefits and skills acquired from teaching practice; (c) the help and support they receive from both the supervisors and the mentor teachers and; (e) the science student teachers' views of how the teaching practice could be improved.

A pragmatic, mixed method approach to research was adopted. In order to gather data to answer the research questions empirical research in the form of a descriptive case study was carried out. This case study was conducted on the science teachers' experience of teaching practice for the academic year of 2005. Data were collected from participants in the teaching practice programme at Edgewood campus using a questionnaire supplemented by interviews, observations and documents analysis. Sixty science student teachers doing Bachelor of Education 2nd, 3rd and 4th year and the Postgraduate Certificate in Education, completed and returned the questionnaire and seven of them were interviewed. In addition, four mentor teachers and five university tutors were also interviewed and twelve students were visited in their host schools.

Among others it was found that: student teachers reported that they felt adequately prepared for the range of activities they were involved in during teaching practice, their expectations of practice teaching were met, and they had a positive view about the general learning and administrative environment of the schools. They reported using a number of different teaching methods but the direct teaching method was still predominant with the textbook being used as the main teaching resource but

a positive indication was that over half the students indicated that they attempted something different or new during teaching practice mostly on their own initiative.

When asked for detail about the skills they gained from teaching practice they reported benefits in terms of improved teaching techniques and methods, dealing with learners and classroom management. There was no one single benefit that stood out but rather a number of different benefits for different students. Generally females were more positive than males, there were very few differences between the year groups and the mentor teachers were seen to be more supportive than the university tutors. However, there were a small but significant number of students who indicated having not been supported or having gained any benefit from their mentor teachers or university tutors.

This study also revealed that the critical triangular working partnership involving student teacher, university supervisor, and mentor teacher was problematic and needed to be reviewed. When asked to make suggestions for change, a number of recommendations were made such as: the teaching practice was too short and needed to be increased; the organisation of teaching practice needed to be improved and; the schools need to give better status to students on teaching practice. However, when asked to rate their overall experience of teaching practice experience almost three quarters of the students indicated that they had at least a satisfactory experience.

PREFACE

The work described in this thesis was carried out in the School of Science, Mathematics and Technology Education, University of KwaZulu-Natal, from July 2005 to March 2006 under the supervision of Prof. Paul Hobden and Mrs. Thelma Rosenberg.

This study represents original work by the author and has not otherwise been submitted in any form for any degree or diploma to any tertiary institution. Where use has been made of the work of others, it is duly acknowledged in the text.

LEON R MUGABO
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LIST OF ABREVIATIONS

B.Ed.	Bachelor of Education
PGCE	Postgraduate Certificate in Education
FET	Further education and Training
ITE	Initial Teacher Education
OBE	Outcomes-Based Education
STS	Science Technology Society
UKZN	University of KwaZulu-Natal

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It gives me a sincere pleasure to thank each of the many people who in one way or another contributed to the completion of this degree and therefore this study.

First of all, the RPF without its endurance and determination I would have been in exile for ever and then, the Government of Rwanda without its commitment to overcome the subsequent scars left by the 1994's genocide, I could not have been able to pursue my studies.

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Last but not least, thanks to all 2005 science Masters of Education students. It has been a pleasure knowing all and each of you. May God bless you in your future endeavors.

DEDICATION

This work is dedicated to my lovely wife and children for having endured my absence for two years without complaining or displaying the sadness they had during my sojourn very far away from them. May God strengthen you.

CHAPTER 1

INTRODUCTION

This introductory chapter presents an overview of the context of the study. It introduces the research by giving the background to the study, describing the rationale of the study and presenting the questions which the research focussed on. Several concepts with specific meaning in the present study are then defined and the chapter ends with a short section dealing with the structure of the thesis.

1.1. BACKGROUND OF THE STUDY

At the University of KwaZulu-Natal (UKZN), among other subjects, the student teachers in the Faculty of Education must complete modules in teaching practice at selected school sites. The duration of teaching practice differs depending on the year of study and their programme of study e.g. there are different requirements for the four year degree of Bachelor of Education (B.Ed.) and the one year Postgraduate Certificate in Education (PGCE). Currently the Faculty of Education is reviewing teaching practice and is putting significant efforts into its organisation to enhance the quality of the supervision and mentoring provided to its students during this time. This fits with the goal of the Faculty to focus on the graduation of highly qualified competent teachers as South Africa still has a large number of under qualified and inexperienced teachers who lack both the subject knowledge and appropriate classroom teaching and management skills (Morar, 2002).

Teaching practice is widely recognized as a pivotal part of the professional development of teachers and many writers agree that it must be maintained as an integral part of pre-service teacher education programmes. For example, Thoman (as cited in Hanson & Herrington, 1976) argues that what does seem to be agreed is that teaching practice is direct experience involving face-to-face confrontations in actual occupational settings and so is seen as more valuable than academic experience alone. For Elliot (1984), teaching is a practical activity and the practical skills involved in teaching can only be acquired by the student teacher attempting to do the job in the

work situation i.e. in the school. Teaching practice is an opportunity for student to try out who they are as professional educators. Furthermore, Sund and Trowbridge (as cited in Brown & Nacino-Brown, 1990), sees teaching practice as designed to smooth the transition from the role of student to that of teacher. As a medical surgeon or an electrical engineer have to put into practice, at some point in their training, what they have learned in theory before they can be considered qualified for their professions, so too, teachers have to practise teaching in front of actual students before they can begin to be considered as qualified teachers (Brown & Nacino-Brown, 1990). At the same time, the requirement of the compulsory teaching practice modules gives to the teacher training institution an opportunity to evaluate the student's teaching capabilities.

In the context of this study which focuses on the science student teachers' experiences, teaching practice should be placed in the general context of the professional development of science teachers as described in the National Science Education Standards of the National Academy of Science of USA (2005). According to these standards, becoming an effective science teacher is a continuous process that stretches from experiences in undergraduate years to the end of a professional career, with teaching practice taking place during each of these undergraduate years. In South Africa, the Norms and Standards for Educators (Department of Education, 2000), a national government policy document, requires teachers to have a number of competencies including practical competency and this can only be acquired through good training which includes teaching practice in an authentic school context.

de Feiter, Vonk and Van den Akker (1995) indicate that to ensure successful development in education, teachers need to play an important role in defining both the goals, the content and the implementation of the required innovations which have occurred in the science curricula during the three last decades in Southern Africa educational systems. However, poorly trained teachers cannot cope with the responsibility to implement the curriculum into their local situation for they need a set of instructions about what to teach and how, while well-trained teachers can be made co-responsible for that implementation because they have the knowledge and skills to adapt the curriculum to the local situation. In addition they can, within a given context, handle the responsibility for their own further development as professionals. Consequently good quality teaching practice is a vital part of the professional development.

1.2. RATIONALE OF THE STUDY

There are a number of considerations which motivated me to undertake this study. Firstly, in my capacity as a science lecturer at the Kigali Institute in Rwanda and as a research student at the University of KwaZulu-Natal, the comments I heard from the student teachers themselves made me aware that their teaching practice experiences vary greatly. I gathered that for many of them teaching practice is seen as, among others, very demanding, or restricting, or annoying, while for some it is just a requirement of the degree. For some the experience is not positive to the extent that they do not want to teach once they have completed their degree. Perhaps this is due to the critical comments made to them during practice teaching, or other negative comments made about teaching in general. This arises according to Moletsane (2004) because in South Africa, "every individual and group feels entitled and qualified to criticise teachers' work ..... South African teachers' emotional and mental well-being continues to take hammering from different sectors of our society" (p. 204). Secondly, perhaps due to the shortage of staff, the supervision provided does not appear to help the student teachers enough during their teaching practice. The supervision might just consist of two or three classroom observations for assessing the student teacher and is not always aimed at advising towards improvement. Thirdly, in some schools the mentor teachers use the teaching practice as an opportunity to rest or to do something else instead of staying beside the student teacher to assist where necessary. Of course in the worst case, some mentor teachers are under-qualified in the science specialist subjects and they cannot provide any help to the student teachers. Fourthly, teacher preparation programmes have long been the subject of criticism for failing to look beyond the immediate tasks of preparing teachers (Adams & Krockover, 1997) including the accusations that pre-service teacher education programmes are stagnant, ineffective, and not responsive to the changing needs of future educators (Schnur & Golby, 1995). Such critics have even gone as far as to suggest that pre-service teacher programmes are of so little value and that they should be abandoned entirely (Yager as cited in Adams & Krockover, 1997). Thus, given the facts that the teaching practice itself is part of these programmes and that it is now recognized that science teacher preparation is a pivotal aspect in the reform of science education, it appears a necessity to investigate the benefits future science teachers get from teaching practice.

Besides these reasons, I have been also motivated by my own experience. As a science lecturer in an institution of teacher training where the teaching practice supervision is part of my duties, I wanted, as part of my own personal professional development, to reflect and to deepen my understanding of teaching practice. By so doing, it will improve not only my current understanding as a Masters student but also my professional skills.

For all these reasons, it is considered worthwhile to find out the ways in which science student teachers benefit from teaching practice and what kind of help they get from their supervisors and mentors during this phase of their professional development. Furthermore, because science teacher preparation cannot be viewed as discrete and separate from the whole science enhancement (Brunkkhorst, Yager, Andrews, & Apple, 1993), there is clearly a need to add on the existing studies in the area of science teachers' pre-service training one that focuses on the science student teachers experiences of teaching practice.

In the light of the above considerations the purpose of this study is to investigate the science student teachers' experiences of teaching practice. The findings of the study, besides deepening our understanding of how teaching practice contributes to science teachers' development, will be useful to all participants involved in science teacher education including: (a) the Faculty in general and the teaching practice office in particular who are responsible for the organisation, the implementation, the follow-up, and the improvement of the teaching practice, (b) the student teachers as actors and beneficiaries of teaching practice, (c) the supervisors and the mentors, and (d) the science education research in deepening the understanding of role teaching practice plays in science teachers' pre-service training.

1.3. RESEARCH QUESTIONS

In the field of research, a research question is compared to the engine which drives the train of inquiry and should be formulated in such a way that it sets the immediate agenda for research, enables data to be collected and permits analysis to be started (Bassey, 1999). Also the research question identifies actions to be taken by the research and when each should happen. Although it is obviously expected that research questions

could be modified or replaced as the inquiry develops, in the words used by Bassey (1999), "without them the journey will be slow and chaotic" (p. 67). By undertaking this research, I intend to answer the following main question: *What are science student teachers experiences of teaching practice?* The associated sub-questions that will be answered are :

1) What do science student teachers do in teaching practice?
2) What do science student teachers benefit from teaching practice?
3) How are they helped and supported both by their supervisors and mentor teachers?
4) What ways do science student teachers feel that teaching practice could be improved?

In this study a pragmatic, mixed method approach to research (Johnson & Onwuegbuzie, 2004) was considered to be consistent with the purpose of the research and was adopted. It was felt that the most suitable way of approaching the research questions was to do empirical research in the form of a descriptive case study. Multiple sources of evidence producing both qualitative and quantitative data were used. The main data collection instruments were a questionnaire, interviews, observation and documents analysis. A questionnaire was administrated to science student teachers while semi-structured interviews were conducted with only few students, university tutors, and mentor teachers. After collecting all data, their analysis and interpretation allowed the researcher to answer the research questions.

1.4. DEFINITION OF TERMS

According to Firestone (1987) the words of everyday language are rich in multiple meanings and like other symbols, their power comes from the combination of meaning in a specific setting. In education specific terminology and concepts usually have specific meaning according to the context. Below some concepts associated with the objects to be studied in this study are defined.

1.4.1. Teacher education

According to Rowntree (1981) this term is wider than teacher-training in that it includes not simply a teacher's vocational training whether initial, pre-service or subsequent in-service training, but also whatever general post-secondary education the teacher has that contributes to his/her growth as a person regardless of the study of one or more academic disciplines as well as educational subjects and supervised-teaching practice. In the context of this study, teacher education will have this broad encompassing meaning.

1.4.2. Teaching practice

This term refers to a period of time during a student teacher's undergraduate course devoted to gaining classroom experience and that the length varies according to the type of course. During the teaching practice, assessment of performance is carried out by supervisors in conjunction with the school. Rowntree (1981) defines the term "teaching practice" as a part of professional training of a student teacher in which he spends a period in a school teaching but with some guidance and supervision from and/ or school staff. For the purpose of this study, teaching practice is understood as that period spend by a student teacher in an actual classroom situation in order to practise teaching skills under the supervision of a university tutor and /or a mentor teacher.

1.4.3. Student teacher

The simplest definition of student teacher is a student who is learning to teach or who is going through a teacher training course. This term designates a person undertaking a course of training to become a teacher but it is also used to indicate the status of such a person whilst undertaking teaching practice in an institution (Gordon & Lawton, 1993) aiming at becoming a qualified teacher. A student teacher is also a trainee teacher, particularly when engaged in teaching practice in schools.

1.4.4. Supervisor

The dictionary of education defines a supervisor in two ways. Firstly, a supervisor is a teacher in higher education who advises and monitors the work of research student by providing help and support to enable the student to complete the research and produce a thesis to the best of the student's ability. Secondly, a supervisor is a university tutor or a teacher specifically employed from a school who is supervising

the work of a student teacher on teaching practice. It is in this second view that the term is going to be used. A 'specialist supervisor' is a tutor with specialisation for the subjects taught by the student teacher.

1.4.5. Mentor teacher

The term "mentor" refers to a trusted and friendly adviser or guide, especially of someone new to a particular role. In the context of this study, the mentor teacher is a teacher in a school who supervises student teachers on teaching practice. Interchangeably, various writers use 'associate teachers', 'co-operating teachers' or 'mentor teachers', to describe teachers who supervise student teachers in their practicum setting.

1.4.6. Induction

This is training, usually of a brief duration, intended to familiarise new employees with the work they will be doing and the systems and people they will be interacting with. In the world of education, this applies for a newly-qualified teacher once appointed to a school.

1.5. STRUCTURE OF THE THESIS

This thesis is divided into five chapters. This first chapter is an overview of the study where the background of the study, the rationale of the study, the research questions, and the structure of the thesis were presented. It is in this chapter where certain specific terms were defined. The second chapter is the review of the literature where the theoretical location of the study is developed in terms of what the literature tells us about science teacher education in general and teaching practice in particular as a compulsory step among others in the pre-service teacher training. The third chapter is the research design and the methodology of the research which specifies the approach adopted, the methods used and the instruments of data collection. The fourth chapter is the analysis and interpretation of the data gathered. The discussion of the findings of the study is part of this chapter. The fifth and last chapter is exclusively a conclusion of the research where a summary of findings is provided, some implications for further study given and some recommendations made for the improvement of teaching practice.

CHAPTER 2

REVIEW OF RELATED LITERATURE

This chapter is concerned with the way in which the research is framed. For the purpose of the study, I have divided this chapter into four main focus areas which relate to teaching practice as an early stage of a continuous process of professional development of science teachers. These foci are: (a) science teacher education and professional development, (b) teaching practice itself with some of its aspects such as the place and purpose of teaching practice in initial teacher education and the different approaches to teaching practice, (c) supervision, mentoring and assessment of teaching practice, and (d) the problems associated with teaching practice. Based on the relevant literature, the next sections provide more details on each of these four foci.

2.1. SCIENCE TEACHER EDUCATION AND PROFESSIONAL DEVELOPMENT

Given the nature of our developing modern world, education is considered as a necessity for individuals and for the economic well-being of the modern community (*Department of Arts Culture Science and Technology*, 1998). As a consequence it is attracting more attention than ever before. Change in the nature and importance of education, resulting from amongst others, the rapid growth in information technology, requires new research on improving effectiveness in teaching. In developed and developing countries, governments are realizing more than ever that low science educational quality has serious implications for the continued and sustained development of their countries (Onwu, 2000). Unfortunately, de Feiter, Vonk and van den Akker (1995) also found that science education in many developing countries is the area in greatest need for quality improvement, both because of historic underdevelopment and the perceived importance science education has for national development aspirations. It can be said that science teacher education is the most important aspect of science education, given its capacity to shape the rest of the education system and that no idea, innovation or development can successfully be

implemented without the teacher (Onwu, 2000). Therefore, by itself or with other strategies, teacher training is the single most widely employed strategy used to improve instructional quality in the developing countries, and by extension the quality of education offered.

In the South African context as well, it is widely agreed that teachers are a key factor in the educational enterprise and are recognized as the single major determinant of the quality of education. This has long been recognized as evidenced by this quote from the De Lange Report (1981) which is still relevant today for it adequately supports this point:

> Without a corps of well trained and talented teachers, any endeavour aimed at a system of education by means of which the potential of the country's inhabitants is to be realised, economic growth promoted, the quality of life of the inhabitants improved an education in equal quality provided for every one, cannot be successful.(n.p.)

In South African teacher education, a more recent major policy document called "The Norms and Standards for Educators" has been introduced (Department of Education, 2000). It is stated that the cornerstone of the Norms and Standards is the notion of applied competence (p. 10) which is seen as the overarching term for three interconnected kinds of competence required by teachers being practical competence, fundamental competence and reflexive competence. Also, one of the strategies identified to improve science education is upgrading the knowledge and teaching skills of science teachers and teaching practice is among other activities aimed at achieving such a goal. However, studies reveal that science education in South Africa is in crisis, with serious concerns about teacher competence and strong evidence of learner under-achievement (Naidoo, 2004; Reddy, 2005) and this constitutes a real challenge to teacher education institutions in preparing future teachers. Also besides the problem of a shortage of well trained and experienced science teachers, most South African schools are ill–equipped for practical science teaching while practical work is generally considered an integral part of science teaching (Reddy, 2006). Given the importance of practical work this is further evidence for the need in science teacher education, like all skills-based professions, to be strongly experiential with a concentration on teaching teachers the actual practical skills required to implement the science curriculum.

Turner (1993) notes that the shortage of adequately trained science teachers is a world-wide phenomenon, evident in richer and poorer countries alike. Such shortage is attributed to the following factors:

1. Science teaching in schools tends to be weak and an inadequate basis for more advanced programmes;
2. The teaching of science is an area where there are major sex differentials;
3. Since science has gained this reputation of being a difficult and unattractive subject, few prospective university students are interested for sciences courses;
4. Since these factors lead to an overall shortage of scientists for whom there is an increasing demand, not primarily from education but from commerce and industry, it becomes extremely difficult to retain qualified scientists within the educational system. (p. 175)

For those who are attracted to studying towards becoming science teachers, it is necessary to describe a vision for science teacher education. In preparing prospective science teachers, science teacher educators could refer to the comprehensive list of the kinds of knowledge required to teach as described by Shulman (1987). These are:

1. content knowledge – about science and of science
2. general pedagogical knowledge – about classroom management and organisation that transcends subject matter
3. curriculum knowledge – the guidelines, national requirements and materials available
4. pedagogical content knowledge - about how to teach the subject matter, including useful illustrations, powerful analogies and examples
5. knowledge of learners and their characteristics
6. knowledge of educational contexts
7. knowledge of educational goals, values, and purposes, including the history and philosophy of education.

The National Science Education Standards (NSES) (National Research Council, 1996) provide criteria for making judgement about progress towards the vision of science education by describing what science teachers at all grade levels should understand and be able to do. In this vision of science education as portrayed by the USA standards, effective teachers of science create an environment in which they and students work together as active learners. Viewed in this perspective, to teach science,

teachers must have theoretical and practical knowledge and abilities about science learning and science teaching. In particular, the NSES recommend six major teaching standards for teachers of science which teachers should meet:

1. plan an inquiry-based science program for their students,
2. guide and facilitate learning,
3. engage in ongoing assessment of their teaching and of student learning,
4. design and manage learning environments that provide students with the time, space, and resources needed for learning science,
5. develop communities of science learners that reflect the intellectual rigor of scientific inquiry and the attitudes and social values conducive to science learning,
6. actively participate in the ongoing planning and development of the school science program.

In considering the vision for science teacher education as described by Shulman (1987) and the standards above, there is a need to be aware of some impediments to the improvement of teaching and learning by considering the practices in many classrooms in the developing countries. Tobin (1993) reminds us that if traditionally the approaches to teaching and learning science have been consistent with a transmission metaphor, whereby knowledge is seen as a commodity to be transferred from the source to the receiver, the prevailing constructivist view underpinning current science curricula places the needs of learners as the highest priority. In science teaching, efforts should be made to consider learners' existing understanding in their process of coming to know in a scientific way. According to this latter model, teaching and learning of science seems to be most effective when teachers allow students to use their everyday language to connect experience and science learning. Moreover, because the inquiry into authentic questions generated from learners' experiences is the central strategy for teaching science, the science teachers' challenge is to balance and integrate immediate needs with the intentions of the curriculum they have to implement. This is a difficult skill and cannot be completely developed during the undergraduate years or during initial teaching practice. To deal with such challenges that science teachers face, many teacher education programmes, including the one in place at UKZN, offer many opportunities for ongoing science teacher professional development.

Within the relevant literature, the terms 'in-service education and training' and 'in-service education' are often interchangeably used to describe professional development as all the activities that contribute to the continuing education programme of professional personnel in the field of education (Pather, 1995). Many authors attempt to define the concept of professional development. For example, de Feiter et al. (1995) see professional development as a culture for educators to be continuously seeking and to be helped in finding ways of improving the quality of their practice. Guskey (2000) sees professional development in education as a set of processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students. Gray (as cited in Karasira, 2004), argues that professional development refers to the opportunities offered to educators to develop new knowledge, new skills, new approaches, and new descriptions to improve their effectiveness in their classrooms.

Teachers in general are considered to be professionals and each profession has a dynamic characteristic. Thus the professional development of science teachers is a continuous process and the pre-service programs are designed to present what is believed new teachers need to know and understand to begin to work in the profession (Northfield, 1998). As described by the National Science Education Standards, professional development for teachers should be analogous to professional development for other professionals and becoming an effective science teacher must be seen as a continuous process stretching from pre-service experiences in undergraduate years to the end of the teaching career. The three following statements from the National Science Education Standards (NRC as cited in Onwu, 2000, p. 46) specify the requirements for professional development of science teachers'. These are: (a) professional development of teachers of science requires learning science content through the perspectives and methods of inquiry, (b) professional development of teachers of science requires integrating knowledge of science, learning, pedagogy, and students and applying that understanding to science teaching and, (c) professional development programmes should enable teachers to build knowledge, skills and attitudes needed to engage in life long learning.

In his article, 'Teacher development', Burden (1990, p. 317) refers to many writers who have suggested different stages of teacher development in general and pre-service teachers' development in particular. However, they all agree that teaching practice in one or another form takes place during one of the various teachers'

development stages. Steffy and Wolfe (1977) explain that the teaching practice during the initial teacher training can be associated with the "novice teaching phase" among the seven phases of the life cycle of a professional educator. This phase extends from the time student teachers initiate the practicum until they complete their student teaching and /or intern experiences in traditional teacher preparation programmes in which students are prepared in subject matter, professional development, and pedagogy. The teaching practice can also be compared to the 'anticipation phase' as described by Moir (1990). This author outlines five phases of first-year teaching which are the: (a) anticipative phase, (b) survival phase, (c) disillusionment phase, (d) rejuvenation, and (e) reflection. This first phase begins during the student teaching portion of pre-service preparation where the student teachers get to complete their teaching practice experiences in which time they become more excited or possibly anxious about their first teaching position. Furlong and Maynard (1995) also adopt the notion of 'stages' in their research. These authors identify five broad stages in student teachers' development while on their school experience: early idealism, personal survival, dealing with difficulties, hitting a plateau and moving on (p. 73). They are, however, careful to qualify that these stages should not be viewed in a "crude or simplistic way", stating that there is no intention to suggest that "student teachers simply progress along a narrow, linear pathway, moving smoothly from stage to stage" (p. 70). They acknowledge that the factors which impact on the development from the 'novice' to 'professional educator' are dependant on "the interaction between individual students, their teacher education programme, and the school context in which they undertake their practical experience" (p.70). In the following sections the researcher takes the points made by Furlong and Maynard further in discussing teaching practice, and thereafter its major components namely supervision, mentoring and assessment.

2.2. TEACHING PRACTICE

2.2.1. The place and purpose of teaching practice in initial teacher education

Teaching practice sometimes called 'school placement', 'the practicum', 'practice teaching', 'school/field' experience or student teaching is probably the most

challenging and exciting part of initial teacher education (ITE). In its various forms, it has long been considered to be an essential and indispensable aspect of ITE. For example, Cruicksbank and Armalin (1986) state that:

> There remains general consensus among teacher educators, teachers, pre-service teachers, and critics alike that learning to teach must be, if not entirely then at least partially, accomplished through practicing teaching ... In its various forms, teaching practice has been and still is well ensconced and entrenched. (p. 35)

While Cohen and Manion (1977), view the teaching practice as an ambiguous concept in the sense that it can refer to the practicing of various teaching skills associated with the role of the teacher, or to the total experience of schools acquired by student teachers during the practicum, they do concede that since the establishment of training colleges in the middle of late nineteenth century, teaching practice, in one form or another has remained as an unchallenged, essential element in the preparation of generations of teachers.

Various writers point us to why teaching practice remains a critical aspect in the preparation of effective teachers. For example, according to Sund and Trowbridge (1973), the teaching practice experience is designed to smooth the transition from the role of student to that of teacher and at the same time, practice teaching assignment will give to the training institution the opportunity to evaluate the student's teaching capabilities. Teaching practice has also long been considered as an opportunity to wed theoretical knowledge of teaching and learning with classroom practice. For example, Elliot (1984) makes the point that the theoretical knowledge of the teaching-learning process will be of little value unless the student teacher learns how to put this theoretical knowledge into practice. Cruicksbank and Armalin (1986) extend on Elliot's point by stating that teaching practice is also an opportunity to experience pupils from diverse socio-economic backgrounds; encounter classroom problems; gain experience with classroom resources such as instructional materials and equipment; and have opportunities for inquiry and reflection on the social and political elements of teaching including curricular choice, choice of teaching methodology, and student teacher-administrator interactions. The critical place of teaching practice in the ITE is also acknowledged by Stones (1987) stating that "in training institutions where systems of teacher training exist, teaching practice forms a major component in the course of training" (p. 681).

Merrill (as cited in Cruicksbank & Armalin, 1986) also views the teaching practice experience as useful in assisting pre-service teachers to assess their desire to teach, to explore the adequacy of their content knowledge, to gain experience in planning and handling classroom routines, to discover how to generate pupil-teacher rapport, and to receive periodic appraisal regarding classroom performance. Brown and Nacino-Brown (1990) further point out that for those students already certain of their desire to teach, student teaching offers the opportunity to learn the ideas, skills and attitudes necessary to become competent teachers. Moreover, Nyaumwe and Mavhunga (2005), view teaching practice as an important component of a teacher education programme for it enables student teachers to test their perception and the efficacy of instructional theories as a guide to their practices. They also acknowledge the complexity of the teaching profession that depends on teacher's creativity, commitment, beliefs, goals, content, decisions and actions, which student teachers cannot successfully gain from theory alone. In addition, Northfield (1998) argues that the student teaching experience in schools is known to have a powerful impact on a new teacher's development, including learning the elements of the profession with the opportunity to work with a master teacher, to consider reflect upon, and study teaching.

In summary, Brown and Nacino-Brown (1990) suggest the following reasons for teaching practice which include: (a) an opportunity to gain confidence, (b) the chance to put theories in practice, (c) an opportunity to learn skills and attitudes of a competent and effective teacher, (d) the chance to learn about children in real life, (e) an opportunity to improve knowledge of subject matter, (f) the chance to gain from the benefits of constructive criticism, (g) an opportunity for self-evaluation and to discover strengths and weaknesses, and (h) an opportunity for the teaching institute to evaluate itself. Viewed from these multiple perspectives, there are clearly no shortcuts to learning how to become an effective teacher other than the teaching practice. In the context of this study, it is important to note the purpose of teaching practice as described in the Norms and Standards for Educators (NSE), where teaching practice is seen as "mode of delivery through which all the different roles of educators should be developed and assessed" and "the authentic context in which student educators experience and demonstrate the integration of the competences used to develop the entire curriculum" (Department of Education, 2000, p. 12). One of the questions that this study is exploring is whether the current teaching practice at UKZN matches with the NSE vision for teaching practice.

Although the situation that the student teachers experience during the teaching practice is generally not as authentic as envisaged by the NSE policy document, it is the first real opportunity to develop and assess their teaching skills. Thus it is crucial that they receive appropriate preparation and support to make a good start especially as teaching practice serves the dual purpose of developing and assessing teaching ability. Elliot (1984) stresses the point that the value of well-organised, regular and properly supervised teaching practice as an integral part of the professional course cannot be over-estimated and that the teacher education course will have failed if it produces teachers who are ineffective in the actual classroom situation. He even goes as far as to state that if this were to happen, the consequences for the education system would be nothing short of disastrous. From the literature, it is evident that there are various arrangements for teaching practice, each with its implications on the student teaching experience. The next section describes some teaching practice approaches.

2.2.2. Different approaches to teaching practice

Even though there are many approaches of learning to teach, the most predominant is the one that consists in learning to teach by imitating and emulating methods and procedures used by other experienced teachers (Elliot, 1984). In fact, there are teachers who learnt to teach by "trial and error" without any professional training but this has had serious disadvantages as it excludes the possibility of benefiting from the skills and knowledge of others. That is what Elliot supports indicating that teachers should be educated and trained professionally so that they gain from the knowledge and experience of others. He considers learning to teach by "trial and error' as old-fashioned and outmoded. An approach supported by Elliot is also what Stones (1987) describes as an approach to practice teaching based on apprenticeship.

However, although it is argued that this approach to practice teaching is effective, simple, and commonsensical, it is also acknowledged that practice teaching that aims to imitate experienced teachers is likely to perpetuate methods that are not necessarily the ones most likely to enhance pupils' learning with understanding. This seems to be possibly the most serious drawback to the training approach based on imitation (Stones, 1987). The further disadvantage of this approach is that it does not allow the student teacher to go beyond the teaching observed in the sense that there will be certain areas of teaching that are not illustrated by any observed teacher.

Another approach to practical teaching experience described by Stones is the "master the teaching model"; an approach which makes possible and necessary the integration of theory and practice. In opposition to the imitative approach, the "master the teaching model" attempts to explicate the processes of teaching by analysing the task of teaching rather than copying a global performance. Within this approach, tutors and student teachers develop teaching strategies and tactics out of their discussion of theories of teaching and learning and thus the procedures are tested in teaching and learning situations and the results evaluated. Furthermore, this approach necessitates precision and rigour and offers practical usable help to all students irrespective of their personality traits, attitudes, and abilities. As there is no one non-negotiable way of learning to teach, I think the ideal situation should be the one suggested by Stones according to which, instead of student teachers spending an extended period of time briefly observing and then acting as surrogate teachers with similar teaching contact time to that of the other teachers in their practice schools, they will spend much time in reflecting upon their teaching, in discussing it with others, in planning, and in systematic observation of their practice schools.

Because it is natural that teachers will, however, teach as they themselves are taught, it is imperative that instructional methods used with educators be congruent to the greatest extent possible with those they are expected to use in their classrooms. This goal can only be achieved through effective ITE programmes, including teaching practice, with the clear focus on developing a deep understanding of the subjects they will teach together with appropriate instructional methods. In this regard Stones' observation that there is very little evidence in any country of systematic courses in pedagogy that attempt to unify theoretical studies and practice teaching should be noted by teacher educators intending to make use of teaching practice to enable student teachers to learn meaningfully and in a supportive environment.

According to Butt (as cited in Beck & Kosnik, 2000), teacher preparation is a complex process requiring different forms of knowledge and experience. Prior to teaching practice all student teachers should have participated in a course in methods of teaching, but as Brown and Nacino-Brown (1990) explain, such courses too often tend to be very theoretical and do not always give the practical down-to-earth advice that student teachers also need to deal with day-to-day problems, which occur in teaching practice situations. As teachers depend not only on knowledge and skills to facilitate learning and therefore to enhance learners' success, teaching practice should provide

student teachers with the opportunity to get familiar with additional aspects such as classroom management, fundamental technological skills e.g. basic computer skills that increase teacher productivity, as well as mentoring and coaching skills for teacher leaders. Particularly in science teaching, bearing in mind the list of the kinds of knowledge required to teach science that Shulman (1987) provides (see p. 10 in this chapter), this familiarity requires more attention, and in addition to particular aspects of curriculum and pedagogical content knowledge. For example, science student teachers should familiarise themselves with the whole school environment as a source of a range of teaching resources. Again given the fact that science subjects require more practical activities including laboratory activities, there is an additional reason to consider teaching practice as the most valued component of initial science teacher education. It is also indicated that practitioners can improve their professional skills during teaching practice by sharing ideas, observing each other and working together collaboratively and reflectively. Thus I maintain that teaching experiences from the teaching practice should culminate in careful consideration being given to what has been learned and what else needs to be known in order to become an effective teacher and this experience is a prime focus of the study reported here.

While it is generally agreed that having more teaching practice before graduating plays a crucial role to improve the professional skills of practitioners, Anderson and Mitchener (1994) recommend that student teachers go through a series of school placements in order to gain teaching experiences with a variety of learners from a variety of backgrounds. These authors further argue that such field experiences should include many levels of involvement, which range from students simply observing teachers to actual teaching practice. Elliot (1984) reinforces this view by stating that effective teacher education and training requires two types of practical teaching experience. The first is the guided observation, where the student teachers watch experienced teachers at work. This activity is best introduced at an early stage in the teacher's course but it should be done under guidance; if not, it is likely to be a waste of time. The second is the full-time block practice where the student teacher gains practical experience under conditions near to the real thing as possible. Although these two activities are the most connected with the teaching practice itself, to be more effective they should be preceded by a preliminary visit to the teaching practice school, a visit during which the student teacher meets with the mentor and other teachers to discuss programme of work and to find out related aspects such as the travelling time, the

location and availability of equipment and other resources, learn how to use it, and who to contact when necessary. At UKZN, where this study is located, pre-service science teachers experience both the two types of practical teaching as described by Elliot (1984) i.e. guided observation and full-time block teaching practice.

2.3 SUPERVISION, MENTORING AND ASSESSMENT OF TEACHING PRACTICE

Although there are many stakeholders directly or indirectly involved in initial teacher education (ITE) in general and in teaching practice in particular, supervisors as university lecturers, mentors teachers as subject teachers in host schools and of course the concerned student teachers are, to a great extent, the parties mostly involved and concerned in this study. White (1989) indicates that "teaching practice involves complex relationships among the tutor, co-operating teacher and student teacher" (p. 142).

At the institution where the study is located, the expectation of supervisors and mentor teachers is that they will not only assess student teachers on a range of professional skills but further they provide educational experiences and guidance to help student teachers' development. Nyaumwe and Mavhunga (2005) also see lecturers' and mentors' assessments as serving both formative and summative purposes by providing diagnostic information on progress in the first and assigning a grade based on levels of competence in identified professional skills in the latter.

Quick and Sieborger (2005), however, argue that teaching practice is such a long established practice that it is easy to assume that all those involved in it have a clear notion of what it is and how it should be operationalised and managed. In discussing the supervision, mentoring and assessment of teaching practice I will also draw attention to the lack of clarity that is sometimes experienced by university supervisors and mentor teachers as they negotiate their respective roles in teaching practice.

2.3.1 The teaching practice supervision

As mentioned in the previous sections, the student teaching field experience is an essential component of learning to teach and supervision plays an important role

(Zahorik as cited in Kauffman, 1992). Generally the supervision of student teachers is the responsibility of the teacher education institution and here it is carried out by the university lecturers also called supervisors or university tutors in this study. While some staff might want to leave supervision to others, Turney (1987) emphasises the idea of shared responsibility for teaching practice supervision arguing that:

> Despite a tendency for tertiary staff to withdraw from participation in practicum's supervision, the universal pattern is still for the student teacher's work to be supervised by both tertiary staff of the teacher education programme and by the cooperating teachers in the schools. (p. 686)

The university supervisor has several major responsibilities in relation to the student teacher. First the university supervisor is a director of learning for the student teacher; secondly, the university supervisor is a supervisor of professional activities planned for and by the student teacher; thirdly, the university supervisor is a counsellor to the student teacher; and fourthly the university supervisor is an evaluator of the personal and professional growth of the student teacher. However, the roles of supervisors are complicated and sometimes ill-defined, as are the institution's expectations of student teachers on the teaching practice (Turney, 1987). This is emphasized by Brown and Nacino-Brown (1990), arguing that supervision implies not only activities such as guiding, helping, correcting, advising, and even showing student teacher how to teach, but also the awarding of grades. In addition to these responsibilities directly concerned with the student teachers themselves, the university supervisors also have responsibilities which they share with other professionals. They act as a liaison persons between the university and the host schools of student teachers, and are seen as resource persons to professional people within the host schools (Borko & Mayfield, 1995).

In many teacher education programmes in South Africa and elsewhere, teaching practice is a fixed-time, credit-bearing course or subject that students undertake with little supervision or guidance (Fraser, Killen & Nieman, 2005). Even though the university tutors are expected to supervise mainly student teachers teaching their subjects and to visit their student teachers as many times as possible, it is not always the case. Fraser et al. (2005), note that because of the time, the cost and mostly the shortage of lecturers in certain subjects particularly in science subjects, the level of supervision of most student teachers in South Africa is minimal. Another factor that contributes to

diminish the supervision's expected value is the unavailability of experienced supervisors, as younger members of staff, perhaps with limited teaching experience, and who have recently completed higher degrees are not always aware of what is expected of them as supervisors (Brown & Nacino-Brown, 1990). Rather than being a well-structured learning experience and an opportunity for authentic assessment, teaching practice for many students becomes a demoralising and sometimes very frightening experience (Marais & Meier, 2004) and, as such, whether or not teaching practice contributes to the development of a particular student's competence is uncertain and unknown (Fraser et al., 2005).

2.3.2. The teaching practice mentoring

The role of the mentor teacher in present-day schools is not much different from the very ancient understanding of a mentor as a wise and trusted counsellor. In general, an effective mentoring relationship is characterised by mutual respect, trust, understanding, and empathy that good mentors are able to share life experience and wisdom as well as technical expertise. In modern times, the concept of mentoring has found application in virtually every forum of learning and in the traditional sense, mentoring is hierarchical and mostly entails the development of a junior associate ('mentee') under the guidance of a more senior or more experienced mentor. Zelditch (1990) captures this conception of a mentor when he states that:

> Mentors are advisors, people with career experience willing to share their knowledge; supporters, people who give emotional and moral encouragement; tutors, people who give specific feedback on one's performance; masters, in the sense of employers to whom one is apprenticed; sponsors, sources of information about and aid in obtaining opportunities; models, of identity, of the kind of person one should be an academic. (n.p)

Viewed in the educational context of teacher training there is broad agreement that the mentor teachers are the key contributors to pre-service teacher education (Glickman & Bey as cited in Beck & Kosnik, 2000) and this is acknowledged both by student teachers and established teachers when recalling their initial preparation (Beck & Kosnik, 2000). This view is shared by Nyaumwe and Mavhunga (2005) arguing that mentors are experienced teachers based at schools, who assist student teachers to learn to teach in the context of teaching. At the beginning of their teacher education

programme, student teachers understandably expect their mentors to supply some basic survival strategies such as how to start a lesson, how to take a register, and how to deal with common misbehaviours. However, as the course proceeds, student teachers must be given the opportunities to experiment, to try out the advice they received, to begin to cultivate their own personal style, to reflect upon the outcomes and definitely they must be allowed some original thoughts. In this regard, Furlong and Maynard (1995) suggest that mentors should not give student teachers only the support they ask for but also provide them with what they really need rather than with what they necessarily want. They suggest that the key to effective mentoring is to utilise the collaborative teaching strategies in ways that will support the learning needs of student teachers at different stages of their development.

Stephens (1996) suggests that the following mentoring skills are essential, even though some areas of mentoring make more or less use of these skills than others. These are: planning, liaising, demonstrating, facilitating, observing, assessing, and guiding. In particular, he provides some guidance points that mentors should consider as essential for their role in mentoring student teachers. Although non exhaustive, the researcher found the following list of recommendations as the most useful and note worthy:

1. Effective mentors help student teachers to become competent classroom teachers, accurate and compassionate assessors of school students' progress, and members of a caring profession. (p. 16)
2. Good mentors see idealism and realism in teaching as complementary, not opposites. (p. 22)
3. Mentors should help student teachers to become competent and principled members of their intended profession. (p. 37)
4. Mentors should be involved in all the stages of the planning of initial teacher education programmes. (p. 57)
5. At the planning stage, mentors should provide student teachers with an accurate indication of: where particular classes are at in terms of prior knowledge and skills and ability range; what knowledge and skills are required by particular syllabuses; the kind of 'orderliness' that can realistically be expected in different classes; the prevailing norms between staff, student teachers and school students; and rules and laws pertaining to school procedures. (p. 76)

6. perceived boundary between 'campus idealism' and 'chalkface reality' is to be broken down. (p. 37)
7. When mentors provide guidance, they should: be as explicit as possible in making their own best practice available for the observation and scrutiny of student teachers; present a compelling case for principled practice; and provide counselling that embraces a concern for student teachers as human beings rather than as a form of crisis-driven 'psychological first aid'. (p. 58)
8. Mentors should cultivate a friendly, supportive rapport with student teachers, and should treat them as professional colleagues. (p. 76)
9. Mentors need to provide opportunities for student teachers to observe teachers marking, doing 'live' assessment, writing school reports, moderating, and, where appropriate, discussing whole-school marking policies. (p. 87)
10. Mentors need to impress upon student teachers that the schools are holistic, and have their own cultures and styles. (p. 96)

It is evident that Stephen's view fits with the traditional hierarchical conception of mentoring described at the start of this section where the aim of traditional mentoring is almost exclusively to benefit the 'mentee'. Ballantyne, Green, Yarrow and Millwater (1997) describe an alternative conceptualisation of mentoring where it is conceived as "a reciprocal professional development activity where beneficial outcomes are shared by both partners" (p. 81). Although the partners namely student teachers and mentor teachers are unlikely to benefit from this kind of mentoring in the same way, these authors suggest that 'reciprocal mentoring' could be of particular benefit to mentor teachers who 'do not normally have the opportunity to reflect on their own practices, nor to discuss their own and others "teaching and educational viewpoints" (p. 81).

In whatever form of mentoring that is utilised, it is important to keep in mind that effective mentoring does not necessarily require large amount of time. In fact, Stephens (1996) notes that an experienced and perceptive mentor can provide great help in just a few minutes by making the right suggestion or asking the right question. The next section discusses the assessment of teaching practice as a shared responsibility of both university tutors and mentor teachers.

2.3.3 The teaching practice assessment

As mentioned in section 2.3.1, the supervisor has among other responsibilities to evaluate the personal and professional growth of the student teacher. As teaching practice supervision and mentoring are shared responsibilities of both the university tutor and the mentor teacher, the same is true for teaching practice evaluation. Supervisors and mentors are expected to be objective in their multiple roles in student teachers' assessment. However, as Barret (1996) points out the complexity of student teaching evaluation makes impossible for any two assessors to see exactly the same professional competencies in a student teacher even when assessing the same lesson and this influences the effectiveness of the evaluation process.

Anderson et al. (1992) acknowledges how crucial is an understanding of evaluation responsibilities that include legal parameters in evaluating student teacher. They argue that beside the task of assessing, the supervisors also explain the purposes of evaluation to mentors, help student teachers engage in self-evaluation, write final evaluations, and grade student teachers. Furthermore, these authors suggest evaluation has several additional purposes, among others: (a) to help student teacher to become the best teacher they are capable of becoming; (b) to keep the student teaching experience from becoming trial-and-error learning; (c) to help prospective employers understand the probable effectiveness of the student as first-year teacher; (d) to aid university faculty in understanding what content might be included in the courses they teach; and (e) to ensure that student teachers develop a rapport with their school students and teach at their level of understanding.

Although there seems to be a lack of consensus among teacher educators about the most effective way of assessing student teachers on teaching practice, there is apparent agreement on a number of areas to be taken into account when assessing teaching practice (Brown & Nacino-Brown, 1990). These are (pp. 68-69):

1. the personal qualities of the student teacher,
2. the preparation involved in the form of a lesson plan,
3. the choice of method and use of instructional materials,
4. the classroom management and control,
5. the assessment techniques, and
6. the general attitude of the student teacher.

To assess a student on teaching practice, it seems unlikely that one assessment instrument will ever be adequate to measure all the required skills and competencies. It

is thus necessary to develop appropriate measuring instruments to apply in circumstances that will generate reliable evidence and to interpret such evidence in valid and defensible ways, otherwise it will create the so-called 'assessment gap' (Fraser et al., 2005). In this regard, these authors state the following:

> The challenges facing teacher educators is the development of assessment criteria that reduce the uncertainty involved in assessing teacher competence and clearly distinguishing between those who are competent and those who are not (yet) competent. (p. 248)

In other words, all pre-service teacher education programmes have to recognise the need to expose students to the reality of the classrooms in which they will eventually teach. More importantly these programmes must endeavour to assess student teachers during their teaching practice in such a way to enable them to demonstrate competence in appropriate 'practice teaching' situations.

For some teacher educators the assessment of student teachers' effectiveness is based on learners' achievement. However this is criticised as too simplistic. Barret (1986) notes that teaching is similar to other professions such as medicine or law, where practitioners cannot guarantee results and therefore, classroom processes and possibilities of a wider range of outcomes have to be assessed. Similarly, Brophy and Good (1986) argue that student teachers' effectiveness depends on the angle from which individual assessors view it. This is also pointed out by Nyaumwe and Mavhunga (2005) arguing that mentors and lecturers incline to different conceptions of effective mathematics and science teaching. They provide examples where mentors usually base their judgements on the student teachers' competencies to dispense the curriculum content clearly within a stipulated time while on the other hand lecturers encourage constructivist instructional methods and creation of learning context that suit the cognitive and affective levels of learners. This is one of the problems associated with teaching practice discussed in the next section.

2.4 PROBLEMS ASSOCIATED WITH TEACHING PRACTICE

Teaching practice can be reviewed taking into account different elements including those suggested by Brown and Nacino-Brown (1990). These are (a) the duration of the teaching practice, (b) the placement of student teachers, (c) the type of

school, (d) the staff organisation to assess and the assessment itself, (e) the posting of supervisors, and (f) the moderation of teaching practice grades. Like any other activity, there are many problems associated with teaching practice. Some of these are directly linked to the student teachers themselves while others are more concerned with the context in which student teachers are placed for teaching practice.

For student teachers on teaching practice, there are a certain number of problems which are not directly connected with learning to teach. Here it is important to keep in mind that each student teacher has a personal background, motivational level, personality, intellectual capacity and level of readiness that differs from his or her peers (Anderson, Major & Mitchell, 1992). Brown & Nacino-Brown (1990) identified some personal problems for the student teacher. These are, among others:

1. *Financial problems*: These problems are inherent to any activity which needs not only material resources but also which involves various cost for meals, transport, and accommodation. At UKZN, while student teachers are provided with limited teaching practice allowances these rarely seem to be adequate and student teachers generally have to struggle to make ends meet and as such they endure the subsequent stress. Such problems could be minimized only in the case where student teachers are posted to local primary or secondary schools, or to schools which can be reached satisfactorily by public transport on a daily basis.
2. *Personal characteristics:* Other problems are linked to the personality of the student teachers themselves in establishing relationships with staff and pupils. Such problems are difficult to solve as it is not easy to advise anyone about how to get on with the staff of a school since there are likely to be so many different personalities involved.

Among the problems related to the school, the lack of teaching resources, the internal school organisation such as the school timetable and the mentoring are the ones most often encountered by student teachers. The lack of teaching resource is a reality in most of the schools in developing countries. More particularly in the science teaching area, it is difficult to teach well in a context where school laboratories are ill-equipped or completely nonexistent or where there are insufficient textbooks. Despite such challenges, students on teaching practice cannot however blame their poor performance on the lack of resources as it is expected that science teachers must be able to improvise

much of the time to make the best of difficult situations by exploring the potentialities offered by the school environment.

The teaching practice supervision also presents problems, both for the supervisor and for the student teacher. Sometimes, the peculiar position of the student teachers during teaching practice leads to a number of tensions which require careful handling (White, 1989). On the one hand, they have to satisfy their supervisors' varying expectations that they have learned and understood those things about teaching that have been stressed during the university course, and demonstrate that they are endeavouring to implement them in their teaching. On the other hand, and this is the most frequent reason, the supervisor's overloaded timetable does not allow sufficient time for effectively evaluating student teachers. Another issue associated with both the shortage of time and the overloaded supervisor's timetable is that it does not facilitate meaningful communication and collaboration between the university supervisor and the mentor teacher, who is ultimately responsible to the principal and parents for the progress and well-being of the class whilst it is in the hands of the student teacher. As a result, where there is not total ignorance of each others roles, the university supervisor and the mentor teacher misunderstand each other (Kauffman, 1992). Such a situation complicates the supervisory process and therefore can affect the student teacher's expected benefit from teaching practice. For this reason, it is clearly essential for the supervisor and the mentor to have some discussions about the aims of the teaching practice, the expectations of the university, the criteria for assessment, and so forth in order to optimise the considerable immediate influence they have on the developing professional attitudes and teaching competencies of student teachers.

In the context of this study, it must be kept in mind that teaching practice guidelines are conceptualised taking into consideration the purpose of teaching practice as described in the Norms and Standards for Educators (NSE) where it is seen as "mode of delivery through which all the different roles of educators should be developed and assessed" (Department of Education, 2000, p. 12). However, although this policy document demands that the ability to integrate theory and practice in student teaching should be assessed, it provides only vague guidelines on how this should be done. Thus the question of how a valid judgement can be made about a student's readiness to enter into the teaching profession presents a potential problem that still needs to be addressed.

CHAPTER 3
RESEARCH ACTIVITIES

As stated in the introductory chapter, the purpose of this study was to investigate the science student teachers' experiences of teaching practice. In particular, the following questions guided the study: (a) what do science student teachers do on teaching practice? (b) what do science student teachers benefit from teaching practice? (c) how are they helped and supported both by their supervisors and mentor teachers? (d) what particular skills do science student teachers acquire from teaching practice? and (e) what ways do science student teachers feel that teaching practice could be improved?

In order to answer the research questions it was felt that a case study would be the most appropriate. As pointed out by Bassey (1999), unlike the experimenter who manipulates variables to determine their causal significance or the surveyor who asks standardised questions of large, representative samples of individuals, the case study researcher typically observes the characteristics of an individual unit such as a clique, a class or a community. This fits with the current study where the individual unit was the 2005 cohort of science students doing teaching practice at UKZN.

This chapter is presented into five foci namely: (a) research design and methodology, (b) participants in the study, (c) methods and data collection procedures, (d) data transformation, and (e) limitations of the study. In the next sections, detailed discussions of these foci are presented.

3.1. RESEARCH DESIGN AND METHODOLOGY

According to Kane and O'Reilly-de Brun (2001), a problem or an issue that a researcher is studying determines not only the research design but more importantly the research techniques used. This is also pointed out by Cohen, Manion and Morisson (2000) arguing that the purposes of the research determine the methodology and the design of the research and by Creswell (2003) stating that certain types of social research problems call for specific approaches. In this study a pragmatic, mixed

method approach to research (Johnson & Onwuegbuzie, 2004) was considered to be consistent with the purpose of the research and was adopted. The study cannot be classified as either qualitative or quantitative but rather a combination of methods and procedures that worked best for answering the research questions was used resulting in both qualitative and quantitative data being collected. It was felt that the most suitable way of approaching the research questions was to do empirical research in the form of a descriptive case study. Bassey characterises an educational case study as:

> an empirical enquiry which is: conducted within a localized boundary of space and time; into *interesting* aspects of an educational activity, or programme, mainly in its natural context and within an ethic of respect for persons; in order to inform the judgements and decisions of practitioners or policy-makers; in such a way that sufficient data are collected for the researcher to be able (a) to explore *significant* features of the case, (b) to create *plausible* interpretations of what is found, (c) to test for the trustworthiness of these interpretations, (d) to construct a *worthwhile* argument or story (Bassey, 1999, p. 12).

It is the opinion of the researcher that this study fits these characteristics and can be classified as an educational case study. There were many reasons why this suited my study of teaching practice. Firstly, Cohen et al. (2000) support the case study approach by arguing that "a case study provides a unique example of real people in real situations, enabling readers to understand ideas more clearly than simply by representing them with abstract theories or principles" (p. 181). Secondly, the case study approach was employed because it allows an investigation to retain holistic and meaningful characteristics of real life events. It is also appropriate when examining contemporary events and is related to the way the initial research questions have been defined. Thirdly, case studies focus on a specific situation, they are descriptive and heuristic, and they offer insights and understanding of the cases being studied. Finally, one of the unique strengths of this approach is its ability to deal with the full variety of evidence (Cohen et al., 2000) that is required to answer the research questions. In addition, the choice of case study approach was motivated by the researcher' awareness of the fact that, although a case study presents difficulty of generalising from a single case, its uniqueness and its capacity for understanding complexity in particular contexts constitute an advantage for a case study research (Bassey, 1999).

In this study, the descriptive research approach has been used rather than an evaluative or theoretical approach as the study was seeking to find out the processes that were ongoing. Descriptive research, as described by Best (as cited in Cohen et al., 2000) is concerned with conditions or relationships that exist; practices that prevail; beliefs, point of views, or attitudes that are held; processes that are going on; effects that are being felt; or trends that are developing. Thus, all these aspects seem to match with the issues being investigated in this study. In order to obtain the descriptive data required a survey questionnaire was used for all the student teachers who were part of the defined case i.e. those participating in teaching practice. This was followed up with detailed interviews with students and other participants.

3.2. PARTICIPANTS

The participants in this study were drawn from the three following groups: (a) undergraduate science student teachers from Bachelor of Education (B.Ed.) in 2nd year to 4th year and students registered in the one-year Post Graduate Certificate in Education (PGCE) programme; (b) a number of teaching practice supervisors who are university lecturers; and (c) some mentor teachers from schools in which students were doing their practice.. I decided deliberately to exclude the first year student teachers due to the fact that their teaching practice experience consists of only two weeks mostly for lessons observations and often dealing with subjects that are not necessarily science subjects. While a true survey method in gathering data requires a representative sample to ensure that characteristics observed occur with an acceptable degree of regularity (Cohen et al., 2000), it is acknowledged that these participants do not constitute a sample of the general population of all science student teachers in South Africa. As stated in the previous section, it is only a case study related to science student teaching practice at one university. So, in this study, the representativeness of the sample is less important. It was not the purpose of the study to generalise the findings to the general population but rather to involve sufficient students to obtain the required data to answer the research questions. Of about 150 questionnaires distributed to all the science student teachers participating in teaching practice, 64 were returned (46%) providing an

adequate sample of the students in the case. In fact this is also within accepted norms for questionnaire surveys (Cohen et al., 2000).

In addition, 16 interviews were conducted with respectively five science university tutors, four science mentor teachers and seven science student teachers. This relatively small number of interviews was due to the fact that the data collected from these groups of participants served to supplement that collected from the main group of science student teachers. Moreover, the researcher focussed only on the science specialist supervisors of whom there were only a limited number. Of the eight permanent staff members in the science department, seven were involved in teaching practice and five of these participated in the study and were interviewed. This number is small when one considers that science student teachers were distributed across more than 80 schools. To supplement the tutors a number of contract tutors were used during teaching practice supervision. These tutors were mainly retired teachers or others looking for part time work and were not considered for interview. As far as the mentor teachers were concerned the limited number of only four was due to the researcher's limited resources and time. In this regard, the researcher was not familiar with the schools' locations and was reliant on the university tutors to see mentor teachers when visiting their student teachers. Their selection can be considered opportunistic. These three groups of participants contributed data for the construction of the case.

3.3. METHODS AND DATA COLLECTION PROCEDURES

According to Bassey (1999), "a case study has no specific methods of data collection and of analysis which are unique to it as a method of inquiry" (p. 69). It is eclectic and the good sense of the researchers when preparing case studies allows them to use whatever methods seem to them to be appropriate and practical. Denscombe (2003) also states that when it comes to selecting a method for data collection, certain research strategies tend to be associated with the use of certain research methods. For example, surveys tend to be linked with questionnaires while experiments tend to be linked with observation. He pursues arguing that the choice of one or another method is influenced by the strategy itself, but also reflects preferences about the kind of data that the researcher wishes to obtain and practical considerations related to aspects such as

time, resources and access to the sources of data. However, and this is the case in this study, the use of multi-methods can be recommendable. The main advantage of this is that using multi-methods produces different kinds of data on the same topic, and therefore improves the quality of the research. In this study, the main instruments of data collection were the questionnaire to science student teachers supplemented by interviews with both the university tutors involved in teaching practice supervision and the mentor teachers as well as a small opportunistic sample of science student teachers. These instruments were supported by a limited number of 12 teaching observations and analysis of documents such as teaching practice files and reports.

As indicated by Kane and O'Reilly-de Brun (2001), a questionnaire in which the respondent fills out a form and an interview schedule, where the researcher asks the questions to the respondent directly, are two different forms of a survey method of gathering data. Typically, surveys gather data at a particular point in time with the intention of describing the nature of the existing conditions, or identifying standards against which existing conditions can be compared, or determining relationships that exist between specific events (Cohen et al., 2000). A written questionnaire presents advantages and disadvantages. Some of the advantages of a questionnaire over an interview are pointed out by Cohen et al. arguing that among other reasons, a questionnaire tends to be more reliable; because it is anonymous, it encourages greater honesty; it is more economical than the interview in terms of time and money and there is a possibility that it can be mailed. In addition, questionnaires rely on written information supplied directly by people in response to questions asked by the researcher and the kind of data collected is different from that which could be obtained from interviews, observation or documents (Denscombe, 2003). On the other hand, its disadvantage are that there is often a low rate of returns and for any questionnaire there is a need to pilot it and refine the content, wording and length appropriate for the targeted sample. Also, since the researcher does not normally directly interact with the respondents, a written questionnaire needs more care and attention.

The following reasons also motivated the use of these instruments. Firstly, questionnaires and interviews are used by researchers as a means to obtain information directly from a person (subject) by asking them rather than watching them behave or by sampling some of their behaviours. Secondly, questionnaires and interviews enable the measurement of what a person knows i.e. knowledge and information; likes or dislikes

i.e. values and preferences and thinks i.e. attitudes and beliefs (Tuckman, 1972). On the other hand, as noted by Gubrium & Holstein (as cited in Fontana & Frey, 2003):

> the interview has become a means of contemporary storytelling, where persons divulge life accounts in response to interview inquiries and as means of data gathering, it is no longer limited to use by social science researchers but is an universal mode of systematic inquiry. (p.63)

Beside the reasons above, Cohen et al. (2000) add that the questionnaire is a widely used and useful instrument for collecting survey information while interviews enable both interviewers and interviewees to discuss their interpretations of the world in which they live, and to express how they regard situations from their own point of view. The semi-structured interviews were used as opposed to highly structured where the questions and their order are predetermined. With students as well as university tutors, interviews took place at university while those of mentor teachers took place in their schools.

In this study, the questions used in the questionnaire as well as those used in the interviews were constructed in such a way that they enabled gathering specific information from : (a) student teachers i.e. their experiences and practices, benefits, support received, lessons learnt and views towards teaching practice improvement (Appendix A); (b) the supervisors and mentors i.e. their perceptions, the help they provide, and the way they think the teaching practice can be improved (Appendices B & C).

The questionnaires for student teachers were distributed during the first week after the teaching practice session while the teaching observations took place during the teaching practice itself. These school visits helped the researcher in the construction of the questionnaire as they provided the researcher with a picture of what happens in schools in relation to the teaching practice. However, before distributing the questionnaire, the researcher proceeded by piloting the questionnaire. Cohen et al. (2000) recognize that "pre-testing a questionnaire is crucial for its success" (p. 260) and it is done through a pilot study which enables the researcher to: (a) ensure the clarity of the questionnaire items, (b) estimate the time taken to complete the questionnaire, (c) identify repetitive questions, (d) identify misunderstandings and (e) try out the coding for data analysis. It also served for obtaining feedback on a number of aspects such the type and the format of the questions, the responses categories and, the attractiveness and appearance of the questionnaire. This phase of piloting was highly recommendable for

the questionnaire success because it serves not only to increase reliability and the validity of the questionnaire but also its practibility (Cohen et al., 2000). The version of the questionnaire that was piloted resulted from a long revision process and discussion between the researcher and the supervisor which aimed at producing a questionnaire that not only fitted with the research questions but also that could be completed easily by respondents. The pilot questionnaire was distributed to 12 science student teachers from different year groups and specialisations and 10 returned the questionnaires. These science student teachers were asked to complete the questionnaire and their responses were examined to ascertain whether any questions were ambiguous or difficult to understand. The responses were also examined and analysed to ascertain if the information they provided would be sufficient to deal with the research questions or if further questions were required. After the pilot study a few changes, especially in terms of reformulation of some questions, were done. For example, after piloting the questionnaire, the questions of Sections 5 and 6 (see Appendix A) were refined in the sense that the benefits of teaching practice in the areas of content and of skills were separated for each of the two subjects taught by the science student teacher (Section 5, Question 5.1) and the support during teaching practice was specified separately for each mentor teacher and university tutor with their respective subjects (Section 6, Question 6.1).

The interviews took place over a relatively long time because they could only take place when the interviewees made themselves available. This contributed to the limitation in number of the participants who were interviewed especially those from the last group of mentor teachers where, as stated before, factors such as a lack of means of transport and the problem of the researcher attempting to locate schools due to unfamiliarity with the region played an important role.

For the purpose of this study, the ethical issues were addressed. William (as cited in Strydom, 2002) argues that: "for researchers in the social sciences, the ethical issues are pervasive and complex, since data should never be obtained at the expense of human beings" (p. 62). With this in mind, the UKZN research ethics policy was respected. In fact, not only in UKZN, but anywhere else, no sociologist or other social scientist would dismiss the three fundamental ethical concerns namely informed consent, right to privacy and protection from harm (Fontana et al., 2003). In addition, because the questionnaire as well as the interview are always an intrusion into the life of the respondent, be this in terms of time taken to complete the questionnaire, the level of

threat or sensitivity of the question or the possible invasion of privacy (Cohen et al., 2000), all activities of data collection were preceded by negotiating and obtaining an informed consent from participants. In this regard, no real name was used whether when transcribing interviews or presenting the data. Also, given the facts that no respondents can be coerced into completing a questionnaire and that they are free to withdraw from research, the researcher worked with the limited number of returned questionnaires. Despite many encouragements to participate in the study many did not return questionnaires and this decision not to participate was respected.

3.4. DATA TRANSFORMATION

Data analysis, in particular dealing with qualitative data, is an ongoing, emerging and iterative or non-linear process (Henning, van Rensburg & Smit, 2004), and therefore follows different steps. Once the raw data has been collected, the researcher's task is now the reduction of the mass of data gathered in a form that is suitable for analysis. According to Cohen et al. (2000), the process of data reduction consists of coding data in preparation for analysis but this phase should be preceded by a task called editing. For questionnaires, editing aims to identify and eliminate errors made by respondents. It consists in checking the completeness, the accuracy, and the uniformity of the questionnaire. In this study, after receiving back the questionnaires, the researcher proceeded by editing. This lead the researcher to reject some questionnaires with higher incompleteness and the number of questionnaires considered to have been answered fully was 60. The following task was the coding. The researcher tried to assign a code number to each answer even though there were some open-ended questions where the multiplicity of answers made the coding a difficult exercise. After many attempts and refinements the first code book was done.

Because the questionnaire used in the study was a mix of close-ended questions and open-ended questions, this made pre-coding difficult. However, it was proceeded by a post- coding, developed after the questionnaire had been administered and answered by respondents (Cohen et al., 2000). After post-coding, the data were captured on a spreadsheet from which the analysis could more easily be done.

The interviews were audio tape-recorded as the audio tape recording is known to be a standard method of capturing interview data and were then transcribed. Although the process of transcribing is certainly laborious, it is a very valuable part of the research because it brings the researcher close to the data (Denscombe, 2003). It is also a crucial step for there is the potential for massive data loss, distortion, and the reduction of complexity (Cohen et al., 2000). That is why Denscombe argues that "transcription is not a mechanical process of putting tape-recorded talk into written sentences but that the talk needs to be tidied up and edited a little to put it in a format on the written page that is understandable to the reader" (p. 184). The researcher has personally been challenged by the problems inherent to all transcription such as the intonation, emphasis and accent used in speech, or some people who do not speak in finite sentences. However, despite such a challenging task, the researcher persevered with the transcriptions and did them personally. In this regard, Henning et al. (2004) state that the better a researcher knows the data, the more competent he or she will be in labelling units of meaning and furthermore in the slow process of transcribing data, one comes and stays close to the data.

Once the transcriptions were done, the next phase called 'working the data" which consists of "coding" from transcribed texts towards "categorising" followed. For the purpose of this study, the researcher proceeded by open coding as suggested and illustrated by Henning et al. (2004) in the figure below (Figure 3.1).

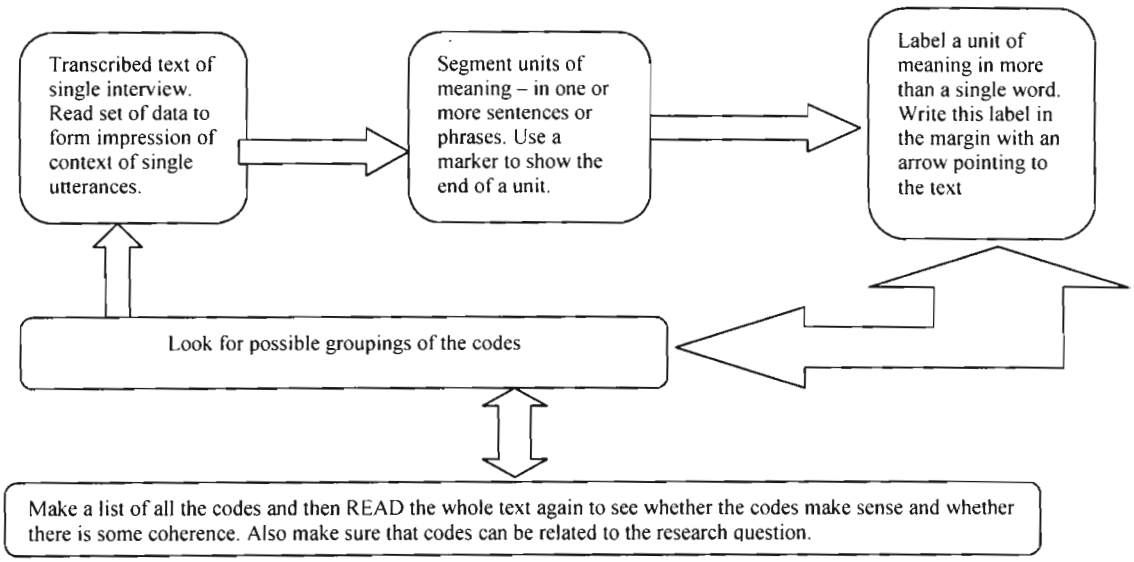

Figure 3.1 Coding from texts (Adapted from Henning et al., 2004)

The other sources of information used in this study included the classroom teaching observations during the teaching practice and certain documents from the teaching practice office. The data from these sources served as reinforcing arguments in the writing up of the findings in the next sections.

These sets of data were then analysed and interpreted. The data from the questionnaire was analysed using a computer statistical analysis software package designed for the social sciences (SPSS for Windows) while data from interviews were analysed manually by grouping responses according to themes. In the coding and developing of assertions, data collected using different methods were used to support the assertions i.e. data triangulation was used. Triangulation is defined as the use of two or more methods of data collection in the study of some aspects of human behaviour and is seen by Campbell and Fiske (as cited in Cohen et al., 2000) as a powerful way of demonstrating concurrent validity, particularly in qualitative research. Mathison (1988) elaborates this by saying that its use in naturalistic and qualitative approaches is an important issue "[in order to] control bias and establishing valid propositions because traditional scientific techniques are incompatible with this alternate epistemology" (p. 13).

Golafshani (2003) also advocates the use of triangulation by saying that triangulation strengthens a study by combining methods and furthermore states that triangulation is seen as a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study. Four categories of triangulation namely time triangulation, space triangulation, investigator triangulation, and methodological triangulation are the mostly used in education; and of these four, the last category is the one used most frequently and the one that possibly has the most to offer (Cohen et al., 2000). Indeed, it is methodological triangulation that has been used in this study.

3.5. LIMITATIONS OF THE STUDY

This study is limited to the science student teachers from the Faculty of Education at Edgewood Campus and deals with the teaching practice in 2005 academic year. The size of the target group involved in the study is not representative enough of

the whole science student teachers to enable generalisability of data to all science teaching practice in the country. Also the purposive and opportunistic sampling procedure in obtaining participants to interview decreases the generalisability of the findings and therefore the reliability of findings as well as validity whether internal or external.

In addition, Patton as cited in Golafshani (2003) states that validity and reliability are two factors which any qualitative researcher should be concerned about while designing a study, analysing results and judging the quality of the study. To ensure reliability in qualitative research, examination of trustworthiness is crucial. In qualitative research, reliability can be regarded as a fit between what researcher records as data and what actually occurs in the natural setting that is being researched. For research to be reliable it must demonstrate that if it were to be carried out on a similar group of respondents in a similar context, then similar results would be found (Cohen et al., 2000). Considering the view of Carmines and Zeller (1979) who see reliability as the tendency towards consistency found in repeated measurement of the same phenomenon, this question of reliability is always raised in qualitative research methods as it is often difficult to repeat the research in exactly the same way and under the same conditions. However, because reliability in a research design is based on the assumption that there is a single reality, which if studied repeatedly will give the same results; this concept of reliability in the context of this study has a little meaning. This is also pointed out by Stenbacha (as cited in Golafshani, 2003) stating that the issue of reliability is an irrelevant matter in the judgement of quality of qualitative research.

On the other hand, Cohen et al. (2000) argue that it is very easy to slip into invalidity as it can enter at any stage of a piece of research. They point out two types of validity namely 'internal validity' and 'external validity' that are mostly considered when assessing a piece of research. The first seeks to demonstrate that the explanation of a particular event, issue or set of data, which a piece of research provides, can actually be sustained by data while the second refers to the degree the results can be generalised to the wider population, cases or situations (Cohen et al., 2000). In this study, the external validity seems to be limited given the nature of the chosen case but attempts to provide confidence in the internal validity were made by ensuring the fitness of the research methodology to the purpose of the study on one hand and using different and rigorously refined instruments for data collection. It is acknowledged that there would be greater confidence in the validity and reliability if the study were extended

over, for example, the four years a student did teaching practice during their B.Ed. degree. However, the researcher did not have the time or resources to pursue this option and was limited to the defined case described above.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

This chapter deals with data analysis, interpretation and presentation of findings. The process of data analysis involves activities such as preparing the data for analysis, conducting different analyses, moving deeper and deeper into understanding the data, representing the data, and then making an interpretation of the larger meaning of the data (Creswell, 2003). In this chapter, the findings supported by both qualitative and quantitative data are presented and discussed. Keeping in mind the research questions, I present this chapter using six focus points. It begins by a brief presentation of the general context of the 2005 teaching practice. The second point concerns a description of the participants. The third point deals with what science student teachers do during teaching practice particularly their practices in the classroom and their views of the teaching practice session. Fourthly, dealing with the research question number two, the benefits from teaching practice are examined. Fifthly, the nature of help and support that the science student teachers received from schools as well as from university, mainly through teaching practice mentoring and supervision are examined. Lastly, the science student teachers' views on how teaching practice could be improved are examined.

4.1. CONTEXT OF 2005 TEACHING PRACTICE

In the Faculty of Education of the University of KwaZulu-Natal, teaching practice is part of the compulsory curriculum both for students doing a B.Ed. degree and a PGCE. As indicated by the faculty documents, the vision of the teaching practice is to provide opportunities where pre-service students can develop into confident, reflective and effective teachers who will continue to strive for personal and professional excellence (UKZN, 2005). It is an essential component of the student's professional training towards becoming a teacher.

For the year 2005, the B.Ed. teaching practice was organised in such a way that the initial school visit took place on Thursday 26 and Friday 27 May 2005 and the main

session of teaching practice itself was from Monday 18 July to Friday 12 August 2005 for B.Ed. 2nd, 3rd, and 4th year. This initial visit was a compulsory activity, the main purpose of which was for the student to familiarise themselves with every aspect of the school functioning and the requirements for teaching practice. The PGCE student teachers who only have teaching practise in their final year of study, had two sessions of teaching practice: the first for five weeks in April-May 2005 and the second for seven weeks from Monday 18 July to Friday 2nd September 2005. The student teachers were placed in a variety of different schools ranging from urban to rural, close to far away, and public or private schools. Where possible the students' choices were considered for their placement.

The duration and the prescribed minimum number of lessons that they had to teach depended on the level or phase of the student. For example the BEd student teachers placed in primary schools were required to teach a minimum number of lessons per week i.e. 10 for 2nd years, 15 for 3rd years, and 20 for 4th years. For those placed in secondary schools, the minimum requirement was 10 hours per week for 2nd years, 12 hours per week for 3rd years, and 15 hours per week for 4th years. PGCE students had similar requirements to 4th year students. In addition, all student teachers were urged to ask teachers in their school for permission to observe them teaching and to observe fellow student teachers.

During teaching practise in the schools, both university tutors and mentor teachers were required to assess student teachers on a range of professional skills and they were also expected to provide educational support and guidance to help with the student teachers' professional development. There were a minimum required number of formal assessments. The university tutors had to formally assess student teachers on at least two or three occasions while the mentor teachers had to assess primary phase student teachers during four formal lessons and secondary teachers during six formal lessons i.e. three per major subject for secondary phase student teachers (UKZN, 2005).

The faculty is currently facing a problem of shortage of specialist supervisors especially in science that obliges it to use other contractual staff from outside the University for teaching practice supervision. However, for the purpose of this study, the tutors who participated were chosen by the researcher from permanent teaching staff in the science education department. As for mentor teachers, there was no particular criterion of their selection. They were chosen by the school management or volunteered in their school to supervise student teachers. The majority did not have specialist

training in terms of teaching practice mentoring but they were informed of what the university expected from them, through a one-day workshop that took place at the Edgewood campus a few days before the beginning of the teaching practice. Unfortunately only a few of those involved in mentoring attended. It was found that in some cases the allocation of teachers to act as mentors by the schools was problematic as student teachers were assigned to teachers who were not appropriately qualified to be specialist teachers.

4.2. DESCRIPTION OF PARTICIPANTS

The participants in this study were male and female science student teachers from the Faculty of Education (Edgewood campus) of the UKZN in 2005. Their ages ranged between 19 and 39 years with a mean age of 23,4 years. Details about the participants' age are presented in the table below (Table 4.1).

Table 4.1 Distribution of participants' age

Age group	Number	Percentage (%)
≤ 20	15	25,4
21 - 25	32	54,3
25 - 30	7	11,8
≥31	5	8,5
Total	59	100,0

Of the 59 participants who provided information on their age, more than three quarters of the participants were under 25 years while only one tenth was over 30. By assuming that the average age of completion of secondary school is 18 years, it seems that the majority of these participants did not interrupt their studies but entered university immediately after passing their matriculation exam. This was confirmed by a further question asking whether they have done any teaching before starting their current degree. More than eighty percent (81,7%) answered that they had not done any teaching before entering university and 18,3% said that they had taught before. A summary of the characteristics of the student teachers who participated in the study is provided in table

4.2. It can be seen that there were more females than males and that the majority of students were intending to become biology teachers with the most popular phase being the further Education and Training phase (FET). Very few science specialists focus on the lower phases like Intermediate with most of these teachers being generalists at this level.

Table 4.2 Characteristics of the participants

Characteristics		Number (N = 60)	% of respondents
Gender	Male	27	45,0
	Female	33	55,0
Degree and year of study	BEd 2nd year	29	48,3
	BEd 3rd year	12	20,0
	BEd 4th year	10	16,7
	PGCE	9	15,0
Teaching phase	Foundation	1	1,7
	Intermediate	2	3,3
	Senior	9	15,0
	FET	48	80,0
First major subject studied	Biology	32	54,2
	Natural science	8	13,6
	Physical science	15	25,4
	Information system (IS)	1	1,7
	Other(s)	3	5,1
First teaching discipline	Biology	33	55,0
	Natural science	6	10,0
	Physical science	19	31,7
	Other	2	3,3
Career choice	Biology teacher	31	51,7
	Natural science teacher	3	5,0
	Physical science teacher	17	28,3
	Primary science teacher	2	3,3
	Other	7	11,7

4.3. SCIENCE STUDENT TEACHERS PRACTICES AND VIEWS OF TEACHING PRACTICE

4.3.1. Student teachers experiences

Information was collected on a number of aspects including participants' views on the schools' learning and administrative environment, the teaching practice organisation and management as well as the meeting of their teaching practice expectations. On the question whether this was their first time they experience teaching practice, only 16,7% (10) of respondents were experiencing it for the first time and as expected the majority of these were PGCE students. The two B.Ed. students who responded could possibly have transferred into the degree and in that way avoided teaching practice in their previous years.

When asked how they would describe the general learning and administrative environment of the school, they provided a variety of responses. In order to analyse these responses, I coded them on a scale from 'Excellent' = 1 to 'Very poor' = 5 and found that the majority were positive. For example, one 3rd year female student teacher responded that the school was "very well organised. Learners are well behaved, respectful and the school is very small and intimate". Another 4th year student teacher reported: "very well organized. I was very impressed". However, a minority of student teachers were very negative and described the learning and administrative environment as very poor. They emphasized mostly the lack of discipline among learners. For example, one 4th year student teacher said: "the school is very poorly maintained as learners are out of classroom during lesson times. And most teachers don't bother going to classes to teach".

Every science student teacher was supposed to teach at least two subjects with at least one being a science subject. Therefore, not only science subjects, but also others such as Mathematics, Information systems, and in rare cases, isiZulu and Technology were taught. By far the most popular science subject taught was Biology with over 50% teaching it followed by Physical Science with about 40% and Natural Science with about 30% reporting that they taught some lessons in this specialisation on teaching practice.

During this 2005 teaching practice, almost all science student teachers reported that both mentor teachers and university tutors supported them by observing them teach. Of concern were the 5% (three) who reported that they had never been supported or observed at all by any mentor teacher and the 10% (six) who reported did not received any visit from a university tutor. It is expected for a student teacher to be observed and formally assessed on a minimum number of times. The university tutors had to formally assess their allocated student teachers on two or three occasions while the mentor teachers were requested to assess primary phase student teachers during four formal lessons and secondary teachers during six formal lessons i.e. three per major subject (UKZN, 2005). From Table 4.3 below, it appears that the tutors visited for formal assessment between three and four times and the mentors between four and six, except for 3rd year students who received less visits from both. This difference between the visits per year could be explained by the fact that 2nd years are visited more because this is the first time they are formally assessed as no assessment is done in the first year. Final year receives more attention because their assessment determines their final teaching practise mark. Consequently more efforts were focused on the beginners (2nd year) and the leavers (4th year).

Table 4.3 Mean number of visits for assessment

Degree	Minimum requirement	No. assessed by mentor	No. assessed by tutor
PGCE	6	4,0	2,9
BEd 2nd year	4	5,4	3,5
BEd 3rd year	4	3,5	2,7
BEd 4th year	4	4,6	3,4

Students are assigned to mentor teachers in the school for the full duration of teaching practice. It would be expected that during this time they would spend time discussing their teaching and learning of science. On the question about how often, student teachers discussed with the assigned mentor teacher about their teaching, responses

were coded in such a way: 'all the times'= 1, 'often'= 2, 'rarely'= 3 and 'never'= 4. Data revealed that slightly more than 80% frequently had discussions while 18% reported seldom or no discussions as shown in the figure below (Figure 4.1). Although it can be seen that over three quarters of respondents had frequent discussions with their mentors, there were a few student teachers (4%) who never discussed their teaching with any mentor teacher.

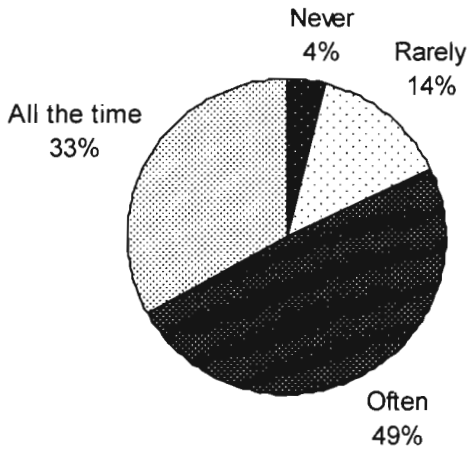

Figure 4.1 Discussion with mentor

Participants were also asked to rate on a scale of 1 = 'Excellent' to 5 = 'Very poor' the organisation and management of teaching practice both by schools and the university. In general, student teachers were positive in their responses about the teaching practice organisation and management but there was some dissatisfaction expressed. The following table (Table 4.4) summarizes their views in response to the question.

Table 4.4 Science student teachers' views on organisation and management of teaching practice (n=60)

Organisation & management		Excellent **(1)**	Well done **(2)**	Satisfactory **(3)**	Poor **(4)**	Very poor **(5)**
By university	%	10,0	36,7	33,3	16,7	3,3
By schools	%	28,3	45,0	15,0	8,3	3,3

From the table above it can be seen that almost three quarters of participants (73,3%) reported that the schools' organisation and management of the teaching practice was at least well done as opposed to less than half (46,7%) for the university. However, about 20% indicated that the university's teaching practice organisation and management was poor or very poor.

Having a look at the responses to the question whether the actual experience met their expectations, these responses were coded as yes, no or partially. The majority of the students (62,7%) reported that expectations were met with 20,3% reporting a partial meeting while for about 17% they were not met at all. When these responses were further analysed by year of study, it was found that the third year students reported the lower levels of having their expectations met and satisfaction with organisation of teaching practice. For example, only 50% of 3rd year student teachers indicated that the expectations were met compared to 80% for 4th year. This could be a result of attention being placed by university on the students being assessed for the first (2nd year) and last times (4th year) which was mentioned previously.

4.3.2 Teaching methods used

Regarding the teaching methods used, the researcher wanted to know which methods were most frequently used by the student teachers while on teaching practice. Participants were asked to report on a scale from 1 = 'used in every lesson' to 5 = 'never used' how often they used various teaching methods or teaching and learning activities in their science lessons. All methods listed in the questionnaire were reported to have been used but to differing degrees. Overall, the most common methods used were 'direct teaching' and 'exercises' and the least used was the 'field trip'. The summary of the way different teaching methods were used is given in the following table (Table 4.5).

From the table, it is seen that direct teaching and exercises are reported as the most commonly used methods. Over 60% of respondents reported that they used these methods in most lessons. As to be expected, projects and field trips were the least used. More than 85% of participants reported that they had never done a field trip and only very few (two student teachers) did it in some lessons. This is understandable due to the fact that undertaking a field trip requires lots of prior preparation and there are often financial constraints associated with transport or site entry.

Table 4.5 Percentage (%) of respondents reporting the use of different teaching methods

Methods used (N = 59)	Never used (1)	Used in one lesson (2)	Used in some lessons (3)	Used in majority lessons (4)	Used in every lesson (5)	Mean use on scale of 1 to 5
Direct teaching	1,7	3,4	31,0	34,5	29,3	***3,86***
Teacher demonstration	10,2	15,3	47,5	20,3	6,8	***2,98***
Learner practical work	10,2	18,6	44,1	18,6	8,5	***2,97***
Investigation	15,8	14,0	42,1	22,8	5,3	***2,88***
Group discussion	13,8	17,2	36,2	29,3	3,4	***2,91***
Copy work	22,4	17,2	34,5	15,5	10,3	***2,74***
Exercises	0,0	5,1	30,5	38,0	25,4	***3,85***
Projects	35,1	21,1	29,8	10,5	3,5	***2,26***
Field trips	86,2	8,6	3,4	(1,7)	0,0	***1,21***
Assessment	10,3	34,5	44,8	6,9	3,4	***2,59***

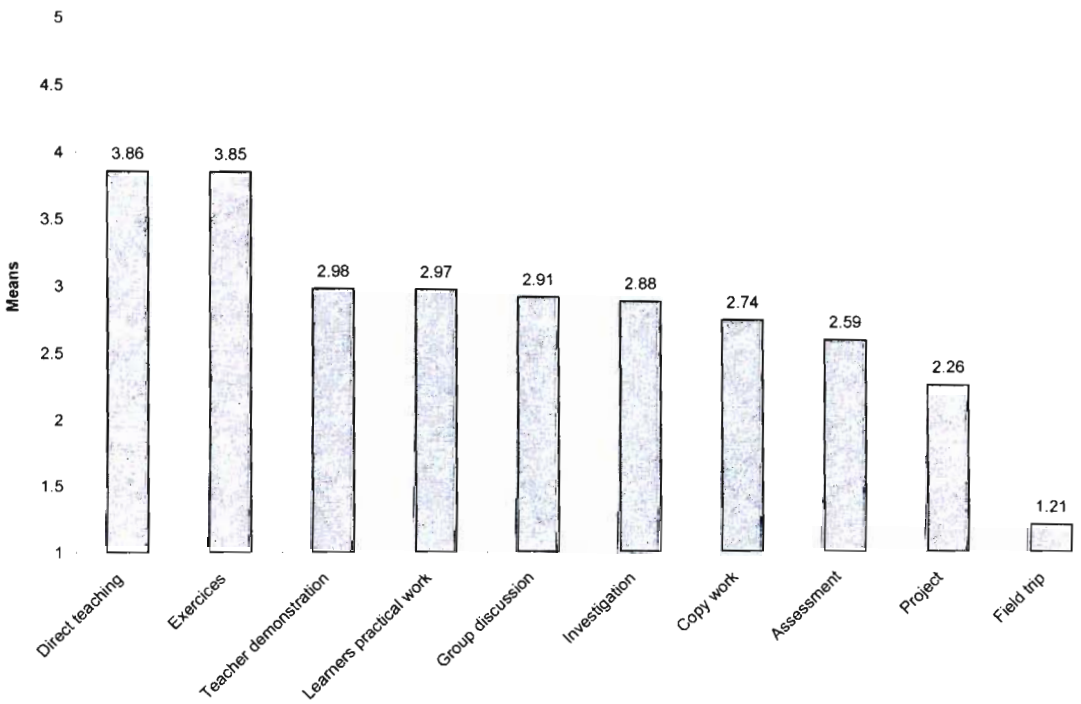

Figure 4.2 Methods used on average

For example two school teachers to whom the researcher talked during a school visit indicated that when they planned for a field trip, they also had to inform the

principal two weeks in advance and depending on the type of site to be visited it required a letter of confirmation before any arrangement of the trip itself. In this regard, the response of one student who reported having done field trip in the majority of lessons was surely incorrect. Indeed this was not possible.

On visual analysis of the questionnaire responses, it was found that the physical science teachers reported that they used demonstrations, practical work and exercises more than the biology teachers. On the other hand, the biology student teachers reported that they used more class discussions. This is reported in the table below (Table 4.6). When analysed statistically (t test for equality of means between the biology and physical science specialists) the only difference of significance was for the use of discussions but only at 0,05 level (t = 2,016, df = 48). So while there were minor differences in the means for a few methods only the discussion showed up as being significant.

Table 4.6 Comparison of methods used by Physical Science & Biology students

		Direct teaching	Teacher demo	Learner practical	Investigation	Group discussion	Copy work	Exercises
Biology	Mean	3,79	2,82	2,97	3,03	3,15	2,67	3,73
	Std. Deviation	0,960	1,103	0,951	1,104	1,093	1,291	0,944
Physical Science	Mean	3,88	3,28	3,11	2,81	2,47	3,00	4,06
	Std. Deviation	1,054	1,018	1,323	1,167	1,125	1,323	0,539

There were too few students classified as Natural Science student teachers to make meaningful comparison with others and their data are not reported in the table. When the responses by gender were examined, there appeared again to be differences for the method "discussions" in which females reported using them more (Mean for Male group = 2,6 while Female group = 3,1). However, further statistical analysis of the responses revealed that there were no acceptable statistically significant differences

between male and female (t test for equality of means was only significant at the 0,10 level indicating little significant difference).

Having discussed the use of different methods, respondents were asked a number of free response questions about their choice of teaching methods. These responses were coded to produce counts. In response to the question whether they were free to use whatever activities and methods they wanted; 81,0% indicated that they had such freedom, 12,1% indicated they were free only sometimes while 6,9% indicated they were assigned to use a particular method and therefore were not free at all. When asked who influenced them in their choices, 25% of students acknowledged having been influenced by their mentor teachers in the choices. The university tutors were only considered an influence by 7% of the students. A variety of other influences such as resource availability (7%), curriculum demands (10%) and a combination of these influences (13%) were mentioned.

When asked why they did not use particular methods, the responses fell into three main groups; those dealing with time (mentioned by 28% of students), those with a lack of teaching resources (15%) and those dealing with relevance to the lesson being taught (22%). During the teaching practice, most student teachers had access to a variety of teaching resources including textbooks, worksheets, visual and electronic resources as well as the combination of many of these. However, when asked what resources they used to plan activities, the textbooks were predominant as they were used by 37,3% of the 59 respondents. Forty five percent of the students were not specific in their answer but wrote that they used many different resources.

On the question whether the student teachers tried something new for the first time during their teaching practice, 58,3% indicated that they did and 28,3% did not. Eight students (13,3%) did not respond, most probably because they did not try something new out. Further analysis was done to determine if the more experienced students were trying new methods more than other groups. However, a cross tabulation followed by a chi square test by year of study revealed no significant differences between the year groups (Pearson chi square test $\chi = 0,29$, df 3, $p = 0,96$). For those who reported that they tried something new, they indicated that they did so mostly by their own initiative (30%) but at the same time, some students acknowledged that the mentor teachers (13%) and university tutors (10%) encouraged them.

In the final question of the section, they were asked if they had attempted to involve the learners in some practical work. Seventy six percent of participants

responded that they had attempted to do this. When asked in what way they were supported in doing this, about 38% indicated that they received no support or supported themselves. The mentors were seen as the most supportive (40%) and university tutors provided support to some students (14%). Given the central role of practical work and investigations in the new curriculum there must be a concern about the low level of encouragement by mentors and tutors to use it.

4.3.3 Preparation for teaching practice

Student participants in the study were asked to rate from 1='not sure what to expect' to 5 = 'very confident' how prepared they were before going to the schools, in a number of areas including the general school administrative management, the classroom management, the pedagogical knowledge as well as the school subject content and pedagogical content knowledge. During their preservice education the students get involved in modules that include both teaching methods of specific subjects as well as the science subject content. The question asked here was trying to find out if they were confident to try out such skills and knowledge in a classroom context. In general, the participants reported that they felt well prepared for teaching practice and therefore very confident. The figure below (Figure 4.3) shows that on average they considered themselves prepared and very confident towards teaching practice and that there was no significantly weak area.

What was interesting was that when these were broken down by gender a visual inspection of the data revealed a difference with females reporting to be more prepared than males in almost all the individual areas discussed. When the researcher wanted to know whether there was a significant relationship between "the degree year " and "the preparedness for teaching practice", a cross-tabulation between these two variables revealed that there was no significant difference except in 'classroom management' and 'school administrative and management' where the PGCE student teachers reported to be more highly prepared than all B.Ed. years. This is perhaps an indicator of the PGCE students' confidence in having already completed a degree. Even though almost one third of respondents 31,7% (19) did not make further comments on their preparedness for teaching, more than half of those who made a comment indicated that they were prepared for teaching practice.

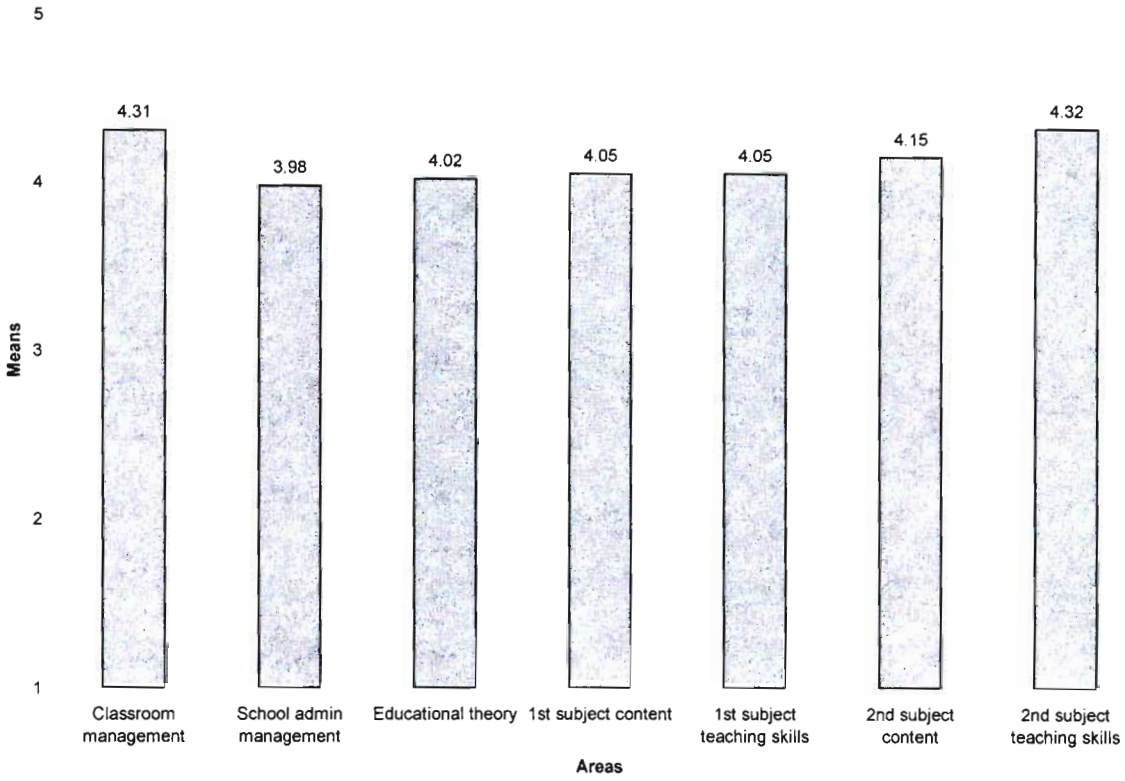

Figure 4.3 Preparedness for teaching practice

4.3.4 Summary

In summary, this section discussed in detail what do the science student teachers involved in the study do in teaching practice. Thus, it provides answer to the research question number one. It was found that, respondents had a positive view about the general learning and administrative environment of the schools. Among the science subjects studied and taught, Biology was by far the most popular choice followed by Physical science. Both mentor teachers supported almost all student teachers and university tutors and had frequent discussions with their mentors. The organisation and management of teaching practice was better in schools than university where it was reported very poor by about 20% of participants. During the teaching practice, the majority reported that their expectations of teaching practice were met by their actual experience. The analysis of the teaching methods and resources used revealed that science teaching is still done in the traditional way as they mostly used direct teaching with textbooks as the main resource. It was also found that student teachers were positively prepared for a range of activities they were involved in during teaching practice.

4.4. BENEFIT OF TEACHING PRACTICE

This section aims at informing the reader what do the science student teachers consider to be the benefits of teaching practice. To get information on the benefit of teaching practice, student teachers who participated in the study were asked to rate what they had benefited in a number of areas from 'learnt nothing' = 1 to 'learnt a lot' = 5, such as general school administrative management, classroom management, pedagogical knowledge as well as the school subject content and pedagogical content knowledge. They were also asked to state what they would consider to be the main benefit of their teaching practice. Furthermore, the same information was collected from other sources including interviews with some student teachers, mentor teachers and supervisors as well. In addition, some informal interviews with student teachers when the researcher visited their teaching at the host schools constituted an additional source of information about the benefit of teaching practice.

In general, participants in the study indicated that they learnt a lot in many areas. The following table (Table 4.7) summarises the way the respondent reported having benefited from teaching practice. (Further details and comments from students are provided on pp. 56-58.)

Table 4.7 Students responses to areas in which they benefited (%)

Areas (N=59)	Benefit of teaching practice				
	Learnt nothing	Learnt very little	Learnt a few things	Learnt a number of new things	Learnt a lot
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Classroom management	1,7	1,7	10,2	37,3	49,2
School admin management	0,0	3,4	25,4	40,7	30,5
Educational theory	1,7	3,4	20,3	40,7	33,9
1st subject content	1,7	5,1	15,3	42,4	35,6
1st subject teaching skills	3,5	0,0	22,8	35,1	38,6
2nd subject content	1,7	5,1	16,9	28,8	47,5
2nd subject teaching skills	1,7	0,0	15,3	30,5	52,5

It can be seen from the table above that, in all areas, more than 70% learnt at least "a number of new things". The two categories of 'classroom management' and 'second subject' were the highest with about 50% reporting they "learnt a lot". Only one student reported having learnt nothing.

When analysing the data in terms of mean response by degree, the same trend appears that respondents were generally positive about all the categories and reported that they learnt a number of new things in all categories. However, the PGCE student teachers reported that they had learnt more than any other of the B.Ed. years in 'classroom management' and similarly B.Ed. 4th years were most positive in 'school administrative and management'. For example, in 'classroom management' the PGCE had a high mean of 4,8 indicating 'learning a lot' which declines to 3,9 for the 4th year students. In the case of 'discipline content' and 'skills', the PGCE and B.Ed. 2nd year students indicated that they benefited more than the others as the means decline as they progress to 3rd year and 4th year i.e. with years of teaching practice. Surprisingly, overall the B.Ed. 2nd year reported that they had learnt the most out of all groups perhaps because it was their first real practice in schools.

There were no statistically significant differences between the discipline groups in their response to questions of the benefit. However, when the differences in the means are examined, one result does stand out despite the lack of statistical significance. The biology students reported that they benefited more than the physical science students in both of the content and skill areas (e.g. difference of means of 4,3 for biology to 3,7 for physical science for content area 1 and 4,4 for biology to 3,8 for physical science for content area 2). When the responses of males and females were considered, significant differences were observed. For example, the analysis of benefit by gender revealed that female are more positive than male in all areas except in 'classroom management' as can be seen visually in the figure below (Figure 4.4).

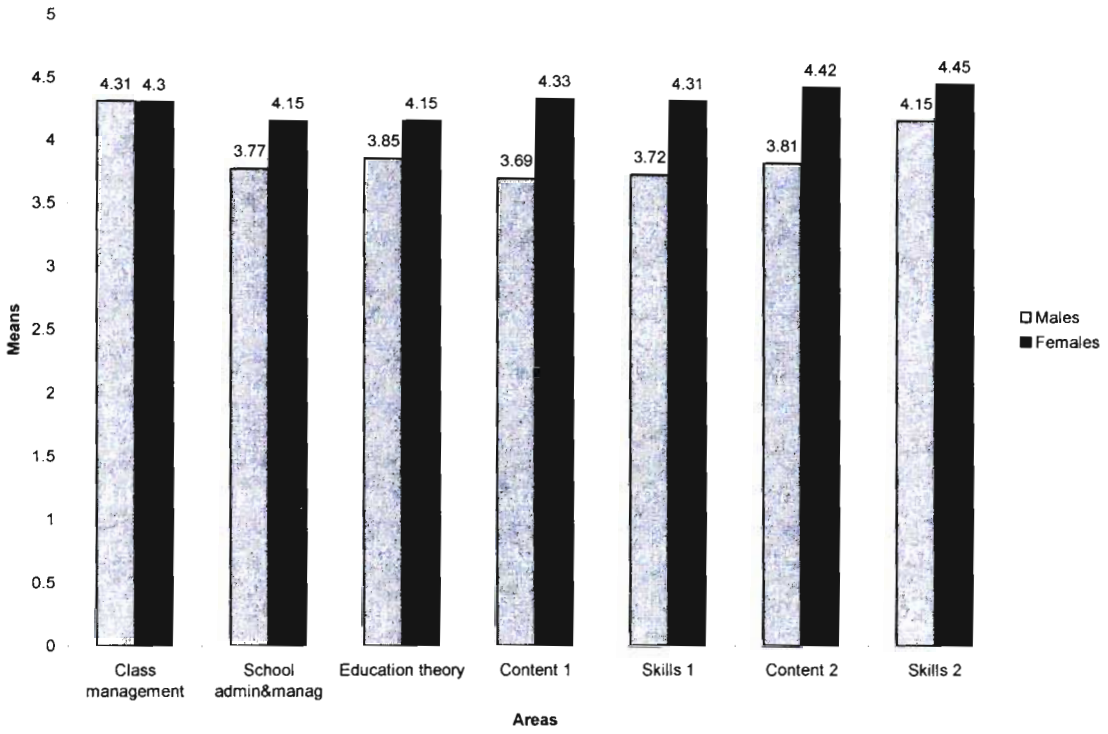

Figure 4.4 Benefit from teaching practice by gender

On the open ended question of what participants would consider to be the main benefit of their teaching practice experience, responses were coded and then analysed. They reported that they mainly benefited in various areas such as 'dealing with learners', 'building self-confidence', 'teaching strategies and experience', 'classroom management', 'school administration' and so forth. For example, one third year student reported: "Dealing with learners and teachers were most beneficial". Another reported her main benefit as: "To acquire and build confidence within my teaching profession and the ability to relate and conduct myself with children". A 4th year male B.Ed. student indicated: "My experience of the administrative functioning of the school and my dealing with senior staff were the main benefits for me". The table below (Table 4.8) shows the ranking of what the participants indicated to be their main benefits. It can be seen that they most gained in terms of 'teaching strategies / experiences' followed respectively by 'dealing with learners' and 'classroom management'.

Table 4.8 Percentage of respondents on the overall main benefit of teaching practice

Benefit	Frequency	Percentage	Ranking
Confidence	5	9,8	4
Knowledge content	4	7,8	5
Teaching experience/strategies	15	29,4	1
Dealing with learners	11	21,6	2
Classroom management	7	13,7	3
School administration	1	2,0	8
Many of the above	3	5,9	6
Other	2	3,9	7
Unclear	3	5,9	-
Total	51	100,0	

Beside information provided by student teachers through the questionnaire, the researcher conducted some teaching observations and informal conversations with some student teachers at their host schools and they supported the findings above. For example, one B.Ed. 4th year science student teacher whose class was observed by the researcher, reported: "I learnt a lot. Rather than before, I am now able to maintain discipline of the class and to control it. My classroom management increased considerably". Another science student teacher after his lesson reported: "By preparing the lesson, I recall things that I have forgotten and enhance my understanding. I feel more confident to manage my classroom". Another B.Ed. 2nd year science student teacher at her school reported after a lesson: "I am getting familiar with the classroom and I feel confident with the classroom management".

In addition, the researcher formally interviewed some student teachers, mentor teachers and university tutors. During the interviews, a lot of evidence was gained to support the view that the student teachers gained significantly in many different areas while on teaching practice. For example, one PGCE science student teacher reported:

> This last teaching practice, I think I benefited in terms of having more experience in teaching and also facing some problems with learners, which I was able to solve, like the discipline issues. I was more confident in class in terms of solving disciplinary issues and in teaching. I also have more experience to teach in physical science. (Jack, interview, 27/09/2005)

He continued by saying: "I think I gained experience, relevant experience of being in front of kids and then I am now more confident which will help a lot in being a good science teacher ... as well as to be able to handle problems from the learners". A second year male science student teacher as far indicated a certain number of benefits including skills of writing on the board, organising the work, and controlling learners in the classroom situation. He even included the social and emotional aspects as he reported: "I have learnt the skill of becoming like a motivator, somebody who is counselling children from disadvantaged homes, children with problems. I learnt the skill of being patient with people".

One fourth year science student teacher exposed some mismatches between what the university teaches and the realities of classroom teaching. He said: "From this last teaching practice, the benefit was basically that it made me more confident, it made me realise that what we were been learning from campus does not actually fit into the actual teaching"; and among other skills he gained, classroom management, speaking abilities, and a better handwriting on the chalkboard were mentioned. One female fourth year science student teacher emphasized the design of resources. She said:

> Uhm.... The second thing was uhm ... I learnt to design resources which gave my learners a head start. When I say a head start I mean it gave them an opportunity to identify the knowledge they have already. ..... So, I definitely developed the skill of using resources. (Betty, interview, 27/09/2005)

Another female fourth year science student teacher simply described her last teaching practice as an eye opener during which she experienced new methods of teaching such as practical work that she have never done before. She also reinforced what was found from the questionnaire as the main benefit because she reported:

> As practical skills, I would say that I learnt a lot about the organisation of my classroom and basic addendum tasks that are not included in our study here (at university) like marking register. ..... But as far as the actual skills in classroom, I think I improved my techniques and methods that I used for teaching as well. (Lise, interview, 28/09/2005)

The University tutors also provided more details about what they consider the student teachers they supervised benefited from teaching practice. For example, one science lecturer and teaching practice supervisor pointed out a number of benefits from teaching practice supporting what all student teachers through both questionnaire and interviews have pointed out. He said:

> I think the student teachers gained confidence. They were confident in the classroom.... Some of the skills would be also that they learnt about group work and discipline in the classroom, beside the overall skill of school management, inter-staff relationship. The other skill that they tried to develop is trying to plan a lesson thoroughly. (John, interview, 06/10/2005)

Another university science tutor with a long experience as general tutor indicated also number of benefits that corroborate those reported by the science student teachers. She even acknowledged that some of these benefits cannot be offered on campus and then reported the following:

> I think one of ways they benefit is that when they are in schools they learn a little bit about how schools actually work, which is something we can't offer them on campus in any real kind of context. So, I think the principal experience on things like ho to manage a class, basic administrative functions like attendance registers, uhm....They learnt a little bit more about those kind of things which I believe we can't offer. They also get to plan lesson and actually present them, which is actually a very valuable experience for them.... They also get to learn the difficulties that teachers experiences in the classroom. (Mary, interview, 27/09/2005)

As for the mentor teachers that the researcher managed to meet and interview, they also added to the information collected about the benefit of teaching practice. Although the number was limited only to four of them but from different schools, the information that they provided corroborates that obtained from the student teachers' questionnaire analysis and interviews. The 'classroom management' was again perceived to be the most benefit of teaching practice. One mentor teacher from an urban school spoke about it as the 'day-to-day basis of classroom management' including the disciplinary aspect of children. He reported:

> They are in the routine; they can actually see what involves being in class and what it demands them so they learn how to prepare lessons on a regular basis ..... the benefits they come about since they are handling the pupils, they learn how to discipline these children. (Holy, interview, 18/10/2005)

In another school, one mentor teacher indicated among other benefits of teaching practice, the teaching experience as well as the confidence. Her statement described the way she observed her science student teachers developing in their teaching practice. She reported:

> Hum, I think they benefited in teaching experience.....you could see that now there is a sort of gain in confidence, they are eeh you know, their teaching is easy with the children, there are no obstacles, there are hard things that you can say was improved on their teaching. So you could see that they have got more confidence, they are finding it easy to teach, they are happy in class. (Ntee, interview, 23/10/2005)

In summary, participants in this study benefited from teaching practice in various areas such as gaining confidence, learning more about teaching strategies and gaining experience, improving their ability to deal with learners and so forth. There was no one single benefit that stood out but rather a number of different benefits for different students. It was found that female student teachers were more positive than males in many areas. Participants' responses from the different data sources did not contradict each other but rather were supporting each other with respect to the main benefits from teaching practice.

4.5. SUPPORT DURING TEACHING PRACTICE

Once a student undergoes teaching practice, it is essential to be supported in various manners and by different stakeholders. Among them, the host school, particularly through the mentor teacher, and the university itself through the teaching practice office and university tutors, play a major role in supporting student teachers in their endeavour. In order to get information about the support that science student teachers received during teaching practice, they were asked to rate from 1 = 'excellent support' to 5 = 'no support at all', the support they received both from mentor teachers and university tutors or from someone else where appropriate. They were also asked to indicate what they gained overall from the support given to them and to indicate if there were some areas in which they could not get any support they needed. The following table (Table 4.9) shows the percentage of respondents summarising how they perceived the support they got during teaching practice.

Table 4.9 Percentage of respondents on the support received from mentors and tutors

Support received from		Excellent (1)	Very good (2)	Good (3)	Poor (4)	None (5)	Total
Mentor 1	%	48,3	25,0	18,3	5,0	3,3	100,0
	N	29	15	11	3	2	60
Mentor 2	%	28,8	27,1	28,8	8,5	6,8	100,0
	N	17	16	17	5	4	59
Tutor 1	%	43,9	29,8	22,8	0,0	3,5	100,0
	N	25	17	13	0	2	57
Tutor 2	%	36,0	34,0	28,0	0,0	2,0	100,0
	N	18	17	14	0	1	50

Note: Missing values have been excluded from the table

In general, responses revealed that student teachers rated the support received from mentors and tutors almost similarly. The percentages of responses can be seen in the table. The mean response for mentors and tutors was close to two (Mean = 1,9 for both) indicating that they considered the support on average as very good. However, it is critical to note that there were some student teachers who rated the support as poor or said they received no support at all. Student teachers were asked to indicate what they gained overall specifically from both mentor teachers and university tutors. This was an open ended question and the responses were grouped and coded. Responses are summarized in Table 4.10.

Table 4.10 Percentage of respondents on the overall gain from mentors and tutors' support

	Overall gain from the support given by					
	Mentor teachers (N=56)			University tutors (N=53)		
	frequency	%	ranking	frequency	%	ranking
Confidence.	15	26,3	2	7	12,3	3
Design and use of resources/creativity.	1	1,7	8	6	10,5	4
Teaching techniques & methods.	16	28,1	1	16	28,1	1
Knowledge of content.	8	14,0	3	4	7,0	6
Many of the above.	4	7,0	5	5	8,8	5
Not much.	3	5,3	6	2	3,5	7
Nothing.	6	10,5	4	9	15,8	2
Other(s).	3	5,0	7	4	7,0	6

It can be seen from the table above that the most commonly mentioned benefit was that associated with learning 'teaching techniques and methods'. This was mentioned most frequently (28% of respondents) as the main benefit of support from supervisors and mentors. Those who reported that they gained in terms of confidence attributed it more to support from mentor teachers rather than from university tutors (26,3% versus 12,3%). Probably this is because student teachers spend more time with mentor teachers and watch them teaching than they do with university tutors who visit them very few times and mostly only for assessment purpose. It is disappointing to see the large number of students who indicated having gained nothing either from their mentor teachers or university tutors. In fact, six and nine students respectively reported that they gained overall nothing from the mentor teachers or university tutors.

Student teachers were also asked whether there was someone else who supported them. They were asked if they received help and then to specify who helped them. The majority (74,1%) indicated that they did receive support from somebody else. Specifically, they listed other school teachers or staff (53,2%) followed by their student peers (14,9%) and parents/relatives (8,5%). On the question whether there was an area of their teaching practice where they did not get the support they would have liked, almost 50% indicated that there were some areas they did not get support but some

indicated that they had not missed support in any area. Only one student teacher reported not having been supported in any area.

The information from the questionnaire does not reveal any significant difference between the support received from the mentor teachers and that received from the university tutors. However, the interview data from the student teachers provides a different perspective as they mostly indicated that the mentor teachers helped them a lot than the university tutors. However, there were a variety of viewpoints. The two following statements illustrate these divergences of point of views. The first is from one-second year male student who indicated:

> What I can say is that I benefited a lot from my mentor because she was always by my side willing to help me. But from university tutor, there was no help, not enough help and if it was rating I can say that the help that I got from my school mentor was like 90% and from the university may be it was 40%. (Michael, interview, 27/09/2005)

The second extreme case is from a PGCE female science student teacher who reported:

> The mentor teachers during this time of change, they have got no ideas of really what I have to do in the classroom because when I am from university coming for my teaching, they take distance and say that I should do whatever I like and see that it is right for me. (Elisa, interview, 27/09/2004)

Even though both mentor teachers and university tutors reported that they helped their student teachers as much as they could, they however acknowledged a number of constraints that prevented them from providing the help and support that they might have wished. The most common reasons given were the limited time due to a large number of students to supervise, the distance they were required to travel due to students being placed in different schools as well as the lack of teaching resources in many schools. Another issue emphasized by both mentor teachers and university tutors that affected the quality of support and help that they provided was the lack of communication and collaboration between mentors and tutors. However, from comments in the interviews it seems like both mentors and tutors regard each other as responsible for such lack of communication even though they all end by suggesting more training for mentor teachers in terms of teaching practice mentoring. The following example from an interview with one mentor teacher illustrates their perspective:

> I think us, mentors as teachers from schools, as I am talking now, I don't remember one lecturer from Edgewood come to talk with me as a mentor. The only things I got were papers that I was supposed to read as a mentor and then do something about them. So, I think what could help is if the tutors from university come more closer to us and sit down together and then we find time, we have a look at problems, we have a look at how we get solving problems, it can be better. But now we are just strangers, I don't know them, they don't know me, they send me papers, of course we went to Edgewood for a certain workshop but that is not enough. I think that they must be closer to us, they must come together with us, you know. (Ntee, interview, 23/10/2005)

On the other hand, almost all university tutors interviewed seem to point the finger at the mentor teachers as not being cooperative and the following comments illustrates this:

> ....but the mentors are always missing, they don't want to take part of the process or they don't avail themselves to be there and when it comes to confront them, they listen to you and say yes, yes. They don't really see the need for the relationship. (Peter, interview, 06/10/2005)

> ...but as I said, many of the schools I went into, the mentors did not make themselves available to meet. In some schools they are not necessarily available at all; sometimes they are not necessarily at school. (Jack, interview, 07/10/2005)

In summary, this section discussed the support that student teachers received not only from the mentor teachers and university tutors, but also from anyone else. It was found that in general, student teachers were well supported by mentor teachers and university tutors even though in some cases, there were some areas in which the expected support was not provided. However, data from interviews revealed that in many cases, the support from mentor teachers was considered more beneficial than that from the university tutors. On the other hand, some student teachers indicated that they have gained overall nothing from either mentor teachers or university tutors. The majority indicated that they did receive support from other individuals. Both mentor teachers and university tutors reported that they helped their student teachers as best they could but acknowledged a number of constraints that prevented them from providing the support and help they wished. The main reason given by the university tutors were the limited time due to a big number of students to supervise placed in a number of different schools. Both agreed that there needed to be an improvement in communication between mentors and tutors.

4.6. PARTICIPANTS' FEELINGS ON TEACHING PRACTICE IMPROVEMENT

The Faculty of Education has a number of specific outcomes of teaching practice. More specifically, the experience during teaching practice should according to the course outline:

> (a) provide an opportunity to link theory and practice through critical and honest reflections, (b) develop the student teacher's awareness of classroom challenges, (c) provide an opportunity to communicate, interact and work with fellow students and practicing educators, (d) assist in identifying and practicing effective patterns of teaching behaviour, (e) develop an awareness, understanding, and respect for diverse learners, and (f) develop and maintain an effective system of record keeping of all experiences in the school. (UKZN, 2005, p. 4)

To reach this goal, there is a need to see all the parties involved in teaching practice working within a framework commonly understood and certain concrete actions to be emphasized. In addition it is accepted that it can always be improved through reflective action of all parties.

In order to get related information, participants were asked what changes they perceive needed to be done by the university on one hand and by the schools on the other hand, to enhance the benefit from teaching practice. Participants reported a number of aspects that need to be reviewed for teaching practice improvement. For example, one B.Ed. 4th year female science student teacher reported: "I find the university very disorganised, perhaps different years should do teaching practice at different times to facilitate school placement, etc." Some indicated that the teaching practice should take longer time while others emphasised the improvement of communication between university and schools, and so forth. These responses were grouped in themes and assigned a code and the following table (Table 4.11) summarizes the most common views expressed by the science student teachers regarding what should be done by the university for teaching practice improvement.

Table 4.11 Science student teachers' views about actions to be done by university

Actions/ changes	Frequency (N=55)	%	Ranking
Review the TP organisation	18	32,7	**1**
Increase the length of TP	9	16,4	**3**
Allocate specialist tutors	6	10,9	4
Training of mentor teachers	4	7,3	5
Communicate with schools	2	3,6	6
Other(s)	12	21,8	**2**
Nothing to be changed	2	3,6	6
Unclear	2	3,6	-

It can be seen from the table above that those student teachers who completed the questionnaire most often emphasised the need for the organisation of teaching practice to be reviewed. This had already been hinted at by earlier responses when they indicated in section 4.3 that the organisation and management of teaching practice by university was lower than it was in schools. They also indicated that the teaching practice was too short and therefore urged the university to increase its length from weeks to months, even for a whole semester, especially for the fourth year students who are very soon going to enter the profession. This was also pointed out in interview with one university tutor who reported:

> My feeling is that student teachers should spend about three months in the school, or maybe a long period rather than four short weeks. They would rather spend three months where lecturers and teachers should work closely to draw the lesson program and plan for three months. And so that the student teacher finds himself in an authentic classroom environment; not just merely teaching for a grading coming out. And also the relationship between mentors and university tutors, that means the staff (tutors) need to be more involved in schools, spend more time with teachers in schools, more time planning lessons with the student teachers, discussing issues related to science. (John, interview, 06/10/2005)

The second ranking for 'other(s)' in the table above (Table 4.11) is due to a range of other actions that have been pointed out by some student teachers. They wanted for example the university to increase the transport allowance, to give one week break after

teaching practice, and to choose well equipped schools for science student teachers placement. When asked about improvements, one mentor teacher also emphasized the communication between schools and university:

> I think there needs to be more communication between the two. So, I like more interaction with the lecturers and little more details as to what is constraining us, as to how to assess properly and how to give them guidance. ....So I think more communication and more training for us as teachers and how to do the assistance of students. In brief, more communication. (Holy, interview, 18/10/2005)

Finally, a few student teachers whose response was coded as "other" mentioned the teaching practice office. They mostly wanted the teaching practice office staff to visit all schools before proceeding with placing students and plan all the activities related to teaching practice earlier i.e. at very beginning of the year, to avoid the confusions that occur when such activities are planned in a hurry at the last minute.

Table 4.12 Science student teachers' views about actions to be done by schools

Actions/ changes	Frequency (N=53)	%	Ranking
Change the ways schools treat student teachers	18	34.0	**1**
Change of mentors' attitudes towards student teachers	7	13.2	3
Have more control	4	6.7	4
Reinforce discipline	2	3.8	5
Get fewer student teachers	2	3.8	5
Involve learners in assessment	1	1.9	6
Get more resources	1	1.9	6
Nothing to be changed	15	28.3	**2**
No clear	3	5.7	-

When asked what can be done by schools for teaching practice improvement, some students indicated a number of aspects that needed to be changed while others reported that nothing needed to be changed in schools. After coding the various responses, details of most frequent student teachers' views on what changes to be made

by schools are presented in the table above (Table 4.12). The most obvious change is the way they are treated by schools where there is the tension between being treated as a student in the staffroom but a teacher in the classroom. They desire the status of a normal teacher during their complete stay at the schools.

Although the respondents pointed out many aspects that need to be improved, when asked to rate their overall experience of teaching practice experience almost 70% of respondents indicated that they had at least a satisfactory experience. However, six of the 55 students reported that they found their teaching practice challenging and stressful but they did not provide more details about the reasons why.

In summary, this section discussed the student teachers' feelings about what should be done or changed for teaching practice improvement. Various aspects that need to be improved or to be implemented whether by schools or by university were pointed out. These include promoting communication between schools and university, to review the general organisation of teaching practice, to increase its duration, to train the mentor teachers, and so forth. Despite all these aspects, which were suggested for improvement the majority of participants reported that they had a positive experience of teaching practice.

CHAPTER 5
CONCLUSION AND RECOMMANDATIONS

This last chapter of this dissertation is presented in two parts. The first part deals with the summary of findings; the second discusses some implications of the findings and gives some recommendations for further research. The study aimed at exploring the science student teachers' experiences of teaching practice and in particular, it has focussed on five areas that were related to: (a) the science student teachers' practices and views of teaching practice; (b) the science student teachers' benefits and skills acquired from teaching practice; (c) the help and support they receive from both the supervisors and the mentor teachers; and (e) the science student teachers' views of how the teaching practice could be improved.

In this study a pragmatic, mixed method approach to research (Johnson & Onwuegbuzie, 2004) was adopted. In order to gather data to answer the research questions, empirical research in the form of a descriptive case study was carried out. Data were collected from participants in the teaching practice programme using a questionnaire supplemented by interviews, observations and documents analysis. Sixty science student teachers doing B.Ed. 2nd, 3rd and 4th year and PGCE completed and returned the questionnaire and seven of them were interviewed. In addition, four mentor teachers and five university tutors were also interviewed. Another source of data that the researcher found useful and used was the teaching observation where twelve students were visited in their host schools. Limitations in the design and carrying out of the study that could possibly affect the study's validity, such as the number of students who decided to participate in the questionnaire survey, have been discussed earlier.

5.1. SUMMARY OF FINDINGS

5.1.1. Science student teachers' experiences of teaching practice

It was also found that student teachers reported that they felt adequately prepared in their science education modules for the range of activities they were involved in during teaching practice. The majority of the students reported that their expectations of practice teaching were met, although third year students did report lower levels of

satisfaction. As a consequence of their experiences it was found that, students had a positive view about the general learning and administrative environment of the schools but a significant number indicated that the university's organisation and management was poor.

Students reported using a number of different teaching methods. However, despite their reported preparedness for teaching practice, the direct teaching method was still predominant with the textbook being used as the main teaching resource. Even though it is known that direct teaching, also called direct instruction or simply lecturing, is a systematic way of planning, communicating, and delivering in the classroom, it is also suggested that direct teaching is most attractive to those teachers who themselves lack mastery of the content. This finding suggests that while the new curriculum encourages different methods on a continuum from direct teaching to cooperative learning and individual learner projects, the participants in this study tended towards the direct teaching extreme. This is not in keeping with the main expectation of learner-centred teaching emphasised in the OBE curriculum.

Although some topics lend themselves much more naturally to direct teaching than others, methods such as group discussion, investigation and practical work are generally encouraged for science teaching and therefore for science student teachers. Some of these reasons are that for example, good discussions give learners an opportunity to formulate principles in their own words and to suggest applications of these principles; they help learners become aware of and define problems implied in readings or lectures; they can also increase learner sensitivity to other points of view and alternative explanations. In this study it was found that three quarters of the students attempted to do practical work but about 40% reported that they received little or no support in attempting it. Given the central role of practical work and investigations in the new curriculum there must be a concern about the low level of encouragement by mentors and tutors to use it. However, even though science laboratory can be considered as one of the few opportunities learners have to practice science in the way professionals do, on the other hand, various educational authorities have estimated that much less material can be covered in a pure laboratory and activity programme than in a lecture programme (Romey, 1968). Perhaps students and their mentors are still occupied with content coverage and practical work is seen as too time consuming?

The reported use of the textbook is not unexpected as its importance is widely acknowledged. Malcolm and Alant (2004) indicated that in South Africa textbooks are

critically important. They argue that "in schools where teachers often have limited content knowledge and planning skills, and where learners need to do considerable work by themselves, text-books serve as sources of science knowledge, curriculum planning and ideas for teachers and learners" (p. 72). Given that these are beginner teachers this could explain their reliance on the textbook.

This study also found that science student teachers were generally free to use whatever methods and activities they wanted in their lessons. However the majority of participants also acknowledged that the mentor teachers did often influence their choice of methods and activities during teaching practice. A positive indication is that over half the students indicated that they attempted something different or new during teaching practice mostly on their own initiative.

5.1.2. The benefits and skills acquired from teaching practice

The science student teachers who participated in the study reported that they learnt a lot in the specific areas of school administrative management, the classroom management, the pedagogical knowledge as well as the school subject content and pedagogical content knowledge. Over 70% of the students reported that they had learnt a number of new things and learnt the most in classroom management. In general the females reported more learning than the males. Although there were minor differences between year groups, in general all groups agreed.

When asked for detail about the skills they gained from teaching practice they reported benefits in terms of improved 'teaching techniques and methods', dealing with learners and classroom management. There was no one single benefit that stood out but rather a number of different benefits for different students.

This finding is important because these categories of learning reflect what is required of a new teacher entering the profession and participants are agreeing that they are learning through teaching practice. Consequently it can rightly claim to be a major component in the course of initial teacher education as seen by many educational researchers such as Stones (1987), Elliot (1984), Northfield (1994), and many others. The benefits and skills gained from teaching practice reported by the participants in this study match in some points with the description made by Brown and Nacino-Brwown (1990) who list among other benefits of teaching practice: the opportunity to gain confidence; the chance to put theories in practice; the opportunity to learn skills and attitudes of a competent and effective teacher; the chance to learn about children in real

life; an opportunity to improve knowledge of subject matter; the opportunity for self-evaluation and to discover strengths and weaknesses, and so forth. Regarding the generic outcomes as described by the Faculty of Education, the analysis of the data gathered through this study reveals that the participants expectations had almost all been met. in terms of the published curriculum. In fact, it is stipulated that teaching practice is designed to provide an opportunity for students to demonstrate their ability to write lesson plans, deliver individualised learning experiences, manage the classroom in a relevant field setting, and to gain instructional confidence (UKZN, 2005). Furthermore, it allows for the integration of theoretical knowledge and practical experience, and these components seem to be experienced to lesser or greater degree by most of the science student teachers during their teaching practice.

5.1.3. Support during teaching practice

Student teachers rated the support received from mentors and tutors almost similarly indicating that they considered the support on average as very good. The most commonly mentioned benefit was that associated with learning "teaching techniques and methods". This was mentioned most frequently as the main benefit of support from both supervisors and mentors. It should be noted that despite the positive attitude toward support and its benefits almost 50% of students also indicated that there were some areas in which they did not get support.

It was disappointing to see the small but significant number of students who indicated having not been supported or having gained any benefit from their mentor teachers or university tutors. This is an area that needs further investigation and the faculty should pay particular attention to such students to elucidate the ways in which they could gain skills. If resources had been available it would have been valuable to trace the students and through interviews determine why they felt they had not been supported. Unfortunately there are also long term consequences for this group as they are probably those who will not easily shift from the first to the next periods of professional growth as suggested by Unruh & Turner (as cited in Burden, 1990) or even once entering the profession they might have difficulty coping with their initial induction period.

A significant finding was that when all evidence was analysed as a whole, it appeared that the mentor teachers were seen to be more supportive than the university tutors. For example those who reported that they gained in terms of confidence

attributed it more to support from mentor teachers rather than from university tutors and many interview comments support this view. This was not unexpected as it is supported by Dean's findings (as cited in Glickman & Bey, 1990) according to which, the help provided by mentor teachers is seen as more adequate than that provided by university supervisors. Also, although the effectiveness and productivity of student teaching is related to the help provided by both the mentor teacher and the university supervisor, studies have revealed that mentor teachers affect student teachers' motivational growth to a greater extent than did university supervisors (Cuff as cited in Glickman & Bey, 1990).

The supervisors and the mentor teachers acknowledged that there were constraints that prevented them from providing the help and support that they might have wished to give. The most common reasons given were the limited time they had to provide comprehensive support and the lack of full communication between themselves. A lack of time for meaningful supervision has been pointed out in the literature where, for example, Fraser et al. (2005) have indicated that because of the time, the cost and mostly the shortage of lecturers in certain subjects particularly in science subjects, the level of supervision of most student teachers in South Africa is minimal.

As far as the lack of communication and collaboration between mentors and university tutors was concerned, both recognised the problem but often felt the source of the problem was with the other party. This is considered a critical issue. The personnel most directly involved with supervision and therefore with supporting student teachers are typically the university tutors and the mentor teachers. These two key figures along with the student teacher form a triangular relationship - a triad- concerned with achieving the objectives the teacher education has specified for the teaching practice and, in particular, with facilitating the professional development of the student (Turney, 1987). Unfortunately, the findings in this study revealed that this triangular relationship seems to be too weak. This kind of weakness is a common finding in studies related to teaching practice. For example Core (as cited by Turney, 1987), in her discussions with students at various stages of their teacher training, found that there was generally lacking "a recognition of a triangular working partnership" involving student teacher, university supervisor, and mentor teacher.

5.1.4. Participants' views of how can teaching practice be improved

When asked to make suggestions for change associated with the university the students focused on two major aspects. Firstly, many participants acknowledge that the teaching practice was too short and urge the university to increase the length especially for the 4th year science student teachers who were soon entering the profession. The literature on student teaching supports this view. For example, Quick and Sieborger (2005) refer to the accreditation organisation for most teacher education programmes in the United States where teacher education programmes require one semester or approximately sixteen weeks of student teaching. In the context of South Africa, the above authors cite Dreyer who argues that "when initial teacher training students spend more of their training time in schools, they get the opportunity to integrate theory of education with that which they are experiencing at first hand" (p. 2) and McFarlane who suggested that "25% of a South African education student training should be school based" (p. 2).

Secondly the participants emphasised the need for the organisation of teaching practice to be reviewed. This arose in more than one place in the questionnaire responses and interviews. They mostly wanted the teaching practice office staff to visit all schools before proceeding with placing students and plan all the activities related to teaching practice earlier i.e. at very beginning of the year, to avoid what they referred to as the confusions that occur when such activities were planned in a hurry at the last minute.

When asked what can be done by schools to assist the improvement of teaching practice, responses were varied with some students indicating a number of aspects that needed to be changed while others reported that nothing needed to be changed in schools. When asked to list changes, the most frequent change mentioned was associated with the way they are treated by schools where there is the tension between being treated as a student in the staffroom but a teacher in the classroom. They desired the status of a teacher during their stay at the schools.

Despite the fact that the respondents pointed out many aspects that need to be improved, when asked to rate their overall experience of teaching practice experience almost three quarters of the students indicated that they had at least a satisfactory experience.

5.2. RECOMMENDATIONS AND CONCLUSION

This study has presented a detailed description of science student teachers' experiences of teaching practice. The overall view of the participants is that it is a positive learning experience but that many aspects need to be improved for optimising the benefit and improving the quality of teaching practice.

In the light of the findings presented in this study, the researcher suggests a number of recommendations to improve the quality and the benefit of teaching practice and to produce a higher quality of science student teachers that are able to cope with the requirements of their new jobs and who fit into the available professional development programmes offered to them once in the profession. Obviously it is the recommendation of this study that all the findings are taken seriously by those involved in the planning and implementation of teaching practice programmes. However, there are three important issues that need to be addressed.

The most important issue that needs to be reviewed is that the university gives status and support to teacher education programmes and emphasises quality through rigorous accreditation. As competent teachers are central to student learning, the researcher recommends that all parties involved in pre-service teachers' training have a thorough look at all the aspects that were perceived as the ways towards teaching practice improvement and consider appropriate measures and strategies. For example I would recommend that on the issue of the duration of teaching practice, the teaching practice for the B.Ed. programme takes place only in third and fourth years for respectively three (one full term) and six months (one full semester); and the first and second years be exempted from teaching practice. This would enable them to concentrate on the subject matter knowledge and pedagogical content knowledge in the first years and then the second year students can focus on micro-teaching at university. If this is done there is clearly a triple advantage: the first is linked to the resources to be allocated to teaching practice, the second is linked to the supervision itself where presently a problem of a limited number of supervisors is faced, and thirdly schools might be more cooperative when receiving a reasonable number of more mature students. For the PGCE science student teachers, the status quo can be maintained as they practice at two different periods within the single year of the programme

To be successful, the teaching practice should be conducted within a framework of a strong partnership between all the parties involved, namely the teacher training

institution, the host schools and of course the student teachers. The lack of meaningful communication between participants and in particular between university tutors and mentor teachers is crucial as it definitely affects the quality of the students' teaching practice experience. In this regard, Dreyer (as cited in Quick & Sieborger, 2005) notes the importance of reinforcing such communication. Looking into the expanded use of mentor teachers in a South African context, he concluded that a minimum requirement for mentoring to be effective was that a very close relationship and partnership between the training institution and the mentors has to be established. To this end it is recommended that the reinforcement of the triangular relationship raised in the previous section is imperative for enhancing the benefits from the teaching practice. The quality of support provided to student teachers will be enhanced by improving this professional relationship.

There is an urgent need to start formal research projects looking at relationships between initial teacher education programmes, the teaching practice component and the development of effective teachers. At present very few studies related to teaching practice have been carried out particularly in the context of South Africa. This is illustrated by Laugsch (2005) when discussing the focus of South African science education research. Despite the need to train large numbers of teachers and the shortage of qualified science teachers there is very little research focussed on teacher training and in particular teaching practice. He argues that "South African science education research focuses to a greater extent on technology, classrooms, and STS-related issues" (p. 1). Initial teacher education and teaching practice do not even rate a mention and in the bibliography of research (Laugsch, 2005) only 15 studies over the last 70 years even mention teaching practice. Other recent authors such as Wineburg (2006) also note that there are few studies that address the connection between teacher preparation and student teacher learning, and Malcolm and Alant (2004) in their review of South African research do not have much to say on teaching practice precisely because it is not a focus of research despite its apparent importance in teacher education. Therefore there are a lot of issues related to teaching practice that need to be investigated.

Although this study has some limitations, it will have made its contribution in the science education research by deepening the understanding of how teaching practice contributes to science teachers' pre-service training. Furthermore, the findings will hopefully enlighten the Faculty staff in general and the teaching practice office in particular to some of the strategies they need to implement in order to improve the

quality of the teaching practice experience of their science students. In addition, the study was carried out to enable the researcher to be exposed to the reality that prevails during teaching practice as part of the initial teacher education. Moreover, aspects of the study have the potential to be transferable to other contexts. Having being directly involved in the carrying out of the research, the researcher would definitely like to conduct a similar study using the experience gained in the teacher education context of Rwanda. Indeed, the Rwandan science teacher training context has many similarities with the one in which this study is located. Within it there are various facets that need to be explored such as teaching practice mentoring, assessment, framework of collaboration between the teacher training institutions and schools hosting student teachers. These aspects will be of interest whether studied in the Rwandese system or compared with the South African. Having completed this study I personally feel that it could serve as a starting point of a partnership for sharing experience between the Rwandan and the South African systems of science teacher education.

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APPENDICES

Appendix A Questionnaire for science student teachers

Teaching Practice Questionnaire for Science Education Students

Please could you assist by completing the following questionnaire. It is part of a MEd research project which is investigating students' experience of teaching practice and the support given to them by staff, and mentor teachers. Through this research we hope to improve the quality of students learning experience on teaching practice.

All personal information provided will be treated as confidential and will not be seen by other staff or school teachers. Completion of the questionnaire is optional.
If you have any questions about the project please contact the researcher Leon Mugabo (mugabol2000@yahoo.com) or his supervisor Prof Paul Hobden (hobden@ukzn.ac.za)

Please return this questionnaire to Mr Leon Mugabo even if you decide not to participate. He will collect them personally from you at your lecture venue.

Section I. <u>Biographical data</u>. Please complete the following table

Student number : optional *(identities will not be disclosed)*	
Gender and age: *e.g. Male , 25*	
Your Current Degree and Year of study. *e.g. BEd 4th year or PGCE*	
Your Teaching Phase. *e.g. Senior, or FET Physical Science*	
Major subjects you are studying this year *e.g. Biology 310, Natural Science 210*	
What is your main teaching Discipline? *e.g. Biology, Natural science, physical science etc.*	
When you have qualified what job do you hope to obtain? *e.g. Grade 10-12 Physical Science Teacher , or Primary Science teacher*	

Section 2. <u>Teaching practice this year</u>. Please complete the following table

1. In what school/s did you do teaching practice this year. (How many weeks?) *e.g. KwaShaka Junior Primary (3 weeks)*			
2. How would you describe in general the learning and administrative environment of the school? *e.g. Well organised with good discipline but learners not interested in science.*			
3. Please summarise your teaching and who was supporting you in school or visiting you. If you cannot remember names then just give a description e.g. class science teacher, or university lecturer in biology			
Learning area or subject	Approx no. of lessons	Teacher mentor from school	University tutor visiting
e.g. Natural Science LA , grade 6A	*15*	*NS Class teacher*	*Prof Hobden*
4. How often were you formally assessed by			
the teacher mentors ?			
the university tutors ?			
5. Have you done TP previous to this year? If yes, provide year and school type e.g. TP in 1st year BEd at Primary school.			
6. Did you do any teaching before starting your degree? *e.g. taught English in Japan for two years*			
7. How would you rate the organisation and management of the teaching practice on a scale of 1 to 5? *where 1= excellent , 2= well done , 3= satisfactory, 4= poor, 5= very poor*			
by university?			
by school you went to?			
8. Were your expectations of Teaching Practice met by your actual experience?			

Section 3. Teaching Methods used.

1. How often did you use the following teaching and learning activities in your science lessons? Please give a rough estimate where 5 means you used this a lot and 1 means you never used this?

5= in every lesson 4 = in majority of lessons 3= in some lessons 2= in one lesson
1= never used this as an activity

Different teaching & learning activities used in my science lessons	How often did you use this method?
1. Direct teaching by teacher: Lecture, give a talk, explain something, etc	
2. Teacher Demonstration: Show students some real practical phenomenon	
3. Learner Practical work: Learners follow instructions and do practical work.	
4. Investigation: Learners work independently or in groups on their own experiment or project.	
5. Group discussion: learners work in groups discussing some science concept or topic	
6. Copy work: Learners copy notes and other information from the board, or OHP or from their text books	
7. Exercises: Learners work on problems or exercises given to them in a worksheet or textbook or on board.	
8. Project : Learners work in groups or individually on their own projects over a number of lessons	
9. Field trips: Taking learners outside the classroom such as a visit to local museum, school rubbish tip,	
10. Assessment: Writing tests and examinations	
11. Other (specify)	
Do you have any comments?	

2. Who or what influenced you in your choice of methods for your lessons?

_____

_____

_____

3. It is unlikely that you used / or were able to use all the above methods. Provide some reasons for why you did not choose to use some of those methods.

4. What resources did you use to help you plan the activities such as lessons, tests, practical work, worksheets etc.

5. Did you try out something new this teaching practice for the first time? Who encouraged you to try that method? Provide a brief description (2-4 lines) of what you did?

6. Doing practical inquiry and investigation are very important parts of science education. Did you attempt to involve the learners in practical inquiry? In what way were you supported by the teacher mentor or university tutor in your attempts?

Section 4. <u>Preparation</u>. Please complete the following table

Consider two of the subjects you taught e.g. English & Natural Science

How prepared and confident were you before going to the school?

How prepared and confident were you to use my knowledge of ……..	Very confident 5	Confident 4	Had some confidence 3	Had no confidence at all 2	Was not sure what to expect 1
General					
1. Classroom Management: Organising the class for teaching, dealing with learners etc.					
2. School administrative management: Knowing how the school functioned, dealing with senior staff,					
3. Education theory : My knowledge and understanding of how children learn (Pedagogical knowledge)					
Subject 1 Name ……					
4. Content: My knowledge and understanding of the school subject content.					
5. Skills: My knowledge and skills of the teaching methods and strategies (Pedagogical content knowledge)					
Subject 2 Name ……					
6. Content: My knowledge and understanding of the school subject content.					
7. Skills: My knowledge and skills of the teaching methods and strategies (Pedagogical content knowledge)					

Would you like to make any comments on your preparedness for Teaching?

_____

_____

_____

Section 5. <u>Benefit of Teaching practice</u>. Please complete the following table

Consider two of the subjects you taught e.g. English & Natural Science

How much did you learn / benefit / develop in these areas?

Answer on a scale of 1 to 5 where 1 means a no benefit and 5 means lots of benefit.

How much did you benefit from going on TP in the following areas?	**Learnt a lot** 5	**Learnt a number of new things** 4	**Learnt a few things** 3	**Learnt very little** 2	**Learnt nothing** 1
General for both subjects					
1. <u>Classroom Management</u>: Organising the class for teaching, dealing with learners etc.					
2. <u>School administrative management</u>: Knowing how the school functioned, dealing with senior staff,					
3. <u>Education theory</u> : My knowledge and understanding of how children learn (Pedagogical knowledge)					
Subject 1 Name					
4. <u>Content</u>: My knowledge and understanding of the school subject content.					
5. <u>Skills</u>: My knowledge and skills of the teaching methods and strategies (Pedagogical content knowledge)					
Subject 2 Name					
6. <u>Content</u>: My knowledge and understanding of the school subject content.					
7. <u>Skills</u>: My knowledge and skills of the teaching methods and strategies (Pedagogical content knowledge)					

What would you consider to be the main benefit of your teaching practice experience?

_____

_____

Section 6. <u>Support during Teaching practice</u>. Please complete the following table

How would you rate the support you received for improving your teaching knowledge and skills?

In some cases you might have had two tutors or mentors. Respond individually for each support person. Respond by ticking the appropriate box.

Quality of support provided by	**excellent**	**very good**	**good**	**poor**	**none**
Mentor teacher at school for science subject 1					
Mentor teacher at school for science subject 2					
University Tutor 1 for					
University Tutor 2 for					
Other school teachers					
Other student teachers					
Other (specify)					

2. Please describe and indicate what you gained overall from the support given to you by the <u>teacher mentor</u> for science?

_____

_____

_____

_____

If you can remember please provide a specific example of something useful you learnt from the mentor?

_____

_____

_____

3. Please describe and indicate what you gained overall from the support given to you by the <u>university tutor</u> for science?

If you can remember please provide a specific example of something useful you learnt from the mentor?

4. Was there someone else who gave you good support which helped you?

5. Was there an area of your teaching practice in which you would have liked support but this was not provided?

Section 7. General comments

1. To enhance the benefits from the teaching practice, what would you like to see changed?

By the university;

_____

_____

_____

_____

By the schools;

_____

_____

_____

_____

Other (specify)

_____

_____

_____

_____

2. Write one sentence which best describes your teaching practice experience.

_____

_____

_____

_____

Thanks you for taking the time to complete this questionnaire.

If you would like to be interviewed so you can provide more detailed information then please leave a contact number or email.

Appendix B Semi-structured interview schedule for supervisors

INTERVIEW SCHEDULE FOR SUPERVISORS

(After a brief introduction, the following questions will guide the interview with the supervisors).

1. Can you tell me more about your teaching *and* experience in science student teachers supervision *(for how long have you been supervising science student teachers?)*

2. You have been supervising science student teachers for.... years. With your experience and particularly during this last TP placement, in which ways did these student teachers benefit from teaching practice?

3. How often did you visit each of your science student teachers whether for assessing or not? Do you think that it is enough or there is need of more visits?

4. In which ways did you help your student teachers regarding: Subjects matter? Teaching skills? Are they any constraints which stopped you from providing the help as you wished?

5. What are the mostly common problems do the science student teachers you supervised encountered and how they dealt with them?

6. Can you give an overall about what particular skills did your science student teachers acquire from teaching practice? *(Which are going to contribute to make them good science teachers?)*

7. What do you think should be done or changed by all involved parties (university, schools, student teachers,...) to enhance the science student teachers' benefits from teaching practice?

Appendix C Semi-structured interview schedule for mentor teachers

INTERVIEW SCHEDULE FOR SCHOOL MENTORS

(After a brief introduction, the following questions will guide the interview with the mentor teachers).

1. Can you tell me more about your teaching *and* experience in mentoring science student teachers *(for how long have you mentored science student teachers? how many science student teachers did you mentored this year)?*

2. You have been mentoring science student teachers for…. years. With your experience and particularly during this last TP placement, in which ways did these student teachers benefit from this last teaching practice?

3. In which ways did you help your student teachers regarding: Subject matter? Teaching skills? Are they any constraints which stopped you from providing the help as you wished?

4. What are the mostly common problems do the science student teachers encountered at your school and how did you help to deal with?

5. You have been working with the science student teachers for 4 weeks. Can you tell me more about what particular skills you found your student teachers have acquired/gained from teaching practice?

6. To enhance the benefits from the teaching practice, what would you suggest to be changed both by the university and by your school?

Appendix D Semi-structured interview schedule for science student teachers

INTERVIEW SCHEDULE FOR STUDENT TEACHERS

(After a brief introduction, the following questions will guide the interview with the student teachers).

1. Brief introduction:
   - Your current degree and year of study,
   - Major subjects you are studying this year,
   - Your main teaching subjects, and
   - In which school did you do your teaching practice this year?

2. Can you tell me more about the ways in which you have benefited from this last teaching practice?

3. Do you think the teaching practice as it is organised is providing you with all the requirements to be a perfect science teacher?

4. How would you rate the help you got both from the mentor teacher, from the university tutors or from somebody else which contributed to enhance the benefits from teaching practice?

5. What particular skills or lessons have you learnt from teaching practice which you feel will contribute to make you a good science teacher?

6. What do you think should be done both by the University and the schools to enhance the benefit from the teaching practice?

Appendix E Teaching observation form

CLASSROOM OBSERVATION GUIDE

Student number or Name (facultative).....

Year of study.....

Specialisation.....

School: .....

Subject/Learning area: .....

Grade: ..... Period: from ..... to .....

Date:.....

Mentor: (name and contact number)
.....

.....

1. Events to be observed:

Was the student teacher waiting for the supervisor?	
Did the supervisor inform the student before for the visit?	
What happened before they go together in the classroom? Did they talk before the lesson?	
Did the supervisor give help?	
Did they talk after the lesson?	
Did the supervisor check the lesson planning?	
Was the mentor helping the student teacher?	
Did the mentor talked to the student teacher before or after the lesson?	
Was the mentor assisting on the lesson or did leave the student teacher alone?	
What kind of help did the student teacher received from the school?	

How did the student teacher progress in attitude while teaching?	
What did the student teacher learnt from the lesson in terms of: Subject content Pedagogical skills Attitudes	

2. Reflection: What is most interesting/ valuable/ enjoyable about the lesson?

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.....

3. Other comments and aspects observed:

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