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An Evaluation of the Initial Scientific Field Teacher Education Programme in the Colleges of Education, Oman

By

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BEd, MEd

A Thesis Submitted in Fulfillment of the Requirements for the Degree of Doctor of Philosophy (PhD)

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DEDICATION

I wish to dedicate this work to:

My beloved grandmother, father and mother, my wife and my children

& my sincere brothers

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DECLARATION

I declare that this thesis is my own work and has not been published or submitted in support of any degree or qualification.

Ahmed Alkindi

Abstract

The purpose of this study was to evaluate the initial teacher education programme which is specifically offered by four Omani colleges of education to prepare "scientific field" female teachers to teach science and mathematics subjects for pupils in Basic Education schools (Grades 1-4), ages of students from (6-10). This evaluation questions the adequacy of this programme to prepare qualified teachers to teach these subjects in a changing school system implementing a reformed Basic Education curriculum and programme. This system tends to transfer the teaching and learning process from the traditional learning environment to one that is a constructivist teaching environment. This study focuses on this programme's defined teaching competencies and to what extent the participants perceived themselves properly trained with respect to these listed competencies in their professional practices. The study also spotlights student teachers' and practicing teachers' attitudes and motivation towards the teaching profession, and towards aspects of science and mathematics teaching in primary schools. The study tried to examine the extent of the constructivist approaches by student teachers and practicing teachers in their science and mathematics lessons.

The evaluation framework of the study was designed to conduct the research plan and to achieve its purposes. Several evaluation models were examined and they were critically reviewed. The review concluded that there is no one specific model which can be considered (the most) outstanding in terms of excellence, the selection of the evaluation model depends on factors such as the aim of the study, the nature of the programme, its context, and the targeted population. Thus the study constructed of three stages with findings from conducted evaluation instruments of each stage leading consequently to the next stage. In the first stage both questionnaires and semi-structured interviews are implemented, while observations with a checklist followed by follow-up interviews are conducted to gather information during the second stage. In the third stage, conversational open interviews are proceeded. Although the group focused upon for the study are the first stakeholders (the student teachers and practicing teachers), the research was extended to get information from other participants, educators from different positions, such as curriculum advisors, college lecturers, inspectors, head teachers and senior teachers.

The findings from this study indicated that in general, participants' considered of the importance of the some of the listed competencies. Even though there is some consensus of the importance for these competencies, there are some un-ignorable critics who view these competencies as being far away from the goals for the preparation of scientific field teachers for the reformed Basic Education schools, most of the listed competencies are supposed to be the foundations of the programme's components, and thus the colleges of education's courses are far too general. Findings from the questionnaire show that student teachers and practicing teachers amplified their self-rating of competence in the listed competencies because responses from the face-to-face, semi-structured interviews with them found divergence views. These differing views were supported by interviewed teacher educators and principals, and their opinions towards the insufficiency of the graduates of the colleges of education. The study found from the observations of some of the practicing teachers and student teachers observed while teaching science and mathematics lessons, and from the follow-up interviews, that there is very little sign of constructivist teaching approaches used in these lessons.

The study proposes recommendations which can improve and strengthen the preparation of cycle one scientific field teachers at the pre-service level and to future in-service so that teachers might better meet the range of work and responsibilities they are facing in the reformed Basic Education schools. Finally, it recommends areas for further research.

The Content

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ABBREVIATIONS

ERIC	Educational Resources Information Centre
PBT	Performance-based Training
C/PBTE	Competency/Performance Based Teacher Education
CBT	Competency-based Training
ITE	Initial Teacher Education
BEC	Basic Education Curriculum
LRC	Learning Resource Centre
MOHE	Ministry of Higher Education
MOE	Ministry of Education
MOD	Ministry of Development
MOI	Ministry of Information
MONE	Ministry of National Economy
SPSS	Statistical Package for Social Science
SQU	Sultan Qaboos University
FCBE	First Cycle Basic Education
PSTF	Primary Science Teacher Education
OCE	Omani Colleges of Education

Chapter One: Introduction

1.1 Background

This study is an evaluation of the initial teacher education programme which is specifically offered by the four Omani colleges of education to prepare "scientific field" female teachers to teach science and mathematics in Basic Education schools (Grades 1-4). The importance of this study is that Oman, like other countries in the world, desires to improve the quality of its education. It is an undisputed fact that teachers have a vital role to play in the education of any nation, therefore, teachers in Oman are partly held responsible for the quality of education in their country. Teacher preparation programmes, to a great extent, determine the quality of teachers, and are crucial to the quality of education.

This study is therefore an effort to explore the strengths and weaknesses of such programmes in Oman from the viewpoint of prospective and experienced teachers. From their opinions, this study will attempt to identify the areas in need of redevelopment and improvement in the teacher preparation programmes.

There appears to be some confusion in the teaching profession about teaching competencies and the agenda that surround them. The Committee of Teacher Education Programmes (MOHE, 1996, p. 18) states that the competency-based approach is the baseline for constructing the elements of the Omani teacher preparation programmes.

Though many educators stress that the identification of unique teaching competencies is essential to the profession, there is debate about whether such pre-determined competencies fulfil the demands of the programme and its stakeholders or not. The focus of this study is on the competencies that student teachers should master in teacher education programmes in order to help ensure successful performance in the classrooms. These competencies are based on those identified in the main framework for the programmes of the colleges of education (MOHE, 1996 & MOHE, 1998a).

1.2 Statement of the Problem

It is an international issue that schools have been failing to meet the goals they set for themselves, and the expectations of the public to deliver the best quality education. Educators and governments in their national policies have taken the initiative to arrest this trend, by making reforms for education which should maximise students' outcomes and raise the standard of education. The success of these efforts is questionable (Haughton, 1997).

There have been many radical changes in Omani educational system since 1996, when the Sultanate's Fifth Five Year Plan was introduced. There has been an increasing emphasis on mathematics, science, computing and economics, along with a reduction in the number of periods set aside for the teaching of the arts. Teaching of English now starts in Grade 1 rather than Grade 5 as was the case in the former system. Evening classes (using schools' buildings for two shifts a day) have been cancelled to accommodate the longer school day – now increased from 4 to 5 hours - thereby bringing it into line with the school day of most countries (MOE, 1996). In addition, appropriate facilities, equipment, staff and materials will need to be provided at the middle and secondary levels so students are well prepared and can compete in the labour market and/or attain higher education.

In other words, there has been a rapid modernisation of the curriculum and methods to keep pace with technological progress and an upgrading of educational practices to match modern educational techniques. There is a shift from behaviourist to constructivist assumptions and theories in education. Teaching the country's reformed curriculum tends to transfer from a teacher-centred transmission model to pupil-centred constructivist learning environments, with the teacher acting as a coach and facilitator of learning instead of a source of knowledge.

There is no doubt that science and mathematics are essential parts of the education of all students. The study of science and mathematics as a way of knowing and a way of doing helps students to reach a deeper understanding of their world. However, there is little point in learning about science unless it is of benefit to people in their everyday life. The extent to which people are able to use science is often described in terms of scientific literacy.

Teacher change is the basis of educational innovation, reform and improvement. The research findings presented in this study emphasise repeatedly that the most important factor in improving learning is the teacher. Efforts to close the gap must focus on helping teachers recognise the gap between students' real needs in science and what is offered in the actual curriculum. Teachers also need support to develop the understandings and skills needed to make the changes possible. Leadership in schools and systems is also important, but it must be balanced by teacher input. Research has continually shown that imposed change without teacher engagement and ownership of the change brings little effective improvement in the longer term. The power for improvement lies in the collegial efforts of teachers and their profession.

To achieve these goals, it is apparent that staff within the Colleges of Education will need to be aware of changes and be prepared to contribute to the Basic Education Curriculum (BEC) reform programme. Improving the in-service training of teachers as well as generating formal induction programmes for expatriate staff of the colleges of education, will become essential elements in the efficacious implementation of the BEC reform.

However, for these changes to be implemented, all parts of the education system must work together (including staff at Colleges of Education) with the Ministry of Education. Donn (2003) states:

> *...so it is not surprising that, in Oman, there should be introduced a new Basic Education Curriculum, emerging out of the World Bank/UNESCO's 1990 Education for All Conference, in Jomtien Thailand, and reassessed in Dakar, Senegal, in 2000, whilst, at the same time, most importantly, staff in Colleges of Education continue to have little knowledge of the imperatives of the new curriculum. Further, research has shown that approaches to education by staff at Colleges of Education may be characterised as 'technicist' rather than 'reflective' or 'critical'. And it is argued, it is through these latter two models of teacher education that one is more likely to find positive resonance for change. Therefore, if there is a disjuncture between current approaches to teacher education and what is needed for the efficacious implementation of the new BEC, how best can this gap in provision best be remedied?*

Within the context of the comprehensive educational reform that has been taking place in Oman, came the decision to upgrade the intermediate colleges of education to university colleges in 1994, offering a bachelor or university degree in primary education or in a specified subject of specialisation for secondary education after four years' study. The previous system had offered only an intermediate diploma of education, and now the responsibility of these colleges was taken from the Ministry of Education, and given to the Ministry of Higher Education. Later on in 1999/98, a new programme was introduced, a field teacher programme, which includes a scientific field section and an arts field section. The first field aims to prepare female teachers to teach science and mathematics, and the second field is specifically for Islamic, Arabic and social sciences' subject teachers in the first cycle (grades 1-4) of Basic Education Schools.

There are questions about the quality of intake, status and outcomes of the programmes of these colleges, as well as the programmes' contents, activities and methods as these colleges are the main providers of scientific field teachers.

1.3 The context of the study

The Omani education system and educational policies went through various phases during the period from 1970 to the present (2006). Each phase was characterised by specific features compatible with the level of social and economic development in the country. Oman witnessed progresses in educational development in the last three decades of the 20th Century. These developments started from a very awkward situation in 1970. Spreading education in Oman was a rising task in view of sparse population over a vast geographical area with difficult terrain. Oman, with only three primary schools and less than one thousand pupils in 1970, now has an integrated educational ladder including all educational levels from kindergartens to higher education. In 2005, there were more than half a million students in more than one thousand schools. In 1986, Oman had its first university in addition to several colleges and government and private higher institutions.

Oman made very good progress in merging females in various educational levels and therefore bridged-up a substantial part of the gender gap in the field of education, an indication of good progress in the field of human development. In 1998-1999 females made almost half of those enrolled in education, and this percentage has exceeded more than 50% of those admitted to higher education institutions (51.6%) in the academic year 1999-2000. (Ministry of National Economy, 2003)

According to the (MONE, 2003, p. 97-114); the first report of the human development stated that: there are problems facing the educational sector from the perspective of human development can be summarized as follows:

Firstly: General Education

a. Non-diversification of educational programmes, which are restricted to theoretical knowledge and not closely linked to the concept of work.
b. High rate of educational waste represented by high rates of failure, repetition and drop out.
c. High ratio of unemployment among graduates of the general education because of their lack of skills and competencies necessary for productive work.
d. Negative attitude towards technical and vocational education. This attitude has been reinforced by certain policies such as the selection of elite students to academic higher education while those who perform less are taken in vocational specialisations.

e. Resources available in the educational sector like schools, books and teachers are not sufficient enough to attract children to join primary schools in view of economic pressures on some families who cannot afford to send their children to school in view of the escalating costs of sending children to school. This combined with the non-obligatoriness of education result in a percentage of children remain outside the primary education.

Secondly: Higher Education

a. The absorptive capacity of higher education institutions in Oman is still limited, as the admission ratio of secondary education graduates stood at 42% in the academic year 2000, which means that 58% of secondary school graduates resort to the labour market to look for suitable jobs except those recruited by the security and defence sector. Studying abroad is costly, as the student or rather their family, has to bear all tuition fees, travel and sustenance expenses it may not be within the affordability of many Omani families, apart from further burdening the balance of payment. Therefore, the solution probably lies in opening more high quality private universities, but this may involve offering attractive incentives to encourage the private sector to engage in such venture.

b. Although higher education avail substantial share of total government expenditure on education, the expansion in admission capacities and the satisfactory fulfilment of University education requirements with respect to provision of scientific apparatus, equipment and libraries etc. require additional resources to finance this sector of education (Probably through reallocation of resources towards scientific aspects).

c. The response of higher educational institutions to labour market requirements and Omanisation policies necessitates remedial action to correct the defects in the distribution of students over humanities and science specialisations. The continuation of the status quo makes it very difficult to create enough job opportunities for Omanis and further complicates the Omanisation process. This situation also results in waste of educational resources, which are already limited.

1.4 Models of Educational Programmes Evaluation

Program evaluation is "the systematic collection of information about the activities, characteristics, and outcomes of programs to make judgments about the program, improve program effectiveness, and/or inform decisions about future program development" (Patton, 1986).

There are many different types of evaluations depending on the subject being evaluated and the purpose of the evaluation. There are also many evaluation models that have been developed. The only justification for creating another is that it may make the evaluator's work easier or more insightful. The word model refers to an ideal plan, which, if followed, would result in the best possible evaluation. The authors of various evaluation models, (Alkin, 1969; Provus, 1969; Stake, 1967; Stufflebeam, 2001, Lincoln & Guba, 1985, 1989) have not told us exactly what to do but have stimulated our thinking about what evaluation ought to include. The following are the main models adopted in this study:

- the Stufflebeam (2001, 2003a & 2003b) (CIPP) model: evaluation should facilitate decision-making and should examine four factors: Context, Input, Process and Product.
- Robert Stake's Responsive Evaluation Model (1973, 1980 & 2003): focuses on describing activities and processes rather than on test scores and outcomes.
- the Lincoln and Guba (1985 & 1989), Fourth Generation (responsive-constructivist) evaluation is organised by the claims, concerns, and issues of stockholding audiences, and it utilises the methodology of the constructionist paradigm. The first three generations of evaluation have been categorized as 'measurement-orientated', 'objective-orientated' and 'judgement-orientated', whereas fourth-generation evaluation is 'negotiation-orientated'.

1.5 The Purpose and the Questions of the Study

The purpose of this study is to evaluate the initial teacher education programme which is specifically offered by four Omani Colleges of Education to prepare “scientific field” female teachers to teach science and mathematics subjects for pupils in Basic Education Schools (Grades 1-4), ages of students from (6-10). This evaluation questions the adequacy of this programme to prepare qualified teachers to teach these subjects in a changing school system implementing a reformed Basic Education curriculum and program. This system tends to transfer the teaching and learning process from the traditional learning environment to one that is a constructivist teaching environment. This study focuses on this programme's defined teaching competencies and to what extant the participants perceived themselves properly trained on these listed competencies in their profession practices.

The study tries to answer the following questions:

Question One: To what extent do Omani women have motivation to be in the teaching profession?
Question Two: To what extent do Omani women have positive attitudes to studying science and mathematics?
Question Three: To what extent are the listed competencies of the teacher education programme important for teacher?
Question Four: To what extent do student teachers and practicing teachers perceive themselves competent in the listed teacher education programme competencies?
Question Five: To what extent do student teachers and practicing teachers practice constructivist teaching in their science and mathematics lessons?

1.6 The Organisation of this Study

This study was constructed of three stages with findings from conducted evaluation instruments of each stage leading consequently to the next stage. In the first stage both questionnaires and semi-structured interviews were implemented, while observations with a checklist followed by follow-up interviews were conducted to gather information during the second stage. In the third stage, conversational open interviews occurred. Methods of research and their instruments were constructed based on theoretical reviews of foundations of educational evaluation models and approaches, particularly CIPP and responsive-constructivist evaluation models, as well as, assistance of review of previous studies in this field. Figure 1.1 shows the framework of the evaluation study of the Scientific Field Teacher Education Programme.

1.7 Definition of Terms

Colleges of Education: The six Omani Colleges of Education are teacher preparation institutions which are managed by the General Department of Colleges of Education of the Ministry of Higher Education.

Initial teacher education (Pre-service teacher education): An Integrated-Approach programme provided by the Omani Colleges of Education, where candidates (student teachers) study both specialisation subjects and professional (educational) subjects in addition to school-based training, to obtain a bachelor's degree which permits them to be employed in schools in Oman.

Scientific field teacher: A teacher of science and mathematics in Grades 1-4 (pupils age 6-10) of the reformed Basic Education Schools

Basic Education system: At the start of the academic year 1998-1999, the Ministry of Education introduced the new "basic education" system in two phases: a basic education phase over 10 years and a secondary education phase for two years. This will gradually replace the existing system of 6 years of primary, 3 years of preparatory and 3 years of secondary schooling. Under the new system, there will be greater emphasis on science, mathematics and the use of computers. English will also be introduced from the first year of basic education, rather than from the fifth grade in the previous system.

Cycle One Basic Education: The first four years of Basic Education Phase (Grades 1-4) for pupils ages from 6-10

Practicum Programme: One of the components of the teacher education programme, and it is of two types: college and school-based training, where student teacher train under supervision of the college lecturers (supervisors) in microteaching, and later in schools under the supervision of a school teacher (cooperating teacher).

1.8 Plan of the Thesis

This thesis consists of ten chapters including this one. Chapter Two addresses the education system in Oman in relation to the purpose of the study. It is described to provide a background for the wider context of the study. It also attempts to highlight the educational developments and features of the teacher preparation programme being targeted by this study.

Chapter Three reviews the literature in educational evaluation and identifies different evaluation models, mainly focusing on teacher preparation programme evaluations. Further review of literature is the topic of Chapter Four. This chapter focuses on the review of teacher education approaches and particularly science and mathematics teacher preparation. It highlights the issues of the teacher's role in a constructivist learning environment, as well as the teacher's motivation towards teaching and science learning.

Chapter Five presents the methodology of the research guiding the three stages of the study. It focuses on the survey methods and its instruments, on the questionnaires and interviews used, and on the study's reliability and validity. In addition, the observations of the data gathering tools used by the study are presented in this chapter.

Findings from the first stage of the study are presented in Chapter Six. This chapter focuses on the analyses of the quantitative results for the questionnaire and the qualitative findings from the semi-structured interviews.

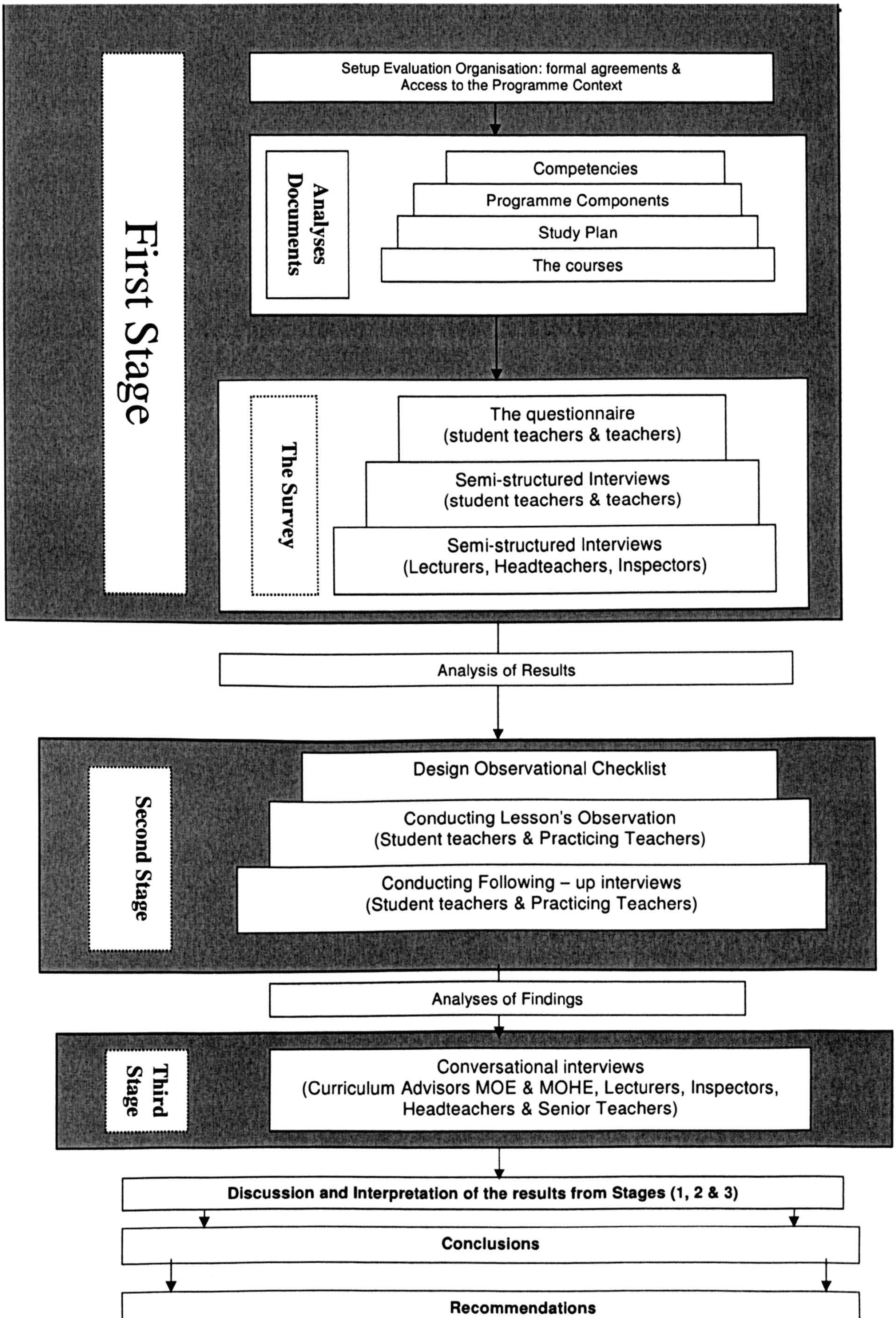
Chapter Seven analyses the qualitative findings from the observation of student teachers and practicing teachers during their teaching, as well as the qualitative results from the follow-up interviews, obtained after each observation. The second part of this chapter presents the qualitative results from the open-ended conversational interviews with some educational personnel including head teachers, inspectors, lecturers and curriculum advisors.

Chapter Eight presents an interpretation and discussion of the findings in the light of reviewed studies and the current situation of the research context.

Chapter Nine concludes the main findings and summaries the implications of the study of the teacher education field. This chapter ends by the limitations of the study .

Finally, Chapter Ten suggests some recommendations to possibly improve both practicing and perspective teachers, as well as teaching processes, and recommends some ideas for future researches and studies.

Figure 1.1 The Framework of the evaluation study of the Scientific Field Teacher Education Programme



Chapter Two: Education and Teacher Education: The Omani Context

2.1 Introduction: Overview to Oman

The Sultanate of Oman is located in the southeast corner of the Arabian Peninsula. The coastline extends 1,700 km from the Strait of Hormuz in the north, to the borders of Yemen in the south, and overlooks three seas, the Arabian Gulf, Gulf of Oman and the Arabian Sea. It borders Saudi Arabia and the United Arab Emirates in the West; the Republic of Yemen in the South; the Strait of Hormuz in the North and the Arabian Sea in the East. The total land area is approximately 309,500 km^2 and it is the third largest country in the Arabian Peninsula (see map of Oman in Appendix 1).

The Sultanate of Oman is divided into three governorates - Muscat, Dhofar and Musandam - and eight administrative regions: A'Dakhliyah; A'Dhahira; Al Batinah; Dhofar; Al Wusta; Muscat; Musandam; and Al Sharqiya. Each of these is further subdivided into smaller districts called wilayats, which are governed by the wali, the person responsible for the area who reports to the Ministry of the Interior. (MOI, 2003). The latest statistics from 2004 show the total population of Oman to be 2,415,567 people, made up of 1,802,931 Omanis, and 612,645 expatriates (MONE, 2005).

2.2 Education System in Oman

Oman has had a non-formal educational system throughout its history. There were, however, traditional schools for teaching the Qura'an to both boys and girls which took places in mosques, houses or under trees in some villages. Male and female teachers taught children from roughly the ages of 6-12 on religious subjects, basic Arabic writing and fundamentals of Islam (AlDhahab, 1987).

The history of a modern educational system is not long, however, as its beginning was in 1970 (AlBelushi, AlAdawi & AlKetani, 1999). Before 1970, there were only three schools in the country, with 30 teachers and merely 909 pupils, so formal education was limited to a very small number of people, and there was no provision for the education of girls. At that time, there were also three shifts in some schools, also providing some adult education. None of the schools were housed in appropriate buildings, since the widespread development of educational services during the 1970s was so fast that it was practically impossible to construct all of the required buildings with the necessary specifications (Hawley, 1995).

The new government of 1970 immediately responded to the widespread hunger for education. It opened a large number of schools all over the country and gave priority to the education of both boys and girls. The desire to learn had grown among people, and there was a great dearth of qualified Omani teachers. Males and females teachers were hastily brought from Egypt and other Arab countries (Hawley, 1995 & AlSalmi, 1994).
One can recognise three stages in the development of education in Oman:

- Stage one emphasized the rapid quantitative development of education;
- Stage two started in the early 1980s, when the Ministry of Education initiated serious efforts to improve the quality of education; and
- Stage three beginning from 1995, after the Conference on Oman's Economic Future, Vision 2020, when a number of reforms were introduced in order to cope with the educational requirements of the future (Ministry of Development, 1997, 2002).

During stage two, the quality of education became a concern of the Ministry of Education. All educational system components were reviewed, including teacher education, teaching materials and methods, and curricula, with the help of competent education experts. The schooling structure at that time was a traditional one, similar to that of many other countries: six years of primary education, three years of preparatory or middle years education, and three years of secondary education. The concept of basic education of ten years duration for all did not yet exist at that time (Rassekh, 2004a).
Clearly, the introduction of qualitative measures has not stopped the pace of quantitative expansion. In fifteen years (1980–1995) the number of students continued to increase.

> *"The specific measures introduced at this stage to improve the quality of education included: construction and equipment of adequate buildings for schools; abolition of the double shift arrangement; better training of teachers; preparation and provision of adequate textbooks; and provision of necessary science teaching equipment"* (Rassekh, 2004a)

In stage three (from 1995 to 2003), several new reforms were implemented, the major being that all children go through ten years of basic education to better prepare them to face the challenges of the future.
Documentation related to Oman's "Vision 2020" produced in 1995 on the country's economic future (Ministry of Development, 1997) contains specific policies concerning education inspired by the following statement of the Ministry of Education:

> *"The challenges facing Oman, particularly the need of self-sufficiency and the need to diversify the economy and keep pace with technological change, require new educational goals to prepare Omanis for life and work in the new conditions*

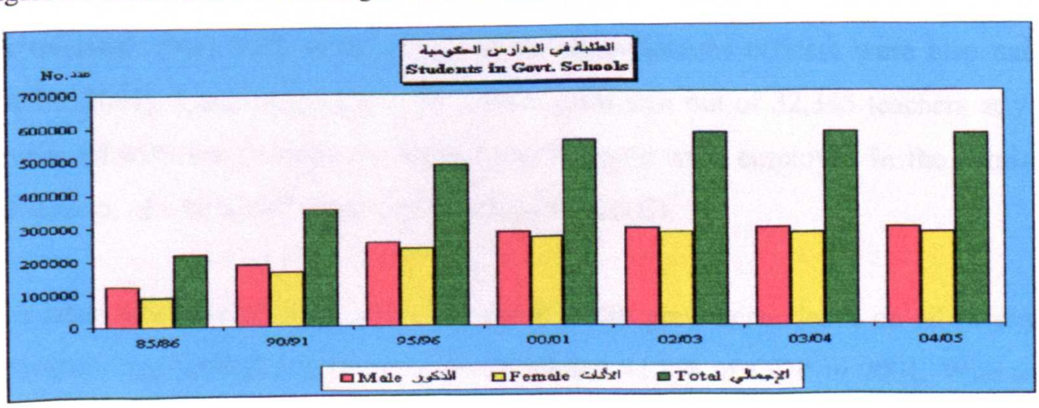
created by the modern global economy. These will require a high degree of adaptability and a strong background in mathematics and science in order to independently apply rapidly changing technologies to Oman's needs. The proposed educational reforms are designed to achieve the knowledge and mental skills and attitudes that young Omanis will need to learn and adapt to the very different future most of them will face". (AlBelushi, AlAdawi & AlKetani, 1999)

As mentioned in the 'Vision 2020' document, those policies were:

- to implement and improve the standards of basic education;
- to make secondary education more consistent with the requirements of the future society;
- to pay more attention to the science subjects;
- to introduce the teaching of computers in schools as a basic subject;
- to improve the teaching/learning of the English language in basic education;
- to provide schools with adequate human resources and educational equipment;
- to improve the status of teachers;
- to improve in-service training courses and workshops for all staff in the educational field; and
- to improve teaching methods and education practices according to new trends and to encourage the concept of learning by doing. (Ministry of Development, 1997)

One of the outcomes of stages two and three was the increase of the percentage of females, both among the students and teaching staff (MOE, 2004). In 2003–2004, out of 576 472 students, 279 180 are girls (48.4%). In all public schools - basic, primary, preparatory and secondary - in that same school year - there are 14 096 male teachers (both Omanis and expatriates) and 18 249 female teachers. Therefore, out of 32 345 teachers of both genders, 56% are female. Figure 2.1 shows number of students in government schools (MONE, 2005).

Figure 2.1 Number of students in government schools



Source: (MONE, 2005)

It is clear that there have been several reasons that called for fundamental changes in the education system (Rassekh, 2004a):

1. Increasing the Omanisation ratio - the percentage of Omanis in the labour force - and the necessity, even within the Ministry of Education, of responding to the problem of the shortage of qualified individuals among nationals.
2. Awareness that the dependence of Oman's economy on oil cannot continue forever, because oil is a finite resource, with its price at the mercy of external circumstances, beyond local control. Therefore, Oman should adopt a four front policy: "the diversification of the economy, the development of human skills, the effective exploitation of the available natural resources and the creation of the suitable conditions to encourage the private sector to perform a greater role in the growth of the national economy" (Rassekh, 2004a).
3. Consciousness of the need to be prepared to encounter the challenges of globalization.
4. Attaining the objective of democratization - accomplished by the establishment of a Consultative Assembly in 1981 and later replaced in 1991 by the Consultative Council - both created by royal decree and by the adoption, again by royal decree, of a Basic Charter in November 1996, which contains among other things the rights and duties of the people and a number of basic principles including the right to education and to literacy and the obligation of the state to produce a generation physically and morally strong, proud of its country and its cultural heritage and equipped with the knowledge of modern science and technology (Rassekh, 2004a).

As to the degree of Omanisation in the teaching and educational staff is concerned, for the academic year 2001–2002, of 26,416 teachers in primary, preparatory, secondary and basic education, 67.2% were Omanis (MOE, 2002a, p. 22). The percentage in other education positions varied between 37.8% (subject inspectors) and 95.6% (laboratory technicians). Over 74% of headmasters and examinations officers were also nationals (MOE, 2002). Latest figures for 2003–2004 show that out of 32,345 teachers at various levels, 80.46% are Omanis. In 2003, 43,953 people were employed in the Ministry of Education, of which 84% were Omanis (MONE, 2003).

The latest available statistics show that there is still great dependence on oil income that petroleum and natural gas provided an estimated 41.8% of GDP in 2001. With a daily production of around 952,000 barrels, the petroleum reserves are sufficient to sustain production only until 2016. Exports of Omani crude petroleum provided 80.4% of total export earnings in 2001. The proven gas reserves are sustainable for almost sixty-two years at 2001 production level (Europa Year Book, 2003, p. 3181, cited in Rassekh, 2004b). However, the government budget still largely depends on petroleum and natural gas revenues (Rassekh, 2004b).

The challenge of globalization, one of the important decisions for increasing the quality of education in Oman was to extend the school year from 160 to 180 days (AlBelushi, AlAdawi & AlKetani, 1999). The Ministry of Education also decided to lengthen the lessons from thirty-five to forty minutes and expand the school day from four to five hours. Another decision was to equip Omani schools with modern computer and science laboratories as well as learning resource centres (MOE, 2002a). The reports from Oman are quite explicit in showing the interest of education authorities in meeting international standards showing that the total number of school days adopted in Oman compares well to the number of days assigned in various countries (AlBelushi, AlAdawi & AlKetani, 1999, p. 15). The result of that change is that in the past system the total number of hours for ten years of education was 5,693, while with the implementation of basic education reform, the number of hours went up to 9,600 (an increase of about 70%). In past arrangements, there was no allocation for computer time; now, 264 hours are devoted to that subject during ten years of basic education. Life skills, useful for Oman's environment, and information technology are also new additions to the basic education curriculum (AlBelushi, AlAdawi & AlKetani, 1999, p.16).
The best indication of progress in education is the tremendous opportunities created for girls and women to reach equal status with boys and men in Oman's society. According to a report on the evolution of education statistics, in 1970, 1980, 1990 and 2000 the percentage of girls among all students was 16%, 33%, 46.6% and 48.7% respectively (MOE, 2002a). The percentage of female school teachers evolved from 32% in 1970 to 52.2% in 2000. The estimated ratio for 2001 was 58.4%. The statistical department of the Ministry of Education provided the following information on teachers by cycle and by gender in public schools for the school year 2002–2003 (Raseekh, 2004b).

The latest statistics for the school year 2003–2004 give the following figures: 14,096 male teachers and 18,244 female teachers at all levels and in all types of schools. The Ministry of Education explained that the concentration of female teachers in the first cycle of basic education (four years) followed by the second cycle of basic education (six years) is likely due to the natural tendency of women to assume a maternal role. It is believed that female teachers show more care and understanding towards the younger generation compared to male teachers. The relative ease of finding a job is the education sector for females may be another reason for that concentration. The report on the evolution of educational statistics further states that in 2001, out of 2,681 education administrators, 1,524 were women, or 57.5% (MOE, 2002a). This percentage, compared to the situation in 1974 of 26.4%, shows in itself the long way women have already come in Oman. The latest figures for 2003 show that out of a total of 3,273 education administrators 1,906 are women or 58.2% (Raseekh, 2004a).

2.2.1 School Education System in Oman

The following sub-sections overview the development of the school education system in Oman since the beginning of the seventies.

2.2.1.1 The General Education System

The former pre-reform general education system consists of three stages: primary, preparatory and secondary. Primary education normally starts at the age of six and continues until the sixth primary grade between the ages of 6-11. Students would study Arabic language, English language, general sciences, Islamic studies, mathematics, social studies, physical education, music and arts. Then pupils who pass this level would move on to the preparatory level where they will study the same subjects but at more advanced levels. This stage lasts for three years where student are between 12 and 14 years old.

Pupils who complete the third preparatory level are then admitted to secondary school (between the age of 15 and 17). After completing the first secondary grade, pupils can choose either to take their final two years of education in either an "arts" stream or a "science" stream of secondary school subjects.

In the science stream, students take subjects such as mathematics, physics, biology and chemistry, while the Arts focuses on subjects like Islamic education, Arabic language, history and geography in their first year of secondary level. For the last two years of secondary schooling, in the science stream students learn mathematics, physics, biology, chemistry, Islamic education, Arabic language and English language. On the other hand, the arts stream contains geography, history, national education, practical mathematics, general science, as well as Islamic education, Arabic and English languages (Hawley, 1995 & AlLawati, 2003).

In order to be qualified for the final general secondary examinations, Omani pupils have to first successfully complete elementary, preparatory, and secondary schooling. This certificate is granted after writing final examinations at the end of the third secondary level.

2.2.1.2 The Transitory System (the Modified General Education System)

The Basic Education and post-Basic Education grades 11 and 12 reforms are being phased-in gradually. As a result, the General Education system and the Basic Education system will be operating simultaneously for several years to come. The Ministry of Education has, therefore, made attempts to upgrade the current system by introducing a number of reforms. The reforms made to existing General Education grades 11 and 12 system can be summarized as follows:

- The arts and science streams in grade 11 and 12 have been replaced with a unified core and options model.
- To make the curriculum more relevant for the needs of students, the options include courses in pure and applied Mathematics with the latter containing units of study related to practical economics.
- Computers have been issued to all schools teaching grade 11 students and since 2004 Computing Studies has been a subject option for students at this level (MOE, 2002a).

2.2.1.3 Basic Education System

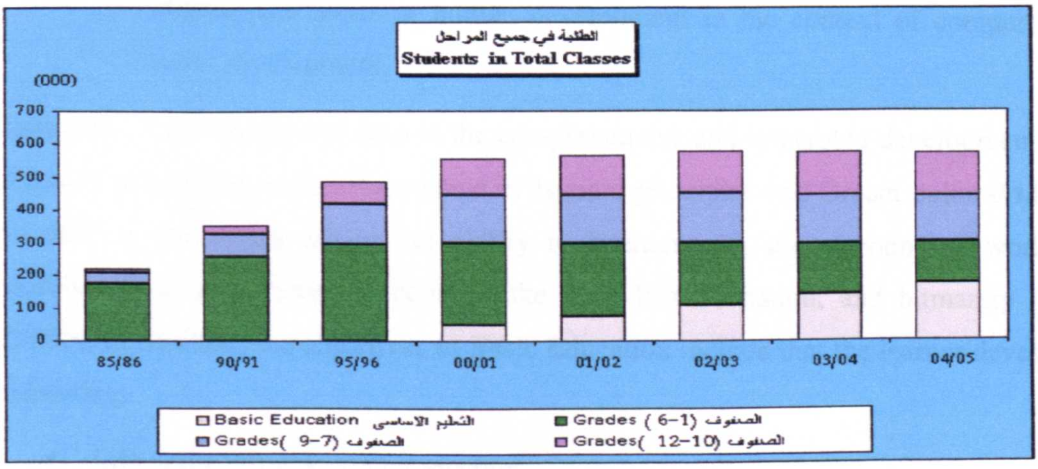
Basic Education is a unified ten-year education provided by the Sultanate for all children of school age. It meets their basic education needs in terms of knowledge, skills, and attitudes and values, enabling them to continue their education or training based on their interests, aptitudes, and dispositions (MOE, 1999).

It aims to enable children to face the challenges of their present circumstances and future developments, in the context of comprehensive social development. Moreover, it aims to develop the learner's personality within the context of Islamic principles and Omani cultural identity, as well as cultivating his/her ability to interact with surrounding world and instilling loyalty towards his/her country, the Arab-Islamic nation and humanity (MOE, 2001a).

Basic Education has been divided into two cycles (stages), according to the pupils' age, and to the characteristics and growth needs of each cycle. The first cycle, the foundation stage lasts for four years (grades 1-4) the second lasts for six years (grades 5-10). Table

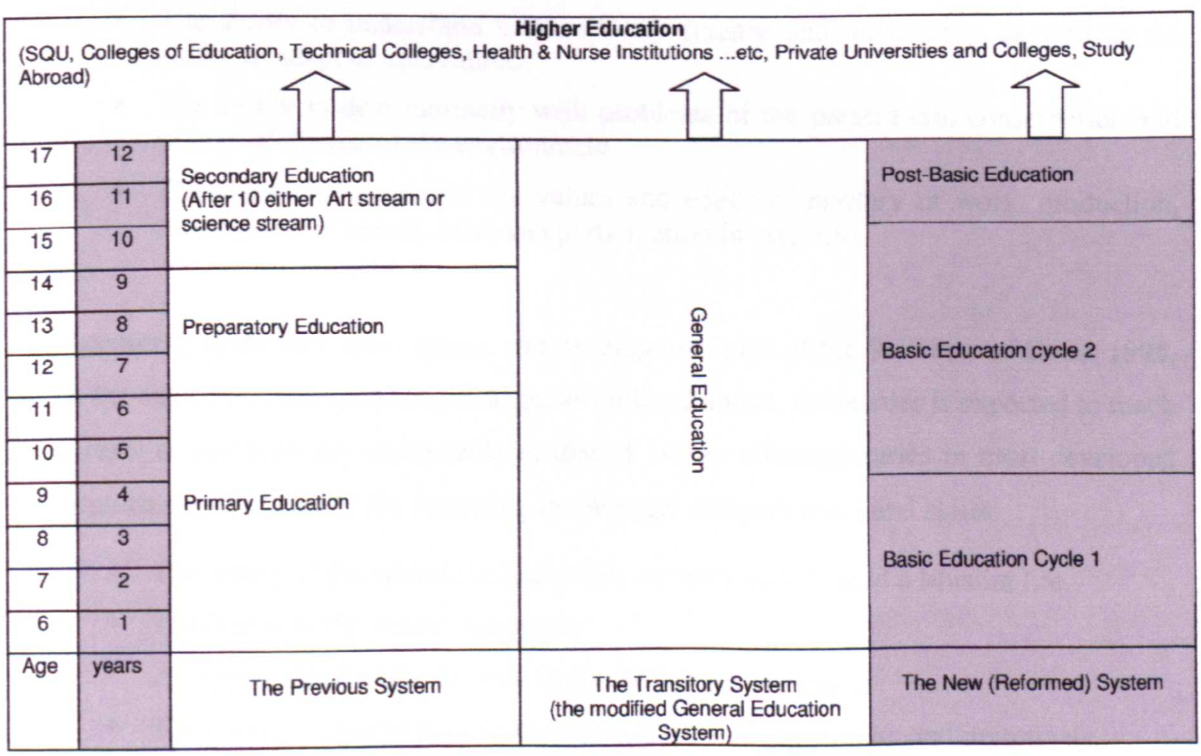
2.1 shows the new Basic Education programme's weekly lesson timetable. Finally, there is Secondary Education covering a span of two years (grades 11-12). Figure 2.2 shows the growth of the numbers of pupils in all levels from academic year 84/85 to 04/05 and Figure 2.3 shows the development of the Omani educational systems.

Figure 2.2 Summery of development of students in all levels from 1984/85 to 2004/05



Source: (MONE, 2005)

Figure 2.3 Development of Education System in Oman



2.2.1.3.1 Objectives and Outcomes of Basic Education

It is clear from its founding definition that Basic Education is aiming at (MOE, 2001a):

- Integration between theory and practice, thought and work, education and life.
- Comprehensiveness in developing all aspects of a whole personality.
- Acquisition of self-learning skills in the context of a lifelong education.
- Inculcating the values and practices necessary for mastery and excellence in learning and teaching.
- Meeting the needs of human development in the context of comprehensive social development.

Generally, Basic Education aims at the comprehensive and integrated development of the learner's personality within the context of Islamic principles and Omani cultural identity, as well as cultivating his or her ability to interact with the surrounding world and instilling loyalty towards the country, the Arab-Islamic nation, and humanity (MOE, 2001b). In addition, the objectives of Basic Education include that the learner develop the following:

- Life skills through communication.
- Self-learning.
- Scientific and critical thinking.
- The ability to understand contemporary science and technology, as well as the ability to adapt to innovation.
- The ability to deal rationally with problems of the present era: conservation and wise exploitation of the environment.
- The ability to internalise the values and ethics of mastery of work, production, sensible use of leisure time, and participation in civil life.

According to the education reform and development plan of the Sultanate of Oman 1995, at the end of the Basic Education stage, as outlined above, the learner is expected to reach a level of achievement comparable to that of his/her contemporaries in most developed countries, i.e. to acquire the following knowledge, competencies, and skills:

- The basics of the Islamic sciences that are necessary to lead a Muslim life.
- The basics of the Arabic language.
- An appreciation of the Omani, Arab and Islamic heritage.
- The ability to cooperate, communicate, use symbols, enquire and investigate.
- Developed self-learning competencies and the ability to locate and obtain information.
- The competencies of scientific and critical thinking, creativity, and aesthetic appreciation.
- A strong background in mathematics and science, and computer skills.

- Proficiency in English.
- Mastery of work- and time-management.
- An awareness of conservation and wise use of natural resources.
- Life skills in his/her own environment.
- Respect for and a positive attitude towards manual work (MOE, 1996)

Table 2.1 The Basic Education programme weekly lesson timetable

Subject	**Number of weekly periods in each grade**									
	First Cycle				**Second Cycle**					
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Islamic education	6	6	6	5	5	5	4	4	4	4
Arabic language	12	12	10	7	7	7	7	7	7	7
English language	5	5	5	5	5	5	5	5	5	5
Mathematics	7	7	7	7	7	7	8	8	8	8
Sciences	3	3	3	5	5	5	6	6	6	8
Social studies	-	-	2	2	4	4	4	4	4	4
Physical education	2	2	2	2	2	2	1	1	1	1
Art Education	2	2	2	2	1	1	1	1	1	1
Music Education	1	1	1	1	1	1	1	1	1	-
Environmental life skills	1	1	1	1	1	1	1	1	1	1
Information technology	1	1	1	2	-	-	-	-	-	-
Computer science	-	-	-	-	2	2	2	2	2	1
Total weekly period	40	40	40	40	40	40	40	40	40	40

Source (MOE, 2001b)

2.2.2 Education and Competencies for life

The Ministry of Education began a study on the status of secondary education in the Sultanate, the aim of this study being to identify suitable curricula and assessment options for post-Basic Education grades 11 and 12. The options identified by the Ministry were to be consistent with the outcomes of the Basic Education reform programme. The intention is to implement the new model in time for the first cohort to complete grade 10 of Basic Education at the beginning of the school year 2007/2008.

Although the Ministry is still at the planning stage, some important decisions have already been agreed upon and these can be summarised as follows:

- Entry into grade 11 will be open to all pupils who have successfully completed grade 10 of Basic Education
- The aim of the programmes will be to prepare individual pupils for life after school, whether for entry to higher or further education or for direct entry into the labour market.
- The curricular model will be one which emphasises the learning of essential skills. In this model, all students will be expected to acquire and develop a set of key skills, or fundamental competencies, which will enable them to operate effectively in a wide range of contexts.
- The curriculum will be organised on a core plus options (electives) model. The essential skills will be delivered through integrating the skills into core subject-based courses taken by all the pupils. The options will give them the opportunity to choose programs that are appropriate for their varying abilities and interests (MOE, 2002a)

2.3 Higher Education

Higher Education in Oman has a very short history, beginning in 1986 when the Sultan Qaboos University was established and the first group of the students were admitted. In September of that year, the University initiated its courses in five colleges: Medicine, Education, Agriculture, Science and Engineering. Two more colleges were later added: the College of Arts was opened in 1987, and a College of Commerce and Economics was opened in 1993.

Previously, most students who upon graduation from secondary school received the General Secondary School Certificate, and desired further higher education, were granted a scholarship to study abroad.

The university is government sponsored. Its governing bodies are the university council and the academic council. Most of other higher education institutions are under the supervision of the Ministry of Higher Education (MOI, 2003).

There are also other governmental higher education colleges and institutes in Oman such as the College of Law, the Colleges of Education, Technical Colleges, Health Sciences Institutions, etc.

There are three new private universities in Sohar, Nizwa and Dhofar, and there are at least 20 private further education and higher education colleges and institutes in the Sultanate operating under license from the Ministry of Higher Education, and are at different stages of development. Some of these are designated University Colleges, such as Caledonian

College of Engineering, Majan College and Sur University College. Most of these University Colleges are affiliated to Universities in the UK, USA, Australia or other countries (MOHE, 2004).

The majority of subjects at these University Colleges are taught in the English language, hence, there is a growing demand for English language courses. These colleges offer post-secondary education in business administration, economics, commerce and computer sciences. The diplomas awarded at the end of one to three year courses qualify the students to enter overseas universities. All of these are coeducation institutes, but there are two private female colleges, the first women's college in Oman, the Mazoon College for Management and Applied Sciences, opened during 1999. This was followed by Al-Zahra College for Girls (MOI, 2003).

The existing provision for higher education is still insufficient, which means that a considerable number of Omanis go abroad for their post-secondary education (AlRubay'ee, 2004).

2.4 Teacher Education

Teacher education in Oman has been developed through the last three decades. In 1970, when the reform movement started and the primary schools were opened, then the Ministry of Education had two options to solve the problem of the acute shortage of teachers. The first option was to appoint any Omani who had the desire and motivation to teach to work as a teacher. Some Omanis had experience in teaching in Mosques and Qura'anic schools and some Omanis who, during the early seventies studied in other Arab countries at preparatory and secondary levels, returned to Oman to join the teaching staff in the rapidly developing schools along Oman. A primary level certificate was considered sufficient qualification for any Omani who joined the teaching profession. In the first academic year, 151 Omani teachers were appointed by the Ministry of Education. The second option was to recruit teachers from other countries to overcome the deficiency of teachers in the Sultanate.

In 1972 the Research and Development Department was established in the Ministry of Education. Its first duty was to accommodate new teachers into their new jobs. In the same year with Arab and world cooperation, it opened some in-service training centres in a number of bigger cities. A total of 261 teachers were selected to follow a training programme that was based on one to two sessions a week of various duration: i.e., one year for those who possessed the secondary certificate and two years for preparatory school certificate holders (AlDhahab, 1987).

2.4.1 Teacher Training Institutes

Training of Omani teachers for the primary schools was initiated in 1976/77 through what is known as the "first-Programme". Students who passed grade 7 were accepted for a two-year teacher preparation programme. A total of 25 students were accepted for a place in the first class; then the programme was terminated in the same year (Razik, 1986).

In an attempt to Omanise teaching positions in elementary schools, the Ministry of Education established, in 1976, the three-year teacher training centres for students who are holders of preparatory certificates (AlSalmi, 1994).

In the school year 1977/78, a different direction was taken for teacher training. A secondary Level Teacher Training Institute was established to accept graduates of the preparatory school (after grade 9).

In 1980, the Ministry upgraded these centres by admitting students who are holders of secondary certificate. The duration of that programme was one year of in-service training. The total number of teachers who graduated from these centres were 2521. The programme was based on daily traditional lectures with afternoon teaching practice. More emphasis was placed on theory than practice. Most of the text books used were the same set of books used by the hosting secondary schools. These centres continued to accept students until 1983/84 when they were phased out (Issan, 1994).

The duration of this programme was three years, after which the graduates received the "Secondary School Certificate for Teachers". With the start of the school year 1979/80, another programme was added. This programme accepted the graduates of secondary academic schools into a one-year programme of teacher training. The graduates of this programme obtained the "Diploma in Primary Education" (Razik, 1986).

Oman also established a scholarship program encouraging teachers to study abroad and obtain bachelors' degrees in reputable Colleges of Education.

2.4.2 Intermediate Colleges

As a step in upgrading and development of the teaching profession, the Ministry of Education issued an ordinance in 1983 to establish the intermediate colleges for teachers. These colleges admitted their first students in 1984/85 and accepted secondary school graduates and trained them as primary school teachers to teach all subjects to all grades. Graduates of these colleges are trained to teach both the three lower levels (grade 1,2 & 3) as classroom teachers as well as the higher grades (4, 5 & 6) as subject-matter teachers (Razik & AlShibini, 1986).

In 1984, the Ministry of Education established two junior teacher education colleges in which primary school teachers specialized in classroom teaching (grades 1-4) and subject matter teaching in upper classes (grades 5-6). The duration of this programme was upgraded further from one to two-year post-secondary education in order to improve the quality of primary school teachers. By 1990, the number of these colleges reached nine, distributed in the various provinces, and existed until 1993, with 6207 teachers graduating from these colleges. Finally, by 1995, almost all primary school teaching posts in most provinces of the Sultanate were occupied by Omani nationals (Issan, 1994).

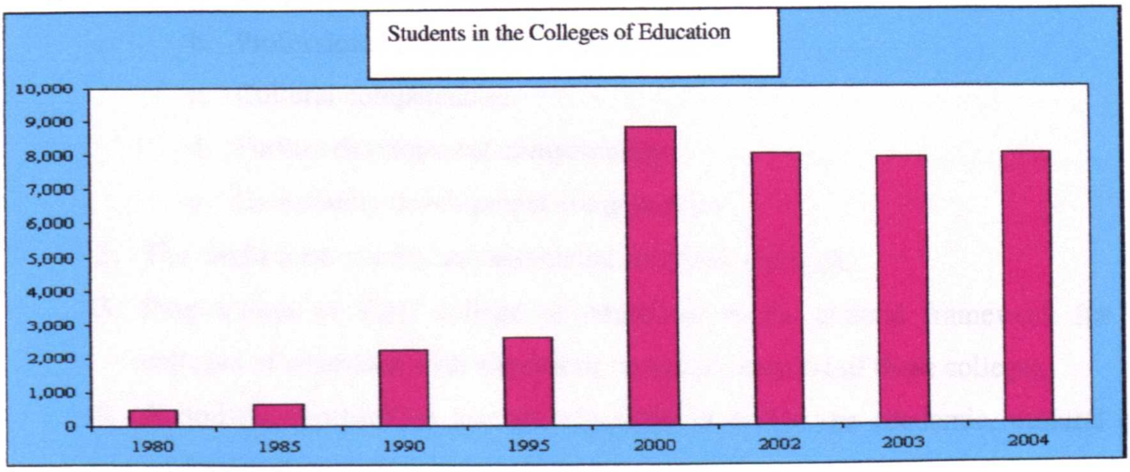
2.4.3 Colleges of Education

In 1994, the government approved a request from the Ministry of Education to increase the duration of the colleges from two to four years thus becoming university colleges. These colleges are also responsible for preparing, in addition to primary school teachers, preparatory and secondary school teachers. As a first step towards upgrading these colleges, the Ministry of Education in 1994, converted two intermediate colleges to university colleges, one in Nizwa and other in Al Rustaq. These colleges offer bachelor degrees in Education.

The Ministry of Higher Education was created under royal decree 2/94. It is responsible for the institutes of higher education and funds scholarships ensuring equal opportunities for students with high academic qualifications (Al Rubay'ee, 2004). Royal decree 42/95 transferred responsibility for the male and female Colleges of Education from the Ministry of Education to the Ministry of Higher Education. Nine intermediate colleges were restructured to create six university colleges. The Ministry believed that the upgrading of these intermediate colleges into university colleges, where the study period would be four years, would prepare a generation of Omani male and female teachers to be competent and efficient in their profession.

The Ministry of Higher Education contributed towards the promotion of such policy and objectives by increasing the enrolment rate of the colleges of education and Sultan Qaboos University, and establishing the concept of Omanisation, keeping it as an important criterion for employment at all levels of educational institutions. Candidates compete for places against students from across Oman, and are accepted on the basis of program availability. By 2001/2, 8896 male and female students had enrolled at teacher training colleges, and 6,049 students graduated with BA degrees. In 2002, programmes were launched to recruit more than 9700 people – mostly women – to reverse a shortage of female staff due to sick leave or maternity leave (Ministry of Information, 2003). Figure 2.4 shows the development of student numbers in the Colleges of Education.

Figure 2.4 Summery of development of student's numbers in the colleges of education



Source: (MONE, 2005)

The colleges of education endeavour to prepare Omani teachers to teach in the various levels of basic and secondary education effectively through the realisation of the following objectives:

- ensuring cohesion and consistency of a university level of teacher education for the various levels of basic and secondary schooling, with the aim of upgrading the quality of primary school teachers.
- enhancing student-teacher competencies in teaching at the various levels and their active participation in co-curricular activities as well as encouraging an effective role in the development of the local community.
- expending Omanisation of teaching posts at the various levels of education, particularly at the secondary level.
- promoting and upgrading the level of teaching scientific subjects (sciences, mathematics and technology) at the levels of general education in line with the Ministry of Education's policy of improving the quality of education and copying with the scientific and technological progress of the time.
- investing college material and human resources in the professional in-service upgrading of the educational sector staff: teachers, supervisors, administrators and educational leaders, through the organisation of training courses and workshops.
- planning and implementing community development services projects.
- conducting and disseminating educational research to enrich the teaching/learning.

2.4.3.1 Programme Principles

Colleges of education programmes are based on a number of basic principles. The most important of these principles are:

1. The competencies approach. The following major competencies have been identified to correspond with the envisaged role of the teacher of the preparatory & secondary stages:
    a. Subject specialisation competencies
    b. Professional educational competencies
    c. Cultural competencies
    d. Further development competencies
    e. Community development competencies
2. The credit-hour system and associated academic policies.
3. Programmes of SQU college of education as the general framework for the colleges of education with alterations to suit the context of these colleges.
4. A holistic approach to teacher education in which the academic, cultural and professional components have been integrated.
5. Emphasis on the practicum in keeping with contemporary international trends and practice.
6. Diversification of teacher education programmes in order to prepare teachers for the two levels of education in various specialisations to meet the actual requirements of education in Oman.
7. Development of student teachers' skills of interaction with the new technologies of education. This will be achieved through the computer courses offered to all students and up-to-date facilities of the learning resources centres established in these colleges.
8. Encouraging learning through the provision of varied references to avoid the sole dependence on the textbooks, with the objectives of enhancing students' self learning skills and developing their ability to utilise multimedia resources.
9. Integrating academic and practical components of learning rather than dependence on the lecturing approach. This would entail increasing number of hours for workshops, school-based practical training and laboratory activities (MOHE, 1999)

2.4.3.2 Administrative and Academic System of the Colleges of Education

2.4.3.2.1 The Ministerial Level

The General Directorate of the colleges of education was established in the Ministry of Education, with its duties as supervision of the colleges, suggestion of policies, and preparation of the study plans and the programmes. Moreover of consideration of issues related to admission and evaluation systems, and the professional development of the staff of the colleges.(AlRubay'ee, 2004).

2.4.3.2.2 The Colleges of Education Level

Academic affairs are managed by the dean of each college, with assistance of the deputy dean, and the heads of academic and support departments, while other administrative and finance affairs are managed by the director of administrative and finance affairs and his staff.

2.4.3.2.3 The Managerial Councils

Colleges of Education affairs are organised by some councils, these councils are responsible for the setting up of general policies and they consider academic and administrative issues. These councils are in four levels (Al Rubay'ee, 2004):

1. Colleges of Education Council: this is the higher council. It is responsible for the construction of general policies of the colleges; is administered by the Minister of Higher Education, with a membership of the Under-secretary of the Ministry of Higher Education, the General Director of the Colleges of Education, and two members; one representing the Ministry of Education and the other of SQU. It is responsibilities as sited by the royal decree (95/79) are:
    a. help the colleges of education to achieve their mission and goals,
    b. establish new colleges, departments, programmes or cancel or modify the current,
    c. sign the annual budget for the colleges and agreement of the final account balance, and confirm the organisation, technical, finance regulations,
    d. confirm the Academic Councils' suggestion,
    e. review colleges of education annual report, and
    f. accredit colleges of education certificates and academic degrees.

2. Academic Council: this council is leaded by the Under-secretary of Higher Education, with the General Director of the Colleges of Education as deputy president, with membership of the deans of the Colleges of Education and two academic staff. Its responsibilities are:
    a. follow up implementation of general policies,
    b. suggest the general policies for education in the colleges of education,
    c. suggest the organisation, technical, finance and administrative regulations,
    d. organise studies, students, staff, and academic degrees affairs, and
    e. discuss the annual budgets of the colleges of education.

3. College Council: this council consists of the dean of the college as president, the deputy dean, and head of academic, supportive, administrative and finance departments, and representatives from academic staff. Its duties are:
   a. implementation of study plans and curriculum, and commitment of conditions for grant of certificates and degrees,
   b. organisation of study in the colleges of education and coordination between departments, with the encouragement of research,
   c. suggestion of rules and timetables for examinations, and confirming of the results, and
   d. formation of committees or groups to work for study, or to implement determined works, and submission of recommendations.

4. Academic Departments Councils: these councils include all staff members in each academic department with a president of the head of the department. Its duties are:
   a. coordinate study curriculum and syllabuses, and implement an academic plan,
   b. present suggestions for study plans, and submit them to the college council,
   c. format standards and descriptions for examinations,
   d. encourage research and coordination for research with other departments,
   e. presenting suggestions for distribution of lessons and lectures to the College's Council, and
   f. study regulations, reports, and letters from the dean of the college of education.

2.4.3.3 Academic Programmes

There were three programmes offered by the colleges at the time this study started:

1. Preparatory/ Secondary Education (Cycle 2 Basic Education and Secondary General Education)

The first group were admitted in 1994, and the programme offered the following areas of specialisation:

1. Islamic Studies	2. Arabic Studies
3. Geography/ History	4. History/ Geography
5. Physics/ Chemistry	6. Chemistry/ Physics
7. Physics/ Math	8. Physics/ Computer
9. Chemistry/ Biology	10. Biology/ Chemistry
11. Math/ Physics	12. Math/ Computer

Except for Islamic and Arabic specialities, all programmes have a major specialisation and a minor specialisation, student teachers taking more courses in the major subject more than in the minor subject. This programme was modified and replaced with the

General Teacher Education Programme, starting in the academic year 2002/03, and it offers the following specialities concentrating on one major subject specialisation:

1. Islamic Studies	2. Arabic language and its literature
3. English language and its literature	4. Geography
5. History	6. Physics
7.Chemistry	8. Biology
9. Mathematics	10. Computer

The length of each of the programmes is 4 years (8 semesters). The academic year consists of 2 semesters of 18 weeks each (15 weeks for actual teaching and 3 weeks for examinations). The student teacher graduates with a Bachelor Degree in Education, and qualifies as a teacher when he or she passes all the required courses, and obtains a General Point Average (GPA) of at least 2 out of a total of 4 points (AlNaibi, 2002, AlRubay'ee, 2004).

2. First Cycle Teacher Education (for teachers of Basic Education schools from grade (1-4), this program began in the academic year 1998, offering two areas of specialisation:

- First Field: Islamic, Arabic and Social studies.
- Second Field: Science and Mathematics (As this programme is the subject of this study, it is illustrated in greater detail in section 2. 4.4.3.1).

3) Generic, Life and Environmental Skills Teacher Education

This program started in the academic year 1998 in response to the needs of the Ministry of Education, but now is suspended having attained its aim of producing the Omani teachers for this subject.

2. 4.3.3.1 Scientific Field Initial Teacher Education Programmes

Within the Basic Education reform context, teacher education in Oman should have had a different emphasis from one that was content-based to one that is more professionally based. This repositioned degree programme, the Bachelor of Field Teacher of Cycle 2 Basic Education, was launched in September 1998. The programme was started in four colleges at AlRustaq, Ibri, Sur and Salalah, all restricted to females.

This programme considers children's characteristics in this age (6-10 years old), when learning is happening through the experiences during play and activities. (MOHE, 1999).

There is no doubt that children face many psychological, emotional and mental challenges when they are separated from home, thus a good teacher is crucial at this stage, consequently the programme was developed with the following elements:

- learning by experiences,
- considering individual differences,
- using a variety of learning resources,
- learning from the arts,
- considering the environment and natural resources, and
- considering the school, family and society (MOHE, 1999).

The programme is based on the integrative pattern of teacher preparation, and adopted the competency-based approach for construction of its components. These competencies include:

1. Domain One: General Competencies

By the end of the programme, student teachers will be able to:

1. Respect professional ethics in dealing with pupils in moral, spiritual, and social situations and provide equal opportunities between them.
2. Belief of the teachers' role in the achievement of the comprehensive educational development of students, and affect in the pupils' future, and acquire the desired positive attitudes of the teaching profession toward dealing with pupils in this age (grades 1-4).
3. Develop positive attitudes toward the nation, the Arabic world, the Islamic world, all Humanity and world peace.
4. Consider of societal values, inside and outside the school, and development of responsibility towards environmental and societal needs.
5. Develop positive attitudes toward integrated development of pupils, particularly towards expressional arts.
6. Respect of educational responsibility and demonstration of supervision of students, as well as instructional and administrative responsibilities.
7. Cooperate with others in order to improve individual pupil's performance, and modernize the quality of the school and general life within the school.
8. Develop abilities through self-learning and continuous professional development.
9. Develop competencies in English Language and in the use of a computer.

2. Domain Two: Planning Competencies

By the end of the programme, student teachers will be able to:

1. Prepare annual, term and daily teaching lesson plans, to achieving the following:
    a. Efficiency and integration of school curriculum content, and its connectivity with all other curricula.
    b. Derivation and formation of the behavioural objectives in procedural, observable and measurable areas.
    c. Determine the prerequisites for the topics studied in each subject.

d. Learn to use a variety of teaching styles, methods and strategies in an integrative way, in order to meet pupil's needs and abilities, and to achieve the behavioural objectives.
e. Prepare and use instructional media from environmental materials and implement them in different learning/teaching situations.
f. Use proper evaluation methods to insure the achieving of the behavioural objectives.
g. Planning and designing of both inside and outside classroom activities.

3. Domain Three: Teaching Competencies

By the end of the programme, student teachers will be able to:

1. Stimulate pupils' motivation towards learning, and using outside and inside classroom activities, to develop their abilities using individual or group work.
2. Keep pupils' motivation towards learning throughout the lessons.
3. Implement learning principles and a variety of teaching methods and strategies to meet pupils' learning styles, particularly for special educational needs.
4. Use different learning resources, including audiovisual and communication techniques with the appropriate topic and time.
5. Implement group work activities to develop positive attitudes towards cooperation and teamwork between pupils.
6. Master communication and interaction skills with pupils and support them to express their ideas clearly and contribute effectively in activities.
7. Implement and integrate psychological and educational principles to stimulate pupil's motivation for learning.
8. Activate cooperation with pupils' parents, staff colleagues and other members in the local community.

4. Domain Four: Classroom Management

By the end of the programme, student teachers will be able to:

1. Employ classroom management skills and organisation in order to attain affective learning and positive relationships between teacher and the pupils.
2. Set clear expectations for discipline in the classroom to control pupils' behaviour.
3. Organise learning experiences inside and outside the classroom.
4. Organise and provide comfort, security and safety within the classroom's physical environment.
5. Know, analyse and establish the proper solutions for the classrooms' behavioural problems.
6. Manage and utilise time for learning in lessons and classroom activities.
7. Organise and file pupils' records, and employ them in order to achieve effective learning.

5. Domain Five: Evaluation Competencies

By the end of the programme, student teachers will be able to:

1. Use oral, written, practical, research reports and cumulative records to evaluate and follow up pupils' progress.
2. Outline assessment items and prepare performance tests in light of instructional objectives
3. Discover and support pupils' strengths, and diagnose and seek to overcome their weaknesses, with assistance of the pupils' cumulative records.

4. Analyses of tests and observations and filing them in a simple form for interpretation.
5. Use self-evaluation methods in order to obtain formative data, and then performance and authentic evaluation.
6. Contribute in evaluation of teaching/learning process and its factors.
7. Contribute in writing of school reports, and provide suggestions.

6. Domain Six: Subject knowledge Competencies

By the end of the programme, student teachers will be able to:

1. Understand and implement concepts in the subject specialisation, and master the subject's content and applications.
2. Mastering of content of school subjects' content being taught in the First Cycle of Basic Education, learning the integration between them.
3. Use a variety of learning resources to meet pupils' needs
4. Develop scientific and educational attitudes by research and continuous updating in the specialisation.
5. Understand and implement characteristics of curriculum construction and development including standard selection, analyses, classification, and sequence and consequence in curriculum development.
6. Employ life skills with the content.
7. Mastery of teaching strategies and competencies appropriate for each grade level of study.
8. Know in general the history and geography of Oman, the Gulf States, and the Arabic World in order to follow information and developments in the economical, cultural and political fields.
9. Implement local environmental features to support loyalty to the nation.
10. Know history of the Gulf States and their relationships with the Arabic World, know world peace principals and benefit from the human heritage
11. Make connections between pupils' life and their environments in order to support preserving resources
12. Follow up historical and contemporary events as well as national, social and religious occasions to support the local culture.
13. Determine natural and industrial resources and use them to produce instructional media.
14. Understand the strong link between resources consumed by the population as well as new technologies and scientific discoveries
15. Acquire ability to link the past and present to prepare pupils for future challenges.

The programme period is eight semesters (2 per year), each semester is 18 weeks, with 132 credits, distributed as the following:

Table 2.2 the programme components

	The component	Credits	Percent
1	Professional Component	36	27.27 %
2	Specialisation & Cultural Component	63	47.72 %
3	Practicum Component	33	25, 01 %
	Total	132	100 %

The study plan of the programme for the eight semesters including the courses, credits and, teaching and practical hours, are illustrated in Table 2.3

Table 2.3 The study plan of the Scientific Field (science & mathematics) Teacher Preparation Programme

Semester 1	Credits	Teaching hours		**Semester 5**	Credits	Teaching hours	
		Theoretical	Practical			Theoretical	Practical
General mathematics	3	2	2	General physics 1	3	2	2
General chemistry 1	3	2	2	Social foundation of education	3	2	2
Introduction to Botany	3	2	2	Educational evaluation	3	2	2
Arabic language	3	2	2	Physical education	2	1	2
Development psychology	3	2	2	English for specific purpose 2	1	-	4
English language 1	1	-	3	Project 3	3	-	6
Total	16	10	13	Practicum 3	3	-	20
Semester 2	3			Total	18	7	
General Algebra	3	2	2	**Semester 6**			2
Geometry	3	2	2	Elective course in mathematics (Physical mathematics or principals of statistics)	3	2	2
Introduction to Zoology	3	1	2	General physics 2	3	2	2
Introduction to Computer	3	2	2	Teaching & learning technology	3	2	2
Curriculum of first cycle of basic education (1-4)	3	2	2	School and classroom Management	3	2	2
Learning psychology	3	2	2	English for specific purpose 3	1	-	2
English language 2	1	-	3	Project 4	3	-	4
Total	18	11	15	Practicum 4	3	-	4
Semester 3	3			Total	18	8	20
Mathematical analysis	3	2	2	**Semester 7**			
General chemistry 2	3	2	2	Learning difficulties & special needs	3	2	2
Computer applications	3	2	2	Food & nutrition	2	1	2
General teaching methods	3	2	2	Child art	3	2	2
English language 3	1	-	3	Practicum 5	6	-	12
Project 1	3	-	4	Total	14	5	18
Practicum 1	2	-	4	**Semester 8**			
Total	18	8	19	Elective course in science (Geology or principals of energy)	3	2	2
Semester 4				Educational research	3	2	2
Human biology	2	1	2	Music education	2	1	2
Science teaching methods	3	2	2	Practicum 6	6	-	12
Mathematics Teaching methods	3	2	2	Total	14	5	18
Arts	2	1	2				
English for specific purpose 1	1	-	2				
Project 2	3	-	4				
Practicum 2	2	-	4				
Total	17	8	20				

Source: MOHE, 1999

The programme consists of three components as following:

1. Professional Component

This component represents the educational aspect of the programme. It includes courses such as: teaching methods, curriculum, educational foundations, and psychology.

2. Specialisation & cultural components

This component includes courses of the science and mathematics subjects and other cultural subjects, as following:

Table 2.4 The subjects specialisation & cultural components

Subjects	Chemistry	Physics	Biology	Computer	English		*Expressive Arts	Arabic	Mathematics	Electives	Total
					General	ESP					
Credits	6	6	9	6	3	3	6	6	15	3	63
No. of Courses	2	2	4	2	3	3	3	2	5	1	27

* *changed later to special teaching methods*

3. The Practicum Components

This component is divided in to two main parts: School-based practicum and integrated projects. The factors of the first part are:

a. The school visits: there are ten visits to schools during the third and fourth semester in order to introduce the student teacher to the schooling environments, its administrative system and to observe some lessons of expert teachers.

b. The serial practicum: School-based training, one day per a week starts from semester five to semester seven. The length of this programme differs from semester to another, i.e. 10 week in semester 5 but it is 5 weeks during semester 7.

c. Block practicum: continues school-based training which is range from 1 week in semester six, 4 weeks in semester 7 and 5 weeks in semester 8.

Table2.5 Summarises the distribution of the practicum teaching hours, (for more details of the regulations and assessment's checklists of the practicum programme see Appendices, 2 & 3).

Table 2.5 Distribution of the practicum teaching hours

The school practicum Factors	**Semester** 3	**4**	**5**	**6**	**7**	**8**	**Total**
The school visits	60	60	-	-	-	-	120

The serial practicum	-	-	60	60	60	30	210
Block practicum	-	-	30	30	120	150	330

The Second part is comprised of the integrated projects. There are 11 credits for this component distributed for 4 semesters, from semester 3 to 6, as illustrated in Table:2.3 In each semester the student teacher is asked to design a project relating to their subjects, like: instructional games, kits, films, ...etc. or evaluation and assessment tools. There are Three stages for the project:

1. Planning for the project
    a. Organisational regulation, such as: grouping students, assigning supervisors, preparing list of the projects, determining meeting day.
    b. Selecting the topic of the project
2. Implementation of the project
    a. Registering of the project: determining its problem, rational, importance, main aspects, needs and the roles for each student and prepare implementing plan
    b. Preparation of the report
    c. Presenting the project and discussion
3. Evaluation of the project

2.4.4 College of Education at Sultan Qaboos University (SQU)

As mentioned above the college of education at SQU is one of the main colleges which were established in the beginning with the other initial five colleges. The college of education is the University's largest college and has an extensive list of specialist subjects. It is geared mainly to train a new generation of teachers broadly qualified outside the narrow confines of academic thinking (MOI, 2003). Objectives of the college of education are (SQU,1999):

1. To prepare qualified teachers for work in general education schools in term of the current international teacher education approaches, in order to satisfy the needs of the educational growth in the Sultanate.
2. Develop the positive attitudes and using of new scientific styles of teaching and learning and reinforcement the Islamic and Arabic values with students.
3. To conduct educational and psychological researches with the aim of development of educational process and promoting scientific researches and self study which connect the specialist with his/ her field of study and relate him with his needs of the local community and Arabic and globally in general.

4. Accompanying the scientific and technical progresses, and positive interaction with current developments in educational, academic and cultural programmes of the colleges of education locally and internationally.
5. To collaborate with the Ministry of Education in development of educational system, either its objectives, content, activities or its teaching methods, instructional media, evaluation and assessment systems, editing of text books, organize inservice training programmes for all educators in all levels.
6. Exchange experiences and coordinate efforts in the educational and research aspects with other educational institutes, locally, Gulf, Arab or internationally.
7. Contribute to develop university teaching in the college and in the University by organizing of preparation of academic staff programmes and benefit from scientific studies and researches' results in development of university learning programmes.
8. Contribution in community services through its educational and cultural activities and provide technical consults in educational and psychological issues for educational and social establishments.
9. Contribution in the university cultural and thoughts movement and enrichment it with variety of events and activities.
10. Contribution in associated educational work through the conferences and symposiums in the Gulf, Arab, Islamic or internationally educational organizations.

2.4.4.1 Programmes of the SQU College of Education

The programme in the college education at Sultan Qaboos University, is an inter- faculty one. The Colleges of Sciences, Art and Social Studies and the language centre are in charge of teaching the students specialized courses in sciences, mathematics, languages, and social studies. The professional oriented training is carried out by departments (psychology, foundations of education & administration, and curriculum & instructional methods) of the college of education in coordination with the Ministry of Education & General Directorate of Education in Muscat region. Initial teacher education for arts, physical education and Islamic sciences rests with the departments at the college itself. At present the BEd. Program is under appraisal at the college of education (Issan, 2003).

A graduate of the BEd. programs, at the college of Education completes 78 Credit hours in specialized courses and 36-39 Credit hours of professional courses including teaching practice and 18 hours of general studies . Field placement in preparatory and secondary schools ensures that practical as well as theoretical teaching skills are maintained. A minimum of 132 Credit hours of study is required for graduation after four years for most programs except English and Sciences and Mathematics, which require proficiency in English language. Therefore, the majority of students in these specializations spend between 4-5 years to fulfill the graduation requirements (Issan, 203).

The college also starts offers a postgraduate programmes from the academic year 1992/93, these include master of education in different specialities such as: educational administration, curriculum and teaching methods and educational psychology. In addition to postgraduate diploma in Education, school administration and Educational supervision and consultant (AlRubay'ee, 2004)

The academic year in Sultan Qaboos University consists of two major semesters: the spring semester and the autumn semester. The length of each semester is 16 weeks. Attending courses in these two semesters is compulsory. The summer semester is of 8 weeks duration and it is optional. Courses taught during summer are intensive and the hours of teaching are double in number compared with hours taught in the other two semesters.

2.4.5 In-service teacher training

The Ministry of Education training policy can be summarized as follows (MOE, 1996):

1. Training the teacher in order to teach in the suitable level. That means to place the teacher in the proper place
2. Adjustment of situations in different levels according to special efficiency standards for each level.
3. Updating the teacher's professional standard to the limit that fulfils the objectives of each educational level.
4. Completion of training of teachers who have not completed their training in the past.
5. Qualifying teachers through educational training to be able to meet the needs of students in their different stages of development and also through receiving intensive theoretical and practical studies of each stage of development of the students in order to make the teachers able to create suitable atmosphere to the students to gain the learning experiences properly.
6. Updating the teacher's knowledge in their specializations to face modern challenges and to be acquainted with the latest innovations.
7. Training teachers on the preparation of field and procedural researches and on textbook writing.
8. Training teachers theoretically and practically in educational leadership.
9. Making teachers acquainted with the general objectives and policies in his field of specialization.
10. Training the teachers on using methods of scientific research and self-development in his field of specialization.

The government is currently implementing programmes to upgrade the qualifications of teachers and technical and administrative staff to BA level. In 2002, training programmes were held for employees, and in-service training centres have been set up in most of the Sultanate's educational regions. There has been a steady increase in the number of training programmes for teachers and supervisors in the Basic Education system. Some members of staff are enrolled on BA, MA and PhD degree courses, and school principals and inspectors are studying at Sultan Qaboos University for higher diplomas in school administration and inspection (MOI, 2003).

2.4.6 Measures Taken to Improve the Efficiency and Evaluation of Teachers in Oman

The Ministry of Education has paid attention to the efficiency and evaluation of the teacher. It has taken certain measures in this respect, some of these are:

- The Ministry recruits a training specialist in every educational region. This specialist coordinates with educational supervisors to follow up the teachers during their first two years of work. They give them necessary help and assistance in order to raise up their professional efficiency and to decide their training needs.
- The Ministry is implementing a new system of a senior teacher for each subject in schools. The senior teacher is supposed to teach less periods per week and is expected to help his colleagues in order to develop their performance skills.
- The Ministry has revised evaluation methods so as to be more objective and scientific. Three forms have been prepared and they are supposed to give an actual view of the professional performance of the teacher. These forms are:
  - Classroom observation form: This form is filled out by the headmaster whenever he visits a teacher inside a classroom. On the form, the headmaster states the positive aspects in the teacher's performance and the plan suggested to raise up the standard of performance.
  - Supervision visit form: This form is filled out by the supervisor and it covers both planning and performing of a lesson. The supervisor also states on the form the positive points and the suggested improvement plan.
  - Evaluation form: It is an annual report which is written by both the headmaster and the supervisor. It evaluates the teacher's performance (UNESCO, 1998, p.74).

2.4.7 Previous Studies of Evaluation Teacher Education Programmes in Oman

There are some studies on evaluation of teacher education in Oman. Although there is not much space here to deal in detail with these studies, it may be helpful to mention briefly some examples of researches in the field of competency-based teacher education in Oman. A review of these studies indicates that some, such as, AbdelRazek and AlShabiny (1986) are concerned with basic competencies of teaching and to what extent they are possessed by new teachers. This study focuses on the programmes of the intermediate colleges. There are some studies focused on the competencies for specific subjects, such as, Alghafri (1995) determined competencies for teaching Islamic studies subject; he developed a scale for measuring teachers' teaching levels in light of these competencies and AlGattami (2002) explored the Arabic subject competencies for secondary school teachers. A study done by AlQatabi (1995), surveyed teachers' opinions towards the three components of the previous intermediate cducation colleges. Meanwhile AlBarawani and Ibrahim (1997) evaluated the teacher preparation program in Sultan Qaboos University. Three observation checklists were developed to evaluate graduates by inspectors, headteachers, and pupils. An evaluative project done by AbdelBaqi et al (1999) in Nizwa College of Education, evaluated beginning teachers' performance (those who graduated from two colleges of education at Nizwa and AlRustaqe) comparing them with Sultan Qaboos University graduates. Their study concluded that there were no obvious variations between performance of teachers from the colleges of education which belong to the Ministry of Higher Education and the other graduates from SQU, but it shows a progressive performance from female teachers. In his study, AlTobi (2002) evaluated an initial science teachers programme. He examined its efficiency for preparing science teachers for basic education in cycle two. Nasr et al (2003, pp. 102-145) studied the effectiveness of the teaching practicum programme for the field teachers at Ibri college. Their findings suggested that the supervisors' opinions varied with regard to how far the programme's objectives had been reached. They also found a statistically significant difference exists between the student's average estimates of the effectiveness related to the educational supervisors but no significant differences were found between the students' estimates of the supervision effectiveness related to the type of teaching practice or field of specialisation.

2.5 Accreditation of Higher Education Programs

The accreditation board was established by royal decree no.74/2001 on 27th June, 2001. Although a government agency, it acts as an independent body. The agency is included in a broader organisation in the field of Higher Education under the Council of Higher Education. Executive support is provided by the Ministry of Higher Education.

There is a formal system of supervision and guidance by the Council of Higher Education, which is the senior policy body for Higher Education in the Sultanate Three permanent committees of the board make recommendations on accreditation of higher education institutions, accreditation of programmes of study and quality control. (INQAAHE, 2002).

2.5.1 Higher Education Council

The Higher Education Council was set up by royal decree no.65/98 in 1998 to draw up a general policy for higher education and scientific research in the Sultanate's higher educational institutions and to regulate student numbers and intake procedures. It is also responsible for evaluating the performance of existing institutions and approving proposals for new private universities.

2.6 Summary of Education and Teacher Education in Oman

This chapter presents the education system in Oman in order to place the research into the context by highlighting the main features of the country in which the evaluation is set together with an overview of the development of the educational system.

The chapter also reviewed the developments in the field of education throughout the last three decades. It is remarkable that there are considerable changes in the quantity from the increase in the number of students and schools. There are observable efforts towards a comprehensive revision of education by introducing the basic education system. This chapter focus on the development of the teacher education programmes in Oman and provides details on the programmes of the Colleges of Education which belongs to the Ministry of Higher Education particularly the Scientific Field preparation programme which is targeted by this study.

Chapter 3: Evaluation of Teacher Education Programmes

3.1 Introduction

The aim of this study is to evaluate the initial science teacher education programme of the Omani Colleges of Education. Therefore, there is need to review the literature in two areas: educational evaluation and science teacher education. This chapter looks at the literature on evaluation and culminates in focusing on appropriate evaluation approaches which will guide the study. A review of literature in science teacher education forms the topic of the following chapter.

3.2 The concept of evaluation

The field of educational evaluation is a burgeoning one and there is considerable confusion as to what it means and how it can be. Wolf (1990, p.8) mentioned two reasons for this confusion.

> *"First it stems partly from the fact that many of the techniques and procedures used in evaluating educational enterprises are rather technical, and educators are often not knowledgeable about such matters.[Second] a more basic reason for the confusion, however, is that different authors have different notions of what educational evaluation is or should be".*

Norris (1993, p.16) states that: "Until Ralph Tyler's work in the 1930s, evaluation was virtually synonymous with measurement and testing ... Many would regard Tyler as the founder of educational evaluation, indeed the invention of the term has been ascribed to him".

He argues that "Tyler commented that the term 'evaluation' was used rather than 'measurement', 'test' or 'examination' because evaluation implied 'a process by which the values of an enterprise are ascertained" (Norris, 1993, p. 17).

According to Norris (1993, p. 18):

> *Tyler's work shifted evaluation away from a focus on individual abilities and qualities towards a focus on curriculum design. He saw evaluation not as technology for discriminating between individuals, but rather as a means of appraising the degree to which curriculum intentions were realised in practice.*

Regarding the difference in what evaluation is about, there are two groups of definitions. One set of writers simply define evaluation as an act of providing useful information for further educational actions such as improving educational practices, materials, decision making and so on. Cronbach (1963), for example, defines evaluation as:

> *"The collection and use of information to make decisions about educational programmes"*

And later as:

> *"Systematic examination of events occurring in and consequent of a contemporary programme and examination conducted to assist in improving this programme and other programmes having the same general purpose" (in Hopkins, 1987, p.4).*

Worthen and Sanders (1987) point out that what is missing from this definition is the act of making a judgement about the value of the evaluation object. There are, however, other writers who assert the importance of making judgements based on the values of the evaluation audience (s). Stake represents this position:

> *"both description and judgement are essential-in fact, they are the two basic acts of evaluation. Any individual evaluator may attempt to refrain from judging or from collecting the judgements of others. Any individual evaluator may seek only to bring to light the worth of the programme. But their evaluations are incomplete. To be fully understood, the educational programme must be fully judged"* (Stake, 1967, p. 525).

However, there are also other definitions for evaluation:

Johnstone (2001, p. 2) defines evaluation as the means by which a course or a curriculum change can be monitored to see if, in fact, it is what it claims to be and if it achieves, in students, the intended outcomes.

Evaluation has been defined by the Joint Committee on Standards for Educational Evaluation. (2003) as the:

> *"Systematic investigation of the worth or merit of a student's performance in relation to a set of learner expectations or standards of performance".*

Scriven (1991) states that:

> *"it is the most powerful and versatile of the 'transdisciplines', tools disciplines such as logic, design, and statistics, that apply across broad ranges of the human investigative and creative effort"* (Scriven, 1991).

He added:

> *"the evaluation process normally involves some identification of relevant standards of merit, worth or value; some investigation of the performance of the evaluands on these standards; and some integration or synthesis of the results to achieve an overall evaluation ..."* (Scriven, 1991, p. 139)

Evaluation can be regarded as a formal or disciplined approach to examine the value of a programme based not only on its outcomes but also on its context, inputs, processes and procedures, and products (Worthen & Sanders, 1987).
It can be seen that most definitions agree that evaluation is a *systematic* endeavour and use the deliberately ambiguous term 'object', which could refer to a programme, policy, technology, person, need, activity, and so on. The other definitions emphasize acquiring and assessing information rather than assessing worth or merit because all evaluation work involves collecting and sifting through data, making judgements about the validity of the information and of inferences we derive from it, whether or not an assessment of worth or merit results (Trochim, 2002).

3.3 Programme evaluation

The concept of programme evaluation can include a wide variety of methods to evaluate different aspects of programmes. There are numerous books and other materials that provide in-depth analysis of evaluations, of their designs, of their research methods, and combinations of methods and techniques of analysis.
The programme evaluation is a process of carefully collecting information about the programme or some aspect of it in order to make decisions about it, thus programme evaluation can include a variety of different types of evaluation used for different purposes, such as for needs assessments, accreditation, cost/benefit analysis, effectiveness, efficiency, formative evaluation, summative evaluation, goal-based, process, outcomes, etc. The type of evaluation undertaken to evaluate the programme depends on what the evaluator wants to learn about the programme.

The most common usage of evaluation is the context of a coordinated set of projects or services of interventions clustered around a coherent set of goals. Programme evaluation can be defined as follows:

> *A process of making reasonable judgements about programme effort, effectiveness, efficiency and adequacy, based on systematic data collection and analysis, designed for use in programme management, external accountability, and future planning, focuses especially on accessibility, acceptability, awareness, availability, comprehensiveness, continuity, integration, and cost of services* (Attkisson & Broskowski, 1978: p. 24).

Joint Committee on Standards for Educational Evaluation (1981) stated:

> *"Programme evaluations are evaluations that assess educational activities which provide services on a continuing basis and often involve curricular offerings.*

Examples include evaluation of a school district's reading programme, a state's special education programme, and a university's continuing education programme".

Rossi, Lipsey & Freeman (2004) define Programme evaluation:

"is the use of social research methods to systematically investigate the effectiveness of social intervention programmes in ways that are adapted to their political and organisational environments and are designed to inform social action in ways that improve social conditions" (Rossi et al, 2004, p.28).

In other words they define programme evaluation is the use of social research procedures to systematically investigate the effectiveness of social intervention programmes.

It draws on the techniques and concepts of social science disciplines and is intended to be useful for improving programmes and informing social action aimed at ameliorating social problems (Rossi et al, 2004, p.28).

The purpose of evaluation research is to measure the effects of a programme against the goals it sets out to accomplish as a means of contributing to subsequent decision making about the programme and improving future programming (Weiss, 1972, p.4).

Evaluation research is the systematic application of social research procedures for assessing the conceptualization, design, implementation, and utility of social intervention programmes (Rossi & Freeman, 1989, p.18).

Programme evaluation is the systematic collection of information about the activities, characteristics, and outcomes of programme for use by specific people to reduce uncertainties, improve effectiveness, and make decisions with regard to what those programmes are doing and effecting (Patton, 1986, p14).

Johnstone (2001) states: The factors or dimensions we use for the evaluation can span a wide range including:

- Improved student learning (measured in new or conventional ways)
- Students' attitudes to a course in terms of ease or difficulty, pleasantness or unpleasantness work load, teacher performance, methods of presentation and so on.
- Ease of organisation
- Staff commitment
- Economy of resources and time
- Type of examination and ongoing assessment
- Employers' reactions
- Standards acceptable nationally or internationally

3.4 Evaluation of Teacher Education Programmes

This part is devoted to portray some issues in evaluating teacher education programme. Specifically, the issues related to teacher evaluation, selecting appropriate model for evaluating teacher education programme, nature of data, evaluation steps and so forth will be discussed.

According to Schalock, (1988) there are a number of unresolved issues in relation to the evaluation of teacher education programmes amid myriad evaluation reports. He infers that success in teaching does not mean to apply only the basic skills but to demonstrate a capability of transforming those skills into classroom context. Historically, teacher education programmes have been designed with a little attention to the programmes at the schools. From Schalock's (1988) perspective, teacher education programmes should be evaluated in terms of the following indicators of teachers' performance evidence:

- work samples, for example, the teaching of lessons or a unit of a study with the attention being given to the pupil learning;
- the ability to engage students in learning activities;
- the ability to perform the functions required of the teachers;
- skills related to teaching;
- knowledge related to teaching;
- experience with children and youth; and
- intelligence and academic ability.

Generally, evaluation is a problematic enterprise because of the lack of the appropriate model to the context for which the researcher is seeking to use (Raths, 1988). In order to carry out an effective formative evaluation, it is essential to tape all possible information related to the process of programme establishing a collaborative enterprise between the teacher trainers, student teacher and the evaluator(s). Furthermore, preparing an initial "mock report" can help identify the way of generating information and developing the process of evaluation (Raths, 1988). According to Popham (cited in Raths, 1988), the mock report can help in identifying the incompleteness of the data and help purify the report. Raths (1988) and Ayers (1988) insist that a readymade and single evaluation model may not be appropriate to address the local context of teacher education.

Kunkel (1988) puts his perspective on the quality evaluation of professional education by following three notions: focusing on holistic evaluation, dealing with hard and soft data and being continually future oriented. Specifically, to evaluate a teacher education programme, different epistemologies are required to deal with the different types of data.

Medley (1988) contends that student teachers' assessment documents can also serve as the sources of information for the programme evaluation.

According to Redfield (1988), student achievement may provide necessary but not sufficient information regarding the effectiveness of teacher education programme. Because of the lack of authenticity of objective tests, achievement tests can infer little about the teacher performance. Furthermore, Redfield (1988) contends that programme evaluation may have multiple audiences hence it requires multiple sources of data. Some of the tools as suggested by Fraser (1985) such as expert responses to structured questionnaires, experts unstructured comments and students' general [and specific] comments can also help develop a strong process of formative programme evaluation. Regardless the name and type of the project these methods are useful in devising the tool for evaluating teacher education programme.

According to Fetterman et al. (1999), the evaluation of the teacher education programme often follows universal steps such as assessing the needs of schools; a plan of action; data collection including interviews, observations and surveys; data analysis; and reporting findings and recommendations.

According to Nedkova, (1998), the survey of literature on programme evaluation of teacher education programme gives a glimpse that the evaluation of teacher education programme requires a synthesis approach to design the evaluation model according to the local context. Specifically, in order to tape the information it is essential to develop an integral perspective of the evaluation process.

The evaluation of teacher education programmes has a lot to offer to a wide variety of audiences. Evaluation information can be used by regulatory bodies for recognising good and weak programmes. Educational institutions see such evaluation as instrumental in bringing about informed change in initial teacher training which in turn will contribute to raising the quality of teaching in schools. Teacher educators are eager to learn to what extent their expectations for the professional development of student teachers are being, and can be, met. They also expect evaluation studies to shed light on issues of interest to those involved in the field of initial teacher training. Students themselves are curious about the quality of the education they receive. It is imperative, therefore, that defensible and effective evaluation systems be developed that take into consideration the claims and concerns of the various stakeholding audiences (Nedkova, 1998).

There is increase in the attention focused on evaluation in teacher education. Studies in general evaluation have been initiated and conducted both (by people) external to the programme and insiders, for purposes of either development or accountability. These evaluations have generated information which varies in its scope and use to the interested audiences and the profession in general. Nedkova (1998) argues that a comprehensive survey of existing practices, however, is difficult to make. Very few reports have found their way into the professional literature despite the evidence that many institutions conduct evaluations of their teacher education courses.

Data from existing surveys suggest that evaluation of pre-service teacher education programmes is taking place during the preparation process (concurrent evaluation) and/or during the first months or years of teaching (follow-up evaluation). It is not always clear, though, whether these evaluation studies are conducted in a systematic way.
It would be useful here to attempt to classify existing evaluation practices according to the main type of evaluative data they are based on. So it might be distinguished between:

1. studies based on student teachers' evaluations of pre-service teacher education programmes;
2. studies based on evaluation of change in student teachers' /graduates' behaviour and cognition;
3. studies based on evaluation of multiple aspects of the programme.

3.4.1 Student teachers' evaluation of pre-service teacher education programmes

The most often reported techniques for collecting evaluative information about programmes of initial teacher training is through questionnaires and / or interviews. Usually the aim of these two procedures is to identify respondents' views of the programme as well as to solicit suggestions for change. In some cases graduates' responses are combined with supervisors' / headteachers' reactions and opinions.

Student teachers'/graduates' evaluations of pre-service teacher education programmes have been criticised for a number of reasons. Such studies usually:

- fail to produce data which can be of interest to the field of teacher education and have only site-specific implications (Galuzzo & Craig, 1990);
- are usually based on the 'controversial one-shot questionnaire' and the validity of results is often threatened by low-return rates and item ambiguity (Tefler, 1985; Adams, 1987);

- produce data which often fail to contribute to changes in programmes (Raths, 1987);
- are usually retrospective in character and produce data which are clearly flavoured by the kind or amount of teaching experience graduates have had by the time the study is taking place;
- rely exclusively on students' and graduates' perceptions which may vary from cohort to cohort.

3.4.2 Evaluations of change in behaviour and cognition

The most frequently reported method for gathering evaluative data on student teachers' behaviour, which is then used in programme evaluation is through classroom observation. Information may be gathered during the programme, at exit and during the first few months or years of teaching.

A number of studies and models have been reported in the literature which make use of evaluative data on observable behaviours of student teachers and graduates. There are also, though on a smaller scale, studies which attempt to relate programme evaluation to the evaluation of teacher cognitions (Nedkova, 1998).

3.4.2.1 Change in behaviour

Some of the models reported in the literature which fall within this genre are Sandfeur's follow-up model (Adams, 1987), Ayers' follow-up model (Ayers, 1988) and Borich's Process-Product Model (Adams, 1987).

Evaluation studies within this category have been criticised for:

- attempting to relate the evaluation of pre-service programmes solely to the teaching performance of graduates. As is well-known the performance of new teachers is affected by many more factors than merely their pre-service training (Calderhead, 1990; Weir & Roberts, 1994). Besides, the intentions behind an action are often as important as the action itself. Seemingly the same teaching acts can have different meanings and awareness of these meanings can help us make better judgements about the impact of the programme and a teacher's individual development;
- using pupil outcomes as a proxy measure of programme effectiveness. Even if the variance in the proxy measure is statistically significant it would be difficult to attribute it to programme effectiveness (Nedkova, 1998).

3.4.2.2 Change in cognition

It is now an indisputable fact that becoming a teacher involves complex changes not only in behaviour but also in cognition, attitudes and knowledge in a context of conflicting personal and social values. Developments in research into the process of learning to teach can help evaluators capture the nature of these changes. Calderhead (1990, cited in Nedkova1998) discusses briefly how some of the frameworks and methods used in the exploration of the teacher cognition can be applied to the evaluation of the effects of different types of teacher education experience. Among the methods mentioned are concept mapping, the structured tree approach, think aloud protocols and stimulated recall, scripted writing and critical incident techniques.

Kagan (1990), too, reports on methods of eliciting and evaluating teacher cognition which have been used in cases of programme and teacher evaluation. She classifies them into five groups:

a) direct and non-inferential ways of assessing teacher belief;
b) methods that rely on contextual analysis of teachers' descriptive language;
c) taxonomies for assessing self-reflection and metacognition;
d) multimethod evaluations of pedagogical content knowledge and beliefs
e) concept mapping..

Nedkova, (1998), recognises, though, that research on teacher cognition has largely failed to make a difference on programme and teacher evaluation. This apparent non-use can be attributed to a number of factors:

- "the literature on teacher cognition is beset with ambiguities and paradoxes;
- generally, teachers' cognitions cannot be assessed directly;
- methods used to elicit and evaluate thought are time-consuming;
- the number of subjects who are the focus of such studies is usually relatively small;
- generalisations often seem risky because of the context / teacher-specific nature of such studies;
- making comparative judgements of teachers' cognitions is problematic".

There is not enough evidence that the cognitive structures of teaching are related to teachers' classroom behaviours or to desirable pupil outcomes. (Morinne-Dershimer, 1993; Morinne-Dershimer et al., 1992; Ciriello et al., 1992, cited in, Nedkova, 1998)

3.4.3 Comprehensive evaluations of teacher education programmes

Some studies have tended to focus on a limited number of aspects of the teacher education programme under consideration – perceptions of relevance and coverage of content, classroom behaviour, developing cognitions.

Nedkova (1998), states that, there have been, however, attempts to capture the complex dynamic nature of a teacher education process and provide information on multiple aspects of the programme in their relation to the whole. One can mention here Aksamit's naturalistic study (Aksamit et al., 1990, cited in, Nedkova, 1998); the naturalistic, inquiry-oriented approach of Applegate & Shaklee, 1992; the sustained evaluation effort of Putnam & Grant, 1992; Weir & Roberts' exploratory approach (Weir & Roberts, 1992, cited in, Nedkova, 1998).

Some of the problems with this type of evaluation are

- the time-consuming nature of the methods and the evaluation process as a whole;
- the success of such an evaluation endeavour is dependent on stakeholder commitment.

3.4.4 Some problematic issues in the evaluation of teacher education programmes

Accordig to Nedkova, (1998), apart from the genre-specific problems, there are also some general problems which the field of teacher evaluation as a whole is faced with:

- "lack of ideological clarity;
- scarcity of professionally illuminating studies;
- insufficient involvement of interested audiences in the design and implementation of the evaluation and the interpretation of results;
- poor utilisation of evaluation results;
- lack of investment in resources, both human and financial, for the development and implementation of effective evaluation systems".

Nedkova, (1998), states that, it could be argued that an approach based on a responsive mode of focusing and constructivist methodology can help overcome some of these problems and provide a basis for future developments. Such an approach will also accommodate some existing trends in initial teacher preparation such as:

- differing practices;
- plurality of values;
- importance of individual and situated knowledge;
- reflection; and

- a call for teacher empowerment and emancipation.

3.4.5 Responsive focusing

Historically evaluations have been focused in many ways. In the case of teacher education, Stake's responsive focusing is of particular interest. It is based on the idea that the scope and nature of the questions to be asked by an evaluation study must be determined on the basis of stakeholder input. Such an approach will enable evaluators to set up a study that takes full account of the characteristics of their evaluand-programmes of initial teacher preparation. It will also

- answer the call for empowerment in the field by providing for full participative involvement of diverse groups (teacher educators, student teachers, etc.) at all stages of the evaluation process;
- recognise the existing plurality of values;
- recognise and respect the importance of context (Nedkova, 1998).

3.4.6 The Constructivist Perspective

In Nedkova's (1998) view, constructivist evaluation is an evaluation that is holistically sensitive to the context of the study setting, to the views or "constructions" of the key parties, and to the interactional effects of the evaluation process itself.

The constructivist approach has been accepted in evaluation in recognition of the understanding that findings from evaluation studies do not represent reality 'as it really is' or 'as it really works' but only how things and actions are constructed by human beings in accordance with a specific set of values. It is particularly relevant to the evaluation of pre-service teacher education which, as noted earlier, is characterised by differing practices and plurality of values among others (Nedkova, 1998).

3.5 The Evaluation Framework of the Study

In order to establish an evaluation framework to conduct the research plan and to achieve its purposes, some evaluation approaches were examined. The theoretical literature is critically reviewed the development of these approaches with their characteristics and applications. This review concluded that there is no one specific approach which can be considered the most excellent, the selection of the evaluation approach depends on some factors such as the aim of the study, the nature of the programme, its context, and the targeted population.

This study did not followed a specific evaluation model. The evaluation framework of the study was designed based on a collection of approaches and methods that could be implemented in many models (such as CIPP Stufflebeam model, Stake's Responsive model and the Lincolin and Guba Fourth Generation "Responsive-Constructivist" model). The researcher developed a framework evaluation to Oman's Colleges of Education teacher education programme (see Figure 1.1, p. 10).

Although the methods that have been used in this evaluation study are influenced by some existing evaluation models, the researcher was concerned about the type of evaluation that was needed to focus on what is essential to evaluate and how that information can be accurately collected and understood. Thus, the programme evaluation was planned and carried out to collect data in order to make major educational programme decisions.

There are numbers of evaluation models that might be selected for a study such as this study. For example, Stufflebeam (2001) analysed twenty-two of these models, or approaches, as he preferred to describe them. Although the construction of the framework for this evaluation study is influenced by different models of evaluation, the following three models were given the most consideration:

CIPP Stufflebeam Model: requires the evaluation of context, input, process and product in judging a programme's value. The definition of evaluation which reflects the CIPP approach is as follows:

> *"Programme evaluation is the systematic collection of information about the activities, characteristics, and outcome of programmes for use by specific people to reduce uncertainties, improve effectiveness, and make decisions with regard to what those programmes are doing and affecting" (Patton, 1986, p.14).*

Critics of CIPP have said that it holds an idealised notion of what the process should be rather than its actuality and is too top-down or managerial in approach, depending on an ideal of rational management rather than recognising its messy reality. In practice, the informative relationship between evaluation and decision-making has proved difficult to achieve, and perhaps does not take into account sufficiently the politics of decision-making within and between organisations.

Robert Stake's Responsive Evaluation Model (1975): focuses on describing activities and processes rather than on test scores and outcomes. It seeks to "tell the story of the programme." A formal evaluation plan consisting of ten steps should be implemented, as seen in the following points:

a. Negotiate a framework for evaluation with the sponsors.
b. Elicit topics, issues and/or questions of concern from the sponsors.
c. Formulate questions for guiding the evaluation.
d. Identify the scope and activities of the curriculum, the needs of clients and personnel.
e. Observe, interview, prepare logs and case studies.
f. Pare down information, identify the major issues or questions.
g. Present initial findings in a tentative report.
h. Analyze reactions and investigate predominate concerns more fully.
i. Look for conflicting evidence that would invalidate findings and corroborating evidence that would support findings.
j. Report the results.

Fourth Generation Evaluation the Guba and Lincoln Model: is based on a post-modern, constructivist paradigm typified by open systems with an emphasis on empowerment. Guba and Lincoln (1989) substitute relativity for certainty and empowerment for control. For them, evaluation consists of comparing alternative constructions, then choosing the construction which best approximates reality, at least until something better comes along. Guba and Lincoln (1989) present a recursive twelve -step process that describes their responsive constructive (fourth generation) evaluation methodology. Verifiable authenticity is a fundamental concept within their evaluation frame. They believe that the hermeneutic process employed in fourth generation evaluation acts as its own quality control. To further assist in the assessment of authenticity, they have created a series of authenticity criteria.

There are many differences between these models in their philosophy and approaches. The evaluation framework guiding the methodology of this study took into account the Omani culture and the context of the programme. The teacher education programme in the Sultanate of Oman, the object and focus of this study, can be characterised by the following features:

- it was originally established to fulfil the deficiency of Omani female teachers in the early Basic Education level in schools in order to employ Omani females required for this stage of the school system.
- one of the main aims of this programme was to upgrade the qualification level for teaching in Basic Education by requiring teachers to obtain a bachelor's degree (instead of the previous two year diploma of education after secondary schooling).

- the candidates (student teachers) of this programme were studying in either single-gender colleges (Ibri and AlRustaq), or in co-education colleges (Sur and Salalah), but in all cases, they were studying in groups of only female students.
- the candidates (student teachers) of this programme were guaranteed employment in the government (public) Basic Education schools directly after their graduation, except for the last group of graduates, when schools were unable to accommodate all Omani female teacher graduates. Thus, for the first time, there were competitions for employment depending upon individual GPA scores, tests of subject competence and interviews' results.
- although this programme exists in four colleges located in four different regions of the country (none of them is the capital region), these colleges have the same administrative and academic system, hence the influence of individual colleges upon the programme is not considered in this study. Future studies might consider whether there is a difference from college to college based upon such factors as the make-up of the college teaching staff, regional cultural conditions (beliefs and values), and other such factors.

As mentioned earlier in the thesis, this study set out to investigate student teachers' perceptions and practicing teachers' perceptions of the importance of identified competencies of the programme, and their self-rating of competence of these listed competencies. The study also aimed to explore the participants' motivation towards teaching and scientific field specialisation preparation in order to relate this aspect to importance of the competencies. To prepare teachers for schools of the Basic Education reform, the programme should tend to shift the teaching and learning environment towards one that is more constructivist in nature. The study also examined the student teachers' and practicing teachers' constructivist teaching practices. Meanwhile, there are also other circumstances that controlled the conditions of this study, one of these conditions being the researcher is a male, and this programme includes only females. The entire study group are females student teachers and female practicing teachers who teach in female staffed schools, hence, the researcher should consider the customs and traditions of a perhaps conservative Islamic society. Moreover, he should be aware of any biases of any kind, as such biases could influence the results of the study. Thus, according to the purposes of the study, as well as the features of the teacher preparation programme, and in addition to the limits and circumstances of the study, this programme study was conducted using a variety of methods and approaches, without restricting it to only a single previously established model. The study used techniques from different educational evaluation models. Accordingly, various methods were involved to facilitate the study throughout its three stages: the initial survey including the questionnaire and semi-structured interview; the observation of lessons followed by interviews; and conservational interviews.

3.6 Conclusion

In this chapter a critical review has been made of existing practices and trends of development in educational evaluation. The analyses has been organised around the educational evaluation models. In view of the aims of this study attention has been initially focused on evaluation of teacher education programmes.

The argument for this content has been that evaluators of initial teacher education programmes should understand and appreciate the developments in educational evaluations. Their decision making should be based on an informed choice between paradigms and models and good understanding of underlying philosophies and implications.

The evaluation framework of the study was designed to conduct the research plan and to achieve its purposes. Some evaluation models were examined and they were critically reviewed. The review concluded that there is no one specific model which can be considered (the most) outstanding in terms of excellence, the selection of the evaluation model depends on factors such as the aim of the study, the nature of the programme, its context, and the targeted population. Thus the study constructed of three stages with findings from conducted evaluation instruments of each stage leading consequently to the next stage.

Chapter 4: Science Teacher Education

4.1 Introduction

As noted in chapter one, this study focuses on the pre-service teacher education programme and its delivery at colleges of education in Oman. In particular, it examines the adequacy of this teacher preparation in meeting the demands of work in the reformed basic education schools. In chapter two, the Omani educational system, including teacher education, was introduced, and in chapter three the literature in educational evaluation was reviewed. This chapter sets out to review the literature and research generally in teacher education and particularly in science teacher education. The teacher education approaches, particularly, competency-based approach are presented, that such approach is formulated the programmes of the Omani colleges. The science teaching situation will discussed specifically in primary stage in order to further understand the issues of primary science teacher education. Much of the literature reviewed is from outside Oman, as there is paucity of research into primary science teacher education in Oman.

4.2 The Quality of Teachers and Teaching

Research has shown that there is a clear relationship between the quality of teaching and the quality of teachers. Subject matter knowledge and academic ability, teachers' professional knowledge and experience make an important difference in student learning. Many other characteristics also matter for good teaching; enthusiasm, flexibility, perseverance, concern for children, and many specific teaching practices make a difference for learning (Good & Brophy, 1995). The evidence suggests, in fact, that the strongest guarantee of teacher effectiveness is a combination of all these elements. (For reviews, see Darling-Hammond, 2000a; Wilson, Floden, & Ferrini-Mundy, 2001). A comprehensive review by Linda Darling-Hammond (2000) investigated the relationships between student achievement and the various State practices in the United States. She triangulated data from surveys of State policies and case studies of State policy making with distributions of State achievement scores and resources and was able to take into account some student characteristics. Darling-Hammond (2000) concluded that:

> *"the findings of this study, in conjunction with a number of other studies in recent years, suggest that States interested in improving student achievement may be well-advised to attend, at least in part, to the preparation and qualifications of the teachers they hire and retain in the profession. It stands to reason that student learning should be enhanced by the efforts of teachers who are more knowledgeable in their field and are skilful at teaching it to others. Substantial evidence from prior reform efforts indicates that changes in course-taking, curriculum content, testing,*

> *or textbooks make little difference if teachers do not know how to diagnose their students' learning needs..." (p. 19–20).*

Darling-Hammond (2000) also concluded that:

> *"Like other studies, this research indicates that the effects of well-prepared teachers on student achievement can be stronger than the influences of student background factors, such as poverty, language background, and minority status. And while smaller classes appear to contribute to student learning...the gains are most likely to be realised...when they are accompanied by the hiring of well-qualified teachers". (p. 19–20)*

According to Darling-Hammond (2000, p 19-20), "thus findings of the studies reinforce what many people accept as self evident". These studies demonstrated a significant relationship between "student achievement and the quality of teachers".

Darling-Hammond (1999, cited in Wijayawardana and Bhattacharya, 2004, p9), points out that many teachers do not feel that their teacher education programmes adequately prepare them for certain teaching tasks. She argues that practice is important to improvement in the quality of teacher education and that it is necessary to redefine teacher education programmes according to the changing role of the teacher.

Darling-Hammond (1997) reports the characteristics of "seven extraordinary teacher education programmes" (p. 30). These features were:

> *"a common, clear vision of good teaching that is apparent in all coursework and clinical experiences; a curriculum grounded in substantial knowledge of child and adolescent development, learning theory, cognition, motivation, and subject matter pedagogy, taught in the context of practice; extended clinical experiences (at least 30 weeks) which are carefully chosen to support the ideas and practices presented in simultaneous, closely woven coursework; well-defined standards of practice and performance that are used to guide and evaluate coursework and clinical work; strong relationships, common knowledge, and shared beliefs among school-and university-based faculty; extensive use of case study methods, teacher research, performance assessments, and portfolio evaluation to ensure that learning is applied to real problems of practice". (p. 30)*

The same characteristics present a challenge to the teacher education programmes in Oman at the present time. As Donn (2002, p.1) points out that,

> *"There have been a number of studies that focus on changes in school curricula and the necessary resonance with activities in Colleges of Education. In these studies it has been found that for change (transformation, even) and the implementation of school curricula to be successful there needs to be change at many levels within the Colleges: at system level; at institutional level; and at programme level. The first refers to the relationship between the Ministries [Education &Higher Education] in charge of teacher education and schooling; the*

second to the internal organisation of the Colleges; the third to the daily practice of the staff and students within the College".

The main purpose of teacher education is that of preparing effective teachers. Therefore, teachers must be able to apply the theoretical knowledge they gain through the theory component of their course into the practical situations they face as beginning teachers. However, as Al-Tobi (2002a, p. 25) mentioned that there is, a gap exists between theory and practice in Omani science teacher education. He also states that:

> *"Thus, in order to prepare effective teachers who are able to cope with the reformed science curriculum, the Omani Colleges programmes should be related to, and accordant with, the demands of the new reform. The philosophy and aims of the reform, the structure of the new system, the design of the Basic Education Curriculum, and the characteristics of this reform should be important components in the college's courses. Aspects of new science education of the reform should be essential and integrated components of these programmes"* (AlTobi, 2002 b, p.425).

These reforms are (Ministry of Education, 1995, 1999a, 1999b): the objectives of science education, theoretical and practical materials of the teaching methods such as experiential learning approaches, hands-on activities and experiments, problem-solving method, out-of-school trips and visits, collaborative learning, self-learning, ICT, games and so on. Assessment strategies such as observation, tests, performance assessment, self-assessment, reports, measurement of higher cognitive skills, interviews, and so on should be also included and integrated in training programmes. Donn (2002, p.1-2) also concluded that:

> *"Yet it would appear that for the Basic Education Curriculum to be implemented successfully a number of supportive approaches have to be adopted by staff within the colleges. One such approach may well be to engage critically with material, "formal knowledge" of the formal curriculum, and to encourage students also to critically reflect on what they learn. It seems that some conjunction between reflective practitioner and critical engagement with education as a social and political process may be the most efficacious approach for the implementation of the Basic Education Curriculum. The gap between "what exists" and 'what is needed' may form one of the barriers preventing successful implementation of the Curriculum. Both staff and students must begin to not fear the "unknown".*

Traditionally within teacher education, theory and practice have been regarded as separate entities. A new trend has appeared in most countries aimed at finding ways to redefine teacher education. Bridges (1999, cited in Wijayawardana and Bhattacharya, 2004, p. 9) suggests that teacher education should be focused on "professional behaviour including subject matter knowledge, pedagogical knowledge, and understanding of the broader social and cultural context, communication skills and team working skills". However, integration of all these aspects into a teacher education programmes is very difficult to implement in prevailing situations.

Thiessen (2000, p. 515-537) describes a three phase pedagogical framework as essential for teacher education:

- Studying about skills,
- Observing and trying out skills under simulated and actual classroom conditions,
- Comparing and elaborating skills in classrooms.

Thiessen (2000, p.515-537) argues for the necessity of connecting all three aspects in order to prepare effective teachers. He emphasizes that the third phase should be focused on encouraging "self-evaluation, transforming new knowledge into the natural environment, providing varied practice inducing reflection and providing full support for use of the skills in natural settings". Many teacher educators agree with the idea of connection of three-phase pedagogical framework because it is an essential need to develop theory practice links to reach the goals of teacher education (Grossman, Wilson, Shulman, 1989, Gess-Newsome,1999 & Grossman,1990).

Normally student teachers gain general pedagogical knowledge, subject specific knowledge, and subject matter knowledge from their teacher education courses. Though these theories are embedded in the course it is successful only when it is implemented in actual practice. Lind (2001, cited in Wijayawardana and Bhattacharya, 2004) described the role of practice in teacher education and explained practice as "Actual" knowledge. Further he emphasizes the necessity of links between theory and practice of teacher education.

The main purpose of the Pre-Service Basic Teacher Education Programme provided by the Colleges of Education in Oman is to prepare female teachers for teaching the Basic Education Curriculum (Grades 1-4). The programme consists of both theoretical and practical components. From the theoretical component of subject studies student teachers gain subject specific knowledge and pedagogical knowledge related to the subject matter. Even though innovations have been introduced under the New Basic Education Reforms, it has not, so far, fully embraced the changing role of the teacher. There is an urgent need to ensure that teachers have adequate opportunity to practice the theories and skills learnt within the teacher education programme in ways that will prepare them better for their future work as effective Basic Education teachers.

Lingam (2004, p. 54-55), reports that ideal teacher education curriculum should produce teacher who:

- has a holistic view- who is concerned for the overall physical, mental, cultural and spiritual development of the child.
- Recognize the cultural underpinning in the various disciplines and uses these to advantage.
- views education as preparation for life, not merely for employment, so that she/he develop each child's potential to become a worthy member of society.
- has sufficient flexibility not only to draw on the strengths and inspirations of his/her cultural roots, but who can cope with and educate children of societal and technological changes. (The ability to balance western and traditional cultural values and methodologies would be valuable).
- has the necessary problem-solving and research skills to be a reflective teacher.
- sees himself/herself as a positive role model for the children and for the community in which he/she serves.
- has appropriate learning to learn skills to cope with changes in the environment.
- has a thorough and up-to-date knowledge of the school curriculum.
- is able to successfully function in multiple class or very large, single class context.
- will seek ongoing professional development.
- will be able to evaluate both learning and teaching.
- assists in evaluation and revision of the teacher education curriculum.

All these aspects of the ideal teacher education curriculum are relevant, and could be used by the teacher education programmes at the Omani Colleges of Education, to determine whether they are reflected in their curricula. According to Baba (1999, cited in Lingam, 2004, p. 55), for example, problem-solving and research skills are becoming increasingly important in the development of reflective teachers.

Fullan (2002) suggests that any attempt to produce deep improvements in the education of teachers fails because society does not treat teacher education as a serious endeavour. He suggest that attempts fail in two senses: "it gives teachers failing grades for not producing better results; at the same time, it does not help improve the conditions that make success possible".

Schon(1983) suggests that the relationship between practice, competence and professional knowledge needs to be turned upside down:

> *"We should start not by asking how to make better use of research based knowledge but by asking what we can learn from a careful examination of artistry, that is, the*

competence by which practitioners actually handle indeterminate zones of practice however that competence may relate to technical rationality".

He proposes a 'reflective practicum' aimed at helping students acquire the kinds of 'artistry' essential to competence in the indeterminate zones of practice. Similarly, Darling Hammond (1999) identified seven successful programmes in North America which had a number of common features:

- a common clear vision of teaching that is apparent in all coursework and clinical experiences;
- well-defined standards of practice;
- a curriculum grounded in substantial knowledge of child and adolescent development, learning theory, cognition, motivation, and subject matter pedagogy, taught in the context of practice;
- extended clinical experiences which are chosen to support the ideas and practices presented in simultaneous, closely interwoven coursework;
- strong relationships, common knowledge, and shared beliefs among school and university based methods and extensive use of case study methods, teacher research and performance assessments to ensure that learning is applied to real problems

4.3 Approaches to Teacher Education

Four philosophical traditions of practice have dominated teacher education in the twentieth century (Zeichner and Liston, 1990, p.4):

1. an academic tradition that emphasizes teachers' knowledge of subject matter and their ability to transform that subject matter to promote student understanding; The Academic Tradition focuses on the importance of disciplinary knowledge for pre-service teachers, gained through a classical liberal arts education combined with an apprenticeship in schools. Here, the "mastery of subject matter is the most important goal in the education of teachers" (Zeichner & Liston, 1990, p. 4). As such, teachers should be educated in their subject matter at university, but should learn *how* to teach in the company of more experienced teachers once they get to the schools (a disciplinary and apprenticeship model). An academic approach to pre-service teacher education would attract academically talented students, who would otherwise be turned away by the 'doubtful intellectual value' of many education courses (Ballantyne, 2003)

2. a social efficiency tradition that emphasizes teachers' abilities to apply thoughtfully a "knowledge base" about teaching that has been generated through research on teaching; For exponents of the Social Efficiency Tradition, the scientific study of teaching provides the best basis for building a teacher education curriculum. This tradition has tended to examine the nature of teacher work in order to provide a basis for studying teaching, and was largely influential in developing such reforms as Competency/Performance Based

Teacher Education (C/PBTE) in the US in the 1960s and 1970s. Here competencies (skills and knowledge) are specified in advance along with the criteria to measure mastery of these competencies. Once the competencies have been demonstrated, the teacher is viewed as 'effective'. The trend towards C/PBTE became widely popular in teacher education literature both in the US and worldwide, although it attracted criticism regarding its behaviouristic underpinnings (Zeichner & Liston, 1990).

Many contemporary teacher education reforms reflect the social efficiency perspective, under the label 'research-based teacher education'. This perspective is evident in reforms that incorporate new versions of the (behaviouristic) C/PBTE combined with broader (cognitive) reforms. Here Zeichner and Liston (1990, p. 9) conclude that:

> *"teaching demands an approach to teacher preparation that reflects the complex and uncertain nature of the work. The crucial task from this point of view is to foster teachers' capabilities to exercise judgement about the use of teaching skills"*

3. a developmentalist tradition that stresses teachers' abilities to base their instruction on their direct knowledge of their students, their mental readiness for particular activities; The *Developmentalist Tradition* asserts that the "natural development of the learner provides the basics for determining what should be taught both to pupils in the public schools and to their teachers" (Zeichner & Liston, 1990, p. 9). Three metaphors can be used to describe its manifestation in the twentieth century. As proposed by Perrone (cited in Zeichner & Liston, 1990), they are (a) the teacher as naturalist, (b) the teacher as artist, and (c) the teacher as researcher Although this tradition is quite varied, Crook (1974, cited in Zeichner & Liston, 1990, p. 11) found that developmentalist teacher education programmes have the following in common:

> *"A commitment to involvement in one's own learning, an active approach to learning in terms of direct experience with materials, an encouragement of children's communication and prospective teachers' communication with children using skills of observing, reading, speaking, and writing; early field experiences, offerings in the expressive arts as well as in academic areas, and an understanding of children's development which reflects the writings of Jean Piaget"*.

This approach is also associated with 'humanistic teacher education' and the 'personalised teacher education programme', grounded in Fullar's studies of teacher concerns. Fullar's (cited in Zeichner & Liston, 1990) assumption is that if a teacher education programme is aligned with student teachers' developmental needs, it will guide them towards maturity as a teacher

4. a social reconstructionist tradition that emphasizes teachers' abilities to analyze social contexts in terms of their contribution to greater equality, justice, and elevation of the human condition in schooling and society. In the social reconstructionist tradition, "schooling and teacher education are crucial elements in a movement towards a more just society" (Zeichner & Liston, 1990, p. 12). This tradition encourages student teachers to take a critical look at the prevailing social and political orders that are associated with education, and aims to break the poverty cycle by preparing teachers to teach in low-income areas (Ballantyne, 2003).

Teacher education/training programmes are in the process of gaining a new momentum over the last two decades. Specifically, the change in educational philosophy has contributed to the change in school education, which has put emphasis on the teacher education programmes to liberate from their traditional notion of teacher preparation, selection and accreditation to (Ayers, 1988, cited in Luitel, 2004, p.3). With this notion, I seek to discuss a range of approaches and their implications to the recent teacher-training/preparation programmes.

4.3.1. Academic Approach

The academic approach to teacher education aligned to the "humanist approach elicits that the teaching and learning should be focused on the long-established values and knowledge" (Grow-Maienza, 1996). In the context of teacher education, this approach focuses the leaner as a "developing scholar". The knowledge base of this approach of teacher education programme is in the core discipline of the liberal arts and sciences. The "constructionists focus that the approach is essential to develop the knowledge base, which help develop a background of the pedagogical content knowledge". The academic approach deals with the knowledge base of the teachers focusing on the traditional subject matter in which there is a little place for "practice-to-theory approach" (Luitel, 2004, p.3).

4.3.2. Personalistic Approach

The personalistic or developmental approach grew out with the "child study movement" initiated by Stanley Hall during the nineteenth century (Grow-Maienza, 1996). The main focus of this approach is to prepare teachers according to the developmental level of the child in which the educational objectives and teaching contents should be designed according to the developmental stage of the child. According to Grow-Maienza (1996), "this approach has also been influenced by the humanist notion of Rousseau, Froebel and others elucidating the view that the subjects matter should be selected according to the need of the child".

In this approach, the teacher education programme aims at developing such teachers who are viewed as "empathetic towards and collaborative with the learners" (Grow-Maienza, 1996). In the context of twentieth century's teacher education programme, this notion focuses on the personal style of teaching that may differ from one place to another (Luitel, 2004, p.3).

4.3.3. Social Reconstructionist or Reconceptualist Approach

According to the "reconstructionists", the school settings are ever "changing, unstable, dynamic and problematic entities". Specifically, the "reconstructionist model of teacher education takes into account the Zeichner's view of melioration movement in teacher education" (Grow-Maienza, 1996). Particularly, the "melioration" movement is guided by a mix philosophy of "child study movement", "the notion of Dewey's experience" and "educational philosophy of neo-Marxism of early twentieth century" (Luitel, 2004, p4). According to Luitel (2004, p5), the knowledge base of the teacher education programme includes the social and political context of the existence of schooling. The children are viewed as raw materials for the industrial society but as organic unity that possess social and intelligent actions.

4.3.4. Synthesis Approach

Luitel, (2004) states that: a single teacher education/training approach cannot provide a practical teacher education model in preparing teachers for the challenging and hi-tech future school contexts. Instead of aligning with only one approach, eclectic model has been put in the perspective designing the teacher-training programme (Luitel, 2004, p.5).

The synthesis approach to teacher education regards a theory-practice partnership in which the practice is the basis of theory and vice versa. Some form of the "reconceptualist approach" deals with this notion of teacher education. In the recent years, the notion of "pedagogical content knowledge" has also been embedded within the synthesis perspective as an important means of teacher development in which the teacher are prepared with a view to transform the traditional content areas in the classroom context (Grow-Maienza, 1996).

The synthesis approach infers that the ecological balance in teacher education is essentially important. This implies that each teacher education programme should be guided by the notion of child development (developmentalist), structure of the subject matter (academic), prevailing social context (reconstructionist), scientific understanding of teaching and learning process (competency based) (Luitel, 2004, p. 5).

On the basis of the literature related to teacher education, it is apparent that the teacher education programme in the Omani Colleges of Education has adopted some aspects from above-mentioned approaches. Looking from the perspective of academic approach, the present teachers preparation has classified the training areas in terms of the traditional subject areas, which would be useful in forming a knowledge base for teachers. Similarly, the focus on a child's developmental stage has also been supposed to take into account under the training area of educational philosophy and psychology. The curriculum of teacher preparation has been intended to contextualise according to the context of the Omani Basic Education schools incorporating the notion of social context. Furthermore, the theory-practice collaboration has also been intended focusing school-based structure of the preparation programme.

4.3.5. Competency Approach

The competency or outcome-based approach in teacher education has been driven by the social efficiency movement promoting the industrial concept of teacher education. Explicitly speaking, this notion deals with the mechanistic view of teacher education programme guided by the pre-determined outcomes. Focusing on the discrete competencies from the traditional knowledge base, this notion regards the outcomes as the basis for the professional development of the teachers, supervision of teaching activities and evaluation of the curriculum process. "Recently, the older notion of competency based teacher education has converted into the process-oriented model in which the teachers are prepared for the high culminating demonstrations, which are known as exit outcomes" (Luitel, 2004, p.5).

The word "competency" is synonymous with the relative terms of quality, efficiency, adequate, suitable or sufficient. Its dictionary meanings are ability, power, skill or talent to do something. According to Hawsam & Houston (1972, p.3), standards dictionaries provide no definition for competency-based. The word competency has been chosen to indicate an emphasis on the "ability to do", in contrast to the more traditional emphasis on the "ability to demonstrate knowledge". The term competency-based has become a special designation for an educational approach, for a movement. The term cannot be defined in a simple phrase; its meaning emerges from the complex of characteristics of this educational mode. Further clarification may arise through efforts to determine what it is not.

Hyland (1995, p. 222) states "competence implies to the satisfaction of basic minimum standards". Teaching competency is a set of abilities, knowledge and belief which a teacher possesses and also uses for an effective teaching and learning process. In other words, competency is the possession of sufficient skills and understanding to do a certain kind of work satisfactorily.

Teaching competency refers to cognitive knowledge of the teachers, which involves effects on student learning. Page et al. (1979, p. 78) use the term competency-based teaching which they describe as "the movement in teacher education which aims to train students in specific classroom skills. It includes the use of teaching methods such as interaction process analysis, microteaching. simulation ...etc."

According to Hager, (1993, p.5), a series of arguments about competency standards by various writers, particularly philosophers of education, has been considered. It has been found that a way of developing competency standards that conform to the general requirements and principles proposed by these arguments is possible. This way of developing competency standards appears to meet all of the theoretical objections that have been raised against competency standards.

Hawsam & Houston (1972, p. 3), stat that, the concept of competency-based instruction has emerged from the emphases on "goal-orientation and individualisation". Learning goals or objectives can be made explicit by and for the learner. The individual then can pursue learning activities and can develop performance skills or competencies in the process. When this approach is coupled with an appropriate management and delivery system, the accountability principle can be applied to all aspects of the instructional programme.

They emphases that, there is need for a definition of the central term: competency-based instruction. "competence" ordinarily is defined as "adequacy for a task" or as "possession of required knowledge, skills, and abilities". In this broad sense, it is clear that any mode of instruction aims for competence for development of well-qualified individuals who possess the required knowledge and skills. Competency-based instruction differs from other modes of instruction, not in its goals, but rather in the assumptions that underlie it and in the approaches that characterise it. (Hawsam & Houston, 1972, p.3)

Hawsam & Houston (1972, p.4-5) argue that there are three characteristics are essential to the concept of competency-based instruction. First, precise learning objectives - defined in behavioural and assessable terms- must be known to learner and teacher alike.

Competency-based instruction begins with identification of the specific competencies that are the objectives of the learner. These objectives are stated in behavioural terms. Means are specified for determining whether the objectives have been met. Both learner and teacher are fully aware of the expectations and of the criteria for completing the learning effort. From a variety of alternative learning activities, those most appropriate to the specific objectives are selected and pursued. In contrast to much traditional instruction, the activities are viewed as means to a specific end. Neither teacher nor learner is permitted to view the activities as the objective of learning experience.

The second essential characteristic is accountability. The learner knows that he/she is expected to demonstrate the specified competencies to the required level and in the agreed-upon manner. He/she accepts responsibility and accepts to be held accountable for meeting the established criteria. (Hawsam & Houston, 1972, p. 5)

A third characteristic, that of personalisation is of somewhat different order from the previous two. Competency-based programmes characteristically are individualised; they are self-paced and thus time is variable. They are personalised as well; each student has some choice in the selection of objectives and of learning activities. Individualisation does not imply that all instruction is oriented toward independent activities. Group and even mass instructional processes are viable alternatives; in some cases, they may be the most effective and efficient options (Hawsam & Houston, 1972, p.6).

Hawsam & Houston (1972, p. 6-7) determine one consequence of competency-based education is that the focus for evaluation or accountability is shifted to the individual's attainment of a set of objectives:

> *"This approach is criterion-referenced, in contrast to the norm-referenced approach. The learner's achievement is compared with the stated objectives and the specified criteria; the achievements of other students are not relevant to the evaluation".*

Another important consequence is that the emphasis shifts from the teacher and the teaching process to the learner and the learning process. Competency-based programmes, emphasising objectives and personalisation, focus on the needs and accomplishments of the students. (Hawsam & Houston, 1972, p. 6-7)

Technology is particularly important for competency-based instruction. In fact, the need for instructional objectives was recognised largely through the attempts to programme new kinds of instructional materials. Nonetheless, the use of modern technology does not automatically lead to competency-based instruction; technology can be directed to either mass or individualised instructional systems. (Hawsam & Houston, 1972, p.5)

These three examples of negative definition emphasise the point that competency-based instruction is a simple, straightforward concept with the following characteristics: (1) specification of learner objectives in behavioural terms; (2) specification of the means for determining whether performance meets the indicated criterion levels; (3) provision for one or more modes of instruction pertinent to the objectives, through which the learning activities may take place; (4) public sharing of the objectives, criteria, means of assessment, and alternative activities; (5) assessment of the learning experience in terms of competency criteria; (6) placement on the learner of the accountability fir meeting the criteria. Other concepts and procedures -such as modularised packing, the systems approach, educational technology, and guidance and management support- are employed as means in implementing the competency-based commitment. For the most part, these contributory concepts are related to individualisation. (Hawsam & Houston, 1972, p.6)

Sullivan (1995, p.1) states that, in a competency-based training system, the unit of progression is mastery of specific knowledge and skills and is learner- or participant - centred. Two key terms used in competency-based training are:

1. *Skill: a task or group of tasks performed to a specific level of competency or proficiency, which often use motor functions and typically require the manipulation of instruments and equipment. Some skills, however, such as counselling, are knowledge- and attitude based.*
2. *Competency: a skill performed to a specific standard under specific conditions.*

Norton (1987, cited in Sullivan, 1995, p.2) describes five essential elements of a competency-based training system:

- *Competencies to be achieved are carefully identified, verified and made public in advance.*
- *Criteria to be used in assessing achievement and the conditions under which achievement will be assessed are explicitly stated and made public in advance.*
- *The instructional programme provides for the individual development and evaluation of each of the competencies specified.*
- *Assessment of competency takes the participant's knowledge and attitudes into account but requires actual performance of the competency as the primary source of evidence.*
- *Participants progress through the instructional programme at their own rate by demonstrating the attainment of the specified competencies.*

4.3.5.1 Characteristics of Competency-Based Training (CBT) Programmes

How does one identify a competency-based training programme? In addition to a set of competencies, what other characteristics are associated with CBT? According to Foyster

(1990), Delker (1990) and Norton (1987) (cited in Sullivan, 1995, p.4) there are a number of characteristics of competency-based programmes:

- *Competencies are carefully selected.*
- *Supporting theory is integrated with skill practice. Essential knowledge is learned to support the performance of skills.*
- *Detailed training materials are keyed to the competencies to be achieved and are designed to support the acquisition of knowledge and skills.*
- *Methods of instruction involve mastery learning, the premise that all participants can master the required knowledge or skill, provided sufficient time and appropriate training methods are used.*
- *Participants' knowledge and skills are assessed as they enter the programme and those with satisfactory knowledge and skills may bypass training or competencies already attained.*
- *Learning should be self-paced.*
- *Flexible training approaches including large group methods, small group activities and individual study are essential components.*
- *A variety of support materials including print, audiovisual and simulations (models) keyed to the skills being mastered are used.*
- *Satisfactory completion of training is based on achievement of all specified competencies.*

4.3.5.2 Advantages of Competency-Based Training

One of the primary advantages of competency-based training is that the focus is on the success of each participant. Watson (1990) states that the competency-based approach "appears especially useful in training situations where trainees have to attain a small number of specific and job-related competencies" (page 18). Benefits of competency-based training identified by Norton (1987, cited in Sullivan, 1995, p.4) include:

- *Participants will achieve competencies required in the performance of their jobs.*
- *Participants build confidence as they succeed in mastering specific competencies.*
- *Participants receive a transcript or list of the competencies they have achieved.*
- *Training time is used more efficiently and effectively as the trainer is a facilitator of learning as opposed to a provider of information.*
- *More training time is devoted to working with participants individually or in small groups as opposed to presenting lectures.*
- *More training time is devoted to evaluating each*
- *participant's ability to perform essential job skills.*

4.3.5.3 Limitations of Competency-Based Training

While there are a number of advantages of competency-based training, there also are some potential limitations. Prior to implementing competency-based training, it is important to consider these limitations:

- *Unless initial training and follow up assistance is provided for the trainers, there is a tendency to "teach as we were taught" and competency-based training trainers quickly slip back into the role of the traditional teacher*

- *A competency-based training course is only as effective as the process used to identify the competencies. When little or no attention is given to identification of the essential job skills, then the resulting training course is likely to be ineffective.*
- *A course may be classified as competency-based, but unless specific competency-based training materials and training approaches (e.g., learning guides, checklists and coaching) are designed to be used as part of a competency-based training approach, it is unlikely that the resulting course will be truly competency-based.* (Sullivan, 1995, p.5)

4.3.5.4 Competency-based Approach for the Omani Teacher Education

Oman, like other countries of the world, realise the importance of the teacher to society and , as a result, have conducted many conferences and research projects in order to find logical solutions to the problems which presently prevent teacher's qualifying and professionalizing. This age is witness to great advances of science and technology in all aspects of life, including the foundations of teaching. Oman as other Arab countries is greatly influenced by this present movement of innovation and change.

The teaching competency movement began to claim attention in Arabic countries early in the 1980s. since then, many studies have been carried out concerning the competencies required for teachers. These can be seen to fall into two groups. On the one hand, studies investigating general competencies, which are considered necessary for every teacher, regardless of the subject matter that he/she teaches; and , on the other hand, investigation of specific competencies related to the subject matter taught (Ahmed, 1990, cited in AlGattami, 2002, p. 21-22).

As mentioned in Chapter 2; section 2. 4.3.3.1, the competency-based teacher education model is adopted theoretically in designing the programmes of the Omani Colleges of Education, which are supervised by MOHE. This model is concerned with developing the following competencies, (MOHE, 1996, p.18):

- Specialization competencies.
- Professional competencies.
- Cultural competencies.
- Ongoing professional development competencies.
- Society and environment development competencies.

The initial secondary and preparatory schools teacher preparation programmes were based on the previous competencies meanwhile the programmes of preparation teachers for First Cycle of Basic Education schools which are targeted by this study were based on the following competencies:

- General competencies
- Planning Competencies

- Teaching Competencies
- Classroom Management competencies
- Evaluation competencies
- Mastery of Subject Knowledge Content competencies

These competencies are translated into objectives and then courses have been designed.

4.3.6. School-based Approaches

The literature about the teacher education programme has delineated that the notion of school-based teacher education and training that has been taking place in many countries focusing the need of the schools and teachers. The simple notion of school-based approaches is to centralise the training activities according to the need of the particular schools. However, the model of school-based teacher education differs from country to county according to the educational structure (Luitel, 2004, p.4).

There is a range of the examples of school-based teacher education programmes including the UK's mentoring approach of school-based teacher training programme (Evans & Abbott, 1997), the school-based teacher education in many school districts of the United States (Dill & Stafford, 1995).

According to Darling-Hammond (1998, p. 6-11), countries like Germany, Belgium, and Luxembourg have long required two to three years of graduate-level study for prospective teachers on top of an undergraduate degree in the subject(s) to be taught. Education courses include the study of child development and learning, pedagogy, and teaching methods, plus an intensively supervised internship in a school affiliated with the university. In 1989 both France and Japan undertook major teacher education reforms to extend both university- and school-based training. In France, all candidates now complete a graduate program in newly created university institutes for the preparation of teachers that are connected to nearby schools. In Japan and Chinese Taipei, new teachers complete a year-long supervised internship with a reduced teaching load that allows for mentoring and additional study. By Japanese law, first-year teachers receive at least 20 days of in-service training and 60 days of professional development. Master teachers are released from their classrooms to advise and counsel them. In both Japan and China, new teachers watch other teachers at length, discuss problems of practice, present and critique demonstration lessons, and, with groups of colleagues, imagine and act out how students might respond to certain presentations of material. In their study of mathematics teaching in Japan, Taiwan, and the United States, Stigler and Stevenson (1991, p. 46, cited in Darling-Hammond, 1998, p. 6-11) note:

> *"[One of the] reasons Asian class lessons are so well crafted is that there is a very systematic effort to pass on the accumulated wisdom of teaching practice to each new generation of teachers and to keep perfecting that practice by providing teachers the opportunities to continually learn from each other".*

From the literature, two major characteristics of such teacher education programmes can be identified: One, the teacher education programmes are intended to the pre-service teachers in collaboration with the in-service ones in which the novice teachers can learn by working with the experienced and two, most of the school-based teacher-training programmes are organised for in-service teachers in which they are coached in theoretical aspects during the weekends or semester break and are insisted to apply such theoretical aspect in their teaching. The basic principle for the both teachers training models is to embed the school-based activities focusing the notion of teaching as a professional enterprise.

In the context of social change and challenges to teacher education, student teachers' teaching (the practicum programme) as a major component of most teacher preparation programmes become crucial (Jones & Vesilind, 1996, cited in Wickramasinghe, 2004, p.4) Literature written on student teaching highlights its importance in developing teacher abilities. According to Darling-Hammond (1994 cited in Wickramasinghe, 2004, p.4):

> *"it can help create a pathway from theory to practice and help student teachers understand the many professional roles related to teaching, schooling and the student learning process they will need to undertake. Moreover, it also helps construct knowledge useful for practice and ongoing theory building. It also assists student teachers to learn how to look at 'the teaching world' from multiple perspectives and use this knowledge to reach learners with divers backgrounds".*

Despite the importance of the practicum and its substantial benefits. Jones and Vesilind (1994, cited in Wickramasinghe, 2004, p.4) suggest that it is a concern for student teachers and can be a time of crisis for student teacher action. According to Jones and Vesilind (1996, p. 92, cited in Wickramasinghe, 2004, p.4) little is known about how and what students learn during their student teaching experience. In technical terms, "little is known about the interaction of specific student teaching experience and student teachers' construction of pedagogical knowledge". This is one of challenges taken up in this study with a particular focus on the Omani context.

In the Omani colleges of education school-based training or the practicum programme has been given great emphasis. The student teaching (practicum programme) is a central component of teacher preparation. The practicum consists of two components: the integrated projects and the school-based practicum. To implement the programme components, modules have been developed focusing on the objectives, content, the operations of implementation, activities, learning resources and assessment methods. The school-based practicum consists of serial and block practicum. In the school-based practicum, student teachers are required as school's teachers to teach whole classes in First Cycle Basic Education schools, Grades 1-4 (pupils: 6 to 10 years old) (AlHarthi, 2004, p 34 - 45). This programme was illustrated in section 2. 4.4.3.1

4.4 Pedagogical Content Knowledge (PCK)

The concept of PCK conceived by Shulman (1986) embraces the idea that successful teachers have a special understanding of content knowledge and pedagogy, which they draw on in teaching that content:

> *"[PCK includes] the most useful forms of representation of [topics], the most powerful analogies, illustrations, examples, explanations, and demonstrations - in a word, the ways of representing and formulating the subject that make it comprehensible to others" (Shulman,*1986, *p. 9)*

Also "encapsulated" in the idea of PCK is the notion that successful teachers have a special knowledge about learners which informs their teaching of particular content, Shulman (1986, p. 9)

Pedagogical content knowledge also includes an understanding of what makes the learning of specific topics easy or difficult: the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning of those most frequently taught topics and lessons.

While Shulman's notion of PCK may seem to resolve the question of what it is that successful teachers know in order to teach in ways that achieve student understanding, the concept itself and its relationship to other fields of teacher knowledge is debated in the literature (e.g., Cochran, King, & De Ruiter, 1991; Ebert, 1993; Grossman, 1990; Lederman & Gess-Newsome, 1992, cited in Mulhall, P., Berry, A., & Loughran, J., 2003). Shulman (1987, p.8) categorise the Knowledge Base for Teaching as:

- *Content Knowledge.*
- *General Pedagogical Knowledge, with special reference to those broad principles and strategies of classroom management and organisation that appear to transcend subject matter.*

- *Curriculum Knowledge, with particular grasp of the materials and progammes that serve as 'tools of the trade' for teachers.*
- *Pedagogical Content Knowledge, that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding.*
- *Knowledge of Learners and their characteristics.*
- *Knowledge of Educational Contexts, ranging from the workings of the group or classroom, the governance and financing of school districts, to the character of communities and cultures.*
- *Knowledge of Educational Ends, Purposes and Values, and their philosophical and historical grounds.*

Lee Shulman (1987) developed the construct of "pedagogical content knowledge" (PCK) in response to some of the problems of teaching and teacher education. This important addition to thinking about teaching is recognized in the content section of the National Science Teacher Association (NSTA) Standards. Ironically it is only mentioned to explain that the content standard would be looking at the content specific aspect of this construct. There is a connection between content knowledge and pedagogical knowledge in science teaching, which is implicit in many of the statements of the NSTA Standards. Careful reading reveals connections in the two domains that cannot be neglected. For example the pedagogy standard suggests that teachers know about "organization of classroom experiences" (National Science Teachers Association, 1998). However to design such "organizations" requires a deep understanding of content. This is what Shulman (1987) is talking about when stating, "the key to distinguishing the knowledge base of teaching lies at the intersection of content and pedagogy" (NSTA, 1998, p. 15, cited in Duggan-Haas, et al, 2000, p. 20)

Duggan-Haas, et al (2000, p. 22) argue that, teachers of science need to be prepared to help students uncover the embedded texts of scientific ideas. PCK provides a useful lens for teachers to begin to help students see the assumptions of science, e.g. teacher can help students see the value of evidence in making a scientific claim. However, this requires more than knowing content and how to teach. It requires an understanding of how to teach the content, namely PCK. As Cochran (1997, cited in Duggan-Haas, et al, 2000, p. 21) states:

> *"pedagogical content knowledge is a type of knowledge that is unique to teachers, and is based on the manner in which teachers relate their pedagogical knowledge (what they know about teaching) to their subject matter knowledge (what they know about what they teach). It is the integration or the synthesis of teachers' pedagogical knowledge and their subject matter knowledge that comprises pedagogical content knowledge".*

Pedagogical content knowledge is a form of knowledge that makes science teachers teachers rather than scientists (Gudmundsdottir, 1987, cited in Duggan-Haas, et al, 2000, p. 20). Teachers differ from scientists, not necessarily in the quality or quantity of their subject matter knowledge, but in how that knowledge is organized and used. In other words, an experienced science teacher's knowledge of science is organized from a teaching perspective and is used as a basis for helping students to understand specific concepts. A scientist's knowledge, on the other hand, is organized from a research perspective and is used as a basis for developing new knowledge in the field. This idea has been documented in Biology by Hauslein, Good, & Cummins (1992, cited in Duggan-Haas, et al, 2000, p. 20), in a comparison of the organization of subject matter knowledge among groups of experienced science teachers, experienced research scientists, novice science teachers, subject area science majors, and pre-service science teachers. Hauslein et al (cited in Cochran, 1997, p. 3) found that science majors and pre-service teachers both showed similar, loosely organized subject matter knowledge; and that the subject matter knowledge of the novice and experienced teachers and the research scientists was much deeper and more complex. According to Cochran (1997, p. 3) however, the teachers showed a more fixed structure, hypothesized to result from curriculum constraints.

Cochran, DeRuiter, & King (1993, cited in Cochran, 1997, p. 3) revised Shulman's original model to be more consistent with a constructivist perspective on teaching and learning. They described a model of pedagogical content knowledge that results from an integration of four major components, two of which are subject matter knowledge and pedagogical knowledge. The other two other components of teacher knowledge also differentiate teachers from subject matter experts. One component is teachers' knowledge of students' abilities and learning strategies, ages and developmental levels, attitudes, motivations, and prior knowledge of the concepts to be taught. Students' prior knowledge has been especially visible in the last decade due to literally hundreds of studies on student misconceptions in science and mathematics. The other component of teacher knowledge that contributes to pedagogical content knowledge is teachers' understanding of the social, political, cultural and physical environments in which students are asked to learn. These four components of teachers' knowledge all contribute to the integrated understanding that we call pedagogical content knowledge; and the arrows indicate that pedagogical content knowledge continues to grow with teaching experience Cochran, DeRuiter, & King (1993, p. 5-15, cited in Cochran, 1997, p. 3).

4.4.1 Science Teaching

Over the past twenty years the preparation of primary science teachers has been of great concern (Bybee, 1993; Willis, 1995; Crowther & Cannon, 1998; Goodrum, Hackling & Rennie, 2001, cited in Hudson & Skamb, 2002). Yager & Penick (1990, p. 670, cited in Roth & Lavoie, 2001, p.1) state that:

> *"While national science education organizations continue to refine positions about teacher education, there is no mechanism for translating these positions and statements into science education courses that can improve the preparation and quality of preservice science teachers at both the elementary and secondary levels".*

According to Schnur & Golby (1995, cited in Roth & Lavoie, 2001, p.1), it is therefore not surprising that there are voices that describe teacher preparation as unsuccessful and as unresponsive to reform efforts.

Roth & Lavoie (2001, p.1) state that we need to find models for science teacher preparation that suitably assist prospective teachers to deal with the different experiences at the university and in schools. History provides evidence that past university-school relations are not good models for future.

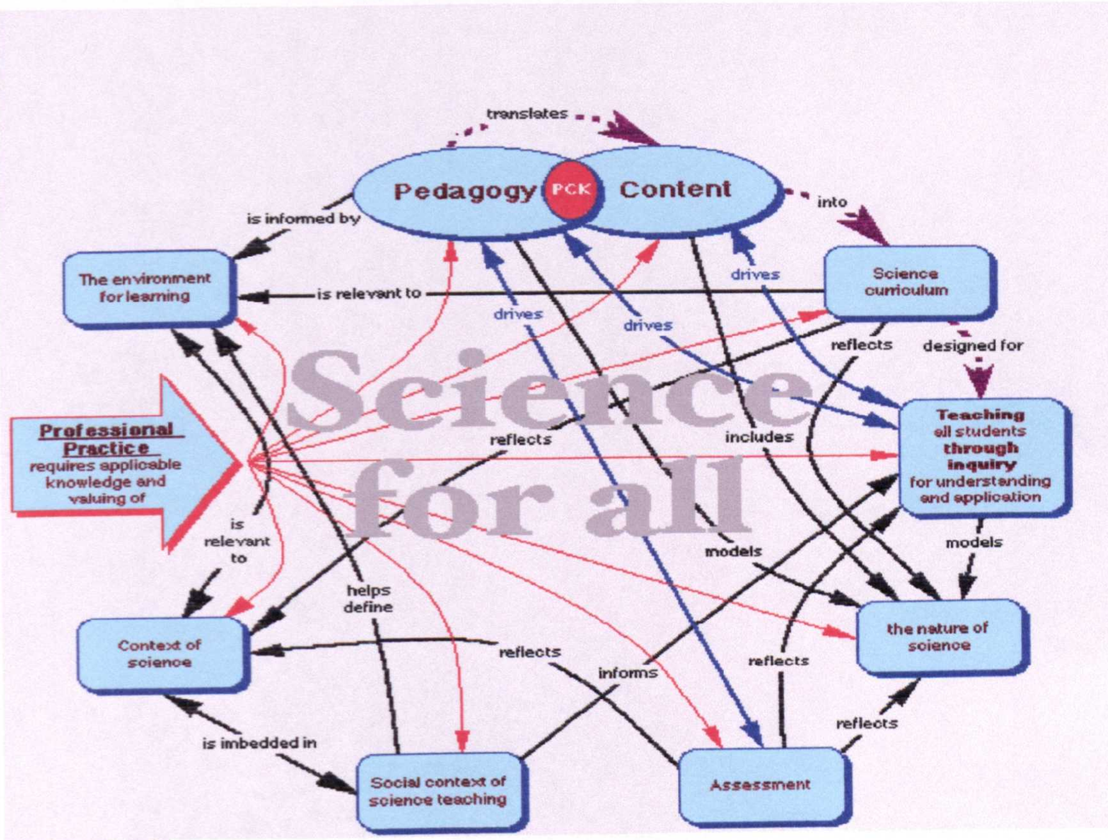
In the United States, "science for all" has become a key goal of contemporary reform in science education (Gallagher, 2000, p. 509), as science for all aims at increasing scientific literacy, which has implications for economic gain and for empowering citizens (Jenkins, 1990, p. 48). At the forefront of ensuring a scientific literate public are up-to-date and capable science teachers., In response to the need for pedagogy content knowledge (PCK) Duggan-Haas, Enfield & Ashmann (2002, p.2), from Michigan State University, propose a model (see Figure 4.1), in which content and pedagogy are joined, forming a leading edge in a less linear model of standards. They point out that

> *" ... a model is proposed here, which joins content and pedagogy into an essential tenet of the document. This is an argument for a more connected and contextualized thinking about the preparation of teachers. In order to make this clear, it will be helpful to look at each of these areas as described in the NSTA Standards. Through this examination we will ask, "Should we consider pedagogical content knowledge PCK when generating a framework of standards?" We think that a non-linear, PCK inclusive model better reflects the challenges and consequences involved in science teaching".*

They argued that:

> *"The drafted, linear model builds on the existing bifurcation of content and pedagogy within the university structure. However, it does not recognize the complexities of science teaching and obscures them from prospective teachers of science. Teachers and scientists are different in many ways".* (p.3)

Figure 4.1 Pedagogy Content Knowledge PCK "Science For All" Model



Adapted from Duggan-Haas, et al (2000)

According to Hudson and Skamp (2001), "despite indications that primary science is taught, and is more investigative and student centred than in previous decades, effective science teaching practice is still not a regular occurrence in many primary classrooms around the world (e.g., Bybee, 1993; Australian Science, Technology and Engineering Council, 1997; Hill, Hurthworth & Rowe, 1998; Lunn & Solomon, 2000)". Educators (e.g. Willis, 1995; Goodrum, et al., 2001) are continually looking for new approaches and agents of change so that the teaching of science may have a chance at permeating the education system. To achieve the "science for all" goal requires a focus on science needs that must commence at the elementary level (e.g., Ratcliffe, 1998). It is believed "the decisive component in reforming science education is the classroom teacher" which requires classroom teachers to "move beyond the status quo in science teaching" (Bybee, 1993, p. 144). However, even with reform measures teachers' practices have not changed significantly (Tobin, Tippins & Hook, 1994). Pre-service teachers on the other hand are very interested in practical primary science opportunities and theories of learning (Meadows, 1994, p. 10), and it is the in-school context of pre-service teacher education that is essential for developing teaching practices, which has been argued for primary science in particular (Anderson & Mitchener, 1995; Mulholland, 1999; Skamp, 2001a,b cited in Hudson and Skamp, 2001).

In its attempts to reform the education system, the Omani ministry of education involves strengthening the teaching and learning of science and mathematics at basic level. To achieve this aim the ministry trying to:

1. Design of an appropriate, context-based curriculum.
2. Emphasis on ability to adopt and ability to learn.
3. The 'what' and ' how' of learning: content and process
4. Learner-centred rather than teacher-centred teaching/learning approaches, with an optimal balance between the two approaches.
5. Emphasis on the student assuming responsibility for learning.
6. Emphasis on problem-based learning.
7. Emphasis on experiential learning.
8. A holistic integrated approach to knowledge versus compartmentalized subjects.
9. Systematic changes and evolutionary development and implementation (Ministry of Education & UNICEF 1999)

According to Loughran (2000) throughout the 1980's there was an ever growing research literature that explored the way in which school students developed an understanding (or misunderstanding) of science. Gunstone and White (1980; 1981), Tasker (1981), Osborne and Freyburg (1985), Champagne et al, (1985), Treagust (1986) and Gunstone (1990) and many others, highlighted the importance of knowing about, and responding to, students' conceptions of science in school science teaching and learning. Fortunately, much of this development in understanding about how students interpreted their science learning influenced science teacher education but sadly, to a lesser extent, science teaching in schools (Loughran, 2000).

4.4.1.1 Scientific Concepts

The National Centre for Improving Science Education (1991) recommends that elementary schools design curricula that introduce nine scientific concepts. The nine concepts are:

1. **Organization:** Scientists have made the study of science manageable by organizing and classifying natural phenomena. For example, natural objects can be assembled in hierarchies (atoms, molecules, mineral grains, rocks, strata, hills, mountains, and planets). Or objects can be arranged according to their complexity (single-celled amoeba, sponges, and so on to mammals). Primary grade children can be introduced to this concept by sorting objects like leaves, shells, or rocks

according to their characteristics. Intermediate grade children can classify vegetables or fruits according to properties they observe in them, and then compare their own classification schemes to those used by scientists.

2. **Cause and effect:** Nature behaves in predictable ways. Searching for explanations is the major activity of science; effects cannot occur without causes. Primary children can learn about cause and effect by observing the effect that light, water, and warmth have on seeds and plants. Intermediate grade children can discover that good lubrication and streamlining the body of a pinewood derby car can make it run faster.
3. **Systems:** A system is a whole that is composed of parts arranged in an orderly manner according to some scheme or plan. In science, systems involve matter, energy, and information that move through defined pathways. The amount of matter, energy, and information, and the rate at which they are transferred through the pathways, varies over time. Children begin to understand systems by tracking changes among the individual parts.
   Primary children can learn about systems by studying the notion of balance, for example, by observing the movements and interactions in an aquarium. Older children might gain an understanding of systems by studying the plumbing or heating systems in their homes.
4. **Scale refers to quantity, both relative and absolute:** Thermometers, rulers, and weighing devices help children see that objects and energy vary in quantity. It's hard for children to understand that certain phenomena can exist only within fixed limits of size. Yet primary grade children can begin to understand scale if they are asked, for instance, to imagine a mouse the size of an elephant. Would the mouse still have the same proportions if it were that large? What changes would have to occur in the elephant-sized mouse for it to function? Intermediate grade children can be asked to describe the magnification of a microscope.
5. **Models:** We can create or design objects that represent other things. This is a hard concept for very young children. But primary grade children can gain experience with it by drawing a picture of a cell as they observe it through a microscope. Intermediate grade children can use a model of the earth's crust to demonstrate the cause of earthquakes.
6. **Change:** The natural world continually changes, although some changes may be too slow to observe. Rates of change vary. Children can be asked to observe changes in the position and apparent shape of the moon. Parents and children can

track the position of the moon at the same time each night and draw pictures of the moon's changing shape to learn that change takes place during the lunar cycle. Children can also observe and describe changes in the properties of water when it boils, evaporates, freezes, or condenses.

7. **Structure and function:** A relationship exists between the way organisms and objects look (feel, smell, sound, and taste) and the things they do. Children can learn that skunks let off a bad odour to protect themselves. Children also can learn to infer what a mammal eats by studying its teeth, or what a bird eats by studying the structure of its beak.
8. **Variation:** To understand the concept of organic evolution and the statistical nature of the world, students first need to understand that all organisms and objects have distinctive properties. Some of these properties are so distinctive that no continuum connects them, for example, living and nonliving things, or sugar and salt. In most of the natural world, however, the properties of organisms and objects vary continuously.

   Young children can learn about this concept by observing and arranging colour tones. Older children can investigate the properties of a butterfly during its life cycle to discover qualities that stay the same as well as those that change.
9. **Diversity:** This is the most obvious characteristic of the natural world. Even preschoolers know that there are many types of objects and organisms. In elementary school, youngsters need to begin understanding that diversity in nature is essential for natural systems to survive. Children can explore and investigate a pond, for instance, to learn that different organisms feed on different things.

4.4.2 Creativity in Teaching

In-depth studies on creativity of teachers are rare, though its importance is widely accepted in educators nowadays (Randi & Corno,1997). The classroom is a dynamic, interactive, complex and ever-changing environment. Every moment in teaching, teachers are facing new challenges. They have to solve problems, which they have not been taught directly in training courses or experienced before. As Cheng (2001, p.5) states, "in his an old book 'Creativity in Teaching', Miel (1961) suggested that teachers might express their creativity in three areas of tasks: integrity in classroom relationships, development of teaching content, and inventiveness in the use of time, space and materials". Rubin (1985, cited in Cheng, 2001, p.2) described two types of inventiveness in teaching; in its simple form, invention involves adapting lessons to particular classrooms and students; and, in its complex form, invention involves devising ways to solve instructional problems. Halliwell (1993 cited in Yin Cheng, 2001, p.4) suggested "inventive flexibility" as a common type of creativity in teaching. Teachers need to make creative mediation between the given materials (e.g. that in the textbooks) and a particular group of learners on a particular occasion. It is this mediation for which some degrees of inventiveness or flexibility become essential. In all their descriptions (Halliwell,1993, Miel,1961, Randi & Corno, 1997, and Rubin,1985, cited in Cheng, 2001, p.2), teaching was considered as a creative process, demanding the flexibility and adaptability of teachers.

With regards to science teaching, few studies have been reported on the creativity of science teachers. Sussman (2000, p.20) suggested, "improvisation is a skill that most science teachers quickly master, whether it's searching for inexpensive or free materials for the classroom, substituting everyday materials for expensive lab equipment, or incorporating activities into the curriculum that don't require a lot of materials". She encouraged teachers to "remember to be creative, use your imagination, and improvise". Melear (1993) had developed a course titled "Creativity and inventiveness in science", and "creative science teaching" is one of its learning areas. In the final chapter of the book "Creativity in Primary Science" (Frost, 1997), its author concluded that "science teaching provides both the opportunity and the necessity to be creative" (p.182).

4.4.3 Constructivist Learning Environment

Constructivists believe that individuals learners construct knowledge rather than storing verbatim information gathered from teachers, textbooks, peers, and the surrounding environment. Thus, learning involves continuous, active construction and reconstruction of experiences (Dewey, 1938). Because the nature of this construction or invention depends on prior experiences and existing knowledge, learning is individual: no two students will leave one class with exactly the same understanding nor have an identical experience.

Constructivism is a theory of knowledge that focuses on the nature of knowledge and how we come to know (Von Glasersfield, 1997). From this perspective, individuals construct knowledge through their interactions with their environment. The main focus on constructivist theory is the nature of knowledge and how learners come to construct their knowledge. This is mainly seen as the process of making concrete meaning out of experiences by searching for patterns, raising questions, and building personal models, concepts and strategies (Von Glaservield, 1997, p. 10). From this perspective, knowledge is not discovered or collected through instruction that does not correspond to the learner's objective reality or real life environment.

Fischler (1999, p.173) stated that teaching should not be regarded as an arrangement of instructional strategies, but more a situation in which learning processes need to be recognized and supported. This important knowledge base of teaching creates demands on the teachers as they need to be sensitive to students' learning difficulties; be patient through the process of students' construction of new knowledge; take into account the students' existing knowledge; create a classroom climate in which students are willing to express and discuss their ideas; create situations in which students can present their own opinions; and, to accept a teaching role that is not so much that of a communicator and an examiner, but more as a person who advises and helps students to develop knowledge.

Cognitive theories of learning have exerted a powerful influence on policy and research relating to the education of students (Stoddart, Connell, Stofflett & Peck, 1993). Learners are increasingly viewed as active participants in the learning process, actively constructing meaning through experience. For this reason Solomon (1997) believed that how teachers teach children is as important as what teachers teach. Since the didactic approach to teaching has been shown to be ineffective in developing students' conceptual understanding (Carin, 1993), there has been a call for a shift in the focus of instruction from mechanical drill and practice towards teaching for understanding. Learning involves the active construction of meaning by the student and is not something that is imparted by the teacher (Driver & Oldham, 1986, cited in So, 2002).

The constructivist view is one of the traditions in educational psychology that rest on the views that a learner's existing ideas are all important in responding to, and making sense of, stimuli. The learner makes sense of experience by actively constructing meaning (Osborne & Wittrock, 1985). When answering the question of whether constructivism is primarily an epistemology or a pedagogy, von Glasersfeld said that "constructivism confronts questions of knowledge - what knowledge is and where it comes from". He therefore considered this is an exercise of epistemology (von Glasersfeld, 1993). However, two years later, von Glasersfeld (1995) stated that the constructivist view is an attempt to explain a way of thinking and makes no claim to describe an independent reality, and he preferred to call it an approach to, or a theory of, knowing. He tried to avoid the terms "epistemology" or "theory of knowledge" for constructivism though he had previously used both.

Constructivist theories draw heavily on the work of Piaget and Vygotsky which emphasized that cognitive change only take place when previous conceptions go through

a process of disequilibrium with the new information (Slavin, 1994). Constructivist theories of cognitive development emphasize the active role of learners in building their own understanding of reality. Leinhardt (1992) stated that the essence of constructivist theory is the idea that learners must individually discover and transform complex information if they are to make it their own. The constructivist theory in education rooted in neo-Piagetain thought is Personal Constructivism (Von Glaserfeld, 1989). Solomon (1987) and Millar (1989) have taken Personal Constructivism further to Social Constructivism that believes learners internalize the interpretations in terms of their previous experience and culture. Spivey (1997) argued that the social constructivist have focused on the cognitive as well as the social. Cobb (1996) stated that although von Glaserfeld (1989, p.37) defined learning as self-organization, he acknowledges that this constructive activity occurs as the cognizing individual interacts with other members of a community. And the sociocultural and cognitive constructivist perspectives each constitutes the background for the other (Cobb, 1996, p.48). On the one hand, an individual constructs meaning as new information should interact with one's existing knowledge, and learning should be personal and subjective and exists in one's own mind. On the other hand, though knowledge is personally constructed, the constructed knowledge is socially mediated as a result of experiences and interaction with others in that social context. And learning science was believed to involve more than the individual making sense of their personal experiences (Wilson, 2000).
"The most conspicuous psychological influence on curriculum thinking in science since 1980 has been the constructivist view of learning." (Fensham, 1992, p.801) Tobin (1993, p.ix) remarked that as "constructivism has become increasingly popular, in the past ten years, it represents a paradigm change in science education." Yeany (1991, p.1) also argued "an unification of thinking, research, curriculum development, and teacher education appears to now be occurring under the theme of constructivism." Their views were echoed by the words of Scott, Asoko, Driver and Emberton (1994, p.219, cited in So, 2002) "science learning, viewed from a constructivist perspective, involves epistemological as well as conceptual development."

Constructivism sees learning as a dynamic and social process in which learners actively construct meaning from their experiences in connection with their prior understandings and the social setting (Driver et al, 1994). The constructivist view of learning argues that students do not come to the science classroom empty-headed but arrive with lots of strongly formed ideas about how the natural world works. In the view of constructivists, pupils should no longer be passive recipients of knowledge supplied by teachers and teachers should no longer be sources of knowledge and classroom managers (Fosnot, 1996). From this perspective, learning is a process of acquiring new knowledge, which is active and complex. This is the result of an active interaction of key cognitive processes (Glynn, Yeany & Britton, 1991). It is also an active interaction between teachers and learners, and learners try to make sense of what is taught by trying to fit these with their own experience.

Constructivist views also emphasize generative learning, questioning or inquiry strategies (Slavin, 1994). An emphasis on constructivism and hands-on inquiry-oriented instruction to promote children's conceptual knowledge by building on prior understanding, active engagement with the subject content, and applications to real world situations has been advocated in science lessons (Stofflett & Stoddart, 1994). And constructivist views emphasizing discovery, experimentation, and open-ended problems have been successfully applied in science (Neale & Smith, 1990). Wildy and Wallace (1995, p.143) believed that good science teachers are those who teach for deep understanding: "They use students' ideas about science to guide lessons, providing experiences to test and challenge those ideas to help students arrive at more sophisticated understanding. The classrooms of such teachers are learner-centred places where group discussion, exploration and problem solving are common place."

The term 'constructivism' encompasses a variety of theoretical positions (Geelan, 1997) and has mainly been applied to learning theories, focusing on learning as a conceptual change (Driver & Oldham, 1986) and to curriculum development and teaching, mainly in science (Osborne & Wittrock, 1985). It also provides some clear pointers towards teaching strategies that might assist students in conceptual reconstruction (Hodson & Hodson, 1998), such as:

a. identifing students' views and ideas;
b. creating opportunities for students to explore their ideas and to test their robustness in explaining phenomena, accounting for events and making prediction;
c. providing stimuli for students to develop, modify and where necessary, change their ideas and views; and,
d. supporting their attempts to re-think and reconstruct their ideas and views.

Teaching methods based on constructivist views are very useful to help students' learning. The following are practices derived from cognitive psychology that can help students understand, recall and apply essential information, concepts and skills. They are used to make lessons relevant, activate students' prior knowledge, help elaborate and organize information, and encourage questioning. Important concepts from this perspective are (Slavin, 1994, p.237-239):

a. Advanced organizers: general statements given before instruction that relate new information to existing knowledge to help students process new information by activating background knowledge, suggesting relevance, and encouraging accommodation;
b. Analogies: pointing out the similarities between things that are otherwise unlike, to help students learn new information by relating it to concepts they already have; and
c. Elaboration: the process of thinking about new material in a way that helps to connect it with existing knowledge.

To explicitly build on students' existing knowledge is one of the ways to encourage deep approaches to learning (Biggs, 1995). To achieve this, teachers should have a clear idea of what students have already known and understood so that they can engage students in activities that help them construct new meanings (von Glaserfeld, 1992). Moreover, the opportunities for pupils to talk about their ideas concerning particular concepts or issues are important in the learning process. Teachers who employ constructivist teaching try to help pupils to learn meaningfully. They should encourage pupils to accept the invitation to learn and to take action on what they have learnt, and to provide pupils with opportunities to explore, discover and create, as well as to propose explanations and solutions.

One main purpose of using the findings of research into children's preconceptions in science is to help teachers to apply constructivist ideas about learning in the classroom (Peterman, 1991, cited in So, 2002). The collaborative effort among researchers and teachers on constructivist teaching is to encourage teaching which takes account of the prior ideas and understanding of children in the development of specific concepts in science, and to stress the need to provide prospective science teachers with a model for constructivist learning situations. This lays the seeds that help prospective teachers in life-long professional growth as science educators (Anderson & Mitchener, 1994).

Though Wilson (2000) suggested science educators need to look beyond the confines of cognitive psychology in developing pupils' understanding of scientific concepts, the four immediate accessible points she suggested for practicing teachers to consider in teaching concepts to pupils also rooted with constructivist teaching, these were:

1. recognizing what pupils already know;
2. teach fewer concepts;
3. improve continuity across key stages and progression of the development of concepts. Pupils are exposed to scientific concepts at a much earlier stage in their education; and,
4. acknowledge the diversity of learners.

Harlen (1993, p. 7) concluded that,

> *"[constructivism] is a view of learning which holds that the learner, in trying to make sense of new events or objects, begins from relevant existing ideas or models and tests the extent to which the new phenomena can be explained using these existing ideas or models. If predictions based on a related existing idea or model fits the new observations, then the range of application of the idea or model is extended; if the evidence does not fit the prediction, however, this may mean that the idea or model has to be modified or rejected in the light of the new evidence".*

Science encompasses the first-hand use of physical and mental skills to generate and test reliable knowledge and generalisations. In learning science, these skills (referred to as the process skills) are involved in using and testing existing ideas. It is through processes such as observation, questions raising and hypothesising that ideas are used in trying to explain new evidence; it is through processes such as prediction, planning, experimenting and interpreting that conclusions are drawn as to whether the ideas fit the evidence. If these process skills are not carried out in a rigorous and scientific manner, then the emerging ideas will not necessarily fit the evidence. Ideas may be accepted which ought to have been rejected, and vice versa. Thus, the development of ideas depends crucially on the processes used. While the facts or data and generalisations are important, how we come about them and what makes us believe them are of equal importance. It is important that they derive directly from the phenomena themselves, that careful planning, observation and recording are done, and that the conclusions drawn are bases for further investigation and verification (Harlen,1993, p. 7-8).

According to Harlen (1993, p. 8), it follows that attention needs to be given to the way in which children test out their ideas in primary science, that is, to the development of the process skills. However, this cannot be done effectively by direct teaching any more than the understanding of abstract scientific concepts can be taught directly. Experience of attempting to give instruction in observation, or prediction, as such, using content-free activities (meaning trivial content, since there has to be some is that the skills are not transferred to use in scientific enquiries as hoped. The usefulness of the skills in helping understanding has to be experienced. So a pupil who recognises that finding a pattern in observations has helped in making a useful prediction is likely to try this in another situation because of its value in helping understanding and not just because (s)he knows how to do it. The continual interweaving of knowledge and process skills in the investigation of natural phenomena is an essential characteristic of science education.

As Harlen (1993, p. 8), states, science also involves using the knowledge that has been generated through process skills to create and continually refine testable models of nature that help us to describe, explain, predict, and to conceptualise observable phenomena of nature. In this model building of science, the approach is first-hand enquiry built around experience and experimentation and the focus is the phenomena themselves. The models at first will be approximations that are improved or revised or discarded in the light of additional data that comes available as children's experience expands.

> *"Children, like scientists, must be ready to reject ideas when the evidence requires this. In this way ideas gradually change and develop to be more encompassing, more generalised and more abstract"* (Harlen,1993, p. 8).

Harlen (1993, p. 8), concluded that, in the type of learning just described the learner collects the evidence and does the reasoning; makes the ideas his or her own. This is what we may call learning with understanding. Learning without understanding, as in rote memorisation, does not require the use of process skills. Learning with understanding helps children to feel at ease with science, to know its strengths and weaknesses, to realise how ideas emerge from human activity, which is important in their education even if they are not destined to practise science.

Harlen (1993, p. 8-9), argues, in mathematics education these same arguments apply in relation to developing children's knowledge, say of arithmetical operations, and to developing skill in selecting appropriate operations, knowing when to add and when to subtract. Children are often taught to know how to add, subtract, multiply and divide, but may still be unable to decide which to do when faced with a real problem. Without experience of taking part in the construction of an algorithm in solving a problem the procedures have to be learned by rote, without understanding. They lack the understanding of what the process means in real terms and the ability to move from a verbal description of a problem, say of dividing a sum of money equally between a number of people, and the appropriate mathematical algorithm:

> *"As in science, the aim in mathematics education is to stimulate and support learning with understanding. The interweaving of knowledge development with process skills and the resulting creation of models of the nature of things are elements that we believe should be at the centre of science and mathematics education"* (Harlen,1993, p. 9).

This, then is the kind of learning which we aim to bring about in children through the education we give the teachers. To do this for teachers already in schools, through in-service education, it is often necessary to produce a quite radical change in their view of what teaching is and how children learn. This will not happen quickly or without some considerable effort on the part of those concerned. The status quo acts to moderate attempts at change and to establish new patterns and move to a new status quo takes a matter of years rather than the months over which in-service activities are usually spread. In the case of teachers in initial training the position is not so different, since these aspiring teachers will have spent up to 12 years in school through which they will have developed quite firm ideas about teaching and learning which may well have to be changed (Harlen,1993, p. 9).

As Harlen (1993, p. 9), concluded, because of the existing ideas and experiences which teachers or student teachers bring with them, in teacher education we are concerned with changing ideas, not just planting new ones in virgin soil. Producing change is notoriously difficult. In the context of curriculum development it has been a matter of concern since the early days of curriculum projects, in the 1960s. In the 1970s, Kelly (1975) and Rudduck and Kelly (1976, cited in Harlen, 1993, p. 9) carried out studies of implementation of innovation in which they distinguished between translocation (just getting new materials to teachers), communication (getting a message over), implementation (using the new materials) and re-education (developing real understanding and commitment to the new approach embodied in the materials). Their work has been followed by many other studies which have shown that producing materials and ideas alone is not sufficient to change practice and that this can not bed one without the active participation and cooperation of teachers (Harlen,1993, p. 10).

4.4.4 Current Teaching of Science

Glynn, Yeany and Britton (1991, cited in So 2002, p.3) stated that school science curricula are commonly placed on a continuum from "textbook-centred" to "teacher-centred" and that the textbook is the vehicle that drives the teaching. The textbook is usually accompanied by a large bulk of resource materials, such as additional information, overhead transparencies, wall charts, cassette tapes, teaching kits, worksheets, exercises, suggested activities and experiments, and the activity cards. Besides this, there are also "very useful" teachers' handbooks prepared by the publishers, which prescribe precisely how a concept should be taught.

The problem of the heavy reliance on textbooks during science lessons was addressed in the American Association for the Advancement of Science Report (1989, cited in So, 2002), noting that the present science textbooks and methods of instruction emphasized the learning of answers more than the exploration of questions, memory at the expense of critical thoughts, bits and pieces of information instead of understanding in context, recitation over argument, reading in lieu of doing .

Morris (1995, cited in So, 2002, p.2) in discussing the pedagogy in classrooms claimed that the major resource used by teachers and pupils in Hong Kong is the textbook. It often provides the content of the lesson and many of its learning activities. Further to this, in examining the nature of the more pupil-centered tasks used in the classrooms, such as group work, problem solving and discovery learning, Morris found that these tasks are often characterized by a high degree of teacher control and a low level of pupil involvement.

The researchers and theorists whose perspectives are outlined below suggest links between constructivist theory and practice. They provide the beginnings of an orienting framework for a constructivist approach to design, teaching or learning.

Jonassen (1991, p.11-12) notes that many educators and cognitive psychologists have applied constructivism to the development of learning environments. From these applications, he has isolated a number of design principles:

1. Create real-world environments that employ the context in which learning is relevant;
2. Focus on realistic approaches to solving real-world problems;
3. The instructor is a coach and analyzer of the strategies used to solve these problems;

4. Stress conceptual interrelatedness, providing multiple representations or perspectives on the content;
5. Instructional goals and objectives should be negotiated and not imposed;
6. Evaluation should serve as a self-analysis tool;
7. Provide tools and environments that help learners interpret the multiple perspectives of the world;
8. Learning should be internally controlled and mediated by the learner

Jonassen (1991, p.35) summarizes what he refers to as "the implications of constructivism for instructional design". The following principles illustrate how knowledge construction can be facilitated:

1. Provide multiple representations of reality;
2. Represent the natural complexity of the real world;
3. Focus on knowledge construction, not reproduction;
4. Present authentic tasks (contextualizing rather than abstracting instruction);
5. Provide real-world, case-based learning environments, rather than pre-determined instructional sequences;
6. Foster reflective practice;
7. Enable context-and content dependent knowledge construction;
8. Support collaborative construction of knowledge through social negotiation

Wilson & Cole (1991, p.59-61) provide a description of cognitive teaching models which "embody" constructivist concepts. From these descriptions, some concepts central could be isolated to constructivist design, teaching and learning:

1. Embed learning in a rich authentic problem-solving environment;
2. Provide for authentic versus academic contexts for learning;
3. Provide for learner control;
4. Use errors as a mechanism to provide feedback on learners' understanding.

Paul Ernest (1995, p.485) in his description of the many schools of thought of constructivism suggests the following implications of constructivism which derive from both the radical and social perspectives:

1. sensitivity toward and attentiveness to the learner's previous constructions;
2. diagnostic teaching attempting to remedy learner errors and misconceptions;
3. attention to metacognition and strategic self-regulation by learners;

4. the use of multiple representations of mathematical concepts;
5. awareness of the importance of goals for the learner, and the dichotomy between learner and teacher goals;
6. awareness of the importance of social contexts, such as the difference between folk or street mathematics and school mathematics.

Honebein (1996, p. 11) describes seven goals for the design of constructivist learning environments:

1. Provide experience with the knowledge construction process;
2. Provide experience in and appreciation for multiple perspectives;
3. Embed learning in realistic and relevant contexts;
4. Encourage ownership and voice in the learning process;
5. Embed learning in social experience;
6. Encourage the use of multiple modes of representation;
7. Encourage self-awareness in the knowledge construction process.

An important concept for social constructivists is that of "scaffolding" which is a process of guiding the learner from what is presently known to what is to be known. According to Vygotsky (1978), students' problem solving skills fall into three categories:

1. skills which the student cannot perform
2. skills which the student may be able to perform
3. skills that the student can perform with help

Murphy (1997, p.1) states that, scaffolding allows students to perform tasks that would normally be slightly beyond their ability without that assistance and guidance from the teacher. Appropriate teacher support can allow students to function at the cutting edge of their individual development. Scaffolding is therefore an important characteristic of constructivist learning and teaching.

Multiple perspectives, authentic activities, real-world environments these are just some of the themes that are frequently associated with constructivist learning and teaching. There were many similarities between the perspectives of different researchers in this brief review of the literature. The following presents a synthesis and summary of the characteristics of constructivist learning and teaching. These are not presented in a hierarchical order.

1. Multiple perspectives and representations of concepts and content are presented and encouraged.
2. Goals and objectives are derived by the student or in negotiation with the teacher or system.
3. Teachers serve in the role of guides, monitors, coaches, tutors and facilitators.
4. Activities, opportunities, tools and environments are provided to encourage metacognition, self analysis, regulation, reflection & awareness.
5. The student plays a central role in mediating and controlling learning.
6. Learning situations, environments, skills, content and tasks are relevant, realistic, authentic and represent the natural complexities of the 'real world'.
7. Primary sources of data are used in order to ensure authenticity and real-world complexity.
8. Knowledge construction and not reproduction is emphasized.
9. This construction takes place in individual contexts and through social negotiation, collaboration and experience.
10. The learner's previous knowledge constructions, beliefs and attitudes are considered in the knowledge construction process.
11. Problem-solving, higher-order thinking skills and deep understanding are emphasized.
12. Errors provide the opportunity for insight into students' previous knowledge constructions.
13. Exploration is a favoured approach in order to encourage students to seek knowledge independently and to manage the pursuit of their goals.
14. Learners are provided with the opportunity for apprenticeship learning in which there is an increasing complexity of tasks, skills and knowledge acquisition.
15. Knowledge complexity is reflected in an emphasis on conceptual interrelatedness and interdisciplinary learning.
16. Collaborative and cooperative learning are favoured in order to expose the learner to alternative viewpoints.
17. Scaffolding is facilitated to help students perform just beyond the limits of their ability.
18. Assessment is authentic and interwoven with teaching

In science and mathematics, however, particular problems are encountered. Many, perhaps most, primary teachers have received from their own education a legacy of failure or at least dissatisfaction in relation to science and/or mathematics. Thus their overriding requirements are for confidence, an appreciation of the nature of scientific and mathematical activity and enthusiasm for teaching the subjects (Harlen, 1993, p. 9).

These pervading aims have implications for the conduct of a teacher education programme, since they concern attributes which cannot be engendered through specific content but only in the way of dealing with that content (which may mean, for example, not using lecturing to a large group of students as the predominant style of a course). In meeting these needs it is as important not to do certain things as it is to do other things. For instance, it would seem important not to teach teachers the science and mathematics background they need in the same way as they were taught previously and which dismally failed. Neither should we underestimate the value of their everyday knowledge, which may be implicit, rather than explicit, but could be greater than assumed. Further, we should not treat them as if they had no existing ideas of their own about teaching, learning and about the subject matter to be taught (Harlen, 1993, p. 10).

Mathematics and science suffer from the popular perception that they are difficult, remote from the understanding of most people and only for the 'specialists'. Teachers, as members of the society in which these views are embedded, tend to share these perceptions. They stand, therefore, to benefit from actions which are taken towards creating a more positive popular attitude towards mathematics and science. More positive attitudes of teachers will influence the perception of these subjects by their pupils, the future citizens, and thus break into the present vicious circle in which unconfident teachers pass on their negative attitudes through the way they teach. Thus the moves to popularize mathematics and science are to be welcomed. For example, a study by ICMI (1990, cited in Harlen, 1993, p. 10) has provided both general considerations and concrete examples around the notion of presenting mathematical ideas of various level of sophistication to a wide audience (Harlen, 1993, p. 10).

A further problem particular to science and mathematics is that the majority of primary teachers in most countries are women. Like many women, they have suffered from the 'masculine image' of science and mathematics. By this is meant the reputation these subjects have of being 'cold and calculating', objective, concerned with facts and accuracy, impersonal and excluding emotions and feelings. Such characteristics do not, as a generality, seem attractive to girls, leading to a high rate of drop out and a sense of failure and alienation from these subjects. Many theories have been put forward to explain this situation, relating to the psychological origins of personality, in-born differences in spatial ability, social conditioning in early life, etc ...(Burton, 1986 & Kelly, 1987, cited in Harlen, 1993, p. 10).

A growing body of opinion is looking at the nature of the subjects and the way they are portrayed in schools, rather that at the supposed deficiencies of girls, for the source of the problem. It has been suggested, in the case of science, for example, that "process-based science is likely to project a more human view of science and to involve learning experiences that engage the thinking, imagination and interest of pupils as well as leading to an understanding of key concepts and principles. The aim of this approach is for pupils to learn with understanding, through development of their own ideas, which are taken seriously and not ignored in favour of the 'right answer'. This type of learning is more likely to appeal to all pupils. " (Harlen, 1989, cited in Harlen, 1993, p. 11). The same may be said of mathematics. If such a view of these subjects could be transmitted in teacher education it could play an important part in generating the confidence and enthusiasm which so many teachers lack. The importance of not reinforcing old prejudices follows clearly from this (Harlen, 1993, p. 10).

An approach to teaching and learning science that provides opportunities for the development of scientific literacy would encompass the changes in emphasis described in Table 4.1. Clearly, some of these changes in emphasis will require significant and sometimes fundamental changes in teachers' practices, and their beliefs, it is not a simple matter of "fine tuning".

Table 4.1 Changes in emphasis required teaching for scientific literacy

Teaching for scientific literacy requires:	
Less emphasis on	More emphasis on
• memorising the name and definitions of scientific terms • covering many science topics • Theoretical, abstract topics • presenting science by talk, text and demonstration • asking for recitation of acquired knowledge • individuals completing routine assignments • activities that demonstrate and verify science content • providing answers to teacher's questions about content	• learning broader concepts than can be applied in new situations • studying a few fundamental concepts • content that is meaningful to the student's experience and interest • guiding students in active and extended student inquiry • providing opportunities for scientific discussion among students • groups working cooperatively to investigate problems or issues • open-ended activities that investigate relevant science questions • communicating the findings of student

• science being interesting for only some students • assessing what is easily measured • assessing recall of scientific terms and facts • end-of-topic multiple choice tests for grading and reporting • learning science mainly from textbooks provided to students	investigations • science being interesting for all students • assessing learning outcomes that are most valued • assessing understanding and its application to new situations, and skills of investigation, data analysis and communication • ongoing assessment of work and the provision of feedback that assists learning • learning science actively by seeking understanding from multiple sources of information, including books, Internet, media reports, discussion, and hands-on investigations

Source (Department of Education, Science and Training, Australia, 2005)

4.5 Changing Role of Teachers

Over the past thirty years or so there have been some major changes in teaching and learning that have challenged the traditional school system and structure of teacher preparation programmes. Students are no longer regarded as passive learners; they are expected to be active learners and problem solvers. Teachers too are no longer regarded simply "dispensers of knowledge", they are expected to perform a multitude of rules. Kilzlik, 2001, cited Wickramasinghe, 2004, p. 2) describes the different roles a teacher must enact, these are: the teacher will be as a communicator, a disciplinarian, a conveyor of information, an evaluator, a classroom manager, a counsellor, a member of many teams and groups, a decision maker, a role-model, and a surrogate parent. (Darling-Hammond, 1997:154):

> *"If teachers are to prepare an ever more diverse group of students for much more challenging work--for framing problems; finding, integrating and synthesizing information; creating new solutions; learning on their own; and working cooperatively--they will need substantially more knowledge and radically different skills than most now have and most schools of education now develop".*

Airasian et al. (1997) described the role of teacher in constructivist environment:

> *"Constructivist teachers must create an open, non-judgmental environment that permits students to construct, disclose, and expose their constructions to scrutiny" (p.4).*

Below is a list of the important principles that guide the work of a constructivist teacher:

1. *Constructivist teachers encourage and accept student autonomy and initiative.*
2. *Constructivist teachers use raw data and primary sources along with manipulative, interactive, and physical materials.*

3. *Constructivist teachers use cognitive terminology such as "classify," "analyze," "predict," and "create" when framing tasks.*
4. *Constructivist teachers allow student responses to drive lessons, shift instructional strategies, and alter content.*
5. *Constructivist teachers inquire about students' understandings of concepts before sharing their own understandings of those concepts.*
6. *Constructivist teachers encourage students to engage in dialogue both with the teacher and with one another.*
7. *Constructivist teachers encourage student inquiry by asking thoughtful, open-ended questions and encouraging students to ask questions of each other.*
8. *Constructivist teachers seek elaboration of students' initial responses.*
9. *Constructivist teachers engage students in experiences that might engender contradictions to their initial hypotheses and then encourage discussion.*
10. *Constructivist teachers allow a waiting time after posing questions.*
11. *Constructivist teachers provide time for students to construct relationships and create metaphors.*
12. *Constructivist teachers nurture students' natural curiosity through frequent use of the learning cycle model* (Brooks & Brooks, 1993).

In Oman, as mentioned in Chapter Two, there have also been major developments in the content and structures of school subjects over the past thirty years, in Basic Education (Grades 1 - 4), school context has been changed, schools are expected additionally to respond to the challenge of preparing individuals for life in the 21st century. These challenges require more innovative ways of learning (Bentley, 1999, cited in Wickramasinghe, 2004, p. 3) these changes reflect and necessitate changes in the roles of teachers. With the need for schools to adopt more innovative ways of teaching, teachers must become more skilful and professional to remain effective in the future school. The report (UNESCO, 1996, p14, cited Wickramasinghe, 2004, p. 4) states that:

> *"A new teacher is at the epicentre of educational transformation. Teachers of the new millennium must be able to develop in their students the competencies and attitudes considered fundamental, such as creativity, receptivity to change and innovation, versatility in knowledge, adaptability to changing situation, discerning capacity, critical attitudes, problem identification and solution".*

It follows that teacher educators and teacher preparation programmes must prepare student teachers to meet contemporary challenges. In the Omani context, as Issan & Donn (2001) suggested, colleges of education should prepare teachers to reform education. Schools must also participate in the professionalization of teaching in collaboration with universities and colleges, by promoting mentoring relationships between outstanding teachers and teacher candidates; by recognizing excellence and leadership among teachers; and by providing programmes for induction and much more inservice development specific to teachers' subject matter fields.

The two main problems in projecting a future plan for initial teacher education are to assure the adequacy of the supply of trained teachers to meet future demand, not only in aggregate numbers but also in areas of specialization; and to assure that the methods employed in training them are adapted to meet the needs of evolving and changing concepts of education and training at this level.

In order for educational reform to be effective and lasting, teacher education must under go a transformation. Pre-service training needs to be improved and life long professional development should be adopted and materialized. Many attempts have been taken to develop such kind of training in many countries.
Education reforms and school-restructuring initiatives that are taking place worldwide are forcing many countries to reconceptualise the role of teachers. The traditional role of the teacher at the centre of student learning is no longer deemed adequate to meet new demands and is being replaced by programmes in which students take greater ownership of their own learning. Conceptualisations of what the teacher should be able to do in this new setting have become the focus of attention. Certainly teachers have to be trained differently and existing ones in the teaching force must adapt and change to meet this challenge (Kim Chuan & Gopinathan, 2001)

The new role of the teacher in reform and in classrooms is as a learner. New interventions "have been invented" that focus more clearly on providing meaningful learning experiences for teachers (Cohen & Ball, 1999, p. 1). According to Finley (2000) many of these interventions stress collegial relationships among teachers where teachers have opportunities to share ideas, discuss educational issues, and participate in collaborative planning, problem posing, and problem solving. There is, thus, an emergence of support for teacher study groups, book discussion groups, whole-faculty study, mentoring programmes, induction programmes, and numerous other teacher-directed, site-specific forms of professional development (Finley, 2000, p. 10-12)

These learning experiences can be transformative for teachers. Thompson and Zeuli (1999, cited in, Finley, 2000, p. 12) have described five characteristics for transformative professional development. Learning opportunities should:

1. *Create a sufficiently high level of cognitive dissonance to disturb the equilibrium between teachers' existing beliefs and practices on the one hand and their experience with subject matter, students' learning, and teaching on the other.*
2. *Provide time, contexts, and support for teachers to think—to work at resolving the dissonance through discussion, reading, writing, and other activities.*

3. *Ensure that the dissonance-creating and dissonance-resolving activities are connected to the teacher's own students and context, or something like them.*
4. *Provide a way for teachers to develop a repertoire for practice that is consistent with the new understanding that teachers are building.*
5. *Provide continuing help in a cycle of surfacing new issues and problems, deriving new understanding from them, translating these new understandings into performance, and recycling.*

Some researchers are actively studying the connection between teacher learning and student learning. Preliminary results suggest that student performance increases when teachers have greater learning opportunities (Cohen & Hill, 1998, cited in, Finley, 2000, p. 12). These authors said that:

> *"When educational improvement is focused on learning and teaching academic content, and when curriculum for improving teaching overlaps with curriculum and assessment for students, teaching practice and student performance are likely to improve". (p. 33)*

They argued that: "...if the reform utilizes constructivist learning theory to formulate student curriculum, for example, then the learning opportunities for teachers must also be designed around constructivist ideas". Further, these learning opportunities should be "firmly grounded in developing deeper knowledge of the student curriculum, of the relationship of assessments to curricula, and of the relationship of both to pedagogy and student learning". (Cohen & Hill, 1998, cited in, Finley, 2000, p. 12).

Liberman and Miller (2000) identified seven transitions that teachers need to make in 'the new social realities of teaching.' These include from individualism to professional community, from teaching at the centre to learning at the centre, from technical work to inquiry, from control to accountability, from managed work to leadership, from classroom concerns to whole school concerns, and from a weak knowledge base to a stronger, broader one. It follows from the above that there is now greater demand for better quality teachers and their role is going to change in profound ways.

It is not possible to effectively reform education systems without taking teachers into greater consideration. Equally, it is not possible for changes to the teachers' role to happen without transforming teacher education (Ordonez & Maclean, 1997). In fact, changes in initial teacher education and in career-long teacher development are an integral part of educational reform and improvement of schools (Beattie, 1997). Beattie (1997) stressed that reform of schools and efforts to change them into communities of learning will never happen without the reform of teacher education and acceptance on the part of professionals of the necessity of continual reforming of ideas, concepts and understandings. Questions have been asked about the kinds of teachers that are being produced and what the teachers of tomorrow would look like and be able to do.

Literature abounds with the censure of teacher education programmes as being inadequate in preparing the 'new' teacher. For example, in the United States, Goodland (1990) concluded that teacher education was muddling along with neither a clear sense of mission nor coherent programmes. Referring to the same country, Smylie and Kahane (1997) felt that teacher education curricula overly reflect practice and prepare future teachers for prevailing conditions and circumstances. Others found them wanting in that they are out of sync with the demographic and curricular changes overtaking K-12 schools and concluded that the restructuring of teacher education programmes is long overdue (Ishler, 1996). In California, shortcomings about teacher education programmes were well reflected in a lack of connections between universities and K-12 school districts, poor quality of student teaching practice experiences, weak links between schools of education and liberal studies, and limited early clinical experiences (Hart & Burr, 1996). Since 1996, the problem has been addressed, to a limited extent, through the efforts of the California State University and 14 schools in the Los Angeles Unified School District (Burnstein et al., 1999).

In Oman as AlKitani & AlHinai (2004, p. 3), report in their entitled paper "The teacher we need: the prospective of the Ministry of Education for the Omani teacher under the development of educational process", the teachers' preparation institutions are criticised for failing to attract peoples with the best mentalities for the teaching profession. There is also a large gap between the theoretical content in these institutions and the practice in work because of the deficiency in building communication channels which are essential for new teachers especially in a continuously changing society. Thus the Ministry attend to enroll teachers whom view teaching as a creative profession, it expects teachers with certain competencies such as: knowledge, skills and flexibility as well as the ability to treat with pupils of different backgrounds, attitudes, abilities and behaviours. Teachers are also asked to be qualified in linguistical and mathematical skills. In order to achieve this desire, the ministry, through the in-service teachers' training and supervision visits, trying to acquire teachers with reflective practices, self learning, procedural researches, and building communication channels, it encourages teachers to present and benefit from these training programmes.

4.5.1 Teacher-Centred vs. Student-Centred Methods

There is a strong tendency for student teachers to use only one teacher-centred method of teaching. The focus of Basic Education in all subjects at all grades is student-centred learning. Student-centred learning or learner-centeredness, is a learning model that places the student (learner) in the centre of the learning process. In student-centred learning, students are active participants in their learning; they learn at their own pace and use their own strategies; they are more intrinsically than extrinsically motivated; learning is more individualized than standardized. Student-centred learning develops learning-how-to-learn skills such as problem solving, critical thinking, and reflective thinking. Student-centred learning accounts for and adapts to different learning styles of students (National Centre for Research on Teacher Learning. 1999, cited in Laurence, 2005).

Student-centred learning is distinguished from teacher-centred learning, which is characterized by the transmission of information from a knowledge expert (teacher) to a relatively passive recipient (student/learner) or consumer. According to McCombs and Whisler, (1997), learner-centred learning is:

> *"the perspective that couples a focus on individual learners (their heredity, experiences, perspectives, backgrounds, talents, interests, capacities and needs) with a focus on learning (the best available knowledge about learning and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning and achievement for all learners)". (p. 9)*

According to Owen (2005, p.50), in the late 1990s, the Ministry of Education in Oman established "student-centred learning" as the corner stone of its education reform now known as Basic Education. Characteristics of the methodology for this student-centred classroom instruction include:

- *the focus is on the learner, not the teacher or content in the textbook*
- *the focus is on how the student learns best*
- *the goal is to help students to learn individually*
- *content of the curriculum is often presented as problems to be solved*
- *the teacher leads students to correct solution and concepts rather than "telling the information"*
- *students learning by working together on activities*
- *students sometimes working cooperatively in groups*
- *students assuming responsibility for their learning*
- *teachers and students work collaboratively to reach curriculum objectives*
- *evaluation is based on continuous progress assessments of student's learning with final examinations downplayed.*

While teachers may spend part of a period with some form of direct instruction, efforts must be made to use different teaching methods to cater to different students and their specific needs. Besides direct instruction, it is essential that student teachers choose other methods to practice by relating the specific learning objectives to specific instructional goals and to the needs and interests of the pupils. Sometimes additional techniques are effectively used for a single activity and may be employed for just a few minutes. In addition, some pupils in the class can be involved with a one learning method while others pupils are doing something else.

4.5.2 The Learning Environment in Mathematics and Science

The call for change in mathematics and science instruction is characterized not only by 'what' is taught but also the manner in which it is taught. What students learn is fundamentally connected to how they learn it. A classroom environment in which optimal learning can take place must be established and maintained; it forms the learning foundation upon which skills and attitudes are constructed. Table 4.2 indicates five major shifts in the environment of mathematics and science classrooms.

Table 4.2 Summary of Shifts in Instructional Practices

Moving away from		Toward
classrooms as collections of individuals	⟶	classrooms as mathematical and science communities
the teacher as the sole authority for right answers	⟶	logic, scientific, and mathematical evidence as verification
primarily memorizing procedures	⟶	mathematical and scientific reasoning
an emphasis on mechanistic answer finding	⟶	conjecturing, inventing, and problem solving
treating a subject as a body of isolated concepts and procedures	⟶	connecting science and mathematics, their ideas and applications

Adapted from Owen (2005, p.50-51)

4.6 Attitudes to Science Teaching

Surveys have long shown that working conditions play a large role in teacher decisions to change schools or leave the profession. Reasons for remaining in teaching or leaving are strongly associated with such matters as how teachers view administrative support, available education resources, teacher input into decision-making, and school climate (Darling-Hammond, 1997; Ingersoll, 2001, 2002).

Many elementary teachers express a lack of confidence in their ability to teach science with dire consequences for the quality of teaching (Watters & Ginns, 2000). According to

Kyriacou et al (1999) in recent years a number of studies have been reported which have explored the reasons why people choose to become schoolteachers. Much of the impetus for the research on this topic has come from a concern in many countries that not enough people are making this career choice, resulting in a shortage of high quality applicants to teacher training courses. Although the picture varies somewhat from country to country, international reviews of the state of teacher recruitment indicate that this is a widespread problem (e.g. Neururer, 1995; Fernández, 1996). Particular attention in these researches has been paid to the reasons given by student teachers for choosing a career in teaching. Such research (e.g. Brown, 1992; Kyriacou & Kobori, 1998; Chuene et al, 1999, cited in Kyriacou et al, 1999) indicates that the reasons fall into three main categories:

1. *Altruistic reasons: these reasons deal with seeing teaching as a socially worthwhile and important job, a desire to help children succeed, and a desire to help society improve.*
2. *Intrinsic reasons: these reasons cover aspects of the job activity itself, such as the activity of teaching children, and an interest in using their subject matter knowledge and expertise.*
3. *Extrinsic reasons: these reasons cover aspects of the job which are not inherent in the work itself, such as long holidays, level of pay, and status.*

Studies of student teachers in various countries as far a field as Brunei Darussalam (Yong, 1995), England (Reid & Caudwell, 1997), South Africa (Leemers, 1998) and the USA (Young, 1995) indicate that the most frequently given reasons for choosing teaching are:

i. wanting to work with children;
ii. wanting to contribute to society; and
iii. enjoyment of teaching.

However, it is noticeable that there are some marked differences in the rankings of various reasons from country to country. This may well be a reflection of the differences between countries in their social, economic and cultural context, and in the general image held of teaching as a career. For example, when national economies are buoyant, and jobs other than teaching are more readily available, the number of high quality applicants to teacher training tends to decrease. Yong's (1995) study of student teachers in Brunei Darussalam found that almost 15% of his sample reported that they had chosen to enter teaching as a last resort. One would expect that this proportion is likely to decrease when the economy is buoyant and other jobs are more easily available, and increase when the economy is flat. The importance of extrinsic reasons, such as long holidays, has also been reported in several studies, such as that conducted in Cyprus by Papanastasiou & Papanastasiou (1998). Interestingly, they reported that the Government of Cyprus guarantees all newly qualified teachers a job after graduation and their teaching post is then made secure after 2 years of teaching. 'Immediate employment after graduation' was cited as the strongest reason by their sample of student teachers for choosing teaching as a career. In some countries, an important factor is that many students who are unable to gain a place at university to do a first degree in the subject of interest to them (such as English, mathematics, science) see a degree-based teacher training course as offering an alternative access to higher education. For example, a study of mathematics student teachers in South Africa conducted by Chuene et al (1999) reported that most of the student teachers in their study were motivated mainly by a desire to gain a diploma in mathematics rather than a desire to become a teacher of mathematics.

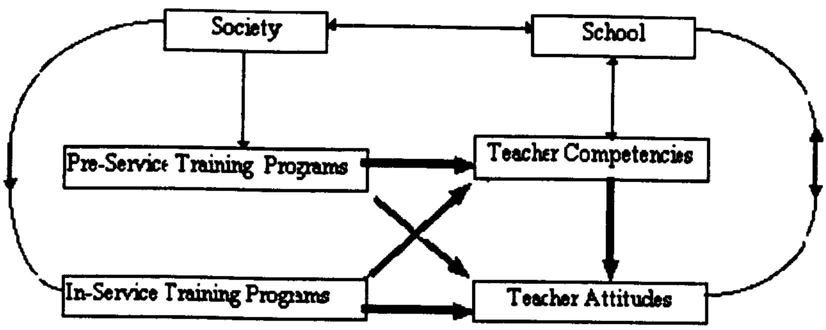
Another important factor, which again varies from country to country, is the perceived status of teaching as a career, and the extent to which wanting to do a high status job is an important motivating factor in people's choice of career. Certainly in a number of countries where there is a problem in recruiting teachers, measures to raise the status of the profession have been taken to encourage more well-qualified applicants. For example, a survey by Shen & Hsieh (1999) in the USA highlighted the pressing need to raise the status of teaching there, and indicated that factors such as improving teachers' salary, working conditions, opportunity to exercise leadership (viz. teachers taking important decisions themselves rather than being told by policy-makers what to do), and increasing entry and exit standards were perceived by future teachers to be measures that would achieve this. In addition, changes in the prevailing values within a country can also influence recruitment patterns. For example, Awanbor (1996, cited in Kyriacou et al, 1999) noted in his study of student teachers in Nigeria that an increasingly materialistic value system prevalent in Nigeria had, to some extent, devalued teaching as a career choice. Despite such differences between countries, few comparative studies have been reported which have collected data in two countries using the same research instrument.

According to Barros & Elia (1998, p.1):

> *"while it is true that there are teachers whose attitudes are positive towards the promotion of good science teaching- learning situations, for most students, in many countries, the reality of the school classroom consists of lessons where science is transmitted by their teachers, at best, as a set of facts, laws and data. The results brought about by physics education researchers' pedagogical experiments have good consequences only when rooted within the school as an institution (teacher, curriculum and defined pedagogical practices) and within a particular context (culture, programme, country)"*

So, It can be concluded that there are no universal methods to modify this situation. That is, there are a variety of science teaching styles as a result of the strong interaction existing between teaching attitudes and competencies, school and society, as suggested by the model shown in Figure 4.2.

Figure 4.2: Model of existing interaction between teaching attitudes and competencies, school and society



Adapted from: Barros & Elia (1998)

4.6.1 The Role of Teachers' Attitudes

The word attitude is defined within the framework of social psychology as a subjective or mental preparation for action. It defines outward and visible postures and human beliefs. Attitudes determine what each individual will see, hear, think and do. They are rooted in experience and "do not become automatic routine conduct" (Barros & Elia, 1998).
According to Barros & Elia, (1998) "Attitude means the individual's prevailing tendency to respond favorably or unfavorably to an object (person or group of people, institutions or events). Attitudes can be positive (values) or negative (prejudice). Social psychologists distinguish and study three components of the responses: a) *cognitive component,* which is the knowledge about an attitude object, whether accurate or not; b) *affective component:* feelings towards the object and c) *cognitive or behavioural component,* which is the action taken towards the object".
It is understood that in most situations the three components appear concomitantly to shape teachers' classroom postures, through a direct and indirect interaction between society, school and teachers, following the model presented above. Barros & Elia, (1998) stat that teaching attitudes affecting negatively the science learning process can be a result of many factors such as:

1. Teachers' lack of confidence due to poor conceptual and phenomenological science foundations. In many countries around the world the number of lay

science teachers is high, and many of those that have undergone formal education are not ready for the job.

2. The fact that most teachers most of the time behave as information providers (Brown, 1982). The basic model of teaching in this case is: a) spontaneous ; (b) belief that all students are identical and ready to follow same type of instruction; c) acceptance of models the teachers were taught; and (d) lack of readiness about students' forms of learning and thought (Hallbawchs,1975).
3. Teachers do not carry out innovations of new curricula and methodologies. Partly due to entrenched beliefs about teaching science as telling science, instead of teaching as a process, science as a way of thinking. Good practices in science teaching are expected to promote critical thinking (Arons, 1990), problem solving abilities and readiness for data interpretations as well as good communication skills. Via non-explicit forms of action, teachers' attitudes indicate the lack of confidence to implement new projects and passively reject new methods and technologies. Reay (1975) says that one of the reasons for this attitude could be due to the little time allowed for preparation within the teacher's working day. Another explanation could be the teacher's personal style in the interpretation of curricula, content and pedagogy (Sacristan, 1989, Gallard and Gallagher, 1994).
4. The lack of coherence between the teachers' classroom attitudes and their expressed belief on active methods of interaction. Black (1989) reported a study made in a physics classroom were the teacher strongly believed in his ability to conduct an interactive science class. When observed, he was talking to the class 90% of the time. Activity dominated learning situation studies show that students listen to the instructor more than 50% of the laboratory time.(Hegarthy-Hazel, 1990). Bliss and Ogborn (1977) did a naturalistic study and reported 43 stories about the science laboratory. More than half of the students had bad recalls from their laboratory work. Carvalho (1992), mentions the dichotomy between the liberal discourse in opposition to repressing action that dominates the teacher training courses. A study of the beliefs and opinions of science teachers (physics, biology and chemistry and mathematics) about the nature of science and science education (Souza, Barros et al., 1987) indicated that though physics teachers were less dogmatic about the nature of science and approved curricular modifications and active methods in the classroom, their standing in the classroom indicated otherwise. Koulaidis (1987) found that science teachers' pedagogical positions

are quite traditional, giving great emphasis to presentation of knowledge and pupils' abilities to think in abstract terms.

5. Teachers tend to see school failure as a result of the socio-psychological deprivation due to social conditions of child and family. Low expectations for these students generate poor teaching practices. Therefore, the tendency to put the responsibility of their (teachers) ineffectual performance on the students (Silva et al, 1987; Carvalho and Gil- Pérez; Alves, 1993; Mazotti, 1994).
6. The conditions under which teachers work. professional and social status; school infrastructure, poor libraries, laboratories, safety conditions, etc., create new variables that (re)define the attitudes of even the most devoted and well prepared teacher. The analysis made by a secondary teacher (Cedrez, 1993) that comes from a country that enforces the implementation of official curricula via regular inspections of the classrooms) presents a good picture about what goes on in the classroom.

Pointing out some of the negative aspects, allows defining actions to change the general picture. There is good agreement (Baird et al, 1991, cited in, Barros & Elia,1998) that teachers who are seldom asked to reflect upon their own teaching could be no more than mere repetitors of book material. Since teachers have a major role in any education reform they should be solicited to understand new proposals and to participate in their formulation, to analyze their performance and modify their behaviour, their personal conceptions on how to teach and what to teach. Most teachers, influenced by how they were taught tend to replicate the model (Baird et al, 1991, cited in, Barros & Elia,1998). Barros & Elia pointed out that:

> *"Teachers' styles, and mainly their attitudes, are strong context outcomes, rooted in experience and do not become automatic routine conducts, in the sense that they are developed via very slow interactions (action/reaction) and become well established constructs for each individual only after some time. In that sense attitudes can be modified only by each individual, when he/she becomes aware, via elements and evidence, that new postures would be better to deal with the world around"* (Barros & Elia,1998, p. 3)

So it could be argued about the possibility to modify teaching attitudes by means of teaching programmes, as I believe to be true when I teach specific competencies in the pre-service courses. On the other hand, "there is need to worry about teachers' negative attitudes since they affect a large number of the student population" (Barros & Elia,1998).

According to (Nemser-Feinman and Floden,1986, cited in Barros & Elia,1998) teachers go through three stages when they start teaching: adequacy, mastery and impact awareness of the effect of their teaching on the students. Pre-service courses should prepare the future teacher for adequacy and mastery. In-service programmes should help the teacher to actualize their knowledge with the acquisition of adequate instruments and methodologies to solve problems.

Solomon et al. (1995) state that science teachers more than most, require an entitlement to regular re-training in school time, this in addition to pre-service training. On the other hand it is necessary to pay attention to what the in-service programmes have to offer. Most of them run pilot courses, didactic materials are constantly reinvented, financial support is mainly temporary, depending on funds and projects.

On the positive side it can be mentioned that they provide teachers with new approaches and methods, present current literature and educational technologies and lead the teachers to reflect upon their practices. More efficient models of in-service programmes involve cooperative research in the classroom (Carvalho and Gil -Pérez, 1993, cited in Barros & Elia,1998). Teachers should be directly involved in defining priorities about what are their real problems and able to select appropriate solutions. (Tobin, 1988, Hewson and Hewson, 1988). It is easy to establish objectives and policies in education but the implementation of real change teaching strategies in order to put into practice contemporary school reform involves high risks for the teachers and financial costs for the schools (Bybee, 1995). It is also important to analyze the consequences of teachers' attitudes. Pre-service courses can benefit from that knowledge and guide the selection of courses and methodologies to insure a good foundation for the future teachers. One possible way to permit a critical evaluation could be putting together the two groups (teachers and students) during the undergraduate training period of the future teachers.

Lee, Krapfl & Steffen (2000) state that: recent literature describes attempts at changing the nature of preservice science teaching methods courses (Anderson, 1997; Butts et al., 1997; Greenwood, 1996) and the accompanying field experiences (Bryan & Abell, 1999) to provide good models of science teaching and elicit changes in preservice teachers attitudes about science and teaching science (Pedersen & McCurdy, 1992; Stefanich & Kelsey, 1989). However, in situations where it is possible, more than the science methods courses must be changed.

4.7 Reflection

As a reflective practitioner, a teacher will: recall and describe specific experiences in his/her teaching, while identifying and framing issues of practice, respond to issues by recognizing both the similarities to other situations and the uniqueness of his/her particular situation. Experiment with solutions to problems of practice and examine the consequences and implications of various solutions (Ross, 1989, cited in Bryan et al, 1997).

Learning to teach science can be likened to learning science. Prospective teachers enter into teacher education programmes with beliefs, values, assumptions, and knowledge about teaching and learning that form their personal theories. Like students of science, students of teaching often adhere strongly to their ideas. Like teachers of science, science teacher educators are responsible for helping students clarify and refine their personal theories and for providing ways to perturb teacher's existing personal theories so that learning through accommodation can occur (Strike & Posner, 1982; von Glasersfeld, 1987, cited in Bryan et al, 1997). Coaching reflective practice in teacher preparation is a means by which science teacher educators may uncover and confront prospective teachers' personal theories and guide them through the process of conceptual change in learning to become a science teacher.

Reflection helps beginning teachers untangle the web of deeply entrenched personal theories about teaching and learning. Prospective teachers no longer view teaching as a predetermined set of rules or "bag of tricks" to apply to any given classroom situation, but as a practice which is grounded in a system of values, theories, and practices (Schon, 1983, cited in Bryan et al, 1997). The notion of reflection involves thinking and acting on those aspects of teaching that frustrate, confuse, and perplex. The reflective teacher describes specific experiences in her teaching, while identifying and framing issues of classroom practice. In so doing, she begins to appreciate her own experiences in teaching and learning as a source of knowledge upon which she can draw in making teaching decisions. The reflective teacher responds to issues by recognizing both the similarities to other situations and the uniqueness of her particular situation (Ross, 1989). This awareness leads the teacher to realize the broader principles and theories that inform her teaching.

According to Bryan et al (1997): furthermore, the reflective teacher is able to experiment with solutions to problems of practice and examine the consequences and implications of various solutions (Ross, 1989). Oftentimes, this results in reframing the issue, reexperimenting with solutions, and reexamining consequences. In essence, the reflective teacher reconstructs her teaching practices as she advances from intellectualizing an issue to taking action to improve and refine her teaching.

4.8 Summary

This chapter has presented the literature on teacher education. The literature on approaches of teacher training and preparation approaches has been reviewed. It focuses on the competency-based approach which was conducted as the baseline for the Omani teacher education programmes. This chapter highlighted the literature in scientific field teaching and learning. The constructivist learning environment has given more consideration and attention has also been given for the changing of teacher's role according these conversions in teaching/ learning process accompanying the comprehensive reform of the Omani education system. A large number of studies have examined the associations between teachers' willingness, motivation and attitudes and appropriateness of the preparation programmes to produce the adequate to be the effective factor in a reformed education system.

Chapter Five: Methodology

5.1 Introduction

The word "research" is generally meant to describe any organized study undertaken to discover new facts and principles. Research is a systematic investigation to find answers to a problem. It can also be seen as an "act with an objective". The act necessitates the researcher seeking for, "enquiring about, investigating, exploring, repetitively, carefully, closely, some specific topic or subject of the research" (Macionis and Plummer, 1998). In order to derive appropriate remedies for a problem, researchers are expected to employ suitable methodologies. Undoubtedly, this particular research also deserves a carefully selected methodology.

This chapter focuses on the specific details of obtaining and analysing data for this study, and presents the methodology used in it, aiming to give a practical dimension to some of the theoretical and epistemological issues of the responsive constructivist approach discussed in the previous chapter.

McMillan and Schumacher (1984) clearly identified the characteristics of research design and reported that:

> *"research design is a term that refers to the way an investigator conducts a study of the procedures and techniques employed to answer the research problem or question".* (p. 107)

As discussed in the introductory chapter 1 and chapters 3 and 4, the choice of the research problem, research methods and the actual research process were guided and determined by epistemological assumptions of some evaluation models such as CIPP Stufflebeam, Responsive Stake's Model and Fourth Generation Evaluation (FGE) model as well as by the theoretical considerations of the particular research area of Primary Science Teacher Education (PSTF). It was assumed that the framework of this evaluation study will make an important contribution to PSTE and will enable me to analyse the Primary Science teacher education process in the Omani Colleges of Education (OCE) from the point of view of the student teachers, practicing teachers, and other educators. In addition, it will help me to gather information regarding their concerns and needs, and to compare the information elicited to formulate recommendations for the improvement and development of the programme at the colleges under study.

This chapter will focus on the three stages of the research. In the first stage a questionnaire and semi-structured interviews were used while in the second stage, an observation and a follow-up face to face semi-structured interview were conducted, and in the third stage an open-ended conversional interview was used. Descriptions of the development of the instrument, the participants, pilot study, the validity and reliability, and data analyses procedures are given. (see the diagram of the Research Plan at the Appendix no. 2, and Evaluation Framework and the instruments used in each stage at the Figure 1.1). This chapter will end by discussion of the ethical considerations of the study.

5.2 The First Stage

The main purposes of this stage of the study is to explore the student teachers and teacher's motivation towards teaching profession and particularly teaching scientific field for young pupils furthermore to investigate the participants' perception of the degree of importance of each of the teaching competencies of the teacher education programmes of the Omani colleges of education and the self perceived degree of the competence of the Omani teachers and student teachers in these competencies.

In this stage, the study engaged a survey research approach. This approach is conducted to discover specific characteristics of a group. It generally "involves discerning the opinion of a group" (Frankel & Wallen, 2000). Surveys have become very popular methods of collecting evaluative data. They are used to measure people's opinion, attitudes, beliefs, behaviours, reactions, and attributes in response to specific questions. It can provide the distribution of some characteristics in a population and can usually accomplish that through surveying only a portion of the people (or units) in that population.

Surveys have several advantages. They are moderate in cost and relatively easy to reach large numbers. They allow for anonymity of responses. Evaluators could also ask fairly complex questions about respondent's attitude and behaviours. Surveys allow time for respondents to reflect on events and report subsequent changes and feelings. The usefulness of survey data can be enhanced if the information is combined with other methods, i.e., observation, or case study.

Surveys could be conducted using mail, telephone, mixed-mode (mail and telephone), or administered under a group setting such as in workshops or classroom settings. Each method has its own advantages and disadvantages.

Survey instruments could also be administered under special group situations like at the end of workshop, seminars, classrooms, etc. This approach to has two major advantages, (a) there is little or no cost in reaching respondents, and (b) the purpose of getting information can be clearly explained. The disadvantages include, (a) limited generalisability of information to a larger population, (b) it takes time away from the regular programme, (c) group mood or setting at the time may affect responses, and (d) it does not allow for long term reactions and changes.

There are justifiable reasons behind the employment of this method. As mentioned before, the main propose for this study is to obtain data from a member of the population to determine the current status of the target population with respect to some variables. Surveys are appropriate for the large populations that are targeted in this study. Cohen, Manion & Morrision, (2000, p.169) describe gathering data processes in surveys as:

> *"Typically, surveys gather data at a particular point in time with intention of describing the nature of existing conditions, or identifying standards against whish existing conditions can be compared, or determining the relationships that exist between specific events".*

Surveys may produce inaccurate results because of the following four types of data collection errors:

1. Coverage error, which results from not allowing every person in the study population to have an equal (or known) chance of being sampled for the study. This error could be minimized by use up-to- date, an accurate list of population to be studied.
2. Sampling error, which results from the fact that only some members of the study population are asked to provide survey information. Sampling errors could be controlled by using random sampling to select members of the study population.
3. Measurement errors, which result from obtaining inaccurate answers to survey questions. Or one can question "are data valid (true)?" Such measurement errors may occur due to: (a) questions not clearly stated, (b) instructions are vague or not clear, (c) tendency of respondents to give socially acceptable answers, (d) respondents do not possess the correct information, and (e) respondents deliberately lie. the measurement errors can be controlled by using suitable, reliable, and valid instruments.

4. Nonresponse error, which results from some people in the survey sample not responding, and their being different from those who respond. A low response rate has been the frequent problem with the mail survey. Dillman (1994) suggests a social exchange concept to guide the survey design to improve a response rate. The principal idea behind the social exchange approach is to increase perception of possible rewards (i.e., make answering interesting, support values, provide token incentives), decrease perceived cost (i.e., time, embarrassment, mental effort) and encourage likelihood that recipients of questionnaire trusts (i.e., promote trust by showing investment, legitimate and trustworthy sponsorship) that reward will on balance outweigh costs.

When subjects can't be located or fail to respond, researcher could consider the following options as suggested by Miller and Smith (1984, cited in Suvidi, 2005):

1. Double-dip- List and number non-respondents; draw a random sample (10-20%); "get" their response by phone, interviews, etc.; statistically compare respondents to non-respondents. If no difference, collapse data. If different, develop a proportionately weighted formula to get "adjusted" data. Can then say results are true for sample; samples should be representative of population; so, results are valid for population.
2. Compare early to late respondents. If no difference, results could be generalized to the population.
3. Compare respondents to non-respondents on known characteristics. If no difference, results could be generalized to the population.
4. Compare respondents to population on known characteristics. If no difference, results could be generalized to the population.
5. Ignore non-respondents- Can only generalize to respondents, i.e., results are not true for the sample or the population.

In case of programme evaluation, researcher should put special efforts to minimize or hold all the above four types of errors to acceptable levels while designing the evaluation.

Data can be collected by two main types: either by cross-sectional or longitudinal surveys. In this phase of the study, a cross-sectional survey was conducted. It was deemed suitable for this status and the circumstances relating to the time, sample of population and the nature of data required. It is unattainable to employ any of the three types of longitudinal studies, which are; trend, cohort or panel studies. By this type of survey data are collected at one point in time from a predetermined population.

Survey researches often using a combination of the quantitative and qualitative approaches. It is common not only to prepare a closed questionnaire for people to answer in writing, but also to conduct open-ended personal interviews with a random sample of the respondents.

The qualitative versus quantitative debate is widely debated in the education research literature, some researchers advocate only one of these paradigm others support the idea of a combination.

According to Miles and Huberman (1994) these two research methods need each other more often they not. Typically qualitative data involves words and quantitative data involves numbers, there are some researchers who feel that one is better (or more scientific) than the other. Another major difference between the two is that qualitative research inductive and quantitative research is deductive. In qualitative research, a hypothesis is not needed to begin research. However, all quantitative research requires a hypothesis before research can begin.

Another major differences between quantitative and qualitative research is the underlying assumptions about the role of the researcher. In quantitative research, the researcher is ideally an objective observer that neither participates in, nor influences what is being studied. In qualitative research, however, it is thought that the researcher can learn the most about a situation by participating and/or being immersed in it.

Studies of the evaluation of teacher education programmes involving both qualitative methods and quantitative information obtained from the administration of questionnaires have proved fruitful. The two approaches have different, complementary strength, and in some areas are overlapping, enabling a study which is more comprehensive (Neuman, 2000).

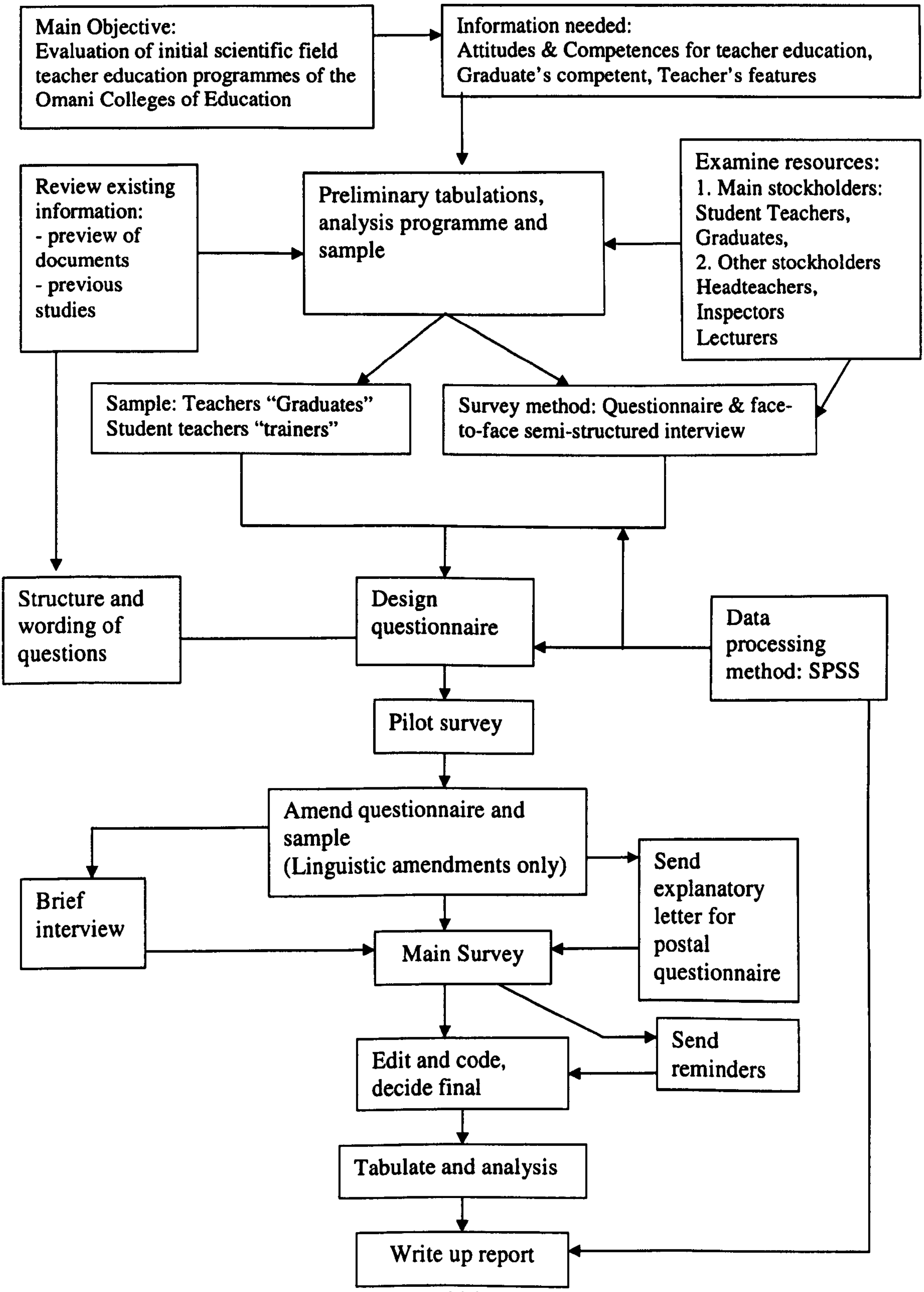
A mixed-method (Green et al., 1989) combining qualitative and quantitative approaches will be adopted to guide the design and implementation of the study. The two approaches were viewed as complementary and, in some instances, one approach yielded data which expanded and informed the study that the other did not, thus providing a more comprehensive understanding of the respondents' perceptions of the teacher education programmes. The combining of the two approaches overcomes some of the weaknesses, biases and limitations of a single approach. Table 5.1 Summaries the characteristics of each of these two approaches.

Table 5.1 Summary of characteristics of quantitative & qualitative research methodologies

Quantitative Methodologies	*Qualitative Methodologies*
Preference for precise hypotheses stated at the outset	Preference for hypotheses that emerge as study develops
Preference for precise definitions stated at the outset	Preference for definitions in context or as study progresses
Data reduced to numerical scores	Preference for narrative description
Much attention to assessing and improving reliability of scores obtained from instruments	Preference for assuming that reliability of inferences is adequate
Assessment of validity through a variety of procedures with reliance on statistical indices	Assessment of validity through cross-checking sources of information (triangulation)
Preference for random techniques for obtaining meaningful samples	Preference for expert informant (purposive) samples
Preference for descriptions of procedures	Preference for narrative/literary descriptions of procedures
Preference for design or statistical control of extraneous variables	Preference for logical analysis in controlling or accounting for extraneous variables
Preference for specific design control for procedural bias	Primary reliance on researcher to deal with procedural bias
Preference for statistical summary of results	Preference for narrative summary of results
Preference for breaking down of complex phenomena into specific parts for analysis	Preference for holistic description of complex phenomena
Willingness to manipulate aspects, situations, or conditions in studying complex phenomena	Unwillingness to tamper with naturally accruing phenomena

Cohen and Manion (1994) identify the first stage in the research process as being identification and formulation of the "problem". There may not always be a "problem" as such as the focus for research, but in this instance there is. The problem identified is that adequacy of initial teacher education in the colleges of education to produce qualified teachers for the reformed education system. The methodology of development and administering the survey instrument for this study is shown in Figure 5.1.

Figure. 5.1 Actual used stages in this research survey (Adapted from Cohen, et. al., 2000)



5.2.1 Development of the Questionnaire

The questionnaire has been designed to collect quantitative data from each of the respondents. Questionnaires have probably been the most frequently used research tool in general education research (Oppenheim, 1992) as well as in evaluating initial teacher education programmes.

A questionnaire was used as the most suitable tool to gather such information at this stage. It is an effective means of gathering data from geographically scattered population (Gay, 1992). The questionnaires can be: (a) wholly closed-ended, with every question having a fixed range of alternative responses, (b) open-ended, with very broad questions designed to elicit the sample's own views rather than their responses to a re-specified range of answers, or (c) mixture of the two.

As Johnson & Christensen, (2004) stated that: strengths of questionnaires are:

- *Good for measuring attitudes and eliciting other content from research participants.*
- *Inexpensive (especially mail questionnaires and group administered questionnaires).*
- *Can provide information about participants' internal meanings and ways of thinking.*
- *Can administer to probability samples.*
- *Quick turnaround.*
- *Can be administered to groups.*
- *Perceived anonymity by respondent may be high.*
- *Moderately high measurement validity (i.e., high reliability and validity) for well constructed and validated questionnaires.*
- *Closed-ended items can provide exact information needed by researcher.*
- *Open-ended items can provide detailed information in respondents' own words.*
- *Ease of data analysis for closed-ended items.*
- *Useful for exploration as well as confirmation.*

Its potential advantages are:

1. The responses are gathered in a standardised way, so questionnaires are more objective, certainly more so than interviews.
2. Generally it is relatively quick to collect information using a questionnaire. However in some situations they can take a long time not only to design but also to apply and analyse.
3. Potentially information can be collected from a large portion of a group. This potential is not often realised, as returns from questionnaires are usually low. However return rates can be dramatically improved if the questionnaire is delivered and responded to in class time.

4. useful means of getting data from a relatively large number of people or from a representative sample of that population.
5. they are very efficient in terms of the researcher's use of time and effort. That is, it can distribute hundreds of them to students, colleagues or clients and get them completed and returned in the time it takes to set up and do half a dozen interviews. Questionnaires are also, usually, quicker to code and analyse that semi-structured or unstructured interviews.
6. a means of standardising the data collection process, i.e. everyone who completes it is being asked exactly the same questions in the same sequence
7. self-completion questionnaire may provide the respondent with time to reflect on the questions before answering them [especially if they can complete them in their own time].
8. respondents may feel that they can say what they really think if the questionnaire can be completed in privacy and anonymously [especially if the researcher is known to them or might be thought to have a vested interest in their answers] (Oppenheim, 1992, Cohen et al, 2000, Hoinville et al, 1978, Robson, 1993, & Blaxter et al, 1996, Johnson & Christensen, 2004) .

Johnson & Christensen (2004, p.164) present its some of its weaknesses such as:

1. *Usually must be kept short.*
2. *Reactive effects may occur (e.g., interviewees may try to show only what is socially desirable).*
3. *Nonresponse to selective items.*
4. *People filling out questionnaires may not recall important information and may lack self-awareness.*
5. *Response rate may be low for mail and email questionnaires.*
6. *Open-ended items may reflect differences in verbal ability, obscuring the issues of interest.*
7. *Data analysis can be time consuming for open-ended items.*
8. *Measures need validation.*

However, using questionnaires is not without limitations, such as:

1. There are hidden costs in the use of questionnaires. It may be a quicker method of collecting data and the format may facilitate data analysed but the design of a good questionnaire with clear instructions and unambiguous questions can take a long time. Semi-structured and unstructured interview schedules can be developed more quickly

because the researcher gets immediate feedback from the respondents if they do not understand the questions.

2. Researcher may not always know that his carefully constructed questionnaire is not asking the 'right' questions until he start analysing the data, i.e. when it is too late to do anything about it. If they have sufficient time researchers try to get round this problem by piloting the questionnaire with a small group drawn from the population they are interested in before they make the final adjustments to it. But this is time consuming and practitioners doing research on a part-time basis do not always feel that they can spare the time to do this.
3. Once researcher have sent out the questionnaire he/she have little control over the situation. Suppose only a few completed ones are returned, i.e. what researchers refer to as a low response rate. Researchers can try several things to increase the likelihood of a good response rate:
   a. Get a 'captive' population or sample to complete it, i.e. ask students to complete it during a seminar or clients to complete it in your presence;
   b. Explain at the beginning of the questionnaire (or in an accompanying letter if it is a postal questionnaire) why their responses are important and what use will be made of the data.
   c. Make the questionnaire as user friendly and attractive as possible by using different font sizes, colour printing, attractive layout and provide as many opportunities as possible to tick boxes or ring code numbers so that it can be filled in as quickly as possible.
   d. Distribute reminders perhaps with a second copy of the questionnaire.
   e. Avoid a lot of open-ended questions. As we have seen, one of the advantages of a self-completion questionnaire is that it pre-codes people's responses into a standardised set of answers to facilitate data analysis (Oppenheim, 1992, Cohen et al, 2000, Hoinville et al, 1977, Robson, 1993, & Blaxter et al, 1996, Johnson & Christensen, 2004)

Johnson & Christensen (2004, pp.165-177) present fourteen principles of questionnaire construction, these are:

Principle 1: Make sure the questionnaire items match your research objectives.
Principle 2: Understand your research participants.
Principle 3: Use natural and familiar language.
Principle 4: Write items that are clear, precise, and relatively short.

Principle 5: Do not use "leading" or "loaded" questions.
Principle 6: Avoid double-barreled questions.
Principle 7: Avoid double negatives.
Principle 8: Determine whether an open-ended or a closed ended question is needed.
Principle 9: Use mutually exclusive and exhaustive response categories for closed-ended questions.
Principle 10: Consider the different types of response categories available for closed-ended questionnaire items.
Principle 11: Use multiple items to measure abstract constructs.
Principle 12: Reverse the wording in some of the items to prevent response sets. (A response set is the tendency of a participant to respond in a specific direction to items regardless of the item content.)
Principle 13: Develop a questionnaire that is easy for the participant to use.
Principle 14: Always pilot test your questionnaire.

Considering the advantages and limitations of using questionnaires, this study employed questionnaires as one of the main instruments of data elicitation.

The questionnaire was designed to be quick and easy for teachers to complete, with several questions involving a choice of circling the numbers, with a minimum amount of written response required. The questionnaire is divided into three parts: Firstly, some bibliographical information related to the participant's college, years of study or experience years and their regions of their schools.

The second part was specified for the attitudes; it divided in to two sections. In the first section a list of 11 reasons behind selection of teaching professional and in the second section there is other list of 6 reasons based for selection of scientific field specialisation. Respondent were asked to tick the reasons behind their decisions. They also asked to write other reasons which were not listed. Moreover they were asked what is their decision if they have chance to change their profession or specialisation and the reasons behind their decisions.

The third part included of 48 competencies, these items are formatted based on the competencies from the guidelines of initial field teacher education for the Omani Colleges of Education, which were discussed earlier in this thesis. These competencies were classified under six main domains:

1. General Competencies (9 statements)
2. Planning Competencies (7 statements)
3. Teaching Competencies (8 statements)
4. Classroom Management (7 statements)
5. Evaluation Competencies (7 statements)
6. Subject Knowledge Competencies (10 statements)

These statements translated from Arabic to English and the translation was reviewed by some Arab colleagues in Nizwa College of Education and Glasgow School of Education who were familiar with both Arabic and English. Final version was reviewed by the programme advisor in the Ministry of Higher Education.

The questionnaire is designed to allow the respondents to answer directly on it. Each item in the third part responded to on a five-point, Likert-type scale rating for each of the listed competencies.

Two demands were requested from the participants. Firstly, under column (A), the participants were asked to indicate their opinion about each competency by circling the appropriate number of the degree of the importance of each competency for the Omani initial teacher education as following:

1- Not important
2- Less Than Average Importance
3- Average Important
4- More Than Average Importance
5- Essential Importance

Secondly, under the column (B), in case of their agreement of the importance of the competence, they will indicate a degree of their competence or ability to each competence by circling the appropriate number, as following:

1- Not Competent
2- Less Than Average Competent
3- Average Competent
4- More Than Average Competent
5- Essential Competent

At the end of the questionnaire the respondents asked to write some competencies they think are missed and should be included and any suggestions or comments which may be help to acquire teaching competencies or support and improve teachers and teacher education programmes. The questionnaire is presented in Appendices 3a & 3b in both English and Arabic versions.

5.2.2 Population of the Study and Sampling

The population were targeted by this study are all, 2368, Scientific Field participants from the four colleges, Table 5.2 summarises the student teachers and teachers of the four groups of the programme.

Table 5.2 Number of the four groups of Scientific Field participants according to their colleges and enrolment and employment year

	Ibri	AlRustaq	Sur	Salalah	Total	Year of employment
1999/89	154	165	16	32	366	2002/01
2000/99	145	168	65	18	396	2003/02
2001/00	304	362	111	35	812	2004/03
2002/01	294	345	135	20	794	2005/06 (not all of them)
Total	897	1040	327	105	2368	

The sample consisted randomly selected groups of teachers from schools in 10 regions and student teachers of third and fourth years from these four colleges of education, 1850 student teachers in the colleges and to 242 teachers.

5.2.3 Pilot Study

After the questionnaire was developed, a pilot study was carried out, to determine whether the method was reliable, and if any changes should be made in order to make it more effective in measuring what it was supposed to measure. Thus, both reliability and validity tests of the research method were implemented

A pilot study is a pre-study of the fuller study. Given the complexity of the questionnaire design process, it is highly unlikely that the first draft of a questionnaire will be perfect. Pre-testing the questionnaire can highlight any problems with it, including excessive length, incomprehensibility, missing questions etc. Pilot studies focus on testing the whole administrative procedure of using the questionnaire in a smaller but representative sample of the participants before the main study. Here the aim is to test the whole questionnaire, letter of introduction, instructions to participants, reminder letters etc. It is a small-scale test of the main study to check that all the procedures are working properly and, if not, to rectify them before the main study. Here are some more reasons to consider a pilot study:

1. It permits preliminary testing of the hypotheses that leads to testing more precise hypotheses in the main study. It may lead to changing some hypotheses, dropping some, or developing new hypotheses.
2. It often provides the researcher with ideas, approaches, and clues he/she may not have foreseen before conducting the pilot study. Such ideas and clues increase the chances of getting clearer findings in the main study.
3. It permits a thorough check of the planned statistical and analytical procedures, giving him/her a chance to evaluate their usefulness for the data. Researcher may then be able to make needed alterations in the data collecting methods, and therefore, analyze data in the main study more efficiently.
4. It can greatly reduce the number of unanticipated problems because he/she have an opportunity to redesign parts of his/her study to overcome difficulties that the pilot study reveals.
5. It may save a lot of time and money. Unfortunately, many research ideas that seem to show great promise are unproductive when actually carried out. The pilot study almost always provides enough data for the researcher to decide whether to go ahead with the main study.
6. In the pilot study, the researcher may try out a number of alternative measures and then select those that produce the clearest results for the main study (Day, 1979 & Meriwether, 2001).

As Johnson & Christensen (2004, p.177) stated that: researcher will always find some problems that he/she have overlooked. The best pilot tests are with people similar to the ones to be included in the research study. After pilot testing the questionnaire, should be revised and pilot test it again, until it works correctly.

In order to examine the clarity and readability, and its implementability the questionnaire was initially piloted among seven of my colleagues and friends at Glasgow, including science education students from different countries in order to clarify any ambiguity in wording or sources of misinterpretation of the questions. Taking into account the suggestions and comments made, as well as many discussions with my supervisor, the questionnaire were modified and revised.

The first pilot study was conducted 9 teachers in AlDakhelyyah (Interior) region and two groups of student teachers in AlRustaq and Ibri Colleges of Education, 15 from the fourth year and 17 from third year Scientific Field groups. The timing to answer the questionnaire was recorded, first respondent finished his answers in 16 minutes and last one in 23 minutes. Some statements were modified in response to student's comments.

The second pilot study was implemented with 18 Scientific Field teachers from Muscat (the Capital) Region. As well, it was conducted to a group of 16 Scientific Field student teachers from Sur College of Education and a group of 10 student teachers form Ibri College . These allowed the questionnaire to be finalised for distribution to the full sample.

The data obtained from the pilot study was not included in details in the research report because the main aim of the pilot study was to test whether the respondents were able to complete the questionnaire correctly. Rreliability coefficient of the questionnaire results in the two pilot studies will be shown in section 5.3

5.2.4 Data Analyses

SPSS was the statistical software package used to analyse collected data. Descriptive statistics were used to organise, summarise, and describe the findings (Ary et al, 1990). Means were used to summarise and describe the data for 48 individual competencies. *T*-test were used to determine whether significant differences existed between the different groups of participants, teachers and student teachers, regarding their motivation towards teaching profession and scientific learning and teaching, in addition to their opinions of the importance and the degree of their competence in these competencies.

5.2.5 Validity of the Questionnaire

The pilot study also enables researchers to explore the validity of the questionnaire. "Validity tells us whether the question, item or score measures what it is supposed to measure" (Oppenheim, 1996, p.144,145). According to Neuman (2000), the validity of a survey is the degree of fit between a construct that a researcher uses to describe, theorise about, or analyse the social world and what actually occurs in the social world. It means truthfulness. It aims to make sure that survey items are clear and understandable, and the conceptual and operational definitions mesh with each other. Validity can be defined as 'the degree to which an instrument measures what it is supposed or intended to measure' (Oppenheim 1992 p. 160). Johnson & Christensen (2004, p.140-141), define validity as it refers to the accuracy of the inferences, interpretations, or actions made on the basis of test scores.

Cohen et al (2000, pp. 105-106) list several different kinds of validity, for example:

- *content validity;*
- *criterion-related validity;*
- *catalytic validity;*
- *cultural validity;*
- *descriptive validity;*
- *interpretive validity;*
- *theoretical validity;*
- *evaluative validity.*
- *external validity*
- *consequential validity;*
- *systemic validity;*
- *ecological validity;*
- *predictive validity;*
- *jury validity;*
- *face validity;*
- *internal validity;*
- *construct validity;*
- *concurrent validity;*

5.2.5.1 Internal and External Validity

Joppe (2000) provides the following explanation of what validity is in quantitative research:

> *"Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. In other words, does the research instrument allow you to hit "the bull's eye" of your research object? Researchers generally determine validity by asking a series of questions, and will often look for the answers in the research of others".* (cited in Golafshani, 2003, p. 1)

Campbell (1986) describe validity by dividing it into two types, internal validity and external validity. 'Internal validity refers to the degree to which a researcher is justified in concluding that an observed relationship is causal'. According to Cohen et al (2000, p.107)

> *"It seeks to demonstrate that the explanation of particular event, issue or set of data which a piece of research provides can actually be sustained by the data. In some degree this concerns accuracy, which can be applied to quantitative research. The findings must accurately describe the phenomena being researched".*

Lincoln and Guba (1985, p.219-301, cited in Cohen at al, 2000, p. 108) suggest that credibility in naturalistic inquiry can be addressed by:

- prolonged engagement in the field;
- persistent observation (in order to establish the relevance of the characteristics for the focus);
- triangulation (of methods, sources, investigators and theories);
- peer debriefing (exposing oneself to a disinterested peer in a manner akin to cross-examination, in order to test honesty, working hypotheses and to identify the next steps in the research);
- negative case analysis (in order to establish a theory that fits every case, revising hypotheses retrospectively)

- member checking (respondent validation) to assess intentionally, to correct factual errors, to offer respondents the opportunity to add further information or to put information on record; to provide summaries and to check adequacy of the analysis).

External validity is related to generalizing, it refers to degree to which the results can be generalized to the wider population, cases or situation. (Cohen et al, 2000, p.109). External validity refers to the approximate truth of conclusions the involve generalizations. Put in more pedestrian terms, external validity is the degree to which the conclusions in the study would hold for other persons in other places and at other times.

In naturalistic research threats to external validity include (Lincoln & Guba, 1985, p.189, 300, cited in Cohen et al, 2000, p.109):

- *selection effects (where constructs selected in fact are only relevant to a certain group);*
- *setting effects (where the results are largely a function of their context);*
- *history effects (where the situation have been arrived at by unique circumstances and therefore, are not comparable);*
- *construct effects (where the constructs being used are peculiar to a certain group).*

Descriptive validity refers to accuracy in the reporting of descriptive information. (Burke-Johnson, 1997:283). Interpretive validity is defined as "...the degree to which the research participants' viewpoints, thoughts, feelings, intentions, and experiences are accurately understood by the qualitative researcher." (Burke-Johnson, 1997:284).

According to Johnson & Christensen (2004, p.141), there are three main methods of collecting validity evidence:

1. Evidence Based on Content: Content-related evidence is based on a judgment of the degree to which the items, tasks, or questions on a test adequately represent the domain of interest. Expert judgment is used to provide evidence of content validity.
2. Evidence Based on Internal Structure: Some tests are designed to measure one general construct, but other tests are designed to measure several components or dimensions of a construct. For example, the Rosenberg Self-Esteem Scale is a 10 item scale designed to measure the construct of global self-esteem. In contrast, the Harter Self-Esteem Scale is designed to measure global self-esteem as well as several separate dimensions of self-esteem.

- The use of the statistical technique called factor analysis tells researcher the number of dimensions (i.e., factors) that are present. That is, it tells researcher whether a test is unidimensional (just measures one factor) or multidimensional (i.e., measures two or more dimensions).

- When the researcher examine the internal structure of a test, he/she can also obtain a measure of test homogeneity (i.e., how well the different items measure the construct or trait).
- The two primary indices of homogeneity are the item-to-total correlation (i.e., correlate each item with the total test score) and coefficient alpha (discussed earlier under reliability).

3. Evidence Based on Relations to Other Variables: This form of evidence is obtained by relating researcher test scores with one or more relevant criteria. A criterion is the standard or benchmark that he/she wants to predict accurately on the basis of the test scores. Note that when using correlation coefficients for validity evidence we call them validity coefficients.

There are several different kinds of relevant validity evidence based on relations to other variables. The first is called criterion-related evidence which is validity evidence based on the extent to which scores from a test can be used to predict or infer performance on some criterion such as a test or future performance. Here are the two types of criterion-related evidence:

- Concurrent evidence: validity evidence based on the relationship between test scores and criterion scores obtained at the same time.
- Predictive evidence: validity evidence based on the relationship between test scores collected at one point in time and criterion scores obtained at a later time.

Here are three more types of validity evidence researchers should provide:

- Convergent evidence: validity evidence based on the relationship between the focal test scores and independent measures of the same construct. The idea is that he/she want his/her test (that he/she is trying to validate) to strongly correlate with other measures of the same thing.
- Divergent evidence: evidence that the scores on his/her focal test are not highly related to the scores from other tests that are designed to measure theoretically different constructs. This kind of evidence shows that the test is not a measure of those other things (i.e., other constructs).
- Putting the ideas of convergent and divergent evidence together, the point is that to show that a new test measures what it is supposed to measure, he/she want it to

correlate with other measures of that construct (convergent evidence) but researcher also want it not to correlate strongly with measures of other things (divergent evidence). The researcher wants his/her test to overlap with similar tests and to diverge from tests of different things. In short, both convergent and divergent evidence are desirable.

- Known groups evidence is also useful in demonstrating validity. This is evidence that groups that are known to differ on the construct do differ on the test in the hypothesized direction.

Johnson & Christensen (2004, p.141), argued that in recent years, our thinking about validity issues has moved from discussion of types of validity (i.e., content validity, criterion validity, and construct validity) to a focus on obtaining evidence for a unitary validity. They added that, the latest thinking is clearly outlined in the following quote from the authoritative Standards for Educational and Psychological Testing (1999):

> *"These sources of evidences [content, criterion, and construct] may illuminate different aspects of validity, but they do not represent distinct types of validity. Validity is a unitary concept. It is the degree to which all the accumulated evidence supports the intended interpretation of test scores for proposed purpose". (p.11)*

5.2.5.2 Triangulation

Triangulation using more than one method or instrument or more than one source of data to study the same variable or phenomenon. Validity can be increased through triangulation. By combining multiple observers, theories, methods, and empirical materials, researchers can hope to overcome the weakness or intrinsic biases and the problems that come from single method, single-observer, single-theory studies. There are five basic type of triangulation:

a. data triangulation, involving time, space, and persons
b. investigator triangulation, which consist of the use of multiple, rather than single observers;
c. theory triangulation, which consists of using more than one theoretical scheme in the interpretation of the phenomenon;
d. methodological triangulation, which involves using more than one method and may consist of within-method or between-method strategies.

e. multiple triangulation, when the researcher combines in one investigation multiple observers, theoretical perspectives, sources of data, and methodologies (Denzin & Lincoln, 1998)

Lincoln and Guba (1985) discussed triangulation of data as it may apply to sorces, methods, investigators and theories. Lincoln and Guba (1985) and Neimeyer and Resnikoff (1983) have argued that triangulation by method, that is, using both quantitative and qualitative research methods within one study to measure the same subject matter, produces a rich composite which could not otherwise be obtained with a single approach.

Guba argues that if the investigator immerses her/himself in the investigation with as open a mind as possible, impressions can emerge from the context, rather than these being projected by the inquirer (1978, p.13). As impressions emerge, according to Guba, the researcher tests their validity using a variety of means; the central method being "triangulation", where one source is checked against another. Data is recycled and re triangulated, until convergence occurs. Guba (1978) characterises naturalistic inquiry as an expansionist mode of investigation, where a holistic view is sought, which will permit the researcher to describe and understand phenomena as wholes, or at least in ways which reflect their situated complexity (p.14).

Generally, this study conducted multiple methods i.e. questionnaire, interview and observation. Triangulating multiple sources of data through multiple data collection and interpretation techniques and a range of theoretical constructs helps to minimise researcher bias, and, thus, contributes to the internal validity of the study. Triangular techniques are particularly appropriate to this study because of the complex nature of the phenomena under investigation.

The following table provides an overview of the major methods used for collecting data during evaluations.

Table: 5.3 The major methods used for collecting data during evaluation

Method	Overall Purpose	Advantages	Challenges
questionnaires, surveys, checklists	when need to quickly and/or easily get lots of information from people in a non threatening way	-can complete anonymously -inexpensive to administer -easy to compare and analyze -administer to many people -can get lots of data -many sample questionnaires already exist	-might not get careful feedback -wording can bias client's responses -are impersonal -in surveys, may need sampling expert - doesn't get full story

interviews	when want to fully understand someone's impressions or experiences, or learn more about their answers to questionnaires	-get full range and depth of information -develops relationship with client -can be flexible with client	-can take much time -can be hard to analyze and compare -can be costly -interviewer can bias client's responses
documentation review	when want impression of how programme operates without interrupting the programme; is from review of applications, finances, memos, minutes, etc.	-get comprehensive and historical information -doesn't interrupt programme or client's routine in programme -information already exists -few biases about information	-often takes much time -info may be incomplete -need to be quite clear about what looking for -not flexible means to get data; data restricted to what already exists
observation	to gather accurate information about how a programme actually operates, particularly about processes	-view operations of a programme as they are actually occurring -can adapt to events as they occur	-can be difficult to interpret seen behaviours -can be complex to categorize observations -can influence behaviours of programme participants -can be expensive
focus groups	explore a topic in depth through group discussion, e.g., about reactions to an experience or suggestion, understanding common complaints, etc.; useful in evaluation and marketing	-quickly and reliably get common impressions -can be efficient way to get much range and depth of information in short time - can convey key information about programmes	-can be hard to analyze responses -need good facilitator for safety and closure -difficult to schedule 6-8 people together
case studies	to fully understand or depict client's experiences in a programme, and conduct comprehensive examination through cross comparison of cases	-fully depicts client's experience in programme input, process and results -powerful means to portray programme to outsiders	-usually quite time consuming to collect, organize and describe -represents depth of information, rather than breadth

Adapted from (Carter McNamara, 1998)

5.2.5.3 Reliability

Researchers need to be clear whether the methods they are using to collect and analyse data are consistent; in other words that the same research instrument would produce the same results if administered repeatedly. Reliability can be broadly defined as, of a measurement refers to the consistency or repeatability of the measurement of some phenomena. If a measurement instrument is reliable, that means the instrument can measure the same thing more than once or using more than one method and yield the same result. Thus the term reliability means "repeatability" or "consistency". A measure is considered reliable if it would give us the same result over and over again Cohen et al (2002, p.117-119). Joppe (2000) defines reliability as:

> *"...The extent to which results are consistent over time and an accurate representation of the total population under study is referred to as reliability and if the results of a study can be reproduced under a similar methodology, then the research instrument is considered to be reliable".* (cited in Golafshani, 2003, p. 1)

According to Johnson & Christensen (2004, p.133-139), reliability refers to consistency or stability. In psychological and educational testing, it refers to the consistency or stability of the scores that we get from a test or assessment procedure.

1. *Reliability is usually determined using a correlation coefficient (it is called a reliability coefficient in this context).*
2. *Remember (from chapter two) that a correlation coefficient is a measure of relationship that varies from -1 to 0 to 1 and the farther the number is from zero, the stronger the correlation. For example, minus one (-1.00) indicates a perfect negative correlation, zero indicates no correlation at all, and positive one (+1.00) indicates a perfect positive correlation. Regarding strength, -.85 is stronger than +.55, and +.75 is stronger than +.35. When you have a negative correlation, the variables move in opposite directions (e.g., poor diet and life expectancy); when you have a positive correlation, the variables move in the same direction (e.g., education and income).*
3. *When looking at reliability coefficients we are interested in the values ranging from 0 to 1; that is, we are only interested in positive correlations. Note that zero means no reliability, and +1.00 means perfect reliability.*
4. *Reliability coefficients of .70 or higher are generally considered to be acceptable for research purposes. Reliability coefficients of .90 or higher are needed to make decisions that have impacts on people's lives (e.g., the clinical uses of tests).*
5. *Reliability is empirically determined; that is, we must check the reliability of test scores with specific sets of people. That is, we must obtain the reliability coefficients of interest to us.*

However, reliability refers to the consistency, stability, and repeatability of a data collection instrument. A reliable instrument does not respond to chance factors or environmental conditions; it will have consistent results if repeated overtime or if used by two different investigators. There are three methods of testing the reliability of research instruments:

- *tests for the stability of the instruments (how stable it is over time)*
- *tests for equivalence (consistency of the results by different investigators or similar tests at the same time)*
- *internal consistency (the measurement of the concept is consistent in all parts of the test).*

According to Johnson & Christensen (2004, p.133), reliability refers to the consistency or stability of test scores but validity refers to the accuracy of the inferences or interpretations we make from test scores. Reliability is a necessary but not sufficient condition for validity (i.e., if you are going to have validity, you must have reliability but reliability in and of itself is not enough to ensure validity.

There are two ways that reliability is usually estimated: test/retest and internal consistency.

1. Test/ Retest: Test/retest is the more conservative method to estimate reliability. Simply put, the idea behind test/retest is that you should get the same score on test 1 as you do on test 2. The three main components to this method are as follows:

a. implement your measurement instrument at two separate times for each subject;
b. compute the correlation between the two separate measurements;
c. assume there is no change in the underlying condition (or trait you are trying to measure) between test 1 and test 2.

2.Internal Consistency: Internal consistency estimates reliability by grouping questions in a questionnaire that measure the same concept. For example, you could write two sets of three questions that measure the same concept (say class participation) and after collecting the responses, run a correlation between those two groups of three questions to determine if your instrument is reliably measuring that concept (Miller, 1991).

One common way of computing correlation values among the questions on the instruments is by using Cronbach's Alpha. In short, Cronbach's alpha splits all the questions on the instrument every possible way and computes correlation values for them all. Cronbach's alpha is a less conservative estimate of reliability than test/retest.

The primary difference between test/retest and internal consistency estimates of reliability is that test/retest involves two administrations of the measurement instrument, whereas the internal consistency method involves only one administration of that instrument.

In other word, reliability is the correlation of an item, scale, or instrument with a hypothetical one which truly measures what it is supposed to. Since the true instrument is not available, reliability is estimated from high correlation among the variables comprising the scale (Cronbach's alpha); from the correlation of two equivalent forms of the scale (split halves reliability); or from the extent to which an item, scale, or instrument will yield the same score when administered in different times, locations, or populations, when the two administrations do not differ in relevant variables (ex., test-retest reliability).

In order to assure the reliability of the questionnaire of this study, a test-retest technique were used to check the reliability. As well as Cronbach's Alpha was obtain to test for internal consistency of the data. The reliability coefficient of the questionnaire results in the two pilot studies are shown in table 5.4. It can be observed that most of the questions obtained a Cronbach's Alpha coefficient of 0.8 and above. According to Miller, (1991), a coefficient of more than 0.8 is considered highly reliable. Questions under Domains 2 in both pilots and 5 in Pilot 1, and 6 in pilot 2 were considered to be moderately reliable. The data were additionally reliable in view of the fact that this minor population of the participants in both pilots contrasting with large number of them for attending the main study.

Table 5.4 the reliability coefficient of the questionnaire results in the two pilot studies

No.	Domains (variables)	No. of items	First Pilot		Second Pilot	
			No. of Respondents	Alpha coefficient	No. of Respondents	Alpha coefficient
1	Motivation to teaching	17	41	.8310	44	.8021
2	General competencies	9	41	.7455	44	.7216
3	Planning competencies	7	41	.8102	44	.8012
4	Teaching competencies	8	41	.8012	44	.8140
5	Classroom management	7	41	.7649	44	.8031
6	Assessment & evaluation	7	41	.8203	44	.6872
7	Subject Knowledge Competencies	10	41	.8061	44	.8024

5.3 Interviews

An interview is a series of questions a researcher addresses personally to respondents (Macionis & Plummer, 1998). An interview may be structured (where the researcher asks clearly defined questions) or unstructured, to allow some of the questioning to be led by the responses of the interviewee. To be specific, structured data is organized and can be produced by closed questions, unstructured data is relatively disorganized and can be produced by open questions. Sometimes it is a better idea to use a videotape recorder to record the interview, if the interviewee has consented to do so. There are advantages and limitations to adopting the interview method. The greatest value lies in the depth and detail of information that can be secured. It far exceeds the information obtained from telephone and mail surveys. During the interview, the interviewers have more control and opportunities to improve the quality of information acquired. However, such a data collection method has a certain level of limitations and drawbacks.

Semi-structured interviews of teachers and student teachers were used because they provide a greater breadth than other types of data collection approaches (Fontana & Frey, 1994) and are useful for identifying possible areas for more detailed analysis. The interviews are a common way to generate qualitative data, being less formal than structured interviews (Arksey & Knight, 1999),

Interview methods allow the participants to reconstruct their own observations and experiences. Interview items were prepared in advance by the researcher and were piloted by using two teachers and one student teacher in Oman. These interviews were type-recorded, so that the general sequences of interview items were re-arranged and some of questions were clarified.

Sample of 13 teachers and 14 student teachers whom signed their agreement to be interviewed were randomly. These interviews also extended to other educators, 4 headteachers, 5 inspectors and College's 8 lecturers. The interview questions in English and in Arabic are shown in Appendices 4a & 4b.

The interview questions are designed from a generally constructivist position, and a methodology is derived from techniques described mainly by Guba (1981), Guba & Lincoln (1989) Lincoln & Guba (1985) stated that:

> *"there needs to be a match (congruence) between the problem being investigated, the inquiry paradigm, and the context in which the research is conducted for the inquiry to be able to produce meaningful results"*

The second type of interviews was obtained in this study is the follow-up interviews which were run with participants after observed their lessons. Observed teachers and student teachers were asked some questions in order to allow them clarify their opinions regarding the observed teaching situations.

The Third type of interviews were used is the open-ended conversational interviews. These interviews were engaged with some educators who related to teaching and schooling work and teacher education programmes, i.e. headteachers, inspectors, and curriculum advisors in the Ministry of Education and then Ministry of Higher Education.

5.4 Observations

According to Cooper and Emory's definition:

> *"Observation qualifies as scientific inquiry when it is specifically designated to answer a research question, is systematically planned and executed, uses proper controls, and provides a reliable and valid account of what happened."* (Cooper & Emory, 1995)

As per the meaning of "observation", data is usually collected visually. However, observation also involves touching, listening, reading, and smelling. There are two types of observation (Kumar, 1996):

1. Participant observation
2. Non-participant observation

Participant observation refers to a researcher participating in the activities of the group being observed in the same manner as its members, with or without their knowing that they are being observed.

Non-participant observation, however, refers to a researcher not getting involved in the group activities but remaining a passive observer. For example, the researcher may want to study a different level of student participation in a group discussion situation. The researcher as an observer will listen, watch and record the behaviour of each student. After a few observations, conclusions can be drawn about the students' attitudes to participating in the group discussion.

During the observation method, the researcher observes participants in natural and/or structured environments. It is important to collect observational data (in addition to attitudinal data) because what people say is not always what they do.

Observation can be carried out in two types of environments:

- Laboratory observation (which is done in a lab set up by the researcher).
- Naturalistic observation (which is done in real-world settings).

There are two important forms of observation: quantitative observation and qualitative observation.

1) Quantitative observation involves standardization procedures, and it produces quantitative data.

- The following can be standardized:
  - Who is observed.
  - What is observed.

- When the observations are to take place.
- Where the observations are to take place.
- How the observations are to take place.

- Standardized instruments (e.g., checklists) are often used in quantitative observation.
- Sampling procedures are also often used in quantitative observation:
  - Time-interval sampling (i.e., observing during time intervals, e.g., during the first minute of each 10 minute interval).
  - Event sampling (i.e., observing after an event has taken place, e.g., observing after teacher asks a question).

2) Qualitative observation is exploratory and open-ended, and the researcher takes extensive field notes.

The qualitative observer may take on four different roles that make up a continuum:

- Complete participant (i.e., becoming a full member of the group and not informing the participants that you are studying them).
- Participant-as-Observer (i.e., spending extensive time "inside" and informing the participants that you are studying them).
- Observer-as-Participant (i.e., spending a limited amount of time "inside" and informing them that you are studying them).
- Complete Observer (i.e., observing from the "outside" and not informing that participants that you are studying them).

Following is a list of the strengths and weaknesses of observational data. First, strengths of observational data are:

- Allows one to directly see what people do without having to rely on what they say they do.
- Provides firsthand experience, especially if the observer participates in activities.
- Can provide relatively objective measurement of behaviour (especially for standardized observations).
- Observer can determine what does not occur.
- Observer may see things that escape the awareness of people in the setting.
- Excellent way to discover what is occurring in a setting.
- Helps in understanding importance of contextual factors.
- Can be used with participants with weak verbal skills.

- May provide information on things people would otherwise be unwilling to talk about.
- Observer may move beyond selective perceptions of people in the setting.
- Good for description.
- Provides moderate degree of realism (when done outside of the laboratory).

Weaknesses of observational data are:

- Reasons for observed behaviour may be unclear.
- Reactive effects may occur when respondents know they are being observed (e.g., people being observed may behave in atypical ways).
- Investigator effects (e.g., personal biases and selective perception of observers)
- Observer may "go native" (i.e., over-identifying with the group being studied).
- Sampling of observed people and settings may be limited.
- Cannot observe large or dispersed populations.
- Some settings and content of interest cannot be observed.
- Collection of unimportant material may be moderately high.
- More expensive to conduct than questionnaires and tests.
- Data analysis can be time consuming.

Classroom observation was conducted by the researcher in this study. Six different Scientific Field teachers from two regions were observed in different lessons, and six student teachers from two colleges were also observed during their practicum programme. The duration for each observation was for a session of about 45 minutes. These observations were obtained in order to gain a further insight into students and teachers reactions to the teaching methods and classroom management to remark if there any evidence of constructivist teaching the as well as to gauge the classroom environment in the actual situation. From reviewing some studies in this particular field, it was found that the checklist which were initiated by (So, 2002) is adequate for such research. It includes a set of characteristics of constructivist teaching. The features of constructivist teaching were grouped into six domains as following:

1. Use pupils' existing knowledge to guide teaching
2. Guide pupils to generate explanations and alternative interpretations
3. Devise incisive questions
4. Provide materials and activities for pupils to test ideas

5. Provide a classroom atmosphere conducive to discussion
6. Provide opportunities for pupils to utilise new ideas

With altogether 22 items utilised as a guide to evaluating and categorizing classroom teaching. With a 4-point rating ranging from strongly agree (3), agree (2), slightly agree (1) to not observed (0). The observation checklist in English and Arabic version are presented in appendices 5a & 5b

5.5 Trustworthiness

The aim of trustworthiness in a qualitative inquiry is to support the argument that the inquiry's findings are "worth paying attention to" (Lincoln & Guba, 1985, p.290). This is quite different from the conventional experimental precedent of attempting to show validity, soundness, and significance (Fenton & Mazulewicz, 2005). In any qualitative research project, four issues of trustworthiness demand attention: credibility, transferability, dependability, and confirmability. Credibility is an evaluation of whether or not the research findings represent a "credible" conceptual interpretation of the data drawn from the participants' original data (Lincoln & Guba, 1985, p.296). "Transferability is the degree to which the findings of this inquiry can apply or transfer beyond the bounds of the project". "Dependability is an assessment of the quality of the integrated processes of data collection, data analysis, and theory generation". "Confirmability is a measure of how well the inquiry's findings are supported by the data collected". (Lincoln & Guba, 1985). In this inquiry, trustworthiness was enhanced through the strategies detailed below.

Lincoln and Guba (1985) address trustworthiness by suggesting that credibility, transferability, dependability and confirmability are required from a study. First, they suggest that in order to demonstrate truth value, the reconstructions that have been arrived at by the researcher should be credible to the constructors of the original multiple realities (the participants). Similarly, Walsh (1998) suggests participant validation as essential in ethnographic research, whereby the researcher shows findings to the participants for their agreement that this is what they say and do.

Guba and Lincoln (1981) propose four criteria for evaluating qualitative findings and enhancing trustworthiness. While each criterion has an analogous quantitative criterion, the list is believed to better reflect the assumptions and epistemology underlying qualitative research. These criteria can be both incorporated into a research design and be used to assess qualitative findings:

1. Credibility. This criterion is an assessment of the believability or credibility of the research findings from the perspective of the members or study participants. The inclusion of member checking into the findings, that is, gaining feedback on results from the participants, is one method of increasing credibility. Credibility is analogous to internal validity, that is, the approximate truth about casual relationships, or the impact of one variable on another.
2. Transferability. Refers to the degree that findings can be transferred or generalized to other settings, contexts, or populations. A qualitative researcher can enhance transferability by detailing the research methods, contexts, and assumptions underlying the study. Transferability is analogous to external validity, that is, the extent to which findings can be generalized.
3. Dependability. Pertains to the importance of the researcher accounting for or describing the changing contexts and circumstances that are fundamental to qualitative research. Dependability may be enhanced by altering the research design as new findings emerge during data collection. Dependability is analogous to reliability, that is, the consistency of observing the same finding under similar circumstances.
4. Confirmability. Refers to the extent that the research findings can be confirmed or corroborated by others. Strategies for enhancing confirmability include searching for negative cases that run contrary to most findings, and conducting a data audit to pinpoint potential areas of bias or distortion. Confirmability is analogous to objectivity, that is, the extent to which a researcher is aware of or accounts for individual subjectivity or bias.

To achieve the purpose of informing the programme participants' perceptions, its findings must be seen to be trustworthy and therefore worth also considered by policy makers and educators.

Triangulation was also used, giving an opportunity to compare different kinds of data from different sources to see whether they corroborate each other. In this study questionnaires, interviews and observations were such a source

In terms of transferability, Lincoln and Guba (1985) suggest that it is contextual similarity that makes one set of findings appropriate to another setting, and that the responsibility of the researcher is to provide sufficient descriptive data to make such judgements possible by others.

Although the participants all came from similar colleges I deemed it necessary to gather rich descriptions of their particular settings, through observations, to allow for such applicability. My previous extensive experience in this context, as science basic education curriculum designer and later as teacher educator, was also brought to bear on the descriptions in this study.

Lincoln and Guba (1985) suggest that both dependability and confirmability can be achieved through accurate audit trails of the products generated throughout the research. A large amount of teacher's documents such as lessons preparation plans, assessment records of their pupils, general records of teaching, senior teachers reports, and supervisors' reports were gathered, examined and filed.

5.6 Ethical Considerations

Individual researchers or research communities engaged in human research are becoming aware of the risks they may place on individuals who take part in their research.

Johnson & Christensen (2004, p.133), define ethics as the principles and guidelines that help us to uphold the things we value. They discussed three major approaches to ethics:

- *Deontological Approach : This approach states that we should identify and use a Universal code when making ethical decisions. An action is either ethical or not ethical, without exception.*
- *Ethical scepticism: This viewpoint states that concrete and inviolate ethical or moral standards cannot be formulated. In this view, ethical standards are not universal but are relative to one's particular culture, time, and even individual.*
- *Utilitarianism: This is a very practical viewpoint, stating that decisions about the ethics should be based on an examination and comparison of the costs and benefits that may arise from an action.*

They (Johnson & Christensen, 2004, p.112), proposed three primary areas of ethical concern for researchers:

1. The relationship between society and science.

- *Should researchers study what is considered important in society at a given time?*
- *Should the federal government and other funding agencies use grants to affect the areas researched in a society?*
- *Should researchers ignore societal concerns?*

2. Professional issues.

- *The primary ethical concern here is fraudulent activity (fabrication or alteration of results) by scientists. Obviously, cheating or lying are never defensible.*
- *Duplicate publication (publishing the same data and results in more than one journal or other publication) should be avoided.*

- *Partial publication (publishing several articles from the data collected in one study). This is allowable as long as the different publications involve different research questions and different data, and as long as it facilitates scientific communication. Otherwise, it should be avoided.*

3. Treatment of Research Participants

- *This is probably the most fundamental ethical issue in the field of empirical research.*
- *It is essential that one insures that research participants are not harmed physically or psychologically during the conduct of research.*
- *In the next section, we will go into the issue of treatment of research participants in depth.*

An awareness that the most important actors of the research process are the participants took the researcher to draft a certain code of conduct that establish his responsibilities and participants' rights. This to assure that the participants being respected as individuals and sows a commitment not to harm them in any way, especially that this research was taking an evaluative study in context which can describes as a conservative society.

This study involved a number of ethical concerns. Firstly the field of this research relying on the request of the decision makers the Ministry of Higher Education who sponsored the researcher. In this study, initial contacts were made for both selected contexts, Ministry of Higher Education and Ministry of Education, with the proof letter from the supervisor. The letter contained the researcher identification and the purpose of the study. By granting permission from both the Ministries by sending a formal letters to the Colleges and to the Departments of education in the regions and from the regions departments to schools, it was allowed for the researcher to implement the instruments of the study. Copies of some of the official letters are shown in appendices 6a-6e.

Secondly, individuals of participants were informed that they are free where to participate in the study or not, and they are well informed of the research, its nature, purpose and its type of data gathered and analyses methods.

Thirdly, anonymity was followed, so the participants were not asked to give their names. In addition, the colleges and regions names does not mentioned throughout presentation of the results.

5.7 Summary

Identifying the appropriate research methodology is crucial to conduct a research. First this chapter begins with reviewing possible research approaches such as qualitative and quantitative techniques, and data collection methods. Strengths and drawback of each research approach and data collection method are investigated and documented. After the examination of available research methods, the remaining chapter concentrates on the selected methods for this study. The main research methodology chosen for this study is the quantitative approach using a written survey for data collection. Pilot studies and the validity and reliability of the questionnaire were presented in the chapter. The supporting research methodology for this study is the qualitative approach using different types of interviews, i.e. semi-structured, follow-up and open-ended conversational interviews, furthermore, using of observation of actual teaching during practicum or school teaching lessons. This chapter ended by presentation of ethical consideration of the study.

Chapter Six: Presentation of the Findings and Analyses of the First Stage: Importance and Internalisation of the Competencies

6.1 Introduction

One of the main purposes of this study is to explore the student teachers' and the practicing teacher's motivation towards the teaching profession and particularly teaching young pupils in the scientific field. The main objective of this study is also to determine the degree of importance of each of the competencies of the initial teacher education programmes in the Omani Colleges of Education training teachers for the Ministry of Education's Basic Education programs, and the self-perceived degree of the internalization of these competencies of the Omani teachers and student teachers. This chapter reports the results of the preliminary study. Firstly, data relating to the participants' characteristics is presented. Quantitative data collected are analysed and then presented in terms of "domains" of competencies. In the third section, the data relating to the participants' self-perceived degree of competence for teacher education programmes' competencies are presented. Then a comparison is made of participants' rating of importance and their perception of self-perceived internalisation and ability in each competency. Secondly, qualitative data from the open questions of the questionnaire and semi-structured interviews are presented. Finally, this chapter ends with a summary of these results.

6.2 Respondent Population

The population targeted by the study was 2368, which included student teachers and former Colleges of Education graduates, the practicing teachers of the scientific field of Basic Education Cycle One. The questionnaires were distributed to 1850 student teachers in the colleges and to 242 practicing teachers in the field, with 2011 responses obtained. Table 6.1 summarises the responses obtained in terms of the college attended and the year of study.

Table 6.1 Summary of Respondent Data

		Population of the study		No of distributed questionnaires		Respondents	
		N	%	N	%	N	%
Type off Participants	Student Teachers	2002	85	1850	88	1775	88
	Practicing Teachers	366	15	242	12	236	12
	Total	2368	100	2092	100	2011	100
Colleges	AlRustaq	1040	44	1020	49	987	49
	Sur	327	14	320	15	309	15
	Salalah	104	4	87	4	83	4
	Ibri	897	38	665	32	632	31
Year of Study (students)	2nd Year Students	794	40	740	40	730	41
	3rd Year Students	812	41	805	44	780	44
	4th Year Students	369	18	305	16	265	15

6.3 Motivation to Teaching

6.3.1 Reasons behind Choosing Teaching Profession

In the order to explore reasons given by participants in influencing their choice to become teachers in First Cycle Basic Education (FCBE) schools, a list of 11 possible reasons was presented, and the participants were asked to indicate the reasons behind their decision, and they were asked to tick as many as they wanted from the provided reasons. As shown in Table 6.2, it can be noticed that family affect is one of the main factors, as well as the influence of the social traditional view that the teaching profession is suitable work for women. Meanwhile, other reasons such as the benefits of teaching profession and social and economic worthiness were given high rankings. Even though both groups of participants are motivated to teaching and weigh these reasons as important, there is a non-ignorable percent indicating that teaching was the only choice for them. The least important factors given were friend's effect and previous school experience. However, it is obvious that there are no marked differences in the rankings of various reasons between the student teacher and teachers.

Table 6.2 Reasons for selecting teaching profession

	Reasons	**ST (n 1775)**	**T (n 236)**
1	I like working with children	55.6 %	54.6 %
2	There are long holidays	45.5 %	40.3 %
3	It is a socially worthwhile job	32.7 %	29.8 %
4	Being a teacher can help improve society	44.8 %	39.9 %
5	My family (parents) encouraged me to become a teacher	68.4 %	78.9 %
6	My friends encouraged me to become a teacher	22.4 %	24.2 %
7	My experience as a pupil gave me a positive image of the job	19.7 %	15.9 %
8	The level of salary is quite good	43.5 %	39.8 %
9	It was the only choice for me	57.8 %	56.5 %
10	Teaching is the suitable work for Omani women	65.4 %	79.5 %
11	I like teaching profession	47.7 %	41.3 %

Participants were given opportunity to add more reasons, and the reasons they suggested are listed below. Most of these reasons had been already mentioned in the previous list but perhaps they put them in different form.

- *"When once teaching children she is rewarded by Allah (the God)"*
- *"The job security."*
- *"Having a bachelor degree give me a chance to complete my postgraduate study."*
- *"To help the income of my family"*
- *"To help my kids to learn, in future, when I have my own family"*

6.3.2 Reasons behind Choosing the Scientific Field

Another list of probable reasons for choosing the scientific field specialisation as a teaching major was presented, and participants were requested to indicate their reasons for their choice. Table 6.3 presents the percentages for rating of the two groups. It can be noted that most of the participants reported selecting this specialisation as the only choice for them, even though they were strongly influenced in their choice by their view of importance of these subjects for pupils and society. It is interesting that there is a fairly high rank given for the interests in science and mathematics as well as the influence of the impressions towards these subjects from previous experience as pupil in school.

Table 6.3 Reasons for selecting scientific field specialisation

	Reasons	**ST (n 1775)**	**T (n 236)**
1	I am good at science and mathematics subject during my school study	38.6 %	36.4
2	Science and mathematics subjects are important subjects for pupils	47.8 %	44.8 5
3	This specialisation was the only choice for me	56.4 %	49.5 %
4	I have scientific interests	36.8 %	31.4 %
5	It is socially prestigious to teach scientific subjects	29.6 %	30.3 %
6	I was admired of science and mathematics teacher when I was a pupil	23.7 %	25.1 %

There were also some additional reasons reported by the participants, and these are listed below:

- *"The practical nature of these subjects, learning them can be enjoyable and not boring".*
- *"Be knowledgeable on some interesting scientific topics such as: diet and nutrition, human body and gardening [plants].*
- *"Be knowledgeable and updating my background to the new inventories and technologies"*
- *"Studying of scientific concepts and facts deepen once believes on the creator, Allah, (the God)"*

In order to explore their attitudes towards teaching in the scientific field, participants were asked about their decision to be science teachers in light of them having a chance to change their choice. Table 6.4 shows there were a number of participants who desired to change either their profession or specialisation or both of them.

Table 6.4 Percentages of participant's agree to change their profession & specialisation

	ST (n 1775)	**T (n 236)**
Changing profession only	21.7 %	24.0 %
Changing specialisation only	19.7 %	21.6 %
Changing both	9.5 %	10.6 %

Although there is a minority desiring to change from teaching or teaching in the science field, these results indicate that there is a lack of proper teaching motivation and of positive attitudes towards the scientific field specialisation among a number of student teachers and practicing teachers. They stated some reasons behind their decisions, such as:

- *"an inadequate salary in contrast the heavy duties".*
- *"unlike medicine, computing and administrative official works, teaching as a profession does not garner the status and respect the former other vocations".*
- *"the horrible working conditions, lack of necessities in schools".*
- *"the problem of crowded classrooms."*
- *"teachers under a pressure of responsible, they are blamed for any fails in education process ."*
- *"because mathematics subjects like algebra are very complicated comparing with science subjects but we have to study both of them."*
- *"we lose many marks because we have to study difficult subjects like physics so this reduce our grades, then this affect our employment or continuing postgraduate study".*
- *Our academic subjects [science & mathematics], look for example, General Physics 1 & 2, Algebra, Geometry, Mathematical Analysis ohh horrible... I feel jealous for my colleagues in First Field [Art subject: Islamic, Arabic & Social Sciences], what to do? This is our predestination.*

6.4 Importance of the Competencies

6.4.1 Domain 1 General Competencies

Respondents of the study were asked the following question: *To what degree do respondents believe that competencies of teacher education programmes are important for their profession?*

Based upon the rating given by respondents, the frequency for each competency was determined, and a measure of importance was assigned to each statement according to the frequency of responses. A mean value for each competency was also determined, and a rank order was assigned to each statement according to its mean value. For purposes of analysing mean values for each competency, the following scheme was used to interpret the respondent responses:

0.00-1.00 = not important (N I)

1.01-2.00 = less than average importance (LAI)

2.01-3.00 = average importance (AI)

3.01-4.00 = above average importance (AAI)

4.01-5.00 = essential importance (E I)

The mean is the average used here because it is the most familiar of all the measures of central tendency and corresponds with most people's notion of what an average is. The mean possesses a number of important mathematical properties and should be calculated only for interval/ratio data. (Miller, 2002)

As shown in Table 6.5, of the nine competencies of the Domain 1 General Competencies, the frequency (percent) for each competency was determined, and importance order was assigned to each statement according to the frequency of responses. Participants rated most competencies as having essential importance or above average importance. Table 6.5 also presents the rank order according to mean rating for the importance of each competency in Domain 1.

It is observed that participants considered the statement: "Cooperate with others in order to improve individual pupil's performance, and modernize the quality of the school and general life" as the most important competency (mean 4.53). In contrast, they considered the statement: "Consideration of societal values, inside and outside the school, and development of responsibility towards environmental and societal needs" as the least important competency (mean 4.09).

Table 6:5 Frequency & Rank of Importance of Domain 1 competencies as rated by respondents

No	Competencies	n (2011)						
		NI	LAI	AI	AAI	EI	m	*R*
1	Consideration of professional ethics in dealing with pupils in moral, spiritual, and social situations and provide equal opportunities between them.	1	1	6	29	63	4.43	2
2	Belief in the teachers' role in the achievement of the comprehensive educational development of students, and effect on the pupils' future, and acquire the desired positive attitudes of her profession toward dealing with pupils in this age (grades 1-4).	1	2	10	40	47	4.32	4
3	Develop positive attitudes toward the nation, the Arabic world, the Islamic world, all humanity and world peace.	2	1	7	28	62	4.34	3
4	Consideration of societal values, inside and outside the school, and development of responsibility towards environmental and societal needs.	3	2	14	34	47	4.09	7
5	Develop positive attitudes toward integrated development of pupils.	1	3	11	32	53	4.32	4
6	Consideration of educational responsibility and demonstration of supervision of students, as well as instructional and administrative responsibilities.	2	4	12	33	49	4.15	6
7	Cooperate with others in order to improve individual pupil's performance, and modernize the quality of the school and general life.	1	1	5	26	67	4.53	1
8	Develop abilities through self-learning and continuous professional development.	2	2	13	40	43	4.16	5
9	Develop her competencies in the English Language and in the use of computers.	2	1	9	35	53	4.32	4

6.4.2 Domain 2 Planning Competencies

As shown in Table 6.6, of the seven competencies of Domain 2 Planning Competencies, the frequency for each competency was determined, and importance order was assigned to each statement according to frequencies of responses. Participants rated these competencies as having essential importance and above average importance. Table 6.6 also presents the rank order according to the mean rating for the importance of each competency in Domain 2 Planning Competencies. It can be observed that participants considered the statement: "Prepare annual, term and daily teaching lesson plans, to achieving the efficiency and integration of school curriculum content, and its connectivity with all other curricula" as the most important competency (mean 4.31). In contrast they considered the statements: "Prepare annual, term and daily teaching lesson plans, to achieving the use of the environmental materials to prepare instructional media and employ them in different learning/teaching situations", and to "use proper evaluation methods to insure the achieving of the behavioural objectives" as the least important competencies (mean 3.99).

Table 6.6 Frequencies and rank of Importance of Domain 2 competencies as rated by respondents

No	Competencies	N (2011)						
	Prepare annual, term and daily teaching lesson plans, to achieve the following:	NI	LAI	AI	AAI	EI	m	*R*
1	Efficiency and integration of school curriculum content, and its connectivity with all other curricula.	2	2	10	34	52	4.31	1
2	Derivation and formation of the behavioural objectives in procedural, observable and measurable areas.	3	2	16	41	38	4.07	5
3	Determine the prerequisites for the topics studied in each subject.	2	4	13	40	41	4.09	4
4	Learn to use a variety of teaching styles, methods and strategies in an integrative way, in order to meet pupil's needs and abilities, and to achieve the behavioural objectives.	2	2	10	34	52	4.28	2
5	Use environmental materials to prepare instructional media and employ them in different learning/teaching situations.	2	4	19	39	36	3.99	6
6	Use proper evaluation methods to insure the achievement of the behavioural objectives.	3	4	20	37	36	3.99	6
7	Planning and designing of both inside the classroom and extra-class activities.	1	2	12	38	47	4.25	3

6.4.3 Domain 3 Teaching Competencies

As shown in Table 6.7, of the eight competencies of Domain 3 Teaching Competencies, the frequency for each competency was determined, and importance order was assigned to each statement according to frequencies of responses. Participants rated these competencies as having essential importance and above average importance. Table 6.7 also presents the rank order according to mean rating for the importance of each competency in Domain 3 Teaching Competencies. It can be observed that participants considered the statement: "Use different learning resources, including audiovisual and communication techniques with the appropriate topic and time" as the most important competencies (mean 4.54). In contrast, they considered the statement, "Activate cooperation with pupils' parents, staff colleagues and other members in the local community" as the least important competency (mean 4.02).

Table 6.7 Frequencies and Rank of importance of Domain 3 as rated by respondents

No	Competencies	n (2011)						
		NI	LAI	AI	AAI	EI	m	*R*
1	Stimulate pupils' motivation towards learning, by using outside and inside classroom activities, to develop their abilities, as well as, using individual or group work.	1	2	10	44	43	4.26	5
2	Maintain pupils' motivation towards learning throughout the lessons.	2	1	13	37	47	4.24	6
3	Implement learning principles and a variety of teaching methods and strategies to meet pupils' learning styles, particularly for special educational needs.	2	1	6	26	65	4.45	2
4	Use different learning resources, including audiovisual and communication techniques with the appropriate topic and time.	1	1	4	28	66	4.54	1
5	Implement group work activities to develop positive attitudes towards cooperation and teamwork between pupils.	2	1	7	38	52	4.34	4
6	Master communication and interaction skills with pupils and support them to express their ideas clearly and contribute effectively in activities.	2	2	12	39	47	4.24	6
7	Implement and integrate psychological and educational principles to stimulate pupil's motivation for learning.	1	1	7	37	54	4.40	3
8	Activate cooperation with pupils' parents, staff colleagues and other members in the local community.	1	3	19	42	35	4.02	7

6.4.4 Domain 4 Classroom Management Competencies

As shown in Table 6.8, of the seven competencies of Domain 4 Classroom Management competencies, the frequency for each competency was determined, and importance order was assigned to each statement according to frequencies of responses. Participants rated most competencies as having essential importance and above average importance. Table 6.8 also presents the rank order according to mean rating for the importance of each competency in Domain 4 Classroom Management competencies. It can be observed that participants considered the statement, "Organise and file pupils' records, and employ them in order to achieve effective learning" as the most important competency (mean 4.46). In contrast, they considered the statement: "Know, analyse and establish the proper solutions for the classrooms' behavioural problems" as the least important competency (mean 3.88).

Table 6.8 Frequencies and Rank of importance of Domain 4 as rated by respondents

No	Competencies	n (2011)						
		NI	LAI	AI	AAI	EI	m	R
1	Employ classroom management skills and organisation in order to attain affective learning and positive relationships between teacher and the pupils.	2	3	11	37	47	4.22	5
2	Set clear expectations for discipline in the classroom to control pupils' behaviour.	2	2	10	37	49	4.26	2
3	Organise learning experiences inside and outside the classroom	2	1	11	39	47	4.25	3
4	Organise and provide comfort, security and safety within the classroom's physical environment.	2	2	11	39	46	4.23	4
5	Know, analyse and establish the proper solutions for the classrooms' behavioural problems.	2	5	22	42	29	3.88	7
6	Manage and utilise time for learning in lessons and classroom activities.	2	5	19	40	34	3.97	6
7	Organise and file pupils' records, and employ them in order to achieve effective learning.	3	1	7	22	67	4.46	1

6.4.5 Domain 5 Evaluation Competencies

As shown in Table 6.9, of the seven competencies of Domain 5 Evaluation Competencies, the frequency for each competency was determined, and importance order was assigned to each statement according to frequencies of responses. Participants rated most competencies as having essential importance and above average importance. Table 6.9 also presents the rank order according to mean rating for the importance of each competency in Domain 5. It can be observed that participants considered the statement: "Outline assessment items and prepare performance tests in light of instructional objectives" as the most important competency (mean 4.43). In contrast, they considered the statement: "Contribute in writing of school reports, and provide suggestions" as the least important competency (mean 3.86).

Table 6.9 Frequencies and Rank of importance of Domain 5 as rated by respondents

No	Competencies	n (2011)						
		NI	LAI	AI	AAI	EI	m	R
1	Use oral, written, practical, research reports and cumulative records to evaluate and follow up pupils' progress.	2	3	13	33	49	4.21	4
2	Outline assessment items and prepare performance tests in light of instructional objectives.	2	2	7	25	64	4.43	1
3	Discover and support pupils' strengths, and diagnose and seek to overcome their weaknesses, with assistance of the pupils' cumulative records.	2	1	9	35	53	4.32	3

4	Analyses of tests and observations and filing them in a simple form for interpretation.	2	2	9	34	53	4.34	2
5	Use self-evaluation methods in order to obtain formative data, and then performance and authentic evaluation.	2	3	15	42	38	4.09	5
6	Contribute in evaluation of teaching/learning process and its factors.	3	4	16	38	39	4.01	6
7	Contribute in writing of school reports, and provide suggestions.	2	6	23	39	30	3.86	7

6.4.6 Domain 6 Subject Knowledge Competencies

As shown in Table 6.10, of the ten competencies of Domain 6 Mastery of Subject Knowledge Competencies, the frequency for each competency was determined, and importance order was assigned to each statement according to frequencies of responses. Participants rated most competencies as having essential importance and above average importance. Table 6.10 also presents the rank order according to mean rating for the importance of each competency in Domain 6. It can be observed that participants considered the statement: "Use a variety of learning resources to meet pupils' needs" as the most important competency (mean 4.53). In contrast, they considered the statement, "Know in general the history and geography of Oman, the Gulf States, and the Arabic World in order to follow information and developments in the economical, cultural and political fields" as the least important competency (mean 3.83).

Table 6.10 Frequencies and Rank of importance of Domain 6 as rated by respondents

No	Competencies	n (2011)						
		NI	LAI	AI	AAI	EI	m	*R*
1	Understand and implement concepts in the subject specialisation, and master the subject's content and applications.	4	6	21	39	30	4.32	2
2	Mastering of content of school subjects' content being taught in the First Cycle of Basic Education, learning the integration between them.	2	3	13	36	46	4.15	5
3	Use a variety of learning resources to meet pupils' needs.	2	3	17	38	40	4.53	1
4	Develop scientific and educational attitudes by research and continuous updating in the specialisation.	2	6	23	41	28	4.16	4
5	Understand and implement characteristics of curriculum construction and development including standard selection, analyses, classification, and sequence and consequence in curriculum development.	1	4	19	39	37	4.32	2
6	Employ life skills with the content.	1	2	12	36	49	4.06	6
7	Know in general the history and geography of Oman, the Gulf States, and the Arabic World in order to follow information and developments in the economic, cultural and political fields.	2	4	13	39	42	3.83	8

8	Make connections between pupils' lives and their environments in order to support preserving resources.	1	3	11	32	53	4.02	7
9	Follow up historical and contemporary events as well as national, social and religious occasions to support the local culture.	2	5	12	33	48	4.27	3
10	Understand the strong link between resources consumed by the population as well as new technologies and scientific discoveries.	1	2	5	26	66	4.16	4

6.4.7 Difference between Student Teachers and Beginning Teachers in their Rating of the Importance of the Competencies

In order to answer the second question of the study, "*To what degree do Student Teachers and Beginning Teachers differ in their rating of the importance of each of the competencies of teacher education programmes?*", comparisons are made between the two groups.

The hypothesis formulated in order to investigate the rating of importance of the competencies of the different groups of the study is:

"There will be no significant differences between student teacher and beginning teacher respondents' rating mean of importance of competencies".

Analyses of the data were conducted using *t*-tests on the groups comparisons of participants' mean ratings to determine if there were any statically significant difference between the subgroups of student teachers and beginning teachers. The t-test is explicitly designed to test whether the differences between the means of two groups are real, and statistically significant (Miller 1991). A t-test is used to determine if the scores of two groups differ on a single variable. It is designed to test for the differences in mean scores. It is appropriate only when looking at paired data and it is useful in analyzing scores of two groups of participants on a particular variable or in analyzing scores of a single group of participants on two variables (Kranzler& Moursund,1999).

6.4.7.1 Domain 1 General Competencies

Table 6.11 shows the analysis for student teachers and then beginning teachers. There is significant difference ($p \leq 0.05$) between student teachers and beginning teachers in their rating of importance of most of Domain 1 competencies.

Table 6.11 Summary of the analysis of the degree of importance rating by student teachers and beginning teachers for Domain 1 competencies

No.	Competencies	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Consideration of professional ethics in dealing with pupils in moral, spiritual, and social situations and providing equal opportunities between them.	4.46	.774	4.58	.722	.000	S
2	Belief in the teachers' role in the achievement of the comprehensive educational development of students, and effect on the pupils' future, and acquire the desired positive attitudes of her profession toward dealing with pupils in this age (grades 1-4).	4.20	.938	4.36	.825	.000	S
3	Develop positive attitudes toward the nation, the Arabic world, the Islamic world, all humanity and world peace.	4.41	.959	4.53	.812	.002	S
4	Consideration of societal values, inside and outside the school, and development of responsibility towards environmental and societal needs.	4.10	1.173	4.22	.980	.014	S
5	Develop positive attitudes toward integrated development of pupils.	4.35	.933	4.27	.908	.040	S
6	Consideration of educational responsibility and demonstration of supervision of students, as well as instructional and administrative responsibilities.	4.20	1.098	4.09	1.065	.019	S
7	Cooperate with others in order to improve individual pupil's performance, and modernize the quality of the school and general life.	4.54	.808	4.51	.884	.365	N.S
8	Develop abilities through self-learning and continuous professional development.	4.11	.970	4.23	1.013	.011	S
9	Develop her competencies in English Language and in the use of a computer.	4.34	.969	4.29	.959	.253	N.S

6.4.7.2 Domain 2 Planning Competencies

Table 6.12 shows the analysis for student teachers and then beginning teachers. There is no significant difference between student teachers and teachers in their rating of importance of most of Domain 2 competencies.

Table 6.12 Summary of analysis of the degree of importance rating by student teachers and beginning teachers for Domain 2 competencies

No.	Competencies Prepare annual, termly and daily teaching lesson plans, to achieve the following:	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Efficiency and integration of school curriculum content, and its connectivity with all other curricula.	4.31	.955	4.30	.956	.693	N.S
2	Derivation and formation of the behavioural objectives in procedural, observable and measurable areas.	4.08	1.032	4.06	.982	.607	N.S
3	Determine the prerequisites for the topics studied in each subject.	4.02	1.111	4.17	1.03 4	.003	S
4	Learn to use a variety of teaching styles, methods and strategies in an integrative way, in order to meet pupil's needs and abilities, and to achieve the behavioural objectives.	4.25	.998	4.32	.982	.143	N.S
5	Use environmental materials to prepare instructional media and employ them in different learning/teaching situations.	4.05	.969	3.92	1.08 9	.006	S
6	Use proper evaluation methods to insure the achievement of the behavioural objectives.	3.95	1.006	4.04	1.03 8	.056	N.S
7	Planning and designing of both inside the classroom and extra-class activities.	4.27	.889	4.22	.902	.275	N.S

6.4.7.3 Domain 3 Teaching Competencies

Table 6.13 shows the analysis for student teachers and then teachers. There is significant difference between student teachers and teachers in their rating of importance in four of the Domain 3 competencies.

Table 6.13 Summary of analysis of the degree of importance rating by student teachers and beginning teachers for Domain 3 competencies

No.	Competencies	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Stimulate pupils' motivation towards learning, by using outside and inside classroom activities, to develop their abilities, as well as, using individual or group work.	4.27	.813	4.24	.841	.409	N.S
2	Maintain pupils' motivation towards learning throughout the lessons.	4.18	.934	4.32	.861	.001	S
3	Implement learning principles and a variety of teaching methods and strategies to meet pupils' learning styles, particularly for special educational needs.	4.46	1.00 6	4.44	.979	.666	N.S
4	Use different learning resources, including audiovisual and communication techniques with the appropriate topic and time.	4.54	.868	4.54	.762	.914	N.S
5	Implement group work activities to develop positive attitudes towards cooperation and teamwork between pupils.	4.30	.957	4.39	.897	.030	S
6	Master communication and interaction skills with pupils and support them to express their ideas clearly and contribute effectively in activities.	4.36	.842	4.45	.762	.010	S
7	Implement and integrate psychological and educational principles to stimulate pupil's motivation for learning.	3.96	.993	4.10	.973	.002	S
8	Activate cooperation with pupils' parents, staff colleagues and other members in the local community.	4.21	1.01 6	4.23	.985	.521	N.S

6.4.7.4 Domain 4 Classroom Management Competencies

Table 6.14 shows the analysis for student teachers and then teachers. There is no significant difference between student teachers and teachers in their rating of importance of all of Domain 4 competencies except competency 4.

Table 6.14 Summary of analysis of the degree of importance rating by student teachers and beginning teachers for Domain 4 competencies

No	Competencies	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Employ classroom management skills and organisation in order to attain affective learning and positive relationships between teacher and the pupils.	4.26	.958	4.27	.946	.755	N.S
2	Set clear expectations for discipline in the classroom to control pupils' behaviour.	4.25	.979	4.25	.923	.955	N.S
3	Organise learning experiences inside and outside the classroom	4.23	.954	4.22	.977	.745	N.S
4	Organise and provide comfort, security and safety within the classroom's physical environment.	3.83	1.030	3.94	1.08 4	.014	S
5	Know, analyse and establish the proper solutions for the classrooms' behavioural problems.	3.96	.983	3.98	1.07 0	.632	N.S
6	Manage and utilise time for learning in lessons and classroom activities.	4.47	1.017	4.45	.985	.822	N.S
7	Organise and file pupils' records, and employ them in order to achieve effective learning.	4.20	1.044	4.22	1.01 3	.717	N.S

6.4.7.5 Domain 5 Evaluation Competencies

Table 6.15 shows the analysis for student teachers and then teachers. There are two when the differences are significant and these are (4) and (5).

Table 6.15 Summary of analysis of the degree of importance rating by student teachers and beginning teachers for Domain 5 competencies

No	Competencies	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Use oral, written, practical, research reports and cumulative records to evaluate and follow up pupils' progress.	4.46	.940	4.40	1.02 7	.199	N.S
2	Outline assessment items and prepare performance tests in light of instructional objectives.	4.29	.924	4.36	1.00 9	.117	N.S
3	Discover and support pupils' strengths, and diagnose and seek to overcome their weaknesses, with assistance of the pupils' cumulative records.	4.31	.907	4.38	.938	.055	N.S
4	Analyses of tests and observations and filing them in a simple form for interpretation.	3.96	1.02 2	4.25	.914	.000	S
5	Use self-evaluation methods in order to obtain formative data, and then performance and authentic evaluation.	3.92	1.14 6	4.14	1.05 9	.000	S
6	Contribute in evaluation of teaching/learning process and its factors.	3.83	1.09 0	3.90	1.02 5	.163	N.S
7	Contribute in writing of school reports, and provide suggestions.	3.77	1.19 8	3.83	1.16 9	.309	N.S

6.4.7.6 Domain 6 Subject Knowledge Competencies

Table 6.16 shows the analysis for student teachers and then teachers. There is no significant difference between student teachers and teachers in their rating of importance of all Domain 6 competencies other than for competencies (1), (2) and (4).

Table 6.16 Summary of analysis of the degree of importance rating by student teachers and beginning teachers for Domain 6 competencies

No.	Competencies	Student Teachers		Teachers		Sig. (2 tailed)	Sig
		M	S.D	M	S.D		
1	Understand and implement concepts in the subject specialisation, and master the subject's content and applications.	4.35	.933	4.27	.908	.040	S
2	Mastering of content of school subjects' content being taught in the First Cycle of Basic Education, learning the integration between them.	4.20	1.098	4.09	1.065	.019	S
3	Use a variety of learning resources to meet pupils' needs.	4.54	.808	4.51	.884	.365	N.S
4	Develop scientific and educational attitudes by research and continuous updating in the specialisation.	4.11	.970	4.23	1.013	.011	S
5	Understand and implement characteristics of curriculum construction and development including standard selection, analyses, classification, and sequence and consequence in curriculum development.	4.34	.969	4.29	.959	.253	N.S
6	Employ life skills with the content.	4.19	1.030	4.18	1.003	.822	N.S
7	Know in general the history and geography of Oman, the Gulf States, and the Arabic World in order to follow information and developments in the economic, cultural and political fields.	4.05	1.063	4.07	.980	.733	N.S
8	Make connections between pupils' lives and their environments in order to support preserving resources.	3.81	1.056	3.86	1.071	.300	N.S
9	Follow up historical and contemporary events as well as national, social and religious occasions to support the local culture.	4.05	.962	4.00	.994	.253	N.S
10	Understand the strong link between resources consumed by the population as well as new technologies and scientific discoveries.	4.29	.891	4.23	.927	.118	N.S

6.5 Perception of Competence for the Competencies

Further statistical analysis was done in order to answer the third question of the study,

To what degree do participants perceive that they have achieved the teacher education programme's competencies?

Based upon the ratings given by respondents, frequencies for each competency were determined, and competence order was assigned to each statement according to the number of responses. The mean value for each competency was also determined, and a rank order was assigned to each statement according to its mean value. For purposes of analysing mean values for each competency, the following scheme was used to interpret the mean values:

0.00-1.00 = not competent (NC)

1.01-2.00 = less than average competent (LAC)

2.01-3.00 = average competent (AC)

3.01-4.00 = above average competent (AAC)

4.01-5.00 = essential competent (EC)

As in previous section, for rating of importance, mean is also used here because it is the most familiar of all the measures of central tendency and corresponds with most people's notion of what an average is.

6.5.1 Domain 1 General Competencies

As shown in Table 6.17, of the nine competencies of Domain 1 General Competencies, participants perceive themselves are in average and in above average competent in all these competencies. Table 6.17 also presents the rank order according to mean rating for the perceived competence in each competency of Domain 1. It can be observed that respondents perceive themselves are the most competent in the area "Consideration of educational responsibility and demonstration of supervision of students, as well as instructional and administrative responsibilities" (mean 3.97). In contrast, they considered the statement "Develop her competencies in English Language and in the use of a computer" as the one they are least competent in (mean 3.04).

Table 6.17 Frequencies and rank of competence of Domain 1 competencies as perceived by respondents

No	Competencies	n (2011)						
		NC	LAC	AC	AAC	EC	m	*R*
1	Consideration of professional ethics in dealing with pupils in moral, spiritual, and social situations and provide equal opportunities between them.	1	6	49	38	6	3.40	5
2	Belief in the teachers' role in the achievement of the comprehensive educational development of students, and effect on the pupils' future, and acquire the desired positive attitudes of her profession toward dealing with pupils in this age (grades 1-4).	3	16	42	31	8	3.20	8
3	Develop positive attitudes toward the nation, the Arabic world, the Islamic world, all humanity and world peace.	3	8	36	42	11	3.46	4
4	Consideration of societal values, inside and outside the school, and development of responsibility towards environmental and societal needs.	5	11	36	37	11	3.34	7

5	Develop positive attitudes toward integrated development of pupils.	3	6	17	43	31	3.92	2
6	Consideration of educational responsibility and demonstration of supervision of students, as well as instructional and administrative responsibilities.	3	3	18	45	31	3.97	1
7	Cooperate with others in order to improve individual pupil's performance, and modernize the quality of the school and general life.	3	6	27	46	18	3.71	3
8	Develop abilities through self-learning and continuous professional development.	4	10	40	36	10	3.37	6
9	Develop her competencies in the English Language and in the use of a computer.	6	20	39	27	8	3.04	9

6.5.2 Domain 2 Planning Competencies

As shown in Table 6.18, of the seven competencies of the Domain 2 Planning Competencies, participants perceive themselves as average and above average competency in all these competencies. Table 6.18 presents the rank order according to mean rating for the perceived competence in each competency of Domain 2. Participants perceive themselves to be most competent in the area "Prepare annual, term and daily teaching lesson plans, to achieving efficiency and integration of school curriculum content, and its connectivity with all other curricula" (mean 3.48). In contrast, they considered the statement: "Prepare annual, term and daily teaching lesson plans, to achieving the determining of the prerequisites for the topics studied in each subject" as the one they are least competent in (mean 2.98)

Table 6.18 Frequencies and rank of Competence of Domain 2 competencies as rated by respondents

No	Competencies	n (2011)						
	Prepare annual, term and daily teaching lesson plans, to achieve the following:	NC	LAC	AC	AAC	EC	m	*R*
1	Efficiency and integration of school curriculum content, and its connectivity with all other curricula.	5	10	32	38	15	3.48	1
2	Derivation and formation of the behavioural objectives in procedural, observable and measurable areas.	6	19	41	27	7	3.05	6
3	Determine the prerequisites for the topics studied in each subject.	8	23	37	26	6	2.98	7
4	Learn to use a variety of teaching styles, methods and strategies in an integrative way, in order to meet pupil's needs and abilities, and to achieve the behavioural objectives.	6	17	38	31	8	3.15	4
5	Use environmental materials to prepare instructional media and employ them in different learning/teaching situations.	6	14	34	34	12	3.32	2
6	Use proper evaluation methods to insure the achievement of the behavioural objectives.	10	21	30	28	11	3.09	5
7	Planning and designing of both inside the classroom and extra-class activities.	5	16	34	33	12	3..30	3

6.5.3 Domain 3 Teaching Competencies

As shown in Table 6.19, of the eight competencies of the Domain 3 Teaching Competencies, participants perceive themselves to be of average and above average competency in all these competencies. Table 6.19 summarises the rank order according to mean rating for the competence of each competency. In Domain 3, respondents perceive themselves to be most competent in the competency "Implement and integrate psychological and educational principles to stimulate pupil's motivation for learning." (mean 3.74). In contrast, they considered the statement, "Activate cooperation with pupils' parents, staff colleagues and other members in the local community" as the one they are least competent in (mean 3.22)

Table 6.19 Frequencies and rank of Competence of Domain 3 as rated by respondents

No	Competencies	n (2011)						
		NC	LAC	AC	AAC	EC	m	*R*
1	Stimulate pupils' motivation towards learning, by using outside and inside classroom activities, to develop their abilities, as well as, using individual or group work.	2	12	41	38	7	3.35	7
2	Maintain pupils' motivation towards learning throughout the lessons.	3	6	30	41	20	3.66	2
3	Implement learning principles and a variety of teaching methods and strategies to meet pupils' learning styles, particularly for special educational needs.	4	7	32	43	14	3.55	5
4	Use different learning resources, including audiovisual and communication techniques with the appropriate topic and time.	3	7	31	40	19	3.65	3
5	Implement group work activities to develop positive attitudes towards cooperation and teamwork between pupils.	3	7	33	42	15	3.56	4
6	Master communication and interaction skills with pupils and support them to express their ideas clearly and contribute effectively in activities.	3	13	35	37	12	3.37	6
7	Implement and integrate psychological and educational principles to stimulate pupil's motivation for learning.	2	5	29	43	21	3.74	1
8	Activate cooperation with pupils' parents, staff colleagues and other members in the local community.	6	16	37	32	9	3.25	8

6.5.4 Domain 4 Classroom Management Competencies

As shown in Table 6.20, of the seven competencies of the Domain 4 Classroom Management Competencies, respondents perceive themselves to be of average and above average competence in all these competencies. Table 6.20 also presents the rank order according to mean rating for the competence in each competency of Domain 4. It can be observed that respondents perceive themselves to be most competent in the competency, "Organise and file pupils' records, and employ them in order to achieve effective learning" (mean 3.74). In contrast, they considered the statement: "Know, analyse and establish the proper solutions for the classrooms' behavioural problems." as the one they are least competent in (mean 3.16).

Table 6.20 Frequencies and rank of Competence of Domain 4 as rated by respondents

No	Competencies	n (2011)						
		NC	LAC	AC	AAC	EC	m	R
1	Employ classroom management skills and organisation in order to attain affective learning and positive relationships between teacher and the pupils.	4	12	35	37	12	3.41	4
2	Set clear expectations for discipline in the classroom to control pupils' behaviour.	5	10	32	36	17	3.50	3
3	Organise learning experiences inside and outside the classroom	4	7	33	38	18	3.58	2
4	Organise and provide comfort, security and safety within the classroom's physical environment.	4	13	38	34	11	3.35	5
5	Know, analyse and establish the proper solutions for the classrooms' behavioural problems.	6	16	40	31	7	3.16	7
6	Manage and utilise time for learning in lessons and classroom activities.	5	16	39	31	9	3.22	6
7	Organise and file pupils' records, and employ them in order to achieve effective learning.	4	6	25	41	24	3.74	1

6.5.5 Domain 5 Evaluation Competencies

As shown in Table 6.21, of the six competencies of the Domain 5 Evaluation Competencies, participants perceive themselves to be of average and above average competence in these competencies. Table 6.21 also summarises the rank order according to mean rating for the competence of each competency in Domain 5. It is observed that participants perceive themselves to be most competent in the competency, "Outline assessment items and prepare performance tests in light of instructional objectives." (mean 3.49). In contrast, they considered the statement, "Contribute in writing of school reports, and provide suggestions." as the one they are least competent in (mean 2.89).

Table 6.21 Frequencies and rank of Competence of Domain 5 as rated by respondents

No	Competencies	n (2011)						
		NC	LAC	AC	AAC	EC	m	R
1	Use oral, written, practical, research reports and cumulative records to evaluate and follow up pupils' progress.	5	12	33	34	16	3.44	2
2	Outline assessment items and prepare performance tests in light of instructional objectives.	5	11	31	36	17	3.49	1
3	Discover and support pupils' strengths, and diagnose and seek to overcome their weaknesses, with assistance of the pupils' cumulative records.	4	14	40	32	10	3.28	4

4	Analyses of tests and observations and filing them in a simple form for interpretation.	6	14	36	31	13	3.32	3
5	Use self-evaluation methods in order to obtain formative data, and then performance and authentic evaluation.	6	16	41	30	7	3.15	5
6	Contribute in evaluation of teaching/learning process and its factors.	8	20	36	29	7	3.05	6
7	Contribute in writing of school reports, and provide suggestions.	9	24	38	22	7	2.89	7

6.5.6 Domain 6 Mastery of Subject Knowledge Competencies

As shown in Table 6.22, of the ten competencies of the Domain 6 Mastery of Subject Knowledge Competencies participants perceive themselves to be of average and above competence in all these competencies. Table 6.22 also summarises the rank order according to mean rating for the competence of each competency in Domain 6 Competencies. It is observed that participants perceive themselves to be most competent in the competency, "Mastering of content of school subjects' content being taught in the First Cycle of Basic Education, learning the integration between them" (mean 3.97). In contrast, they considered the statement: "Understand the strong link between resources consumed by the population as well as new technologies and scientific discoveries" as the one they are least competent in (mean 2.84).

Table 6.22 Frequencies and rank of Competence of Domain 6 as rated by respondents

No	Competencies	n (2011)						
		NC	LAC	AC	AAC	EC	m	*R*
1	Understand and implement concepts in the subject specialisation, and master the subject's content and applications.	3	6	17	44	30	3.92	2
2	Mastering of content of school subjects' content being taught in the First Cycle of Basic Education, learning the integration between them.	3	3	18	45	31	3.97	1
3	Use a variety of learning resources to meet pupils' needs.	2	6	27	46	19	3.71	3
4	Develop scientific and educational attitudes by research and continuous updating in the specialisation.	11	23	40	22	4	3.37	8
5	Understand and implement characteristics of curriculum construction and development including standard selection, analyses, classification, and sequence and consequence in curriculum development.	3	6	28	41	22	3.69	4
6	Employ life skills with the content.	4	12	37	34	13	3.38	7
7	Know in general the history and geography of Oman, the Gulf States, and the Arabic World in order to follow information and developments in the economical, cultural and political fields.	7	20	41	26	6	3.03	9
8	Make connections between pupils' lives and their environments in order to support preserving resources.	3	11	35	34	17	3.52	5

9	Follow up historical and contemporary events as well as national, social and religious occasions to support the local culture.	3	13	32	34	18	3.50	6
10	Understand the strong link between resources consumed by the population as well as new technologies and scientific discoveries.	5	14	36	32	13	2.84	10

6.5.7 Difference Between Student Teachers and Practicing Teachers of Perceptions of Their Internalization and Ability of the Competencies

The fourth question of the study is "*To what degree do Student Teachers and Beginning Teachers differ in their rating of their self-perceptions of competence in each of the competencies of teacher education programmes?*"

The hypothesis formulated in order to investigate the rating of importance of competence of the competencies for the different groups of the study was the following:

There will be no significant differences between student teachers and teachers respondents' rating of self-perception of competence in all competencies.

Analyses of the data were conducted using *t*-tests on the groups comparisons of participants' mean ratings to determine if there were any statically significant difference between the two subgroups of student teachers and beginning teachers.

6.5.7.1 Domain 1 General Competencies

Table 6.23 shows the analysis for student teachers and then practicing teachers. There is significant difference ($p \leq 0.05$) between student teachers and teachers in their perception of competence in most of Domain 1 competencies.

Table 6.23 Summary of analysis of the degree of competence by student teachers and beginning teachers for Domain 1 competencies

No.	Competencies	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Consideration of professional ethics in dealing with pupils in moral, spiritual, and social situations and providing equal opportunities between them.	3.32	.748	3.51	.806	.000	S
2	Belief in the teachers' role in the achievement of the comprehensive educational development of students, and effect on the pupils' future, and acquire the desired positive attitudes of her profession toward dealing with pupils in this age (grades 1-4).	3.09	.966	3.33	.943	.000	S
3	Develop positive attitudes toward the nation, the Arabic world, the Islamic world, all humanity and world peace.	3.39	.951	3.55	1.00 4	.000	S
4	Consideration of societal values, inside and outside the school, and development of responsibility towards environmental and societal needs.	3.25	1.08 9	3.46	1.08 1	.000	S
5	Develop positive attitudes toward integrated development of pupils.	3..91	1.025	3..93	1.062	.607	N.S
6	Consideration of educational responsibility and demonstration of supervision of students, as well as instructional and administrative responsibilities.	4.02	1.019	3.91	.951	.010	S
7	Cooperate with others in order to improve individual pupil's performance, and modernize the quality of the school and general life.	3.73	.932	3.68	1.013	.280	N.S
8	Develop abilities through self-learning and continuous professional development.	3.39	.979	3.34	.975	.276	N.S
9	Develop her competencies in English Language and in the use of a computer.	2.96	1.046	3.13	1.074	.000	S

6.5.7.2 Domain 2 Planning Competencies

It can be observed from Table 6.24, that significant differences were found between student teachers and teachers in their perception of competence in all of Domain 2 competencies. Teachers' rating of competence of competencies is higher than of student teachers.

Table 6.24 Summary of analysis of the degree competence as perceived by student teachers and beginning teachers for Domain 2 Competencies

No.	Competencies Prepare annual, term and daily teaching lesson plans, to achieve the following:	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Efficiency and integration of school curriculum content, and its connectivity with all other curricula.	3.43	1.060	3.55	1.060	.009	S
2	Derivation and formation of the behavioural objectives in procedural, observable and measurable areas.	2.95	1.024	3.17	1.015	.000	S
3	Determine the prerequisites for the topics studied in each subject.	2.82	1.077	3.18	1.071	.000	S
4	Learn to use a variety of teaching styles, methods and strategies in an integrative way, in order to meet pupil's needs and abilities, and to achieve the behavioural objectives.	3.03	1.041	3.31	1.052	.000	S

5	Use environmental materials to prepare instructional media and employ them in different learning/teaching situations.	3.21	1.090	3.45	1.089	.000	S
6	Use proper evaluation methods to insure the achievement of the behavioural objectives.	3.04	1.160	3.17	1.197	.012	S
7	Planning and designing of both inside the classroom and extra-class activities.	3.20	1.063	3.43	1.011	.000	S

6.5.7.3 Domain 3 Teaching Competencies

As shown in Table 6.25, significant differences ($p \leq 0.05$) were found between student teachers and teachers in their perceiving of competence of all Domain 3 except in competencies 2 and 7. Teachers' rating for competence is higher than of student teachers for all competencies.

Table 6.25 Summary of analysis of the degree of competence as perceived by student teachers and beginning teachers for Domain 3 competencies

No.	Competencies	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Stimulate pupils' motivation towards learning, by using outside and inside classroom activities, to develop their abilities, as well as, using individual or group work.	3.27	.867	3.44	.886	.000	S
2	Keep pupils' motivation towards learning throughout the lessons.	3.63	.978	3.71	1.051	.088	N.S
3	Implement learning principles and a variety of teaching methods and strategies to meet pupils' learning styles, particularly for special educational needs.	3.49	1.034	3.62	1.016	.008	S
4	Use different learning resources, including audiovisual and communication techniques with the appropriate topic and time.	3.60	.969	3.71	.997	.015	S
5	Implement group work activities to develop positive attitudes towards cooperation and teamwork between pupils.	3.50	.985	3.63	1.034	.004	S
6	Master communication and interaction skills with pupils and support them to express their ideas clearly and contribute effectively in activities.	3.28	1.016	3.49	1.006	.000	S
7	Implement and integrate psychological and educational principles to stimulate pupil's motivation for learning.	3.70	.978	3.78	.913	.078	N.S
8	Activate cooperation with pupils' parents, staff colleagues and other members in the local community.	3.10	1.042	3.45	1.023	.000	S

6.5.7.4 Domain 4 Classroom Management

Table 6.26 shows significant differences ($p \leq 0.05$) were found between student teachers and teachers in their perceiving of competence of all Domain 4 competencies except for competencies 2 and 7. Teachers' perceiving of competence is higher than of student teachers in four competencies.

Table 6.26 Summary of analysis of the degree of competence as perceived by student teachers and beginning teachers for Domain 4 competencies

No.	Competencies	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Employ classroom management skills and organisation in order to attain affective learning and positive relationships between teacher and the pupils.	3.32	1.021	3.53	.987	.000	S
2	Set clear expectations for discipline in the classroom to control pupils' behaviour.	3.52	1.077	3.48	1.080	.410	N.S
3	Organise learning experiences inside and outside the classroom	3.66	1.074	3.47	1.026	.000	S
4	Organise and provide comfort, security and safety within the classroom's physical environment.	3.40	1.010	3.29	1.008	.020	S
5	Know, analyse and establish the proper solutions for the classrooms' behavioural problems.	3.05	1.060	3.30	1.036	.000	S
6	Manage and utilise time for learning in lessons and classroom activities.	3.12	1.026	3.34	1.049	.000	S
7	Organise and file pupils' records, and employ them in order to achieve effective learning.	3.70	1.095	3.78	1.058	.111	N.S

6.5.7.5 Domain 5 Evaluation Competencies

Table 6.27 shows that significant differences ($p \leq 0.05$) were found between student teachers and teachers in their perceiving of competence of all Domain 5 competencies except in competency 7. Teachers' rating of competence is higher than of student teachers with the exception of competency 4 were student teachers perceive themselves to be more competent.

Table 6.27 Summary of analysis of the degree of competence rating as perceived by student teachers and beginning teachers for Domain 5 competencies

No.	Competencies	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Use oral, written, practical, research reports and cumulative records to evaluate and follow up pupils' progress.	3.36	1.122	3.54	1.058	.000	S
2	Outline assessment items and prepare performance tests in light of instructional objectives.	3.38	1.070	3.64	1.108	.000	S
3	Discover and support pupils' strengths, and diagnose and seek to overcome their weaknesses, with assistance of the pupils' cumulative records.	3.21	1.019	3.37	1.026	.000	S
4	Analyses of tests and observations and filing them in a simple form for interpretation.	3.37	1.105	3.26	1.076	.026	S
5	Use self-evaluation methods in order to obtain formative data, and then performance and authentic evaluation.	2.98	1.015	3.36	.966	.000	S
6	Contribute in evaluation of teaching/learning process and its factors.	2.91	1.135	3.23	1.051	.000	S
7	Contribute in writing of school reports, and provide suggestions.	2.86	1.118	2.94	.997	.079	N.S

6.5.7.6 Domain 6 Subject Knowledge Competencies

It can be seen from Table 6.28 that in Domain 6 the pattern is that significant differences ($p \leq 0.05$) were found in half the competencies. In the other five, the differences were not statistically significant.

Table 6.28 Summary of analysis of the degree of competence rating as perceived by student teachers and beginning teachers' respondents for Domain 6 competencies

No.	Competencies	Student Teachers		Teachers		Sig. (2 tailed)	Sig.
		M	S.D	M	S.D		
1	Understand and implement concepts in the subject specialisation, and master the subject's content and applications.	2.74	1.110	2.96	1.062	.000	S
2	Mastering of content of school subjects' content being taught in the First Cycle of Basic Education, learning the integration between them.	3.69	1.043	3.68	1.016	.781	N.S
3	Use a variety of learning resources to meet pupils' needs.	3.32	1.064	3.46	.958	.002	S
4	Develop scientific and educational attitudes by research and continuous updating in the specialisation.	2.98	1.044	3.13	1.005	.001	S
5	Understand and implement characteristics of curriculum construction and development including standard selection, analyses, classification, and sequence and consequence in curriculum development.	3.53	1.012	3.51	1.033	.725	N.S
6	Employ life skills with the content.	3.48	1.048	3.53	1.012	.265	N.S
7	Know in general the history and geography of Oman, the Gulf States, and the Arabic World in order to follow information and developments in the economical, cultural and political fields.	3.31	1.063	3.44	.991	.008	S
8	Make connections between pupils' lives and their environments in order to support preserving resources.	3.91	1.025	3.93	1.062	.607	N.S
9	Follow up historical and contemporary events as well as national, social and religious occasions to support the local culture.	4.02	1.019	3.91	.951	.010	S
10	Understand the strong link between resources consumed by the population as well as new technologies and scientific discoveries.	3.73	.932	3.68	1.013	.280	N.S

6.6 Comparing Between Importance and Competence Values

The fifth question of the study was *"Is there any significant difference between perceptions' rating of importance and their self-perception rating of the competence of the competencies of teacher education programmes?"*

A paired sample t-test was used to measure participants' perceptions in terms of rating of importance of competencies and perceiving of their perceived competence in these competencies. It can be observed from Table 6.29 that there is a statistically significant difference ($p \leq 0.05$) between the two scores.

Table 2.69 Paired Samples Statistics of the comparison between importance and competence values

		Mean	Std. Deviation	Std. Error Mean	Sig. (2-tailed)
Pair 1	Competency 1 importance	4.51	.754	.017	
	Competency 1competence	3.40	.780	.017	.000
Pair 2	Competency 2 importance	4.27	.894	.020	
	Competency 2 competence	3.20	.964	.022	.000
Pair 3	Competency 3 importance	4.46	.901	.020	
	Competency 3 competence	3.46	.978	.022	.000
Pair 4	Competency 4 importance	4.15	1.095	.024	
	Competency 4 competence	3.34	1.091	.024	.000
Pair 5	Competency 5 importance	4.32	.923	.021	
	Competency 5 competence	3.92	1.041	.023	.000
Pair 6	Competency 6 importance	4.15	1.083	.024	
	Competency 6 competence	3.97	.992	.022	.000
Pair 7	Competency 7 importance	4.53	.843	.019	
	Competency 7 competence	3.71	.969	.022	.000
Pair 8	Competency 8 importance	4.16	.991	.022	
	Competency 8 competence	3.37	.977	.022	.000
Pair 9	Competency 9 importance	4.32	.965	.022	
	Competency 9 competence	3.04	1.061	.024	.000
Pair 10	Competency 10 importance	4.31	.951	.021	
	Competency 10 competence	3.48	1.060	.024	.000
Pair 11	Competency 11 importance	4.07	1.010	.023	
	Competency 11 competence	3.05	1.025	.023	.000
Pair 12	Competency 12 importance	4.08	1.081	.024	
	Competency 12 competence	2.98	1.089	.024	.000
Pair 13	Competency 13 importance	4.28	.992	.022	
	Competency 13 competence	3.15	1.054	.024	.000
Pair 14	Competency 14 importance	3.99	1.025	.023	
	Competency 14 competence	3.32	1.095	.024	.000
Pair 15	Competency 15 importance	3.99	1.020	.023	
	Competency 15 competence	3.10	1.177	.026	.000
Pair 16	Competency 16 importance	4.25	.895	.020	
	Competency 16 competence	3.30	1.045	.023	.000
Pair 17	Competency 17 importance	4.26	.826	.018	
	Competency 17 competence	3.35	.880	.020	.000
Pair 18	Competency 18 importance	4.24	.905	.020	
	Competency 18 competence	3.66	1.012	.023	.000
Pair 19	Competency 19 importance	4.45	.995	.022	
	Competency 19 competence	3.55	1.028	.023	.000
Pair 20	Competency 20 importance	4.54	.824	.018	
	Competency 20 competence	3.65	.984	.022	.000
Pair 21	Competency 21 importance	4.34	.932	.021	
	Competency 21 competence	3.56	1.009	.023	.000
Pair 22	Competency 22 importance	4.24	.927	.021	
	Competency 22 competence	3.37	1.016	.023	.000
Pair 23	Competency 23 importance	4.40	.810	.018	
	Competency 23 competence	3.73	.951	.021	.000
Pair 24	Competency 24 importance	4.02	.987	.022	
	Competency 24 competence	3.25	1.049	.023	.000
Pair 25	Competency 25 importance	4.22	1.003	.022	
	Competency 25 competence	3.41	1.012	.023	.000
Pair 26	Competency 26 importance	4.26	.953	.021	
	Competency 26 competence	3.50	1.078	.024	.000
Pair 27	Competency 27 importance	4.25	.956	.021	
	Competency 27 competence	3.58	1.056	.024	.000
Pair 28	Competency 28 importance	4.23	.965	.022	
	Competency 28 competence	3.35	1.010	.023	.000
Pair 29	Competency 29 importance	3.88	1.056	.024	
	Competency 29 competence	3.16	1.054	.024	.000
Pair 30	Competency 30 importance	3.97	1.022	.023	
	Competency 30 competence	3.22	1.041	.023	.000
Pair 31	Competency 31 importance	4.46	1.004	.022	
	Competency 31 competence	3.74	1.079	.024	.000
Pair 32	Competency 32 importance	4.21	1.031	.023	
	Competency 32 competence	3.44	1.097	.024	.000
Pair 33	Competency 33 importance	4.43	.980	.022	
	Competency 33 competence	3.49	1.095	.024	.000
Pair 34	Competency 34 importance	4.32	.963	.021	
	Competency 34 competence	3.28	1.025	.023	.000
Pair 35	Competency 35 importance	4.34	.922	.021	
	Competency 35 competence	3.32	1.094	.024	.000

Pair 36	Competency 36 importance	4.09	.986	.022	
	Competency 36 competence	3.15	1.011	.023	.000
Pair 37	Competency 37 importance	4.01	1.115	.025	
	Competency 37 competence	3.05	1.112	.025	.000
Pair 38	Competency 38 importance	3.86	1.063	.024	
	Competency 38 competence	2.89	1.068	.024	.000
Pair 39	Competency 39 importance	3.80	1.186	.026	
	Competency 39 competence	2.84	1.093	.024	.000
Pair 40	Competency 40 importance	4.18	1.018	.023	
	Competency 40 competence	3.69	1.032	.023	.000
Pair 41	Competency 41 importance	4.06	1.028	.023	
	Competency 41 competence	3.38	1.021	.023	.000
Pair 42	Competency 42 importance	3.83	1.063	.024	
	Competency 42 competence	3.05	1.028	.023	.000
Pair 43	Competency 43 importance	4.02	.976	.022	
	Competency 43 competence	3.52	1.021	.023	.000
Pair 44	Competency 44 importance	4.27	.907	.020	
	Competency 44 competence	3.50	1.031	.023	.000
Pair 45	Competency 45 importance	4.16	.938	.021	
	Competency 45 competence	3.37	1.034	.023	.000
Pair 46	Competency 46 importance	4.25	.956	.021	
	Competency 46 competence	3.58	1.056	.024	.000
Pair 47	Competency 47 importance	4.23	.965	.022	
	Competency 47 competence	3.35	1.010	.023	.000
Pair 48	Competency 48 importance	3.88	1.056	.024	
	Competency 48 competence	3.16	1.054	.024	.000

6.7 Suggested Competencies

In part three of the questionnaire, participants were asked to add any suggested competencies they perceive as important for their profession

Which competencies are important for teachers which were not included and must be included in teaching competencies of teacher education programmes in Omani colleges of education?

6.7.1 Suggested Competencies by Practicing Teachers

Respondents added some competencies. Table 6.30 illustrates some competencies that were suggested by practicing teachers with a frequency for each. It can be observed that most of these competencies are specifically framed in short and incomplete sentences. Many of these suggestions are already included within the previous listed competencies but they presented them in different form.

Table 6.30 Summary of suggested competencies by practicing teachers

Suggestions	No. of suggestors
Acquire long-life and continuous of learning skills.	14
Acquire English language, especially reading and writing skills.	13
Integration between curriculum disciplines and tasks and in-between deferent subjects.	12
Behave as excellent example for her pupils and for the society and to have a good reputation	11
Considering intellectual sequence in the order of lessons, not merely follow the textbook.	9
Realise the significance of reading as a means of enriching teachers knowledge and information.	9
Understand concepts of subject content without blind memorisation.	7
Importance of moral or religious values (honesty, respect others, truthful... etc) in	7

his/her work	
Have a consciousness of globalisation and its effects on the local values, culture, behaviours of youngsters, youth and society.	7
Mastery of research techniques.	6
Ability to use extra or foreign references, textbook, and scientific journals.	5
Time management	5
Awareness of political events which happen nationally and internationally and the teacher's role regarding them.	3
Organisation of the school-day time	3
Be literate or at least familiar in one foreign language	3
Satisfaction with the income (salary) from her profession as a teacher	2
Awareness of the future *vision* for the Omani society.	1
Realisation that many things (results) depend on her performance.	1
Disconnect between her personal problems and teaching	1

6.7.2 Suggested Competencies by Student Teachers

As shown in Table 6.31, student teachers are also suggested competencies which were not included in the above list of the competencies.

Table 6.31 Summery of suggested competencies by student teachers

Suggestions	**No. of suggestors**
Mastery of development of high thinking skills	15
Efficiency in using the internet in education	15
Familiarity with content of school curriculum for all stages.	13
Simplify difficult and complicated topics in mathematics and science to the pupils	12
Prepare appropriate plans for dealing with pupils with learning problems or weaknesses.	12
Using of environmentally friendly materials for production of instructional aids.	11
Create new models and educational aids and material.	11
Know the administrative regulations of school and education administration	10
Using / employing internet in teaching	10
Mastery of skills which can make her lessons active, funny, interesting, and enjoyable.	9
Know how to reply to or answer some pupils' disconcerted questions	9
Using variety of positive and negative enhancement or reinforcement methods	9
Initiate practices of environmental production, not only remember these instructions.	7
Mastery of a variety methods to introduce lessons	7
Prepare practical tests in addition to theoretical tests.	7
Acquire self-confidence	5
Dealing with pupils' psychological problems in classroom.	5
Formatting adequate evaluative approaches for her pupils' levels.	5
Treating gently and wisely with others (colleagues, pupils, parents, administrative staff ...etc.)	5
Mastery in (have command of) communication skills with pupils.	5
Using variety of methods of homework	4
Initiative to social services.	3
Using variety of individual and group encouragements and reinforcements	3
Understand pupils' attitudes and interests.	3
Using instructional instrument, media, and other educational technology.	3
Dealing with pupils democratically	2

Flexibility in administrative aspects.	2
Build human relationships with pupils	2
Stability on his personality	1
Restrain oneself (control her behaviour), self possessed	1
Realise what is meant by student-centred learning	1
Treating wisely with disabled pupils	1

6.8 Suggestions and Comments for Developing the Teacher Education Programme

In part four of the questionnaire, participants were asked to add any suggestions or comments which could help to develop the Colleges of Education teacher education programme. The respondents expressed different opinions regarding different aspects in teacher education with these suggestions summarised in Tables 6.32 and 6.33.

Table 6.32 Summarised suggestions and comments of practicing teachers

Suggestions	No. of suggestors
Integrate science and mathematics curricular	9
Give teachers more freedom and flexibility in decision making regarding classroom and curriculum management	7
Train teachers on how to deal wisely with unexpected situations	7
Support schools' budget for field visits and practical activities.	5
Reduction of the teachers' routine works in schools like writing a lot of records.	5
Double the time allotted in the timetable for science subjects to give more chance for the practical activities	5
Supply enough stationeries as well as science & math kits and materials for the activities	3
Inclusion of some new topics like: colony culture, diseases e.g. SARS, ...etc. in the college science syllabus	3
Society should support teachers because they are starting to despair from teaching and their situations	3
Train teachers practically on how to treat pupils with special needs	2
Train teachers on how to be creative in his teaching and give him some unusual or attractive teaching ideas	1

Table 6.33 Summarised suggestions and comments of student teachers

Suggestions	No. of suggestors
Changing the content of teaching method courses to make teaching science and mathematics integrally and interesting for young children	11
Provide the colleges resource centres with videotapes of model lessons from expert teachers, as well as documents about planning for teaching and assessment in Basic Education, and also CDs of scientific & educational programmes	9
Training cooperative teachers to be mentors and to take care of the student teachers	9
Technicians in the learning resource centres should be more helpful and support student teachers in using computers, printers, photocopy and other instruments and allow student teacher to borrow these instrument to take it to the schools during the practicum	7
Colleges' lecturers should use the developed teaching methods and behave as models for their student teachers	6

Updating computers of the college and make them more available for student's different uses, and make the internet faster.	5
Reduce the content of educational courses especially number of theories and the repetition of the same content in different courses.	3

6.9 Presentation of Qualitative Data from the Interviews

This section reports the qualitative data collected through interviewing randomly selected student teachers, teachers, inspectors, head teachers and lecturers, with their detailed data shown in Table 6.34

All of these participants were interviewed either face-to-face individually or as round table group or pair discussion using a semi-structured format, using question schedules (Appendix 5). The interviews focused on the opinions about three areas: (1) adequacy and quality of the programme, (2) competencies of the programme, and (3) the future of teacher education.

Details of the procedures of these interviews were illustrated in Chapter 5 on Methodology. The individual interviews lasted 45 minutes on average, but group or pair interviews were lengthier at 2-3 hours on average. The main aims of this interview were to:

- Confirm and validate the results given in the questionnaires for teachers and student teachers.
- Explore other participant's perceptions such as those of supervisors, head teachers and lecturers.
- Discuss the results of this stage with participants to develop suggestions for the next stages of the research.

Table 6.34 Summary of the interviewees

Type of respondent	**Student Teachers (ST)**		**Teachers (T)**		**Lecturers (L)**		**Head-teachers (HT)**	**Inspectors (I)**	**Total**
College	A	B	A	B	A	B			
	6	8	7	6	4	4	4	5	
Total	14		13		8		4	5	44

6.9.1 Questions about adequacy and quality of the programmes

In the beginning, participants were not given the results from the questionnaire, to avoid any influences for their views and opinions. Later they were provided with results from the questionnaire in order to clarify and interpret these results.

They were asked the question "*Do you think that graduates of the Colleges of Education are sufficiently qualified to work in developed and well equipped schools, such as Basic Education Cycle One Schools? If No, why not?*"

There were contradictions between the different groups of respondents and within each group regarding the sufficiency of the graduates of the Colleges of Education programmes and the degree of their qualification and their adequacy to teach in the scientific field in Cycle I Basic Education schools.

Student teachers commented about their preparation, one of them saying:

> *"... we did not prepared academically and practically, we are excellent only in theoretical educational aspect, there are some changes and new techniques in schools and we are not familiar with them."* STA1

Another student teacher commented that:

> *"... we did not prepared in a proper way, we have a shortage in educational and academic experiences, we can teach normal [general education] primary curriculum, but we will be facing many difficulties teaching the new curriculum."* STA3

A third student teacher stated that:

> *"...because teaching in this new education system [Basic Education] based on educational and practical activities not only presents information in a theoretical way, but we did not understand this system, this is referring to the preparation programme."* STB3

One student teacher explained that:

> *"there is a gap between what is taught in colleges and what should be taught in schools, especially in science and mathematics courses."* STB2

Other student teachers complained:

> *"We were thrown in the school [for the practicum programme], if our supervisors [the college's lecturer] are away from the school, the people there [teachers & headteacher] did not take care of us, we feel as a stranger in the school, this happened many times with several schools ...this inconveniences us ... I don't like it [the schooling work]"* STA7

In contrast to these negative views, some student teachers have somewhat more optimistic views, one of them saying:

> *"... we were prepared in three major domains: professional, speciality and culturally, but there is a shortage in subject-knowledge because the academic courses was not deeply treated and the teaching method course does not consider new teaching methods ...I think this shortage is normal for novice teachers but in future, after a short period of experience, we can cope with it".* STA2

Another one added:

> *"Yes, from practicum programme in schools, we can implement what we had in colleges, like teaching methods & applications of instructional media." STB7*

Practicing teachers also strongly commented that there is dissatisfaction about the level of the preparation programme; and they also justified their perceptions:

> *"I don't think so, especially the first group [the graduates], because in the first years [started in 98/99], we were enrolled in this programme when these schools [Basic Education Cycle 1] were in establishment stage, and this new system was not commonly applied yet [the project started by 17 schools only], by that time there is no clear idea about this system for the college's staff and students, we went to the practicum from the second year [1999/2000] when the system was still in its beginning ." TA5*

Another one added:

> *"... because of the shortage in developed instructional media and instruments, thus teachers were not trained for this applications."* TA3

There are a lot of similar comments from other teachers, such as:

> *"they [graduates] did not have enough training period."* TA2.

Another teacher added:

> *"I mean the practicum was not organised properly, it takes long time but it was just a waste of time in schools, many teachers are always complaining of their situations, they depict teaching and working in schools as a frightening matter."* TA7

Other teacher comments included:

- *"... because there is weaknesses in academic preparation curriculum as well as shortage of necessities in some cooperative schools [where student teacher had their practicum]."*TB1
- *"there are some skills not covered in preparation programme such as: cooperative learning strategies and also there is shortage in instructional aids."* TB4
- *"they can not master many types of teaching methods. ... if we consider changes in educational environments and scientific developments in basic Education schools, there is less ability of the colleges to cope with these developments."* TB6
- *"because there is insufficiency in academic preparation ... it is true that we are skilful in traditional teaching methods but we have shortage in diversity of teaching methods, because college curriculum is undeveloped either in academic or educational aspects."* TB3

Some other teachers have different views, believing that the graduates of these programmes are better if they are compared with the others, one of them said:

> *"We [the graduates] started our practicum early, from second year, thus we can work properly." TA4*

Others commented that:

- *"Now teachers are well prepared to work properly in the Basic Education system, they are provided with competencies and skills to do their duties."* TB5

- *"Yes, they are well prepared but there are some educational and academic courses which are studied instead of other important courses."* TA1

When the inspectors from the school system were asked same question, some of them answered negatively, one female inspector saying:

> *"I totally disagree, what I have seen is low capability of these outcomes [graduates] either in subject matter or in educational aspects, this is also declared by the graduates themselves, who I am supervising."* I3

Another inspector commented that:

> *"No, what I observe, teacher [the graduate] has a weakness in planning for teaching, reading or research skills, and for professional development. Even in their subject specialisation, they don't have ability to develop themselves, but some of them can be improved by the schooling practice...and the in-service training."* I5

However, other inspectors have more positive views:

> *"Most of teachers whom I am supervising are active in their schools but they have deficiency in subject knowledge of some topics, this maybe due to discrepancies between educational and academic colleges' courses."* I2

Another inspector stated:

> *"...outcomes [graduates] of teacher education programmes are developed, this is obvious in their performance in schools."* I1

Head teachers also expressed some negative views, such as:

> *"Those [graduates] not in that satisfaction level, I think the subject knowledge component in these programmes need more revision; in types of courses and number of the credits for each course. On the other hand practicum component is over-emphasised and this affects the consideration of other components."* HT2

Anther head teacher commented:

> *"There are varieties of teacher education programmes and many approaches but the problem is with the way that these programmes are run and assessed. It isn't effective and there is a deficiency in its subjectivity of the assessment of the student teacher, they have high grades with less knowledge and skills." HT4*

When college lecturers were asked this question, they had mixed responses. Some of them criticised the programme, one of them, said:

> "... a *developed schooling system require a development of teaching and learning, but teacher preparation styles in the colleges, such as assessment and evaluation systems need to be changed to meet changes of assessment systems in schools."* LB2

While another lecturer answered:

> *"I agree that teacher education programmes achieved its objectives temporarily, or previously [in past time] to produce teachers for the old system [general education] but now it needs a revision in order to meet the reform of educational system."* LA1

Further comments from lecturers included:

- *"I agree with this opinion, for many reasons, with some reservations, the reasons are: there are obvious efforts to improve the programmes, there are attempts to modify these programmes according to changes in school environments, I mean the Basic Education." LB1*
- *"I think there are some achieved objectives, but many other objectives need more efforts to be achieved, the graduates' capability is still not in desired level, that will affect quality of teaching and the whole schooling system in the long-rub, in future." LA2*

Some lecturers added comments and suggestions such as:

> *"... regarding professional preparation, courses, like teaching methods, curriculum, assessment & evaluation, should be developed to meet developments of the Education System, methods such as cooperative learning and assessment methods such as portfolios must be included, the same situation for academic component subject specialisation courses should be related with the school curriculum."* LA4

Other lecturers have positive views:

- *"...according to the academic preparation, the new study plan, is sufficient, it is qualifying teachers for the developed schooling system, in contrast with the old study plans, which suffered from many deficiencies and according to professional aspect, the qualification programmes are excellent especially if it is connected with the recent developments in educational fields so I think teacher education programme achieved its objective for preparation of qualified teachers to work in a developed schooling system, especially after review of the course syllabus ."* LB4

- *"This is right statement for many reasons: these programmes are continuously reviewed and developed and the strong relationship [cooperation] between the Ministries [Ministry of Education and Ministry of Higher Education] so I agree that these programme achieved its objective to prepare qualified teachers for the developed schools. Graduates proved their professional competence when they replaced non-Omani teachers."* LA3

The second question asked was:
"The graduates of the Colleges of Education are very competent, with high qualifications but this does not meet the underdeveloped, poor schooling system, so they do not have the opportunity to implement what they have learned, and prepared for. Do you agree? If yes, Why? If no, Why?"

To this question, a variety of responses were received. There is a mixture of negative and positive responses from the interviewees. Most student teachers commented about their training schools and mentor teachers, for example, one of them said:

> *"Yes, I agree, in many situations, lack of schools equipments was an impediment for student teachers to perform good lessons."* STB1

Other student teachers said:

- *"Yes, I agree, many teaching strategies based on technology, schools lack computers and internet, even when found the numbers are not enough comparing with number of pupils and teachers who want to use them, so they are forced to implant traditional methods but student teachers can not accept using these methods."* STA5

- *"Yes, student/ teachers are asked only to do specific traditional lessons, they imitate the cooperative teachers, so they can not concentrate on developed methods."* STB3

- *"Yes, I agree, some students/ teachers are trained in some modern teaching methods which are inapplicable because of schools circumstances, curriculum, teaching plans and unmotivated students."* STB2

Others had different views, such as:

- *"No, I'm against this idea, schools now are well equipped, they are provided with science and math kits and computers, so it depends on teachers willingness."* STA1

- *"Appropriate and developed educational environment are available but application depends on the teacher if she desires to practice what she learned in the college."* STB6

- *"Appropriate school environment is available, but sometimes cooperative teachers do not help, consider or respect student teachers."* STA4

There were also a variety of teacher's opinions in their answers of this question They commonly agree that there is a deficiency in most of schools, but they also infer that success depends on student teachers' and teachers' willingness. This can be obvious in such answers:

- *"I don't agree, teachers can acquire more experience during their practice not only from what they studied in the colleges."* TB3
- *"No, to some extent, but situation different from one school to another, but in case of sufficient preparation, teachers can succeed in any circumstances."* TA1
- *"No, the school environment is sufficient in to some extent and many types of equipments are available in schools, who want to be privilege he can invest these facilities."* TB6
- *"I slightly agree, but it depends on the personality of teacher, there are teachers whom can be creative in teaching even though there is lack of equipments."* TA7
- *"Yes, I agree, there are some great ideas which can not be implemented because the crowdie classrooms [the maximum number of pupils in basic education classroom is 30] and overloaded duties."* TA2

Some of them have more pessimistic views:

"Yes, the issue is some teachers do not have the motivation to teach; they are not interested in teaching." TB1

One supervisor has also similar view, one of them said:

> *"No, none is available, neither proper preparation nor educational school environment, teachers are insufficient in their academic aspects."* I3

Similar perceptions are received from head teachers, for example, one of them said:

> *"I reject this idea, teachers are not qualified to deal with changes in the developed schools, they were prepared only in a theoretical-based approach, which could be acceptable in the old system." HT4*

Even some lecturers have this perception, one lecturer commented:

> *"I think both institutions share the responsibility; there is a deficiency in teacher preparation in the colleges as well as deficiency of the facilities in schools, so each factor affects the other, hence there is a vicious cycle from action and reaction." LB2*

Another lecturer answered:

> *"I agree with this opinion for these reasons: number of student teachers groups in practicum is inappropriate [large number of students against limited class numbers] this large number of student teacher lessen opportunity for them to teach many lessons and this reduce their practice of teaching." LA4*

But other lecturers have other views, they place most of the responsibility to the schools, as can be seen from their answers:

- *"This programme prepares good graduates, but I think there are many factors effecting their performance after graduation: limitation of financial support for schools and deficiency of instructional tools, shortage in laboratory instruments and materials."* LA1
- *"Graduates of colleges of education play their roles in a high competence in contrast with other college graduates, but there are still many difficulties which challenge them."* LA3
- *"I support this view, really, there are many schools that do not provide a proper educational environment, because of unawareness of some head teachers of the needs for teaching science in the new system, some of them prevent teachers to take their pupils outside the classroom, for example, to collect samples. Their concern is only on the stability and quietness of their schools, this has effect on the teachers' performance, even though they are well qualified ... but we can notice that there are attempts of educational reform which will develop school environments."* LB1
- *"This idea is correct to some extent, in that the graduates face challenges of shortage of the facilities in the schools, they have difficulties of implementing what they have learned from the colleges, but I notice that most of the renewed schools [Basic Education School] are provided with these facilities, so work in these schools will reduce the gap between what is learned from the college and what can be implemented."* LB3

6.9.2 Questions about the Competencies of the Preparation Programme

Participations were asked to give their views about the competencies, and to what extent the colleges succeed in assisting their student teachers to acquiring them. Participants were asked this question:

What are the positive aspects of the Colleges of Education Programmes regarding assisting student teachers to acquire the following competencies?

1. *General Competencies*
2. *Planning Competencies*
3. *Teaching Competencies*
4. *Classroom Management*
5. *Evaluation Competencies*
6. *Subject Knowledge Competencies*

Participants were given some examples in each category of these competencies. At the same time, they are asked to critique the programme in light of these competencies through this question:

What are the criticisms of these programmes regarding each of these competencies?

There are varieties of perceptions toward this question. Generally, participants confirmed the importance of competencies for the construction and development of the programme. But most student teachers and teachers view these competencies as an ideal ambitious goal which is far removed from the reality; this can be observed through their points of views:

- *"this is the first time we heard about these competencies, [although she answered the questionnaire!] we should have been given these competencies during the beginning of our study, there are important."* STA7
- *"These are very important competencies, but they are not implemented in the college, it may just be said as an advertisement."* TA3
- *"They are good competencies, and we have opportunity to practice what we learned in practicum programmes at school."* STB8
- *"These competencies are acquired by student teachers among their studying and practicum programme, but there is a need for support to relate these competencies with the developments which arise in schools, especially the introduction of basic education system, which needs different skills of planning for teaching and teaching strategies."* TA4
- *"Theoretically, there is nothing wrong with these competencies, although, no one has ideas about them ...are lecturers or school teachers aware of them? I don't think so."* STA5
- *"These competencies are talking about ideal situation but what really happen is something else, we learn many educational theories, for Dewey, Jean Piaget and other educational scholars, and we were asked to memorize these theories for the exams but we do not want to be philosophers we are only primary teachers, how can these theories help us in planning or implementing lessons in the classroom and dealing with young pupils."* STB5

- *"All of these competencies are important and teachers acquired them gradually through practice teaching ...unfortunately, there is no role for school teachers [mentors] to train us during the practicum, they know about the new system more than the lecturers [tutors]."* STB3

Others added some arguments:

- *"...how do they to ask us to use variety of teaching methods and strategies and the lecturer of the teaching methods course is using only one type which is very traditional and this is making this course very boring and not useful."* STB2
- *"There are some competencies about the assessment, but we did not train how to use the new assessment techniques which are implemented in basic education schools, like using portfolios, and cumulative records, we just heard about these things from some teachers." STA3*
- *"there is much focusing on planning particularly written plans, this is useless work, anyone can copy others' perfect plans but what about the performance in the lesson? No one using these plans ...just for show, for the visitors, they [principals] always change there mind of the form of the plans" TB2*

In contrast other student teachers and teachers have different views, they are satisfied with their training and preparation:

- *"We master these competencies very well, it depends on a personal willingness, but the courses are playing significant role, particularly science and mathematics teaching methods course, and this also depends on the lecturer and his ability to bring new things." STA6*
- *"These competencies are well acquired."* STA2

Head teachers and inspectors also argued about the acquiring of these competencies, it is obvious from their answers:

- *"Developments of research interest are absent from many teachers."* I3
- *"These are good competencies, but some college lecturers should encourage their students to research, and give them high level of subject-knowledge not only outlines and rough ideas."* I4
- *"It is very important for student teachers to know the nature of their future profession, but there is no more consideration in such competencies."* HT2
- *"These competencies did not mention many things required for teaching in basic education schools ... student teachers should know how to integrate science and mathematics in their teaching."* I5

Some others complained that transforming these competencies into reality depends on the lecturers and the college's and school's facilities:

- *"I think the problem with these programmes are the colleges staff, some lecturers don't have the ability to develop themselves they still teach their students the traditional teaching methods ... imagine some of them reading directly from old educational references, some of them asking their student teachers just to copy or take notes from the board, and others are reciting for them like nursery rhymes... they don't allow their students to argue or discuss them, many teachers told me that their lecturers from both academic and educational courses are always criticising other courses in front of their students ."* I2

- *"These are ideal competencies if acquired by student teachers but unfortunately, educators [lecturers] themselves didn't understand them, they just read from their papers [handouts] and students listen to them all the time, and then examinations only test memorisation."* HT4

Lecturers criticise most of these competencies, one of them said:

> *"Most of these competencies do not meet the needs of Basic Education system"*

When asked to give an example, he replied:

> *"All of these competencies are just a modification of [competencies] of previous programmes." LA2*

Another lecturer commented:

> *"Most course descriptions do not reflect these competencies, as well as, there is less coordination between academic and professional courses so these programmes still can not equip student teachers with these competencies, for example: the competency which is related to research is given in a theoretical way, also in the competency of information Knowledge related to the subject specialisation need to be renewed and developed."* LA4

A third lecturer added that:

> *"There is a gap between these competencies which if acquired we will have perfect teachers but the courses which we are teaching are similar to those of previous programmes [Preparatory & Secondary teacher education programme], although we had enrolled in a three days workshop about Basic Education Schooling System by the Ministry of Education it did not cover many things and also many lecturers did not attend it."* LA3

Meanwhile, other lecturers have different points of view that were more positive:

> *"Most of graduates have these competencies, and they implement them in a proper way in Basic Education schools, they just need to train how to demonstrate classroom management and this is the school's role."* LB3

Another lecturer also agreed with this idea, he said:

> *"I can observe that college graduates have most of these competencies which related to the teaching except those which related to curriculum analysis and critique, it still needs additional efforts from the inspectors when they are in charge of the work."* LB1

6.9.3 Future of Teacher Education Preparation Programmes

In order to investigate awareness of some issues that relate to teacher education, respondents were asked this question:

There are many issues related to the future of teacher education in Oman in light of international and local inconsistencies.

- *What might these issues be?*

- *How might they be considered in the teacher education programmes?*

It can be noted from their answers that there is a consensus of the concerned issues, such as teacher's professional situations and society, effects of mass media and globalization in the social values and traditions, deficiency in financial support for schools, and expanding use of information technology.

One teacher mentioned a teacher's situation in the society, and said:

> *"Teachers are socially eliminated, I mean teachers are disrespected by many people in the society and this transmits to the pupils as well as having work overload, so there must be a consideration of teachers' situations, and changes of society's attitude toward teachers."* TA2

One complained:

> *"Limitation of opportunity for promotions and awarding of teachers, so teachers should be given chance to complete their higher [postgraduate] education by sitting a competition between them based on their performance."* TB3

A third one said:

> *"Deficiency in academic preparation and starting teaching directly after graduation without enough practical background information and professional background, this issue should be wisely treated."* TB4

The following answers from the different groups point to a variety of issues:

- *"Children are negatively influenced by media, so mass media should be employed to help education instead of working against it."* I3
- *"Cultural globalisation and its effect on the curriculum as well as other problems like; shortage in instructional media and content density in school curriculum, these issues should be discussed widely."* HT2
- *"Internet implementations should be introduced as a main part of the teacher preparation programmes."* I4
- *"Shortage in instructional media, so these equipments should be provided and teacher education programmes should be designed to train teachers on how to behave or conduct in different situations."* TA3
- *"Deficiency of economical capability of the state, or shortages of the income, intervention of political issues in education and effectiveness of international issues, e.g. wars, pollution, shortage of water resources, thus teacher education programmes should be re-planned in the light of these issues."* LA4
- *"Globalisation and its effectiveness in students' behaviour and thinking, this issue should be treated wisely and teacher's opinions and ideas should be considered."* I5
- *"Accelerated and continuous negative changes in moral, cultural and society values and customs, these issues should discussed clearly in all educational programmes."* HT4
- *"Usage of technology on a wide range in future, thus teachers should be prepared for future society and schools."* TA7
- *"Reduction of new generation or pupils motivation to learning because they have many disturbances, this is very important problem facing all educational systems."* TB5

In order to explore the participant's views towards the connection between developments in the educational sector and role of initial teacher education, respondents were asked this question:

The Ministry of Education is implementing a comprehensive educational reform by introducing of the Basic Education system.
Do you think that the programmes of teacher education in the Colleges of Education in Oman are able to prepare well qualified teachers who cope and lead the change in the educational system?

There are some negative replies from all types of respondents, such as:

- *"No, teachers should be developed, some pupils are better in technology application than their teachers, there is a shortage in the computer equipments and the way of presenting computer courses, people [teachers & student teachers] looking for practical not only theoretical lessons."* I4
- *"No, college's curriculum should be developed to follow up developments in schooling educational system."* I5
- *"No, even where there are in-service training courses but they are very short, just one week to introduce new education system and curriculum with its new content, teaching methods and assessment."* TA5
- *"No, there is no chance for teachers to criticise or discuss any disadvantages of the new schooling system with any one."* TB6
- *"No, teacher education programmes in colleges are falling behind changes in schooling system."* I3
- *"No, new curriculum is based on cooperative learning but teacher education programmes did not prepare teachers in this skill."* I1
- *"No, we are going to schools without any idea about new Basic Education system and its attainments."* STA1
- *"No, I don't think so, many student teachers will be surprised by the rapid changes in education and schooling system."* HT2
- *"No, most of colleges' educational programmes are still working as before, with slight changes, which do not meet the implemented, reformed and developed schooling education system."* HT4
- *"Many factors: overloaded lessons, assessment work and reports, extra-curricular activities, administrative duties for each teacher prevent us from creativity and development of ourselves... these matters make me as well as my colleagues suffer from teaching, you know that most of teachers are fed up of teaching and they want to change to administrative work..., a lot of them [teachers] waiting for resin or retired but they are staying in their work because of the salary"* TB4

Meanwhile there are some more positive responses:

- *"Yes, but teachers aspire to the better."* TA7
- *"Yes somewhat, but regarding development in schooling system teachers should be aware of these developments, so they can compensate all other deficiencies in teaching/ learning process."* I2
- *"Yes, but the school curriculum needs to be reviewed to meet learners and society needs."* LB2
- *"Yes, but in-service workshop training is most important."* TA3

Although participants gave some suggestions and comments during their answers of previous questions, they were asked this question:

Would you like to add any suggestion or comments, for the development and improvement of the quality of the Omani initial teacher education programmes and their graduates?

Inspectors, head teachers and even teachers and student teachers presented many suggestions, focusing on a balance between academic and educational courses and the possibility of recovering of the shortages in practical aspects through in-service training. It can be observed from their comments that they need to gradually be introduced to school working, most of them asking for the first year of teaching to be as training under supervision, they also ask for more collaboration between schools and colleges:

- *"many parents did not have clear idea of the Basic Education curriculum and the new system, many of them disturb our work, they think the practical activities and making the lessons fun is wasting their kids time, they still keep the idea of learning as memorising and feeding of knowledge, some of them come to conflict of the marks [arguing the self-evaluation] they just believe on examination"* HT3

- *"Teachers should gradually transfer from teaching in early classes in the stages to upper classes, and there should be examination to licensing them to teach in any stage."* HT1
- *"Teachers should be given at least on year on trial or under experimentation before employment."* I3
- *"Reduce theoretical educational courses and extend academic courses."* STA4
- *"Practicum workshops and microteaching should be activated and problem-based method should be introduced according to real problems in schools."* STB8
- *"Teachers should be integrally prepared."* I4
- *"Expand in-service training courses."* TB1
- *"There should be a follow-up of graduates."* I2
- *"Consideration of local and international educational, researches, conferences and meeting's recommendations."* HT4
- *"Colleges should be supplied with science and mathematics' kits and make them available for student teachers, as well as enough numbers of the school curriculum textbooks and renew the versions and updating them as in schools."* STA3
- *"Prevent of divestment teachers from contribute of workshops and seminars on the plea of no one can replace him."* TA2

In contrast, lecturers consider many other issues, such as information about the features of the new education systems and its needs, and assessment and supervision of student teachers during the practicum.

- *"Improvement of assessment and examinations in the colleges to be qualified for high standards of the bachelor level."* LA4
- *"We [colleges lecturers] should be given more chances and freedom in our course description."* LA1
- *"Practicum supervisors should be specialised in teaching methods."* LA2
- *"Microteaching should be reactivated and its time should be increased and it could be started earlier from the first year."* LB4

- *"Consideration of local and international educational conferences and meeting's recommendations."* LB1
- *"Colleges should be updated with any changes in the schooling system, such as the changes in pupils' assessment system."* LA3

6.10 Summary

The main purpose of this chapter has been to present the findings obtained from the questionnaire at identifying motivation towards teaching and the importance and self perception of competence in the teacher education programme competencies as perceived by the student teachers and beginning teachers of the scientific field for the Cycle I Basic Education in Omani schools. In addition, the qualitative findings obtained from the open questions of the questionnaire, semi-structural interviews with different groups of respondents were briefly presented.

It can be concluded that both of the two groups of participants are motivated to teaching and also have positive attitudes towards learning and teaching scientific subjects to young pupils. There are also non-ignorable percents of them whose selection of this profession and this specialisation were influenced by their families and the society views towards teaching as the suitable work for women.

It also can be concluded that all competencies were rated as above average importance and essential importance and there is significant difference between the rating of the student teachers and teachers in some of these competencies. It was also found that most participants perceive themselves to be of average and above average competence in most of these competencies, significant differences in their rating also appear in some of these competencies. Generally, practicing teacher's' rating is higher than that of student teachers in most of these competencies. There is a significant difference between the rating of competence and the rating of importance for all the competencies. Both groups of respondents to the questionnaire added more competencies and proposed some suggestions to serve development of teaching and teacher education programmes.

Analysis of the qualitative findings from the interviews confirmed the participant's views of the importance of these competencies, although there is a contradiction in some of their views, but there is mostly a consensus of dissatisfaction of the quality of the preparation programme which is in contradiction somewhat with the questionnaires results of students and graduates self perceptions of their competence in these competencies. There are questions about the adequacy of the programme to prepare qualified teachers. Moreover, participants came out with some comments, concerns and issues regarding College graduates sufficiency to teach Cycle I Basic Education mathematics and science. Thus these results led to the necessity of further investigation about the quality of the teacher preparation programme in different aspects. Moreover, the study was expanded to examine other factors related to the programme. These are covered by the second stage of the study illustrated in the next chapter.

Chapter Seven
Presentation of the Findings and Analyses of Stages Two & Three Results: Observation of Student Teachers' and Practicing Teachers' and Results of Conversational Interviews

7.1 Introduction

Results from stage one of the study, which explored student teachers' and practicing teachers' motivation towards teaching and their scientific specialisation, and surveyed their perceptions towards the importance of the teacher preparation programme's competencies and their self-perception about the importance of these competencies, rationalises a crucial need for a deep investigation in order to evaluate this programme. The main purpose of such research is to highlight the areas of weaknesses as well as the strengths of the programme from observing the participants in their actual teaching situation. This chapter provides an analysis of the findings from the observations of teaching which were carried out during the second semester of the academic year 2003/2004. This chapter starts with objectives of this stage of the study. Then the quantitative data is presented followed by the qualitative data from the follow-up interview questions are reported, and finally it will conclude with the analysis of these data.

7.2 Objectives of Stage Two of the Study

The main purpose of this stage of the study was to collect more information about the student teachers and the practicing teachers (the graduates) of the Scientific Field Initial Teacher Preparation Programme (SFITP) run by the Omani Colleges of Education. It was to identify the effectiveness of the preparation programme in helping teachers to acquire the skills for constructivist teaching which is needed for scientific field subjects teaching in Basic Education Schools, thus this stage of the study is trying to answer the questions:

- Is there any evidence of constructivist teaching in science and mathematics lessons?
- Are there any significant differences between student teachers' and practicing teachers' performance if there is constructivist teaching?

7.3 Respondents' Characteristics

As mentioned in Chapter 5, the instruments which were used in this stage of the study were an observation, and then follow-up interviews, which was implemented for the fourth year student teachers during their practicum programme and the same procedure was used for the practicing teachers employed as Scientific Field teachers in Basic

Education Schools. The sample of the 12 participants of the study is presented in Table 7.1 with their observed lessons and classes. Participants were coded e.g.: (ST1A): means student teacher one from college A of the sample from two colleges, (T1B): beginning teacher one from the region B of the teachers' sample from two different educational regions. The sample of student teachers was randomly selected by their colleges according to their agreement to be observed, and teachers were selected by the Directorate of Education in their regions who were in agreement with the observation. There were no videotape recordings because this was refused by the participants, but there was permission to take some photographs during the lessons (Some samples of these photos are in Appendix 8).

Table 7.1 Summary of the observed participants of the study and their lessons

	ST1A	ST2A	ST3A	ST5B	ST5B	ST6B
Science Lessons	Classification of colours	Parts of plants	Making sunglasses	Measuring of heart beats	My shadow is my friend	Soil & Plant
Class & Pupil's no.	Second (29)	Third (29)	Second (29)	Third (29)	Second (27)	Fourth (28)
Mathematics lessons	The fractions	The fractions	Straight figures	The angles	multiplications	Dimensions of shapes
Class & Pupil's no.	Third (29)	Third (27)	First (31)	Fourth (28)	Third (27)	Third (30)
	T1A	T2A	T3A	T1B	T2B	T3B
Science Lessons	How to keep my body clean	Soil & Plant	Rocks & minerals	Light &vision	Classification of colours	Making sunglasses
Class & Pupil's no.	Three (27)	Fourth (27)	Fourth (27)	Fourth (27)	Second (31)	Second (31)
Mathematics Lessons	Multiplication by more than 2 factors	Symmetry levels	Approximation	Classification of flat shapes	The fractions	Addition
Class & Pupil's no.	Fourth (29)	Fourth (27)	Four (22)	First (28)	Third (29)	First (32)

7.4 Presentation of the Findings from the Observations

In the following sections the findings will be presented and explained. In order to explore the evidence of constructivist teaching the observations of lessons were conducted in normal classroom settings, which normally lasted for forty-five minutes. As mentioned in Chapter Five (Methodology), the checklist used here was adopted from (So, 2002). The features of constructivist teaching were grouped into six domains, with altogether 22 items utilized as a guide to evaluating and categorizing classroom teaching (Appendix 5). A four-point rating, ranging from strongly agree (3), agree (2), slightly agree (1) to not observed (0) were used to indicate the degree of observation for each feature.

7.4.1 Observation of Student Teachers' Lessons

Table 7.2 shows the student teachers' constructivist teaching performance during their school practicum programme, in their science and mathematic lessons. The upper rows represent ratings for science lessons and the lower rows for mathematics.

Table 7.2 summary of student teacher's constructivist teaching performance

	ST1A	ST2A	ST3A	ST4B	ST5B	ST6B	*mean*
1. Use pupils' existing knowledge to guide teaching						Science (overall mean)	.165
						Mathematics (overall mean)	.33
a. teacher's awareness of pupils' existing ideas	0	0	1	0	1	0	.33
	0	0	0	0	1	0	.16
b. elicit pupils' ideas before presenting teachers' own idea or before studying ideas from textbook or other sources	0	1	1	1	0	0	.5
	0	0	0	1	1	0	.33
c. challenge pupils' initial ideas	0	0	0	0	1	0	.16
	0	0	0	0	0	0	0
d. make new ideas accessible to pupils	1	1	2	1	2	1	1..3
	1	1	1	1	1	0	.83
2. Guide pupils to generate explanations and alternative interpretations						Science (overall mean)	.33
						Mathematics (overall mean)	.364
a. pupils observe phenomenon	0	1	0	1	1	0	.5
	0	0	1	1	1	0	.5
b. pupils describe phenomenon	0	0	0	1	0	0	.16
	1	0	0	1	0	0	.33
c. pupils generate explanations and interpretations	1	1	0	0	1	1	.66
	1	0	1	1	1	0	.66
d. probe pupils' responses for clarification and justification	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
e. pupils explain contradictions and misconceptions	0	0	0	0	0	1	.33
	0	0	0	0	0	0	0
3. Devise incisive questions						Science (overall mean)	.495
						Mathematics (overall mean)	.413
a. a question-rich learning environment	1	1	2	1	1	1	1.16
	1	1	1	1	1	0	.83
b. questions based on pupils' responses	0	0	0	0	1	0	.16
	0	0	0	0	1	0	.16
c. pupils expand on their questions and justify their responses	0	0	1	0	1	0	.33
	0	0	0	0	1	0	.16
d. accept and value pupils' answers and suggestions	1	0	0	0	1	0	.33
	0	1	0	0	1	1	.5

4. Provide materials and activities for pupils to test ideas	Science (overall mean)						.358
	Mathematics (overall mean)						.2
a. pupils work with materials and activities	1	2	1	1	2	1	1.3
	1	1	1	1	1	1	1.0
b. pupils engage in scientific inquiry	0	1	1	0	0	0	.33
	0	0	0	0	0	0	0
c. pupils work independently with minimal help from the teacher	0	0	1	0	0	0	.16
	0	0	0	0	0	0	0
d. pupils put their ideas to test (disprove or prove what they think)	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
e. pupils' suggestion about the direction of the activity/experiment	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
5. Provide a classroom atmosphere conducive to discussion	Science (overall mean)						.745
	Mathematics (overall mean)						.33
a. pupils put forward and discuss ideas with the teacher	1	1	1	1	1	0	.83
	0	0	0	0	1	1	.33
b. pupils put forward and discuss ideas with peers	0	1	1	1	1	0	.66
	0	0	1	0	1	0	.33
6. Provide opportunities for pupils to utilise new ideas	Science (overall mean)						.58
	Mathematics (overall mean)						.415
a. relate current teaching points to previous knowledge	1	1	0	0	2	1	.83
	0	0	0	1	1	0	.33
b. pupils apply knowledge to new situations or real-life problems	1	0	0	0	1	0	.33
	0	1	1	0	1	0	.5
Total	8	11	12	8	17	6	
	5	5	7	8	14	3	
Overall mean Science (overall mean)	.36	.5	.54	.36	.77	.27	.466
Mathematics (overall mean)	.23	.23	.32	.36	.64	.14	.32
Rank order Science	4.5	3	2	4.5	1	6	
Mathematics	4.5	4.5	3	2	1	6	

As can be seen from Table 7.2, it was not common for student teachers to be found to be utilising constructivist teaching in their science lessons, with overall mean rating of (.466). The student teachers' performances as found in six areas of constructivist teaching were as follows:

1. *Using learners' existing knowledge to guide teaching*

The average rating in this area was (.165), the lowest found among the six areas. Student teachers were able to make new ideas accessible to their pupils, but they were not aware of pupils' existing ideas and very rarely tried to elicit pupils' ideas before presenting their own, there were no challenges to pupils' initial ideas during their teaching.

2. *Guiding learners to generate explanations and alternative conception*

The average rating for this category was (.33). Four student teachers were able to guide their pupils to generate explanations and interpretations. In contrast three teachers were able to guide pupils to observe phenomenon. There was no one who was able to probe pupils' responses for clarification and justification, and there was only one who was able to guide pupils to explain contradictions and misconceptions.

3. *Devising incisive questions.*

The average rating here was (0.495). Some student teachers were able to use questions to guide pupils' thinking but their questions were generally not based on pupils' responses. They were able to accept and value pupils' answers, but it was uncommon for student teachers to guide pupils to expand on their answers and to justify their responses.

4. *Choosing materials and activities for pupils to test ideas*

The average rating here was (0.358). Some student teachers were able to choose materials and activities for pupils to work with during science lessons. Most of the activities did not require pupils to engage in scientific inquiry nor to put their ideas to the test. No student teachers asked pupils to suggest the direction of the activities.

5. *Providing a classroom atmosphere conducive to discussion*

The average rating here was (0.745),. Some student teachers allowed their pupils to put forward and discuss ideas with them and their peers but in most of the lessons, it was the student teacher who put forward questions in class. This is the highest score in the six areas and yet it still below the 'slightly agree' point of the scale.

6. *Providing opportunities for pupils to utilise new ideas*

The average rating here was (0.48). Some student teachers were able to relate current teaching points to pupil's previous knowledge and apply their knowledge to new situations or real-life problems but such instances were not frequent.

In the case of mathematics lessons, student teachers were also not frequently observed to be utilising constructivist teaching in their lessons. The overall mean rating of mathematics was (.32), slightly less than of science lessons.

The student teachers' performances as judged in six areas of constructivist teaching were as follows:

1. Using pupils' existing knowledge to guide teaching

The average rating in this area was .33. Few student teachers were able to make new ideas accessible to their pupils, and most of them were not aware of pupils' existing ideas, and had no procedure to elicit pupils' ideas before presenting their own, or to challenge their initial ideas during teaching.

2. Guiding pupils to generate explanations and alternative conception

The average rating for this category was (.33). It is seen as a similar situation of science lessons, in that four student teachers were able to guide their pupils to generate explanations and interpretations. In contrast, three student teachers were able to guide pupils to observe phenomenon. No student teachers were able to probe pupils' responses for clarification and justification, and there was only one who was able to guide pupils to explain contradictions and misconceptions.

3. Devising incisive questions.

The average rating here was (0.413). Some student teachers were able to use questions to guide pupils' thinking, but their questions were generally not based on pupils' responses. They were not able to accept and value pupils' answers and it was uncommon for the student teachers to guide pupils to expand on their answers and to justify their responses.

4. Choosing materials and activities for pupils to test ideas

The average rating here was (0.2), the lowest found among the six areas. Some student teachers were able to choose materials and activities for pupils to work with during mathematics lessons but most of the activities did not require pupils to engage in scientific inquiry nor to put their ideas to the test. No student teacher asked her pupils to suggest the direction of the activities.

5. Providing a classroom atmosphere conducive to discussion

The average rating here was (0.33). It was very rare to have pupils put forward and discuss ideas with their teacher and their peers. Like science lessons, in most of the mathematics lessons, it was the student teacher who put forward questions in class.

6. Providing opportunities for pupils to utilise new ideas

The average rating here was (0.415). Some student teachers were able to relate current teaching points to pupils' previous knowledge and apply their knowledge to new situations or real-life problems, but such instances were still not frequent.

7.4.2 Observation of Practicing Teachers' Lessons

Table 7.3 shows the practicing teachers' constructivist teaching performance in their science and mathematic lessons. Three of those teachers are in their second year of teaching while the other three are in their first year. The upper rows represent ratings for science lessons and lower rows for mathematics lessons.

Table 7.3 Summary of practicing teachers' constructivist teaching performance

	T1A	T2A	T3A	T1B	T2B	T3B	*mean*
1. Use pupils' existing knowledge to guide teaching	Science (overall mean)						.625
	Mathematics (overall mean)						.415
a. teacher's awareness of pupils' existing ideas	0	1	1	1	0	0	.5
	0	1	0	1	0	0	.33
b. elicit pupils' ideas before presenting teachers' own idea or before studying ideas from textbook or other sources	0	2	0	0	1	1	.67
	0	1	0	1	0	0	.33
c. challenge pupils' initial ideas	0	1	1	0	0	1	.5
	0	0	1	0	0	0	.33
d. make new ideas accessible to pupils	1	1	1	1	1	0	.83
	1	1	1	1	0	0	.67
2. Guide pupils to generate explanations and alternative interpretations	Science (overall mean)						.432
	Mathematics (overall mean)						.387
a. pupils observe phenomenon	1	1	1	0	0	1	.67
	0	2	1	1	1	0	.83
b. pupils describe phenomenon	0	1	0	1	0	0	.33
	0	1	0	1	0	0	.33
c. pupils generate explanations and interpretations	1	2	0	0	0	0	.5
	0	1	1	1	0	0	.5
d. probe pupils' responses for clarification and justification	0	1	0	0	0	0	.16
	1	1	0	0	0	0	.33
e. pupils explain contradictions and misconceptions	0	1	0	0	1	1	.5
	0	0	0	0	0	1	.33

3. Devise incisive questions	Science (overall mean)							.33
	Mathematics (overall mean)							.33
a. a question-rich learning environment		1	2	2	1	0	1	1.17
		2	1	0	1	1	1	1.0
b. questions based on pupils' responses		0	0	0	0	0	0	0
		0	0	1	0	0	0	.16
c. pupils expand on their questions and justify their responses		0	1	1	0	0	0	.33
		0	0	1	1	0	1	.5
d. accept and value pupils' answers and suggestions		0	0	1	0	1	1	.5
		0	1	1	0	0	0	.33
4. Provide materials and activities for pupils to test ideas	Science (overall mean)							.43
	Mathematics (overall mean)							.29
a. pupils work with materials and activities		1	1	1	1	2	1	1.17
		1	2	1	0	1	0	.83
b. pupils engage in scientific inquiry		0	0	1	0	0	0	.33
		0	1	0	0	0	0	.33
c. pupils work independently with minimal help from the teacher		0	0	1	0	0	0	.16
		0	0	1	0	0	0	.16
d. pupils put their ideas to test (disprove or prove what they think)		0	1	0	0	0	0	.16
		0	0	1	0	0	0	.16
e. pupils' suggestion about the direction of the activity/experiment		0	1	0	1	0	0	.33
		0	1	0	0	0	0	.16
5. Provide a classroom atmosphere conducive to discussion	Science (overall mean)							.67
	Mathematics (overall mean)							.33
a. pupils put forward and discuss ideas with the teacher		1	2	1	0	0	0	.67
		0	1	0	0	1	0	.33
b. pupils put forward and discuss ideas with peers		1	1	1	1	0	0	.67
		1	1	0	0	0	0	.33
6. Provide opportunities for pupils to utilise new ideas	Science (overall mean)							.67
	Mathematics (overall mean)							.42
a. relate current teaching points to previous knowledge		1	1	1	0	1	0	.67
		0	1	0	1	0	1	.5
b. pupils apply knowledge to new situations or real-life problems		1	1	1	0	0	1	.67
		0	1	0	0	1	0	.33
Total		9	22	15	7	7	8	
		5	18	10	8	5	4	
Mean	Science	.41	1.0	.68	.32	.32	.36	.515
	Mathematics	.23	.82	.45	.36	.23	.18	.38
Rank order	Science	3	1	2	4.5	4.5	6	
	Mathematics	4.5	1	2	3	4.5	6	

It is obvious from Table 7.3 that it is very rare for practicing teachers to be observed as utilising constructivist teaching methodology in their science lessons with an overall mean rating of (.515), even though this rating was higher than that of student teachers. The practicing teachers' performances as judged in six areas of constructivist teaching were as follows:

1. *Using pupils' existing knowledge to guide teaching*

The average rating in this area was (.625). Most of the practicing teachers were able to make new ideas accessible to their pupils, but they were not aware of pupils' existing ideas, and rarely made attempts to elicit pupils' ideas before presenting their own., There were very few teachers who challenged pupils' initial ideas during teaching.

2. *Guiding pupils to generate explanations and alternative conception*

The average rating for this category was (.432). It was very rare for teachers to guide their pupils to generate explanations and interpretations. Also, few teachers were able to guide pupils to observe phenomenon, while only two were able to probe pupils' responses for clarification and justification. There was only one teacher who was able to guide pupils to explain contradictions and misconceptions.

3. *Devising incisive questions.*

The average rating here was (0.33), the lowest found among the six areas. Some teachers were able to use questions to guide pupils' thinking but their questions were generally not based on pupils' responses. Some of them were able to accept and value pupils' answers and but it was not common for them to guide pupils to expand on their answers and to justify their responses.

4. *Choosing materials and activities for pupils to test ideas*

The average rating here was (0.43). Some teachers were able to choose materials and activities for pupils to work with during science lessons. Most of the activities did not require pupils to engage in scientific inquiry nor to put their ideas to the test. It was very rare that a teacher asked pupils to suggest the direction of the activities.

5. *Providing a classroom atmosphere conducive to discussion*

The average rating here was (0.67). It was very rare to have pupils put forward and discuss ideas with their teacher and their peers. In most of the lessons, it was the teacher who put forward questions in class.

6. *Providing opportunities for pupils to utilise new ideas*

The average rating here was 0.67. Some teachers were able to relate current teaching points to pupil's previous knowledge and apply their knowledge to new situations or real-life problems, but such instances were not frequent.

In mathematics lessons, practicing teachers were also not frequently observed to be utilising constructivist teaching in their lessons, where the overall mean rating was (.38), which is lower than of science. The teachers' performances as judged in six areas of constructivist teaching were as follows:

1. *Using learners' existing knowledge to guide teaching*

The average rating in this area was (.415). Some teachers were able to make new ideas accessible to their pupils, but they were not aware of pupil's existing ideas, and made no attempts to elicit pupils' ideas before presenting their own. There were no challenges of the pupils' initial ideas during teaching.

2. *Guiding learners to generate explanations and alternative conception*

The average rating for this category was (.387). Three teachers were able to guide their pupils to generate explanations and interpretations. Four teachers were able to guide pupils to observe phenomenon, while two were able to probe pupils' responses for clarification and justification, and there was only one who was in able to guide pupils to explain contradictions and misconceptions

3. *Devising incisive questions.*

The average rating here was (0.33). Some teachers were able to use questions to guide pupils' thinking, but their questions were generally not based on pupils' responses. They were not very able to accept and value pupils' answers, and it was uncommon for teachers to guide pupils to expand on their answers and to justify their responses.

4. *Choosing materials and activities for pupils to test ideas*

The average rating here was (0.29), the lowest found among the six areas. There were very few teachers who were able to provide materials and activities for pupils to work with during mathematics lessons. Most of the activities did not require pupils to engage in scientific inquiry nor to put their ideas to the test, just following teacher's instructions. Only one teacher sometimes asked pupils to suggest the direction of the activities.

5. Providing a classroom atmosphere conducive to discussion

The average rating here was (0.33). It was very rare to have pupils put forward and discuss ideas with their teacher and their peers. In most of the lessons, it was the teacher who put forward questions to the class.

6. Providing opportunities for pupils to utilise new ideas

The average rating here was (0.42). During mathematics lessons, it was very rare for teachers to relate current teaching points to pupils' previous knowledge, and apply their knowledge to new situations or real-life problems..

7.5 Follow-up Interviews

In order to clarify and explore student teachers' and practicing teachers' views about teaching science and mathematics in Cycle 1 Basic Education Schools and to investigate the programme role in this matter, the participants were interviewed after each observation of their lesson. To begin with, the interviewees were asked this question:

What is the best way of learning science and mathematics? Have you ever been taught in this way?

There is a tendency for some student teachers and practicing teachers to adopt the traditional view of science and mathematics learning, which is looking towards these subjects as providing solid content knowledge therefore, as pupils gain scientific information, they are well educated. One respondent commented:

> *pupils should memorise the basic information, so they can answer the questions in any situation, during the lesson, or in assessment of the topic* (ST5B)

Another student teacher pointed out:

> *we had memorised much information of science during our primary studying in schools, we know many things about things such as the human body, space and galaxies,, light and sound ...etc. but today's pupils do not have this, because school curriculum now emphasises practical activities. (ST 3A)*

Even some practicing teachers have a similar view; one saying:

> *my previous teachers had always made us memorise science and mathematics information, such as the multiplication timetable, they had many ways to make us understand lessons, they simplified them for us, Our pupils usually forget so we have to repeat and listen to them.* (T2A)

Another teacher also revealed:

> *Science and mathematics can be learned when the teacher simplifies the knowledge for her pupils., Also reading the textbooks and doing practical activities is important, but this does not much improve the knowledge of the kids.*(T3A)

While this type of thinking among the participants is common, others view the learning of science and mathematics in a different way, one saying:

> *The learning of scientific subjects in the early stage of school should be directed to make kids like these subjects, it doesn't matter if they gain much knowledge, in past, when we were studying at school there were no practical activities or any fun during the lessons, ...e.g. we were punished if we did not memorise the multiplication timetable* (ST1A)

Another one added:

> *There are a lot of people who think learning science and mathematics should be done by memorising the information and if pupils do not gain much knowledge there is a weakness in the teacher, ...this is wrong idea, we should change this idea, ... unfortunately I was taught these subjects in a very poor way, sometimes my teacher reading from the textbook and we just repeating what she said without any understanding, this made me hate mathematics... but now I am a mathematics teacher*. (ST2A)

Some other teachers also support these views; one of them said:

> *Learning scientific subjects can be done in many ways, it depends on the topic and the pupil him/herself, but in today's schools there should be no chance for the memorisation method, pupils should understand what they learn, I like to know the worth of scientific knowledge for my life, so it is no doubt that my pupils also like to as well.* (T2A)

Another teacher commented:

- *I learned science by a totally different method than my pupils learn now., at that time I was impressed by any word said by my teacher. I was feeling every thing was new for me so when the teacher lectured about scientific information we listened to her, and we thought that it was the only way of learning science but now my pupils are becoming bored if I start talking to them, I think today's generation should learn science and mathematics in a different way.* (T3A)

- *I never did experiments in my school studies, or ever presented any science work or project, so I don't want my pupils to be in the same situation. They should be in a better position.* (T1B)

The second question was:

What is your opinion about teaching scientific subjects? What is your best way (method, paradigm, approach, or strategy) to teach pupils science and mathematics? What is the teacher's role?

Generally, most participants have a consensus that teaching science and mathematics should be changed to be more pupils-centred and problem-based instead of the traditional teacher-centred and knowledge-based. They raised many issues, which were obvious from their answers, one student teacher said:

> *Pupils should do their own work and teachers just direct them, it is not her [teacher's] duty to transfer what is in the book to children. Children know a lot but they need someone who can help them to organise their information and show it in a scientific form, I like to utilise such methods in my teaching but I need more training.* (ST5B)

Another student teacher said:

> *I believe that scientific subjects have their extraordinary, or specific methods. These methods tend to be more practical in nature, I leave children to do their own work, they can help each other through group work, and they learn much from each other.* (ST2A)

One teacher pointed out that:

> *[There is] no doubt that children can learn better by doing activities, through discussions and investigation and behave as small scientists, I am trying to reduce my interruptions and make them do learning by themselves, but I am familiar with teaching as lecturing during my school study or even my college, it is not easy to switch to more pupil-centred teaching.* (T2A)

While another teacher commented:

> *My role is still important even there is emphasis on self-learning or pupil-centred teaching, I can implement these techniques in science lessons more than mathematics.* (T2B)

It can be noticed that all of these responses do not reflect the observed situation, it is seen that most of them have more positive perceptions towards requirements of constructivist teaching. Thus, in order to do more investigation about their understanding of the nature of teaching science and mathematics, and how they perceive their work, the participants were asked this question:

What are the most important features of teaching science and mathematics in Cycle One Basic Education schools? Do you think that you are meeting these features in your teaching? Why? Do you think that the preparation programme covered these features?

Initially most participants had some common ideas about teaching scientific subjects in Cycle 1 of Basic Education schools, such as: cooperative learning, pupil-centred learning, authentic assessment ...etc, but still do not have a clear vision for utilising techniques or implementation mechanisms. This is obvious through the following responses:

- *Group working or cooperative learning is more emphasised in these schools., It is one of the main signs of this system [Basic Education] so you find pupils sitting in the classrooms as groups of four to six even though they don't do group work. I am trying to implement this technique in my teaching but it is too difficult to assess pupils' performance during group working, we don't have enough experience in this matter.* (ST5B)

- *Teaching this curriculum required using of instructional media and instruments like overhead projectors, slide projectors, videos, charts ...etc,... but I could not do this in all of my lessons ... it can be implemented in most science lessons but it is difficult for mathematics because of the nature of this subject, where the curriculum is over-intensified and I should cover many topics in a short time.* (T2B)

- *During our college study we learn a lot about problem-solving, cooperative learning, pupil-centred learning, individual differences, and the teacher as a facilitator, authentic assessment and many other innovative thoughts, but in a real situation it is difficult to implement these ideas, and I faced many problems. I don't have practical skills, so I am forced to return to traditional dictation methods as I was taught with some improvements.* (T2A)

- *Using questioning skills to stimulate pupils' thinking, explaining ideas to pupils, organising and supporting practical work, matching activities to pupils' development and needs and continuous (diagnostic) assessment in relation to process skills all of these issues are crucial in this system [Basic Education] but we need more training to put these into practice situatiosn.* (ST4B)

- *At present, I select some science and mathematics activities and then research the subject myself through books within the LRC. The knowledge I have is only slightly further on than that of the children I teach. I like it if teachers' guidebooks give the scientific information I need to feel confidence in the areas I teach.* (T1A)

The fourth question aims to find or reveal participants' views towards teaching scientific subjects and investigate if there are any changes in their attitudes caused by the preparation programme.

Before enrolling in the programme, what were your thoughts about science and mathematics teaching for children? Does the preparation programme change your initial thoughts or preconceptions about teaching scientific subjects for children?

Respondents gave evidence that the programme caused changes in their perceptions. Most of them initially thought of science and mathematics teaching as only transmitting some simple information already included in the pupils' books. Teachers also generally felt that the programme does not practically succeed in transmitting a clear vision of how constructivist teaching should be accomplished as seen from next responses:

- *Before enrolling in the programme I had very naïve idea about teaching science and mathematics, from my previous schooling experiences, from my teachers, ... it was very simple, just dictate some facts [information] to the children and that is teaching, ...but what I have discovered now is something different, teaching is a complicated job, it is a cluster of complex functions, the main part in it is how to inspire children to think.* (ST2A)

- *I thought I would be willing to teach any topic in science but now I think that science expectations in the Basic Education schools are too complicated and off-putting for most people.* (ST6B)

- *The traditional way of teaching. as we were taught is more merciful [easier] for teachers By that method any unskilful one can teach. Educators say the teacher's role now is as a facilitator and manager of children's work, but this new type of teaching requires more skills and experience, theoretically the lecturers tried somewhat to clarify this for us, but I think they do not themselves believe in it, many of them still believe in the efficiency of lecturing.* (ST5B)

- *What I knew before coming to the college was totally different what I know now,... I feel that I am beginning to develop a clearer view of how I would like to teach science, and what targets I need to achieve to do so effectively. I am trying to perceive matters from a child's perspective, encourage children to challenge their own minds, give children time to absorb activities and discuss their work. I would like to be able to do so effectively. I had some theoretical knowledge from the college about these things but practically, I still need experience which can be gained from others, e.g. senior teacher and inspector.* (T2A)

- *My view of science and mathematics teaching is changing now I was influenced by my previous primary traditional teachers, whose concern was only on recording of information. That style was maybe successful at that time because of examinations and the nature of that curriculum ... from the college, we were learning so many things, but there is too much work; it is difficult to grasp.* (T3B)

- *Teaching these days tends to concern methods such as activities, pupil-centred lessons, learning by doing and discovery, which are not only gained by what is taught in the college but need much practice., People, even head teachers, are not familiar with them We as teachers are lost between the intensive curriculum and strict head teachers and how to implement what we learned from the college.* (T2B)

- *The college lecturers often give us more innovative methods, but when we come to practice the influence of classroom teachers overpowers the college influence. So we are forced to imitate and copy the classroom teacher even where she is teaching wrongly, and through time we will be as a copy of her.* (ST6B)

After the conversation with each respondent, they were shown the observation checklist with their scores. When they saw how it indicated a very low constructivist teaching performance, which should be the base for learning environment in Cycle One Basic Education schools, they asked what the constraints were for their utilisation of the constructivist way of teaching science and mathematics even though they believe in this. However, participants justified their situation. One teacher said:

> *It is true in some way, but I am trying my best to initiate my teaching from pupils previous ideas or knowledge, and concern about the individual differences among them, but how long does it take to discover about 30 pupil's ideas, or at least 70% of them? Time is an issue, as well as the intensive curriculum, particularly for mathematics of class four.* (ST5B)

Another respondent pointed out that:

> *In most of my lessons it is looks like questioning or discussions, but by the end the right answers should be what is in the textbooks, also children are waiting for me to give them some information from time to time, so our lessons should also not be as activities or discussions, I have to teach [dictate] from time to time or I will lose my value, my reputation.* (ST4B)

A third participant commented:

> *I agree that I don't elicit pupils' ideas before presenting my own idea every time because I expect that pupils do not have any ideas particularly in the new topic. There is another important reason, the available time is very limited to utilise these types of constructivist factors, so the time for what should be taught in only one lesson will extend to five or more.* (T2B)

One teacher said:

> *Before I saw this check list I was satisfied that I was on safe side, and I thought that I was teaching in the proper way which is needed in this system [Basic Education], I am allowing pupils to give their ideas and so on, but know I have satisfaction that teaching does not only following the teacher's guide textbook, it is more complex situation,... I think others like: senior teachers and head teachers even inspectors should have awareness of constructivist teaching, I don't think they understand as it must be [appropriately].* (T2A)

Finally participants were asked what suggestions or comments they would like to make, specifically in this particular field (constructivist teaching) if they had the chance to contribute in a committee for the development of the Scientific Field Teacher Preparation programme.

The following is a list of some of their comments and suggestions:

- *Teachers should be provided with core knowledge booklets.* (ST5B)
- *Training of lecturers to behave as constructivist-teachers models.* (ST4B)
- *providing more references and resources, e.g. videos of model constructivist-lessons in the colleges and schools LRCs.* (ST1A)
- *School curriculum especially some mathematics topics should be presented in a different way, so the teacher can easily utilise them in constructivist teaching.*

- *Other peoples; especially the parents should have awareness of the requirements and the nature of teaching and learning science and mathematics in the new system.* (T2A)

7.6 Summary

Observation is a significant way to learn what is happening, what the classroom is like, what teachers are doing, and how learning is taking place. The findings from observation of student teachers' and practicing teachers' lessons indicate that, although there were indications of attempts to apply constructivist teaching, there is misunderstanding on how it should be accomplished. Teachers received relatively high scores of constructivist teaching compared to those of student teachers.

It can be commonly concluded, from these observations, the teachers set up activities for pupils, but the mode of teaching was predominantly transmissive. Typically, the pupils participate, but do not initiate any debate or interpretations nor is opportunity for debate provided by the teacher. The learning situation demands little mental involvement. The teacher explains and instructs. The pupils listen, do what they are told, and wait when they are not engaged.

To supplement the findings garnered through observations, follow-up interviews of the same sample of observed practicing teachers and student teachers were conducted subsequent to these observations. Overall, the respondents felt strongly that their preparation programme provided them with some theoretical background about constructivist teaching but most of them were unsure about their practical efficiency to cope with the requirements of such a style of teaching.

Specifically, the participants asked for more opportunities, not only to implementing group work or activities-based teaching as instructed in teacher's guide textbooks, they need more experience and good practice as well as more cooperation from head teachers and senior teachers as well as parents in this specific matter.

Hence, there is a need for more extended study to explore others points of view in order to clarify the whole picture of the preparation programme and its outcomes.

7.7 Presentation of the Qualitative Findings from the Conversation Interviews

7.7.1 Introduction

Findings from the observations of teaching and discussions with the observed student teachers and teachers proved that they have not met expectations in their teaching. Even thought they are attempted to utilise different methods in their teaching which can translate the Basic Education principles and philosophy, most of them have misunderstandings of the features of constructivist teaching. They mentioned some restraints which prevent them from full utilisation of such teaching. They attributed this to many reasons, not only of their preparation programme, but they also talked about the structure of the school curriculum and schools' conditions. It becomes needful to peruse the other principals' perceptions, thus face-to-face conversational interviews were obtained in this stage of the study. These conversations engaged a variety of educators from different fields, two represented each of the positions of scientific field senior teacher, inspectors, head teachers, college lecturers, two advisors of the curriculum department, and one from each of the Ministry of Education (MOE) and the Ministry of Higher Education (MOHE).

7.7. 2 Questions of the Interview

In order to explore the participants' views towards the results from the previous stage of the study, the following issues were discussed throughout the interviews:

- To what extent is the notion of constructivist teaching adopted and supported by the principals?
- To what extent do the practices in teacher education programme reflect the notion of a constructivist teaching environment?
- To what extent are the science and mathematics curricula designed as constructivist-based curricula?
- To what extent do students teachers (perspective teachers) and teachers reflect this notion in their teaching?

Although these questions touch many aspects the researcher directed the conversation to focus on the target of the study, the initial preparation programme.

7.7.3 Presentation and Analysis

7.7.3.1 The Meaning of Constructivist Teaching

Participants have awareness of the importance of utilising a constructivist approach in teaching, and there is agreement that the utilising of such an approach will emerge with a shift of traditional modes of teaching dominant in the former school environment. Participants see a shift to the new trends, expected by the comprehensive educational reform, even thought they differ in their interpretations and what they mean by it. The programme advisor in the Ministry of Higher Education (MOHE), pointed out:

> *"Although there are great efforts for developing and renewing teaching in the colleges, many people still think that one is to stand and give a lecture [talk] as long a time as possible is the one who hold the knowledge; this idea dominate*

> *faculties, lecturing is still the main method and many believe it as one of the academic rules, and then this habit transfers to perspective teachers, so many teachers depends on memorising the lesson and repeat it in front of their pupils".*

He added:

> *"To be a constructivist teacher one should be not only lecturing. In both, colleges and then schools, students should be offered with a variety of learning situations and instructional formats; e.g. projects, trips, readings, reports, discussions, and field works ... etc, and this what we are trying to achieve when we planned the preparation programmes".*

One of the lecturers commented:

> *"Constructivist teaching means that we should provide rich context for learning, we should challenge students not just provide them the ready knowledge, so students should be faced with reasoning, questioning, drawing connections, evaluating of viewpoints, framing of problems and using evidences. Our students are used to being passive, and even they are sharing in the discussion this is just to gain marks in their grades. I find difficulties in activating them".*

The curriculum advisor at the Ministry of Education (MOE) said:

> *"To provide a constructivist teaching environment we should emphasise meaningful learning, learning for understanding, sense-making learning and cooperative learning so the classrooms should be changed from the stereotyped image of the pupils sitting in rows. It should be active, acceptable, messy, and noisy".*

One of the inspectors said:

> *"There are no much materials or sources [in Arabic] talking about this approach[constructivist teaching], we have heard about such types of teaching and assessment techniques during the training workshops in Muscat [the central training centre]; even in the colleges they do not have references about these new things, I think what is attended by the Basic Education reform and the new curriculum, which is based on the idea of pupil-centred and cooperative learning and problem-solving and activity-based learning; all of these if implemented properly, will lead to such [constructivist] teaching".*

One of the head teachers said:

> *"Questioning is an important part of the teachers' role in the new sitting of teaching, teachers are asked to use questions as a way for pupils' learning, ask questions such as: what do you think happens if ...? how might we find out .. ? have you seen anything new? can you give me an example from your daily life? ...etc. such questions call for analysis, evaluating and judging".*

One of the senior teachers said:

> *"As I understand, in the new systemg of teaching, science is not as simple as telling or searching for truth. It is a process that assists pupils to make sense of their world, by this way teaching science becomes more like the science that*

scientists do, pupil behave as a small scientist or inventor...such methods [constructivist] allow students to rethink their ideas when they make mistakes, students are subsequently become less afraid to make errors, and this lead them to discovering and understanding".

7.7.3.2 The Preparation Programme

Secondly, the discussion aimed to explore participants' views of constructivist teaching, and how the preparation programme deals with this issue. Does the preparation programme consider this matter, and does it provide student teachers with the required skills? Is there any evidence of practicing of such teaching in the colleges?

Generally, even though there was consensus among the participants that there is a deficiency from the programme their views differ according to their background or their positions. The curriculum advisor at the Ministry of Education (MOE) said:

"Have[the colleges] undertaken the main part of the responsibility of how is it delivered? They [student teachers] are imitating their lecturers and do lecturing for young children, this is not the type of teaching we need, those teachers should be prepared specifically for the new trends of teaching, most of them still need further educational preparation".

The programme advisor in the Ministry of Higher Education (MOHE), pointed out that:

"There are many issues and factors surrounding the teacher preparation process, we can not generalise and blame only the colleges. I agree that there is a shortage with these outcomes [the graduates] in some aspects, specifically what you have mentioned about the new trends in teaching [constructivist teaching], but the field [schooling system] is also responsible for what they [student teachers] want for the practicum and facing a traditional school environment without substantial change ...they need guidance, even teachers themselves who should behave as a mentors, the philosophy of the Basic Education is still not clear for them".

He also added:

"One of the essential elements of the developed teaching course for student teacher development, so that even after graduation, they should be learners themselves, teachers are continually learning about their pupils learning, and the nature of teaching process itself, and this is what the college programme is attending to".

He also commented:

"It is true that there is no course or topic called constructivist teaching environment or constructivism but many features of this theory are covered in many professional component courses such as teaching methods, developmental psychology, educational psychology ...etc".

This point of view is also supported by the lecturers, with one of them saying:

"One of the main factors is confidence; school pupils should trust student

teachers, but how it works when the head teacher asks the school teacher to repeat the student teacher's lessons, such actions effect them negatively; this may damage their image in front of the pupils, and reduces her awareness of the responsibility...according the theoretical aspect, I agree that there were much in this aspect but student teacher should have the theoretical base either in her subject or in pedagogical content, when she will employed in the school, lecturers will be not with her any more, so she will depend on her self for her professional development ... it is essential to provide a theoretical base".

Inspectors, head teachers and senior teachers presented more critical views, as can be observed from their answers:

- *"student teachers come to schools and they thought that they are fully knowledgeable, then they are facing of the real situation and what they were listened from their lecturers does not reflect the reality, lecturers themselves should get down to the field, not only depends on the theories and their researches".* (Head teacher)

- *"One of the examples which is evidenced by what happened in the colleges, is the preparation or the planning for the lessons, student teachers are still trained in the old style of lesson preparation which was used in the old system [General Education], they also do not have idea about portfolios and new assessment techniques. How you talk about these advanced practices and they lack of the basics of teaching!".* (senior teacher)

- *"Most of the new teachers who I am supervising are using direct instruction, this can work with the old system, this is effective when the goal of instruction is to have pupils reproduce factual knowledge, I think there should be no distinction between what is taught in the college and the school situation".* (inspector)

7.7.3.3 The School Curriculum

Based on the student teachers' and practicing teachers' comments about the science and mathematics curriculum, particularly their mention of its lack of supportiveness of the constructivist teaching environment, this issue was discussed with the principals. There is consensus among them that this curriculum is designed to direct teaching towards the constructivist practices in most of its topics, even if there is disagreement regarding the level of implementation of this curriculum. The MOE curriculum advisor commented:

"The big deference between the new curriculum and the old one is that this curriculum is structured on the philosophy of pupil-centred learning, e.g., in the designing of the tasks in the pupil's textbook, it used the form of pupil as the speaker, e.g.. 'what I need' instead of 'the tools', 'what I am going to do' instead of 'the procedures', 'I'm drawing what I observed' instead of 'the observations', 'what I conclude from the results' instead of 'the conclusion'...etc".

When asked about teachers who are suffering from the perceived new overloaded curriculum, complaining of multitasks and repeated activities, he said:

"It is true that there are a variety of activities, and there are some details, but these have been put in to serve the teacher, even the novice one can survive teaching it, the purpose of these activities is to give teaches many alternatives, so there is a freedom for the teacher, she can select which one is suitable according to the conditions of her community, school, pupils ...etc. this depends on her ability and creativity, They should be trained on taking or making decisions towards their teaching situation".

The MOHE programme advisor commented that:

"As I understood what is intended by the Basic Education reform is a transfer from traditional teaching style to a form of constructivist teaching, this is what should be happening in Basic Education, e.g. peer review, cooperative learning where pupils naturally collaborate on activities, curriculum focused on daily life-based themes, self evaluation, portfolios and other forms of alternate assessment, pupils-developed plans for learning, teacher as facilitator, authentic activities, peer support groups and higher level thinking skills so this is can be seen as a translation of constructivist classrooms, I think the new curriculum considers some of these themes".

One of the inspectors said:

"when modifying a curriculum or designing a new textbooks [curriculum] educators need to take into account all dimensions concerning both the learning they wish pupils to achieve; content, skills, knowledge and understandings, and how learning will be facilitated; supported, structured ... etc. these dimensions may be included or somewhat presented in this [Basic Education] science & mathematics curriculum. These new curricula direct teachers to often use problem-solving as a learning strategy".

One of the head teachers commented:

"The curriculum includes many innovative ideas, it considers pupils' interests, it is motivating pupils to learn, but because of its heavy density, teachers can not cover it properly, its lessons need a careful preparation, particularly the practical and field works".

One of the senior teachers mentioned:

"The most essential feature of this curriculum its focusing on the authentic assessment, this variety of assessment tools, provides a richer information than traditional paper and pencil types of tests, but because teachers do not have enough training in this aspect as well as the large number of pupils and other duties, teachers feel inconvenience with it".

7.7.3.4 Student Teachers and Practicing Teachers' Teaching Practices

Participants were asked for their observations about the practices of student teachers and practicing teachers, and how these meet the needs for constructivist teaching, most of their comments indicating that their practises are a ways from what is intended.

One of the inspectors said:

"Many teachers are working as machines or rebots, they are following precisely the instructions of teachers guide, I think they don't like to make any mistakes, so new methods looks like adventures for them, but if they have enough support I think over the time, they [teachers] gradually learned some very valuable lessons: i.e. to think on purpose about what teaching is, about what quality teaching ought to be, about the needs of students, to continuously evaluate both teaching and learning, to be prepared to modify what does not work and create and experiment with alternative approaches".

The curriculum advisor in the MOE pointed out:

"Even when the tasks [in the textbooks] are presented as a problem-based, children following teachers' instructions as parrots, even when they said conclusions and explanations, they said what is already expected by the teacher or given indirectly by teachers... teachers are rapidly give them the results or the answers, so there is no chance for pupils to try or think to solve the problem themselves, teachers should know their new roles, it is not to impart blanket knowledge, but to determine the knowledge status and needs of individual pupils, and to provide a path for each pupil".

The programme advisor in the MOHE said:

"The teacher should make sure that she understands the pupils' pre-existing conceptions, and guides the activity to address them and then build on them. We [the Curriculum Development Committee] introduce these strategies in the syllabuses of teaching method courses, so teachers that have idea on how to start their teaching from the prior knowledge of her pupils".

One of the lecturers said:

"It takes a long time to change not only teachers minds to this type of teaching but also some other principals in schools and even the community, they should know that the teacher's role is like this example; the classroom work should become in this way, groups of pupils in the class are discussing a problem in any science topic. Though the teacher knows the answer to the problem, she focuses on helping pupils restate their questions in useful ways. She prompts each pupil to reflect on and examine his or her current knowledge. When one of them comes up with the relevant concept, the teacher seizes upon it, and indicates to the group that this might be a fruitful avenue for them to explore. They design and perform relevant experiments or activities. Afterward, the pupils and teacher talk about what they have learned, and how their observations and experiments helped (or did not help) them to better understand the concept, I am trying to train my student teacher in this way, most of them are satisfied with it, but in the practicum they were faced of the unsupportive school environment".

One of the senior teachers commented:

"Even teachers who are trying their best to modify their way of teaching face many constrains, it is still the idea in the society that teacher is the provider of the knowledge and it is not allowed for them to say I don't know, they are expected to answer any question but according to the rapid development and abundance of information, it would be impossible for teachers to become masters of all content

areas. Teachers are also worried to utilise such strategies, they are frighten to lose the control pupils, they do not like to be blamed from headteachers that they can not manage the classroom, so they keep them silent and this reverse them backwards to the traditional classroom sittings".

One of the head teachers said:

> *"This type of teaching not only needs skilful teachers, but even skilful teachers need much time and if they follow this type of teaching they can not cover the curriculum, in order to implement these type of teaching they are also ask for many stuff and materials, over of the capability of the school budget".*

However it can be concluded that there are many constrains against constructivist approach of teaching in Oman schools. As constructivism is concerned with how we build knowledge. Student's prior knowledge, mental structure and believes influences their knowledge construction. This theory of epistemology requires certain strategies such as learning by discovering and investigating, brain storming, problem solving, and discussion. In Oman, the wrongly taken tendencies that the teacher is still the main source of information (teachers-centered not pupil-centered), obstacle the use of such theory. In addition, the teacher is seen as the controller of the class and has complete authority of the teaching / learning atmosphere.

Furthermore, culturally, people consider the response to most questions is either true or false and it is nonnegotiable. This belief contradicts with what constructivism main principles. In many cases, some teachers regularly tend to reject most of the new obligated teaching approaches or strategies. Teaching within constructivism values is unfamiliar for Omani teachers and consequently it is rejected. Besides, this approach of teaching requires extra time and tools for students to have the opportunity to perform the essential activities themselves so it is difficult to apply it. Implementation of constructivism needs other than traditional ways of assessing learning process such as using portfolios of different kinds. Teachers do not have the adequate skills to work on these new assessment techniques.

7.7.4 Summary

The main aim of this section was to present the perceptions from different educational principals about the issues of constructivist teaching in light of the results from observations of student teachers and practicing teachers' teaching practices and the revelations of follow-up interviews. From the discussions during the conversational interviews with those interviewed, it can be concluded that there is agreement between them that the Basic Education curriculum and schooling systems desire constructivist teaching and its related features, even though there is some contradiction on the level of the school environment's supportiveness. They also agreed that there is inadequacy of the preparation programmes to provide teachers with required skills to utilise such teaching approaches. Though there is agreement among the participants about the nature of constructivist teaching, their understanding of this notion is still influenced by the hierarchy system (or their positions), and the clarity of the vision reduces from the top to the bottom of the education system, from curriculum advisors down to senior teachers. There is also a disagreement between the personnel from the two institutions, the colleges in contrast of the schools, each side passing the responsibility of weak teachers to the other.

Chapter Eight: Discussion and Interpretation of the Findings of the Study

8. 1 Introduction

The findings from the three stages of the study analysed and presented in the previous chapters have focused on evaluating the teacher education programme from various aspects including the motivation of the participants towards the teaching profession, their perceptions towards the importance of the programme's competencies, and the degree to which constructivist teaching is practiced in science and mathematics lessons. This was done in order to explore the adequacy of the programme to prepare teachers to fulfil the needs of teaching a reformed and changed curriculum in the schools within Oman. In this chapter, the discussion of these findings and their relation to the review of literature is presented. This discussion identifies the problems and highlights the issues that are raised by participants of the study.

8.2 Participant Motivation and Attitudes

8.2.1 Motivation towards the Teaching Profession

The study began with a survey focusing on student teachers' and practicing teachers' attitudes and motivation towards the teaching profession, and towards aspects of science and mathematics teaching in primary schools. It can be reasonably concluded from the results, that most of teachers and student teachers were positively motivated to learn science and mathematics, and to then teach such to their young pupils. The percentage, (55.6 %) for student teachers & (54.6%) for teachers for those who like teaching, and working with teaching children, compares favourably with the low percent of the participants who agreed to change their profession if they were given a chance to do so, is at not than 24%. This gives evidence of their motivation to be in the teaching profession. But the extrinsic reasons for choosing the teaching profession are still crucial factors for Omani women when enrolling in this profession. These extrinsic factors as mentioned previously (see section 4.6) cover different aspects of the job which are not inherent in the work itself, such as long holidays, level of pay, and status. These findings are broadly in line with other studies in Oman (Al Belushi, 2004), in the UAE (Al Mansoori, 2001) and (Cyriacou, Hultgren & Stephens, 1999) in the UK and Norway. The teaching profession is perhaps chosen by Omani women either to satisfy the parents' wishes and expectations, or to adhere to the social view that teaching is the most appropriate profession for females.

Perhaps because of the availability of teaching as their only career option, many participants expressed their resentment with the situation of the teaching profession's challenges, which was described by them as a tragedy, leading as they suggested, to the case of teacher burnout. Follows are examples from some teachers' views:

"*...Yes, the issue is some teachers do not have the motivation to teach; they are not interested in teaching.*" (teacher) (see page 175)

"*Many factors: overloaded lessons, assessment work and reports, extra-curricular activities, administrative duties for each teacher prevent us from creativity and development of ourselves... these matters make me as well as my colleagues suffer from teaching, you know that most of teachers are fed up of teaching and they want to change their career to administrative work..., a lot of them [teachers] waiting for resin or retired but they are staying in their work because of the salary*" (teacher) (see page 181)

There are different factors leading to the case of teacher burnout which is defined by (Schwab et al. 1986) as "a condition caused by depersonalization, exhaustion and a diminished sense of accomplishment [...] it is an individual negative affective experience occurring as a result of unending work stress which reduces teachers' enthusiasm for work". Teacher burnout has become prominent in recent professional teaching literature. One interesting aspect of teacher burnout is the thought that beginner teachers are experiencing burnout due to lack of mentoring. Following an examle from interviews:

> "*We were throwen in the school [for the practicum programme], if our supervisores [the college's lecturer] are away from the school [absent] peoples there [co-operative teachers & headteacher] did not take care of us, we feel as stranger in the school, this happened many times with several schools ...this is inconvenience us ...I don't like it [the schooling work]*" Student teacher (see page 171)

Other factors of teacher burnout may include decreasing resources, larger class sizes, rigid administration practices, the stressful nature of teaching, imbalance between demands at school and the resources teachers have for coping with them, lack of reward, lack of professional development opportunities, and the interpretations of others (such as parents) of their work - all of these are crucial factors in this aspect. As mentioned in (page 145), following are some complains:

- "*an inadequate salary in contrast the heavy duties*".
- "*unlike medicine, computing and administrative official works, teaching as a profession does not garner the status and respect the former other vocations*".
- "*the horrible working conditions, lack of necessities in schools*".
- "*the problem of crowded classrooms.*"
- "*teachers under a pressure of responsible, they are blamed for any fails in education process .*"

Some student teachers added the interesting factor regarding their lack of enthusiasm to teaching that they are negatively affected by the poor practices of the supervising teachers, and their complaints and displeasures of their situations. This negative influence may occur during the interaction between them, either in the society outside the schools, or more likely during the practice teaching practicum periods, following are some responses from the interviews:

> *"I mean the practicum was not organised properly, it takes long time but it just a waste of time in schools...many teachers are always complaining of their situations, they depict teaching and working in schools as a frightening matter."* Student teacher (see page 172)
>
> *"Deficiency in academic preparation and starting teaching directly after graduation without enough practical background information and professional background, this issue should be wisely treated."* Teacher (page 180)

The Omani society still has a predominantly conservative view toward women's roles limiting them to marriage, motherhood, and house and family care responsibilities with outside career opportunities generally restricted to only education and health related professions. However, the economic and social changes which have taken place in Oman's society since the early seventies have had a great impact on the achievements of the Omani women and their opportunities and rights. Omani women and men have been made equal in parts of the workforce, now females competing with their counterparts in jobs such as education, health, media, banking or retail businesses. The climate has fast changed to enable Omani women work and earn their livelihood.

> *[...] the Omani labour force structure is heavily male oriented. This however, should not mislead the reader in to interpreting the gender inequity in the labour force for reasons of lack of education and or job opportunities for women. Analysis of the Omani labour composition attributes this gender discrepancy to several economic and social factors. Some of the fundamental factors include traditional culture and attitudes coupled with values and stereotypes of the Omani woman as a wife and mother as their primary role in the Omani society. Other factors relate to the type and nature of occupations which the labour market provides, the unsuitability of some of these occupations because of social customs and traditions, or the short supply of some jobs which women normally prefer. This situation is expected to change with projections of the increased role of women in the labour market caused by the steady increase in the education of girls and the expectation that thousands of girls will complete various stages of education in the coming years (Oman Statistical Year Book, 1996).*

According to AlLamki (1999), there are ten major driving forces acting for change women situation in the Sultanate of Oman including religion (Islam), national leadership, education, nationalization (Omanisation), economy, General Directorate for Women's and Children's Affairs (Omani Women's Associations), women's leadership, favourable labour laws, family support and child care services, and changing women's attitudes.

It has been possible to employ a large number of females in the Cycle One Basic Education teaching profession because of the large numbers of secondary female graduates, but this sector is now nearly totally Omanised.

With regards to the fulfilment of the Omanisation of the teaching profession, particularly in the female sector, the teaching competition in Oman is also being changed, from the period of guaranteed employment for all graduates to one of selecting just some of them for employment in the country's schools. This can be readily observed from the statistics of the four groups of the science and math teachers (scientific field specialists) whom were targeted by this study (see Table 5.2 page 154). Most of the fourth graduating group from the programme studied were still not employed in schools. Thus, the idea of selection of teaching as a profession guaranteeing work after graduation is changing. With regards to the competition for limited places within higher education in Oman, the Colleges of Education attracted many female students of very high scores of final secondary certificate standing.

While there is a dominance of family and societal views acting as major factors driving participants to select the teaching profession, it is interesting to find the influence of other factors causing females to enter the programme. Some students have the ambition to complete postgraduate studies, while an additional belief relates to values and religious factors had being given attention, earning rewards of the God (ALLAH), for showing enthusiasm for teaching for many practicing teachers and student teachers.

8.2.2 Attitudes towards Science (Scientific Field Specialisation)

The second question of the study aimed to examine the female student teachers' and practicing teachers' attitudes towards "Science" as a subject. Eaton & Kidd (2005) states "often, when teacher education courses are designed, little consideration is given to the set of beliefs which students carry and it is perhaps for this reason that student teachers are more likely to teach mathematics in ways in which they were taught". This statement in somewhat fulfilled in the findings of this study as participants were asked for their attitudes towards teaching and scientific subjects. There is evidence that teachers' positive attitudes towards the subject(s) they teach could affect their pupils' attitudes and motivation towards its learning. As the international view of teaching has shifted from didactic to constructivist with its image of the learner as participatory, so research on teacher education has moved from a focus on the transfer of a body of knowledge to a more dynamic view of the classroom, with teachers being facilitators of learners' knowledge construction. In this view of teaching, teacher beliefs and attitudes play an important role in shaping classroom practice (Bolhuis and Voeten 2004), and there is a substantial body of evidence examining this supposed link between teachers' attitudes to and beliefs about mathematics and science teaching and classroom practice (Ernest 1989, Fang 1996, Macnab and Payne 2003 quoted in Eaton & Kidd, 2005). In particular, the experiences that a student has during his/her own formative years in the classroom as a pupil have been shown to have a major impact on their behaviour as a teacher. The findings of this study, specifically from the answers given in interviews parallel the finding of many studies. For example, Borko et al (1992) pointed out that "It seems to be the case that student teachers revert to models of teaching that they themselves have experienced rather than try the often new and unfamiliar models that they study during their teacher training programmes".

Females are seriously under-represented in most areas of science in the United States, and as well, in other places around the world (Miller et al. 2006). Girls' declining interest in scientific subjects may be related to many factors. Many female students may not see science as connected with their personal lives (Barton, 1998). Science courses often fail to address issues of interest to females and to include pedagogical techniques that engage females (Miller et al. 2006). Several years ago, it was observed that girls, attempting to control their achievement levels, showed much less of an inclination to choose science and mathematics subjects than boys (Dekkers, 1985; Eccles et al., 1985). This is also the case today as seen in recent studies (Arnot, David, & Weiner, 1999; Jonsson, 1999; Smyth & Hannan, 2004). The persistence of this phenomenon is even more striking in light of other developments in that the original achievement deficits of girls with regard to science and mathematics have declined over the years (Baker & Jones, 1993). According to (Farkhonda Hassan, 2000) fewer girls than boys are enrolled in high school science curricula because of a bias in the existing education structure that encourages girls to study the arts and humanities.

There are various reasons for this related to gender stereotyping, misleading perceptions that science and technology are subjects more suitable for boys, and the failure of curricula to relate science and technology to the everyday life of women. Thus, there is self-inhibition among school girls that affects not only the number of young women entering university to study science and technology subjects, but also results in the reluctance of talented women to introduce their own values and visions into a working world dominated by men. She points out that the percentage of females enrolled in science and technology university courses in some Arab countries ranges from 70% in the United Arab Emirates, 8% in Djibouti; 35% in Egypt, and in Oman, 50% of science undergraduates are women. Even though many of the studies were searching for the reasons behind the inclination to choose science and mathematics subjects, there is relative congruence between the results of these previous studies and the present study. The main reason for selecting the "second subject field" (teaching the subjects of mathematics and science in grades 1-4) may have been because it was the only choice left for these students. This being the case, it might contribute to evidence of the presence of the negative attitudes towards the teaching of scientific subjects.

Referring to the results from interviews, many participants may have preferred to enroll into the "first subject field" (Islamic education, Arabic and social science subjects) but it was not open to them having graduated from the secondary education "scientific stream". Following are some evidences from the interviews:

> *"Our academic subjects [science & mathematics], look for example, General Physics 1 & 2, Algebra, Geometry, Mathematical Analysis ohh horrible... I feel jealous form my colleagues in First Field [Art subject: Islamic, Arabic & Social Sciences], what to do? This is our predestinate".* Student teacher (page 145)

> *"we lose many marks because we have to study difficult subjects like physics so this reduce our grades, then this affect our employment or continuing postgraduate study".* Student teacher (page 145)

Even though the second factor given a high rating was the importance of these subjects for the pupils, it might be a sign of their awareness of the importance of these subjects. There are some factors which had been given a moderate rating such as the presence of scientific interests and their good achievement levels in these subjects during school study, in addition to it being perceived socially prestigious to teach these subjects. A lower rating had been given for the factor of the esteem of the science and mathematics school teacher. This could indicate that the school background experience in science can influence the selecting of scientific subjects in higher education, but not the expected high influence as found by such studies (Zietsman A. & Sproule, S.,1996, Bender, 1994).

This view may arise from the fact that many science and mathematics teachers are not working as proper teaching models to inspire the next generation. It should be noted here that all of the student teachers and practicing teachers were taught science and mathematics by female teachers in a female schools during their past school study.

Results of many studies (Mlenga, 2005) indicated that elementary female students' choice of science as a major at college level is affected by their attitudes toward science, teacher behaviour, out-of-school experiences, role models, gender stereotyping, parental influence, peer-influence, in-school experiences, and societal expectations, namely cultural and social expectations. It appears that the main reason for the participants' choosing of the scientific field specialisation was to have a place in the teaching profession regardless of the subject specialisation. Many of the respondents mentioned the difficulties of learning science and mathematics subjects, pointing out how they struggling to have success and to gain high marks in these subjects in secondary schools compared to the students of arts subjects in secondary schools and in the colleges.

It is interesting to find other factors to cause the Omani women to select science and mathematics subjects, some student teachers mention about being knowledgeable in some scientific topics such as nitration and human body. On the other hand an additional belief relates to values and religious factors had being given attention, understanding of scientific concepts and facts could be deepen once believes on the creator the God (ALLAH), for showing interest for studying scientific subjects.

8.3 Perceptions of the Importance of the Competencies

The first main purpose of this study is to identify the importance of the Scientific Field Initial teacher education competencies of the Colleges of Education programmes in Oman. These identified competencies have been formulated by a committee comprised of some experts in teacher education from the Ministry of Higher Education along with some academic personnel from the Colleges of Education. It is obvious that the educators who are working in the field such as inspectors and head teachers as well as practicing teachers did not share in the process of identifying these competencies. According to Brundrett & Silcock (2002, p.9) "Before we can list teaching competencies, we have to make a better shot at listing the challenges of modern classrooms. If we start with generic skills, we risk getting sidetracked into trying to fit all of them to all tasks, and then having very little insight into the particular ways in which they apply"

The survey questionnaire given to participants is based on these competencies as well as the questions of the interviews. The results of the questionnaire indicated that the majority of the participants agreed with the importance of most of programme competencies. Generally, participants rated 43 of 48 competencies as essential importance, and the remaining 5 as above average importance. These results show the awareness that practicing teachers and student teachers have towards these competencies. Such results could strengthen these competencies while validating them as well. Practicing teachers' and student teachers' rating of the importance of these competencies was significantly different between the two groups in 20 of the 48 competencies. Practicing teachers had higher ratings in 16 competencies and student teachers had higher ratings in 4 of these competencies. These results are discussed in the following sub-sections. Participants also added some extra competencies to the given list. These findings support the notion that teaching is not job with very specific and well-defined outputs. "It is notable for its diversity of task, and the culturally cherished yet often contested nature of the intellectual, social, emotional and physical gains awarded by it" (Brundrett & Silcock, 2002)

8.3.1 General Competencies

General competencies compound nine competencies which considered some generic and cultural skills that teachers are asked to acquire. There are many courses that could be built and taught in teacher preparation based on these competencies. Moreover, all of the three components of the programme could involve equipping student teachers with these competencies.

The analyses has shown that all of the general competencies had been given high scores of importance, and there is no large different between the highest rating for competency (7) "Cooperate with others in order to improve individual pupil's performance, and modernize the quality of the school and general life" (mean 4.53) and the lowest rating for competency (4) "Belief in the teachers' role in the achievement of the comprehensive educational development of students, and effect on the pupils' future, and acquire the desired positive attitudes of her profession toward dealing with pupils in this age (grades 1-4)" (mean 4.32) a difference of only (0.44). (see Table 6.5, page 146).

Findings also indicated that participants generally consider the importance of cooperation with others in order to improve pupils' performance and the contribution for the development of the quality of the life of society. Participants also showed consideration for the importance of professional ethics in teaching. There are many reasons behind this consideration including awareness of their roles towards society, through their development of their pupils they can contribute in social development, also a feeling that by the consideration of ethics and morals issues, they can gain a reputation and respect in their societies. On the other hand, participants demonstrate moderate consideration on the importance of some issues such as the development of positive attitudes towards integrated development of pupils and development of abilities through self-learning and continuous professional development. This may be because many of them still do not have the view towards teaching as a process of a comprehensive development and this issue does not have enough emphasis in the teacher preparation programme.

The lowest score of importance were for competencies (6) and (7) which deal with the issues of administrative and supervision tasks, and the responsibilities towards environmental and societal needs. This may reflect participants' rejections of this type of obligation, from their point of view, is an overload of their duties. They thought their focusing on teaching is hindered by these perceived extra administrative duties. Teachers articulate their irritation and inconvenience with administrative record and filing works such as:

- supervision of pupils during the morning assembly, break times, buses and canteens.
- supervision of extra-curricula group activities such as school journalists groups, English club, science club ... etc.
- contribution to some school competitions such as "the protection of the tidiness and healthiness in the school environment" competition.
- participation in the whole day activities such as camping which usually runs during the weekends, school fairs ... etc.

The significant differences between the practicing teachers' and student teacher's perceptions of the importance was found in favour of teachers in the first 4 competencies and competency (8), which are:

- *Consideration of professional ethics in dealing with pupils in moral, spiritual, and social situations and provide equal opportunities between them*
- *Belief in the teachers' role in the achievement of the comprehensive educational development of students, and effect on the pupils' future, and acquire the desired positive attitudes of her profession toward dealing with pupils in this age (grades 1-4).*
- *Develop positive attitudes toward the nation, the Arabic world, the Islamic world, all humanity and world peace.*
- *Consideration of societal values, inside and outside the school, and development of responsibility towards environmental and societal needs*
- *Develop abilities through self-learning and continuous professional development.*

Perhaps this is an indication the effect of teaching experience, with teachers becoming more responsive of some advanced issues in teaching such as the consideration of professional ethics, positive attitudes towards the teaching profession, positive attitudes towards the nation, consideration of societal values and consideration of the self-learning for continuous professional development.

8.3.2 Planning Competencies

As a part of their profession, teachers are asked to plan their work. They are expected to prepare a written plan for the whole year which may include learning outcomes, behavioural objectives, instructional aids (or the materials they need for the tasks), teaching methods and assessment strategies. They also asked to prepare other written detailed plans for daily lessons. These plans are checked and signed by the head teachers, inspectors and senior teachers, and may be presented to other principals from the Directorate of Education in the region, or from the Ministry of Education. There is a standard form for these plans recommended by the curriculum advisors in the Ministry of Education, but teachers are allowed to design their own planning form, however, they must include all of the previous main elements of the suggested forms in their lesson plans.

It is revealed in the study (Table 6.6) that participants consider the importance of the planning for achieving the efficiency and integration of the science and mathematics school curriculum content and its connections with other school subjects (competency 1, mean 4.31). Further, they consider it of importance in planning to use a variety of teaching strategies in an integrative way (competency 4, mean 4.28). This might occur because that they are usually requested to teach both science and mathematics subjects. The Basic Education curriculum tends to overcome the weaknesses of the disconnection and overlapping of the topics and tasks of the previously (General Education system) used curriculum. Science and math subjects were used to taught separately by different teachers. Brandt (1991, pages 24-26) suggests that curriculum integration requires cultural change within subject disciplines and argues that good planning can result in the elimination of repetition in separate subject areas and therefore increased efficiency.

It can been concluded from (Table 6.6, page 147) that the participants' consideration of using environmental materials as instructional aids is of importance in planning (mean 3.99) was less than the score of other competencies, this notion is not clearly understood by teachers in that it is not considered properly in any of the preparation programme's courses. The Basic Education curriculum request teachers to using such materials as instructional aids helps with two aspects of planning; connecting daily-life experiences with scientific lessons as the pupils use these materials in their science activities, and help in the recycling process.

Practicing teachers and student teachers significantly differ in their perception of the importance of two planning competencies. Classroom teachers attribute greater importance in determining the prerequisites for the topics in each subject, even though this determination has already been cited by curriculum designers. On the other hand, student teachers place greater importance of planning for using environmental materials in instruction than did the practicing teachers. The reasons for this is not clear, perhaps it related to the structure of the practicum programme when student teachers have discontinuously periods of training in schools. They have limited chances to teach, some of them teach only one or two lessons per week, sometimes no one lesson just observe others' lessons because of the large number of the group of them (the trainees) in each school.

Practicing teachers do not believe in the importance of written planning for preparation of their teaching. As shown in the following response:

"there is much focusing on planning particularly written plans, this is useless work, anyone can copy others' perfect plans but what about the performance in the lesson? No one using these plans ...just for show, for the visitors, they [principals] always change there mind of the form of the plans" Teacher (page 178)

They think of its importance as justified to convince the administration and their principals that they are planning lessons. Lesson planning for them serves little purpose and has no practical use other than to be evidence for administrators and for visitors. Practicing teachers usually view written lesson planning as an inconvenience to them and are frustrated with ambiguity of what is required of them to implement changes with the Basic Education curricula with the changing of the planning style and lesson plan forms. Many student teachers also complained of the difference between the style of lesson planning that they were trained to use in the college and the style which they used in the schools.

8.3.3 Teaching Competencies

Participants attribute importance to the competency (4) of using different learning recourses in their teaching, and implementing a variety of teaching methods and strategies to meet different student learning styles, particularly for students with special educational needs. This may have resulted because teachers feel that these competencies are desirable and needed during their teaching in Basic Education schools. Moreover the Ministry of Education plans to enrol the pupils with special needs who are normal mentally in the regular classes.

Although there were no large differences between the score of the previous competency (4) (mean 4.54) which given the most importance and the competency of "Activate cooperation with pupils' parents, staff colleagues and other members in the local community" which attributed the least (mean 4.02) of (0.52), participants showed less awareness of the importance of actively cooperating with parents, staff colleagues and other members in the local community. This result indicates the probability of the situation of the school environment being isolated from the surrounding community. Detachment of schools from the outside community reduces the main goal of teaching and learning to prepare individuals to be an effective in their communities and societies.

Many teachers look at the involvement of others, specifically parents, as interferences in their work inside the classroom. In many local communities the majority of parents still not educated especially the mothers. Following are examples of such responses:

"many parents did not have clear idea of the Basic Education curriculum and the new system, many of them disturb our work, they think the practical activities and making the lessons fun is wasting their kids time, they still keep the idea of learning as memorising and feeding of knowledge, some of them come to conflict of the marks [arguing the self – evaluation] they just believe on examination" Headteacher (page 182)

"...the school curriculum needs to be reviewed to meet learners and society needs." (page 182)

Some competencies has been given a moderate consideration of importance by both groups of participants (see Table 6.7), such as stimulating and maintaining pupils' motivation throughout the lessons (competency 2), mastery of communication and interaction skills with pupils (competency 6) and implementation of group work activities (competency 5). This might be construed as evidence of the deficiency of the participants' awareness of these issues.

Differences between practicing teachers and student teachers in their perceptions of the importance of some of these planning competencies as shown in (Table 6.13) may indicate the experience of teaching as practicing teachers had the higher rating.

8.3.4 Classroom Management

Generally, participants attribute high importance to classroom management competencies. A higher score is given for the competency (7) of organising and filing pupils' records and employing them to achieve effective learning (mean 4.46). This expected result might be because of that filing of pupils' work and records is giving great importance and consideration by principals in the schools.

Although it was rated as above average important (Table 6.8), it is interesting to find that the lowest score of importance was given to the competency of preparing suitable solutions for classroom behavioural problems (competency 5, mean 3.88). This may result from student teachers who do not face such issues in school daily life. Practicum of one or two days per a week in schools does not give enough practice of dealing with specific classroom issue and usually those trainees were helped by the practicing teachers in the management of the classroom.

Student teachers and practicing teachers were significantly different in the competency of providing comfort, security and safety within classroom physical environment. Hence, the experience factor was again an effect as practicing teachers scored higher.

Participants emphasised that classroom management competencies should address the teacher's ability to manage the educational environment, and directly manage and assess students' classroom behaviour. As Gilbert and Lignugaris-Kraft (1997) state: "classroom management competencies should divided into four categories. Two categories address the educational environment: (a) arrangement of the physical environment to facilitate student management, and (b) formulation of a standard for student behaviour in the classroom. Two further categories address teachers' management and behavioural assessment: (c) implementation of strategies to increase appropriate behaviour or to reduce inappropriate behaviour, and (d) assessing or measuring the effectiveness of the implemented strategies". Practicing teachers place greater importance on classroom management competencies than do student teachers.

8.3.5 Evaluation Competencies

Generally, there was not much difference between the highest and lowest ranked evaluation competencies with high importance given to evaluation competencies. The competency of contributing in the evaluation process and providing suggestions had the lowest ranking. This might relate to the fact that teachers are always passively receiving instructions from their principals regarding the evaluation and assessment process. The highest ranking was attributed to the competencies of preparing performance tests, and using different types of evaluation tools to follow up pupils' progress.

Practicing teacher placed greater importance on Evaluation Competencies than do student teachers particularly in competency of analysing of tests and observations and filing them in a simple form for interpretation as well as the competency of using self-evaluation methods to obtain formative data, and then performance and authentic evaluation. Hence the experience plying role in developing the awareness of teachers towards these competencies that student teachers complain of the absence of the opportunities to be involved in evaluation process during their practicum programme.

8.3.6 Subject Matter Knowledge

Teachers are expected to master the content of their specialisation subjects as well as the pedagogical content. Subject matter knowledge is a factor that one would think could be related to teacher effectiveness. The degree plan of the college teacher preparation programme includes 14 courses in a variety of mathematics and science subjects. As Druva and Anderson (1983) found, students' science achievement was positively correlated to the teachers' course-taking background in both education and in science. The relationship between teachers' training in science and student achievement was greater in higher-level science courses, a result similar to that found by Hawk, Coble, and Swanson (1985) in mathematics.

Generally, participants considered these competencies of high importance. The highest ranking was given for the three competencies (3, 1 &9) of using variety of learning resources, understanding and implementing concepts in subject specialisation and mastering the subject's content and applications as well as understanding the curriculum characteristics.

The lowest ranking was for the competency (7) of knowing the history and geography of Oman and the neighbouring countries. This is probably an expected result for teachers and student teachers in that mastering the content of science and mathematics subjects is attributed greater importance than history and geography when becoming teachers of science and mathematics and that they might already know these information as a general knowledge and from their previous schooling study.

Subject content knowledge given a high concern by participant reflected by the dominance notion of the teacher is the source of knowledge, much of society and also pupils think of the teacher as an encyclopaedia, expecting them to answer any question at any time.

8.4 Perceptions of Personal Competence of the Programme Competencies

The following sub-sections discuss the results of the second main purpose of the study which was to investigate student teachers and practicing teachers self-rating of their own competence level in each of the designated programme competencies. In this phase, the study implemented a type of self-evaluation in order to evaluate the efficiency of the teacher preparation programme. The results indicated that the majority of the participants perceived themselves as being competent in most of the listed teaching competencies. Commonly, they rated themselves as above average in terms of competence in 45 competencies and as average in terms of competence in only three of the 48 they assessed. Practicing teachers and student teachers were significantly different in their rating in 35 of the 48 competencies. Practicing teachers have a higher rating than student teachers in 33 of these competencies while student teachers were higher in 2 competencies which are the competencies of "Consideration of educational responsibility and demonstration of supervision of students, as well as instructional and administrative responsibilities" and "Follow up historical and contemporary events as well as national, social and religious occasions to support the local culture" which will be interpreted and discussed in the following sub-sections.

Although there were no participants rating themselves as not competent, or less than average in any competence, in contrast, there were none perceiving themselves as extremely competent in any of the listed competencies. It is obvious that both groups of the participants, student teachers and practicing teachers, downplayed their perceptions about their competence because many of them have a different of point of view given in their answers to the interview questions. These results are discussed in detail in the following sub-sections.

8.4.1 General Competencies

In contrast the results indicated that most of the participants perceive themselves as of average and adequate competence in most of the listed competencies. The highest scores were given for the competencies of the consideration of educational responsibility and demonstration of supervision of pupils. As well, high scores were given for instructional and administrative responsibilities, this being an expected result, particularly from practicing teachers, in that administrative skills may easily be acquired from the first weeks in the schools. An emphasis for student teachers in administrative visits to schools came later in their practicum when student teachers were introduced to the administrative issues in the school. Moreover, head teachers and principals always place high emphasis on these types of responsibilities.

On the other hand, the competencies of using the English language and in the use of a computer had the lower score of competence (Table 6.17). Some of the reasons for this result may be:

- although there are three English Language courses during the first three semesters, these courses had only one credit in each semester out a total of 18 credits per semester, so these courses do not represent a high percentage in the teacher preparation programme, hence student teachers may not give them due emphasis.
- there are three other English for specific purposes courses (ESP) but these courses, are also had given only one credit per semester out a total of 18 per semester.
- the content of these courses is for beginners as well as the assessment levels.
- there are no English Language courses for the last three semesters so there is loss of perceived importance of English Language by the end of the programme.
- many of English Language lecturers are not native speakers so many of them do not properly teach English with many of them using Arabic in their teaching.

There is also discrepancy between the content of the English Language courses and the other academic courses as students were not required to do more readings in English, even in the ESP courses, and there is a shortage of English references and materials both in the college learning resource centres and those in the schools.

The situation in the area of computers is not better. There are only two introductory courses for computer science and they are taught in badly out-dated ways without addressing the uses of computers in education as is found in Basic Education schools at the present time. Although one course is designated as applications of computers, these courses include theoretical lessons on the structure and the parts of computers with some very basic introductions to Windows and some of Microsoft's office programmes. The designated practical sections of these courses are presented by lecture, and there are few opportunities given for the practicing computer skills. Furthermore, there is a shortage of the computer terminals and accompanying software as well slow or unavailable Internet services, As some participants commented:

"...updating computers of the college and make them more available for student's different uses, and make the internet faster". (page 170)

"...many teaching strategies based on technology, schools lack computers and internet, even when found the numbers are not enough comparing with number of pupils and teachers who want to use them, so they are forced to implant traditional methods but student teachers can not accept using these methods." (page 175)

"Internet implementations should be introduced as a main part of the teacher preparation programmes." (page 180)

"... teachers should be developed, some pupils are better in technology application than their teachers, there is a shortage in the computer equipments and the way of presenting computer courses, people [teachers & student teachers] looking for practical not only theoretical lessons." (p. 180)

Receiving a moderate score of competence were some competencies related to the understanding of a teacher's role in the achievement of comprehensive educational development and consideration of societal values, along with the acceptance of the responsibilities towards environmental and societal needs. This moderate score may be attributed to the structure of the teacher preparation programme. The fragmentation of these competencies from college course to course causes candidates to deal with them separately, each component being disconnected from the other. It is obvious from looking at the teacher preparation degree programme plan (see page 32), that there is a list of traditional courses. There are not many differences between the content of the courses of this elementary preparation programme and the other college programmes (secondary and preparatory teacher preparation programmes for the General education system), therefore these courses do not reflect such competencies.

Another factor which might be considered is that many of the lecturers, in order to represent and reinforce the importance of their courses and their subject specialisation, criticise other courses in front of their students. There is also a conflict between the lecturers in the departments of the academic scientific subjects and the others of professional or educational department, each group try to prove its importance at the expense of the other, and this has a negative effect to student teachers, as some participants commented:

"Most of teachers whom I am supervising are active in their schools but they have deficiency in subject knowledge of some topics this maybe due to discrepancies between educational and academic colleges' courses." Inspector (page 173)

"I think the problem with these programmes are the colleges staff, some lecturers don't have the ability to develop themselves they still teach their students the traditional teaching methods ... imagine some of them reading directly from old educational references, some of them asking their student teachers just to copy or take notes from the board, and others are reciting for them like nursery rhymes... they don't allow their students to argue or discuss them, many teachers told me that their lecturers from both academic and educational courses are always criticising other courses infront of their students" Inspector (page 178)

"These are ideal competencies if acquired by student teachers but unfortunately, educators [lecturers] themselves didn't understand them, they just read from their papers [handouts] and students listen to them all the time, and then examinations only test memorisation." Headteacher (page 179)

The affect of experience can be obviously marked with practicing teachers perceiving themselves as having more competence in the competencies of this domain, but it is interesting to find student teachers perceiving them selves more competent in the areas of consideration of educational responsibility and demonstration of supervision of students, as well as instructional and administrative responsibilities (competency 6, student teachers' mean 4.02, teachers' mean 3.91) which is unexpected result that their experience in schools is less than of practicing teachers.

8.4.2 Planning Competencies

With regard to the perception of this domain's competencies, it is interesting to find that the competency of planning to achieve the integration of school curriculum content was the most importance for participants, and is also the same as the one they perceive themselves the most competence in. This may have resulted because of the efforts of designing the science and mathematics basic education curriculum in an integrated style, the curriculum and the content of each subject serving the content of the other one.

A second competency, which received a high score in importance, is planning to achieve the using of environmental materials in instruction. This probably expected result might be attributed to the nature of the new curriculum, which forces teachers to search for such resources and materials, and invest them in their teaching in order to reduce the expenses for purchasing artificial materials as well as to connect pupils to their environment. It was observed that many teachers encouraged their pupils to collect such things from their surroundings as a part of the activities, and reward them so pupils are very enthusiastic in these tasks.

Participants perceive themselves of moderate competence in some competencies such as planning for the classroom and extra-curriculum activities, and planning for using of variety teaching and evaluation strategies. This feeling of inadequacy my be due to the lack of preparation courses in the programme to deal with such issues.

The lowest score of competence was for the competency of planning to achieve the determination of the prerequisites for the topics. This is an expected result because these prerequisites are already indicated for each subject area in the curriculum department in the Ministry of Education, meaning teachers just have to follow these instructions.

The remarkable differences between student teachers and practicing teachers in their perceptions of their competence of these competencies might be attributed to the factor of teaching experience. Practicing teachers accept the planning skills because they have attended a workshop in the beginning of their first year of teaching while student teachers have not yet had such opportunities. This workshop is run by the inspectors and senior teachers in the school system, and it focuses on the planning for teaching as well as teaching and evaluation strategies. May be that as they gain experience they will be competence in planning.

"... what I observe, teachers [the graduates] have weaknesses in planning for teaching, reading or research skills, for professional development. Even in their subject specialisation, they don't have ability to develop themselves, but some of them can be improved by the schooling practice...and the in-service training" Inspector (page 173)

"...teachers can acquire more experience during their practice not only from what they studied in the colleges" (Page 175)

Although the curriculum writers and advisors try to reduce the tension of written lessons preparation and planning, teachers still spend considerable time writing these plans. This is because head teachers and principals still place a large emphasis on the outward or external appearance of these plans. As a result, many teachers are likely to copy previous lesson plans of other teachers. Some samples of these lesson plans were examined, and the efforts can be noticed behind developing and decorating of these plans.

8.4.3 Teaching Competencies

Generally, participants perceived that they were of average competence of these designated essential competencies for teaching. The highest rating was for the competency (7) of implement psychological and educational principles to motivate pupils for learning and maintaining this motivation through the lessons. Even those competencies rated high in competence by participants they still have misunderstanding of the psychological and educational principles or foundations, they think reinforce methods as the only ways of encouraging pupils to learn. They are measuring the motivation of their pupils to learn by the there degree of answering mechanical questions asked during the lessons. Pupils usually answer these questions just to avoid teachers' disappointment.

The lower rank important competencies as viewed by participants, also perceiving as having less competence in, are those of activating cooperation with parents, colleagues and local community, and mastering communication and interaction skills (Tables 6.7 & 6.19). This is evidence of how the teaching process is practiced separately and how a teacher's work is isolated from her surroundings.

"*Society should support teachers because they are starting to despair from teaching and their situations*" (page 169)

"*...but the school curriculum needs to be reviewed to meet learners and society needs*" (page 181)

Many teachers commented on their feelings of a lack of confidence to teach science and maths. This seemed to be associated with limited understanding of the new Basic Education mathematics and science curricula, methods and practices resulting from little exposure to these factors during their teacher preparation programme (e.g. see page 171).

"*... we did not prepare academically and practically, we are excellent only in theoretical educational aspect, there are some changes and new techniques in schools and we are not familiar with them.*"

"*... we did not prepared in a proper way, we have shortage in educational and academic experiences, we can teach normal [general education] primary curriculum but we will be facing many difficulties teaching the new curriculum.*"

"...because teaching in this new education system [Basic Education] based on educational and practical activities not only present information in a theoretical way, but we did not understand this system, this is referring to the preparation programme."

8.4.4 Classroom Management Competencies

The ranking order for the perception of competence of these competencies is very similar to the ranking of the importance of having such competencies. It is obvious that practicing teachers perceive themselves more competent in competencies of employing classroom management skills to attain effective learning, establishing proper solutions for classroom's behavioural problems, and time management. Therefore, the experience of being in schools as a teacher is a factor here with teachers now being able to adjust the period lesson time to the length of the planned and required tasks and activities. It is noticeable that these results support the results of other studies. Ryan et al (1980) identified personal life adjustment and the teaching assignment itself as two key areas of difficulty for beginning teachers. Veenman (1984) cited other perceived problems of beginning teachers including motivating students, planning lessons, and dealing with individual differences. Elias, Fisher & Simon (1980) also reported problems in finding and using appropriate materials. It seems that the more problems beginning teachers encounter, the more likely they will eventually leave the profession (Veenman, 1984).

8.4.5 Evaluation Competencies

With regard to the perception of these competencies, the ranking order is similar to that of the perceived importance. Participants usually favoured the familiar types of evaluation and assessment tools such as pencil and paper tests.

The differences between student teachers and practicing teachers in their perceiving of competence of the competencies may be attributed to the teaching experience factor.

Generally, the weakness of student teachers in their abilities of evaluation competencies might be influenced by many factors, such as:

- there has been no training for student teachers on some observation techniques such as observation and self-evaluation for themselves, or for their pupils.
- student teachers have no background or experience in the process of pupil evaluation such as preparing portfolios, cumulative records, etc.
- the teacher preparation programme includes one course about evaluation, but the content of this course is outdated and it does not prepare students to practice Basic Education assessment and evaluation. This course deals with the educational evaluation process in general, and specific topics of pupils' evaluation are very limited.

- evaluation and assessment are less commonly considered than other factors in the educational process with examinations as the only focus for most of teachers.
- the negative attitudes towards evaluation and assessment, so the society should be encouraged to look at this processes as a means towards achieving development rather than seeing it an something negative.

8.4.6 Subject Matter Knowledge Competencies

Participants rated themselves as above average of competence in all the subject knowledge competencies, except for the last competency, which is understand the strong link between resources consumed by the population as well as new technologies and scientific discoveries. The main reason for this result might be that the preparation programme did not focus on this issue, and it does not given much consideration to these concepts in any of the courses. Mastering of content in the school subjects being taught in the First Cycle of Basic Education, and learning the integration between these subjects was given the highest competence. It is perhaps unexpected that student teachers have a higher rating competence than practicing teachers in this competency. This might be due to their short experience with the school curriculum, and they have the impression that the curriculum of Basic Education is the same as the curriculum they were taught in their early elementary schooling. However, practicing teachers have the higher rating of competence in the rest of these competencies and this is sign of the factor of professional experience.

8.5 Who is responsible for the poor uptake of constructivist approaches? Results from observations and conservational interviews

The adequacy of the initial teacher education programme in the Omani colleges to prepare scientific field teachers for teaching in the Ministry of Education's Basic Education mathematics and science programs is one of this researcher's questions.

In the second stage of this study, twenty four lessons were observed for both practicing teachers and teachers in their teaching of science and mathematics subjects. An observation checklist of 22 items was used to examine if there is any evidence of constructivist teaching. These observations were consequently followed up by some interviews of those participants in order to clarify the findings from the observations.

The results from observations indicated that neither practicing teachers nor student teachers showed much signs of a constructivist approach in their lessons although teachers' situation was slightly better than of student teachers because of the experience factor. Their familiarity with Basic Education curriculum and some of the in-service workshops may be the factors for their improvement. It is interesting to observe that science lessons had slightly higher overall scores than of mathematics in most of these items. (see Table 7.2, for student teachers is: science mean .466 & math mean .32 & Table 7.3 for teachers is: science mean .515 & math mean .38).

The participants' answers through the interviews appeared that they can be categorised into two groups; first, although there minority some of them still believe on the tradition style of teacher's role as controller and the resource of the knowledge to the pupils. They have a doubt of the efficiency of the new trends of the Basic Education system and its adequacy for the Omani society. Their argument is as we successfully gain knowledge in this way so this is the best way of transfer it to our pupils. Their thoughts had been constructed from their notion of the philosophy of the Basic education as imported system which is not suitable for the Omani society and culture. (see page 195)

"pupils should memorise the basic information, so they can answer the questions in any situation, during the lesson, or in assessment of the topic"

"we had memorised much information of science during our primary studying in schools, we know many things about, e.g. human body, space and galaxy, light and sound ...etc. but today's pupils do not have, because school curriculum emphasises the practical activities"

"Science and mathematics can be learned when the teacher simplies the knowledge for her pupils., Also reading the textbooks and doing practical activities is important, but this does not much improve the knowledge of the kids"

The second group convinced and believed in their new roles which lead them to the constructivist teaching. They are consciousness of some aspects of constructivist teaching such as using of pupils' existing knowledge to guide teaching but they complain of many issues which restrain them from the practicing of such teaching. These are some samples of their responses (see pages 196-197):

"Learning scientific subjects can be done in many ways, it depends on the topic and the pupil him/herself, but in today's schools there should be no chance for the memorisation method, pupils should understand what they learn, I like to know the worth of the scientific knowledge for my life, so it is no doubt that my pupils also like to"

"Pupils should do their own work and teachers just direct them, it is not her [teacher's] duty to transfer what is in the book to children, children know a lot but they need someone who can help them to organise their information and show it in a scientific form., I like to utilise such methods in my teaching but I need to more training"

"My role is still important even there is emphasis on self-learning or pupil-centred teaching, I can implement these techniques in science lessons more than mathematics"

Many of these factors referring to their preparation programme. This aspect does not have enough consideration weather in the structure of the programme's components (the cultural, professional & academic) or in the content of the different courses moreover of the learning environment in the colleges. Analysis of the content of one of the main courses (science teaching methods, see Appendix 7) support this perspective. The other main factor is the schools' conditions like the overloaded duties and the unfamiliarity of this ways of teaching for many people, e.g.:

"I agree that I don't elicit pupils' ideas before presenting my own idea every time because I expect that pupils do not have any ideas particularly in the new topic. There is another important reason, the available time is very limited to utilise these types of constructivist factors, so the time for what should be taught in only one lesson will extend to five or more" Teacher (page 200)

The final stage of the study was a sense of conversational interviews. Educators from different positions of the educational field such as curriculum advisors from the ministry of education and the ministry of higher education, lecturers from the colleges of education, inspectors, headteachers and senior teachers were individually interviewed in order to explore those principals' perceptions about the issues of constructivist teaching in light of the results from observations of student teachers and teachers' teaching and follow-up interviews.

As mentioned in the conclusion of the results of these interviews (see section 7.7.4), there is consensus among the participants on many issues. They all agree that the Basic Education curriculum tends to shift learning environments from the traditional teaching to the constructivist teaching. There is a conflict between the representative of sides, the schools which belongs to the ministry of education and the colleges which belongs to the ministry of higher education for the responsibility of the insufficient teachers for the constructivist teaching. Whether the liability referred to the unsupportive schools conditions during the practicum programme and sequence practicing of teaching or due to the insufficiently of the college's programme of preparation (pages 204-205).

"There are many issues and factors surrounding the teacher preparation process, we can not generalise and blame only the colleges, I agree that there is a shortage with these outcomes [the graduates] in some aspects, specifically what you have mentioned about the new trends in teaching [constructivist teaching], but the field [schooling system] is also responsible, when they [student teachers] want for the practicum and facing a traditional school environment without substantial change ...they need guidance, even teachers themselves who should behave as a mentors, the philosophy of the Basic education still not clear for them". (Curriculum Advisor Ministry of Higher Education)

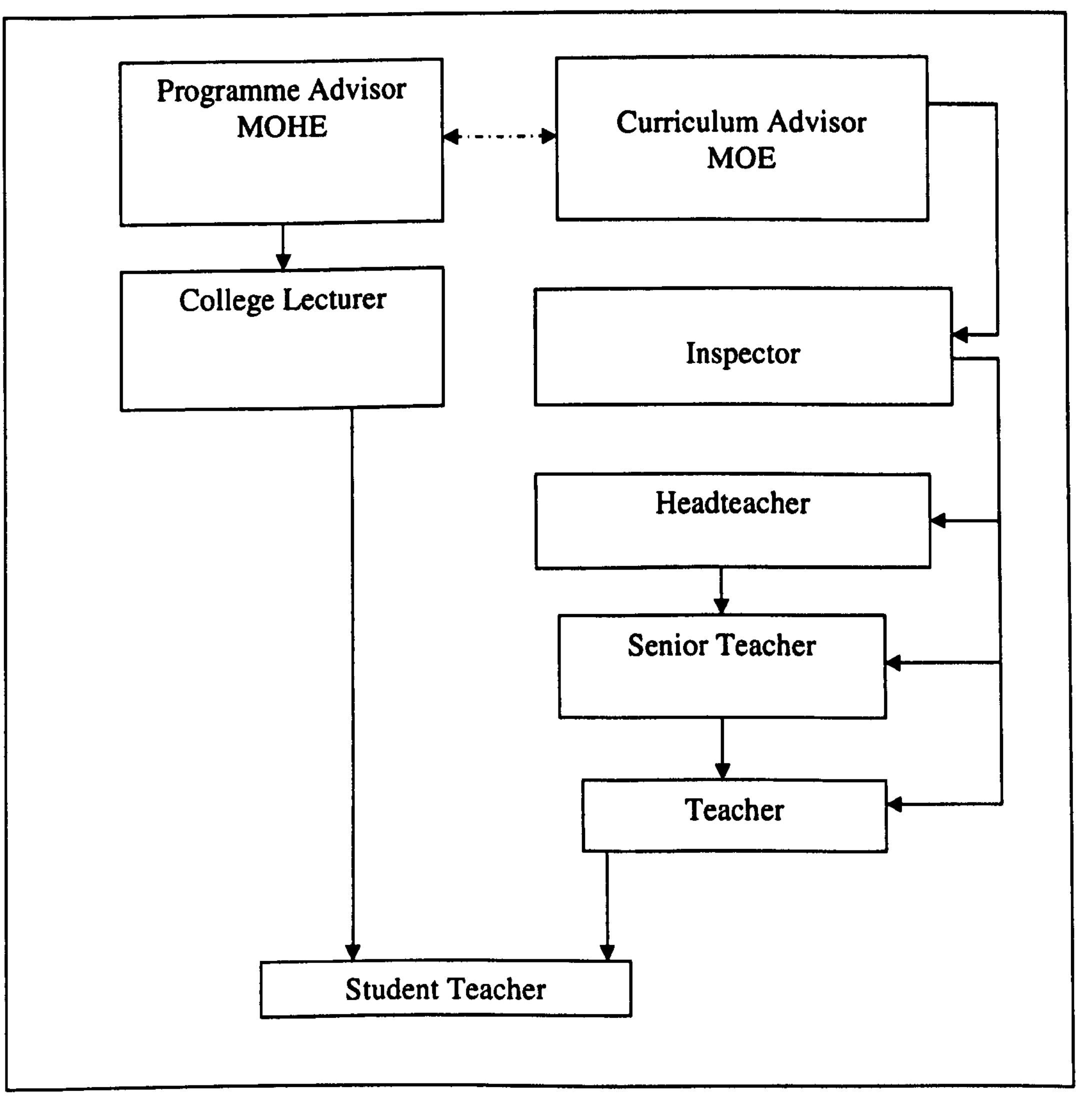
"One of the examples which is evidenced by what happened in the colleges, is the preparation or the planning for the lessons, student teachers are still trained on the old style of lesson preparation which was used in the old system [General Education], they also do not have idea about portfolios and new assessment techniques. How you talk about these advanced practices and they lack of the basics of teaching!". (senior teacher)

"Most of the new teachers who I am supervising using the direct instruction, this can work with the old system, this is effective when the goal of instruction is to have pupils reproduce factual knowledge, I think there should be no distinction between what is taught in the college and the school situation". (inspector)

It is obvious that there is a gap between the people in both institutions. The hierarchical succession which is illustrated in figure 8.1 is main factor of restrain or prevent streaming of the message to teachers and certainly to student teachers.

A suggestion of a pre-service training model to overcome this issue will be presented on the next chapter.

Figure 8.1 the hierarchal system of the transmission of the information within teacher education system



8.6 Summary

The central focus of this study is on the adequacy of initial teacher education programme at the Omani colleges of education on preparing its students to meet the demands of the reformed curriculum at the Basic Education schools. This chapter has been presented a discussion and interpretation of the results and the findings from the three stages of the study.

The main part of the discussion focuses on the results of the survey questionnaire and interview questions regarding to the perceptions of the student teachers and practicing teachers of the importance of the competencies of there preparation programme in addition to their self-rating of the competence of these competencies.

This followed by a discussion of the findings from the observations of participants' science and math lessons and their answers of the follow up interviews with them.

Finally the chapter ended by a discussion of the conversational interviews with some educators such as curriculum advisors, headeachers and inspectors who related to the teacher education.

Firstly the results of the first question regarding the motivation and attitudes towards teaching profession and specialising in science and mathematics for the Omani women were discussed.

The results show that the Omani female teachers show a high motivation to the teaching profession. Many of them have a personal commitment towards teaching. The majority of them have satisfaction with teaching because they have been raised to believe teaching is proper work for women. They hold this view in accordance with the notion that society respectfully considers that teaching is a suitable career for women.

Regarding to the main issue of this study, generally, participants consider of the importance of the some of the listed competencies. Even though there is some consensus of the importance for these competencies, there are some un-ignorable critics who view these competencies as being far away from the goals for the preparation of scientific field teachers for the reformed Basic Education schools.

Although student teachers and practicing teachers perceive themselves competent in the listed teacher education programme competencies the results from the interviews show there are many factors behind the deficiencies and perceived lack of competence in the listed competencies.

The results illustrate that many teachers desire to use pupil-centred, constructivist, depth-versus-breadth approaches in their science and mathematics classes, they themselves present many restraints for such implementation, such as lack of training and confidence to practise of this way in their lessons.

The next chapter, chapter nine, will summarises the study and the final chapter proposes recommendations based on the conclusions of the study which might be contribute the development of teacher education and suggests some areas for future research.

Chapter Nine: Conclusions

9.1 Introduction

This chapter presents conclusions of the study. Firstly the chapter introduces the context of the study then it presents the established evaluation framework which was conduced the study. The main findings of the study concluded and sorted according to the questions of the study. Finally this chapter ends by limitations of the study.

9.2 The Context of the Study

This introductory section highlights the context of the Omani education situation where this study was carried out.

Despite the rapid advances witnessed in the development of the education field in Oman, there are many ambitions still to be achieved to promote its quality and upgrade its efficiency. The political conditions, along with the financial and social circumstances in Oman before the nineteen seventies which kept the country isolated and resisted the development does not justify a delay of the speeding up of steps for more achievement. There are many challenges facing Oman including the pressure of the globalisation and its affects for the society, the revolution in communication and information technology, and the necessity of the national economic income variations in order to reduce the dependence on the oil as an only resource. These factors lead to the focus on the human resources to produce future generations who are going to understand and be able to meet the upcoming challenges. Hence, the development of the quality of education is essential, particularly for the early levels of education in the public school system. As teachers are the translators of developed plans in the curriculum and the schooling system to the real implementation of what is envisioned, their preparation and qualification is a fundamental aim for any educational reform.

The Ministry of Education began in 1998/99 to implement the Basic Education system. Most students will complete the Basic Education programme at the age of 16. This system provides education for all students for an uninterrupted period of 10 years. One major benefit of the Basic Education system, therefore, is the encouragement it gives to such students to extend the level of their education by completing at least ten years schooling.

Consequently, with the implementing of the Basic Education system, a number of major reforms have been introduced into the Omani school system in recent years. The aim of these reforms has been to bring about qualitative improvements to the educational programmes being offered. The Ministry of Education has introduced reforms to the curriculum, teaching and learning methodologies, assessment and evaluation systems and in-service training for teachers.

The Ministry of Education, for example, has encouraged teachers to adopt formative assessment techniques in their classrooms. As well as helping to improve standards in the school education system, the reforms are making the programmes more relevant and meaningful to students' needs and this should help to encourage more people to enrol and remain within the system.

Moreover, teachers are being guided to recognise and assist students with special needs, and community involvement in schools is being encouraged through the promotion of parents' councils. All of these school reform initiatives are seen as an integral element of the Ministry of Education's development strategies as a whole.

These changes resulted in the progression of the educational philosophy from a behaviourist approach, that maintains learning is externally controlled by the teacher, to a more constructive perspective, which suggests that learning is more of an active process (Ryan and Copper cited in Al Manthari, 2002, p.181). These changes have been included in the curriculum reform, and consequently, the teachers' preparation and teaching role certainly should be changed.

The problem referred to in the study indicates that when the principals have training from a different educational specialization they do not know how to mentor other teachers in their schools. As well, society raised the issue of the low quality of the graduates of the teacher education programmes at the Colleges of Education and their insufficient preparation to teach in Basic Education schools. Hence, the main purpose of this study was to evaluating the Omani teacher education preparation programme.

This study was limited to the programme provided by the Higher Education Colleges of Education to prepare Scientific Field female teachers to teach science and mathematics subjects in First Cycle Basic Education schools. This programme was introduced in the academic year 1998/99 to fulfil the need for Omani teachers as a part of an Omanisation plan. This Study was also limited to some aspects of the programme, particularly to its competencies.

The study contributed to the knowledge in the area of evaluation of teacher education as follows:

1. investigated the motivation of Omani women towards the teaching profession
2. examined Omani women's attitudes towards studying science and mathematics subjects

3. focused on the importance of the competencies of the teacher education programme
4. considered the self-perception of the competence-rating of the competencies of the teacher education programme of the Colleges of Education
5. examined the adequacy of this programme to prepare teachers for constructivist teaching in reformed Ministry of Education schools, and
6. examined educational evaluation models in order to establish an evaluation framework for the evaluation study which can be fitted with the context and culture of the Oman's Colleges of Education teacher education programme.

Moreover, the study was enriched by the implementing of a variety of methodological instruments and tools for gathering of information. Although the group focused upon for the study are the first stakeholders (the student teachers and practicing teachers), the research was extended to get information from other participants, educators from different positions, such as curriculum advisors, College lecturers, inspectors, head teachers and senior teachers.

9.4 Conclusions

This section presents the conclusions of the main findings of the study sorted according to the questions of the study.

Question One: To what extent do Omani women have motivation to be in the teaching profession?

The national women of Oman show a high motivation to the teaching profession. Many of them have a personal commitment towards teaching. The majority of them have satisfaction with teaching because they have been raised to believe teaching is proper work for women. They hold this view in accordance with the notion that society respectfully considers that teaching is a suitable career for women.

Although they have a positive view towards teaching in Basic Education schools, either according to their personal preference or family and social demands, the extrinsic reasons for choosing the teaching profession are still crucial factors for Omani women when enrolling in this profession. The female teachers consider other factors such as job esuriency, income and long holidays as influencing their decisions.

There is no significant differences found between student teachers and practicing teachers in their motivation towards the teaching profession, but practicing teachers are more likely to suggest a change to their career if given the opportunity to do so, as some of them began to develop negative views towards teaching because of the nature of teaching duties and being overloaded at work.

Question Two: To what extent do Omani women have positive attitudes to studying science and mathematics?

Omani women demonstrated an interest for learning science and mathematics. Some specific topics they liked included health and nutrition, applications to their homes, and scientific and geometric applications in their daily lives rather than general theoretical physics and mathematics. There is an awareness of the importance of these subjects and teaching them for their young pupils.

Although there is this optimistic view towards teachers selecting the scientific specialisation in the Colleges of Education, the study found that the main factor for Omani women to specialise in this field is to have position in the teaching profession regardless of the subject they are teaching. It also found that the programme failed to develop positive attitudes towards these subjects, with participants keeping their previous attitudes, whether positive or negative.

These findings have important implications for the role of pre-service teacher education programmes. These programmes should have the potential to provide prospective teachers with the capacity and confidence to change existing attitudes toward mathematics and science and develop a positive perception of their abilities to teach these subjects. The potential of teacher education programs to change the attitudes of pre-service teachers has been considered by many researchers. Sullivan (1987), for instance, found that teacher education courses in mathematics "improved their attitudes overall, but those who started with negative attitudes still had the most negative attitudes at the end".

Question Three: To what extent are the listed competencies of the teacher education programme important for teacher?

Generally, participants' consideration of the importance of the some of the listed competencies might be due to reasons which can be summarised as following:

- they were influenced by what they studied in some specific teacher preparation courses,
- they were influenced by their experiences during their school practicum programme,

- they have feelings that they have deficiencies in some of these competencies, so they may subscribe more importance,
- they were influenced by the effectiveness of the school's administration and principal,
- they were influenced by society values and their community culture, and
- they brought impressions that they had from previous school studies and school experiences.

Even though there is some consensus of the importance for these competencies, there are some un-ignorable critics who view these competencies as being far away from the goals for the preparation of scientific field teachers for the reformed Basic Education schools.

The literature in competency-based teacher education shows that there are different opinions towards the form and structure of the competencies. In the case of this study, most of the listed competencies are supposed to be the foundations of the programme's components, and thus the Colleges of Education's courses are far too general. Moreover, as the participants suggested, many of these listed competencies need to be revised and made into statements that can be included in a specific college's course or courses, and then measured once the student has taken these course/s dealing with each of the stated competencies.

Practicing teachers and student teachers showed a significant difference in their rating of importance in 20 of 48 listed competencies, in 16 of them practicing teachers putting higher ratings than of student teachers. Their experience in schools may be playing a crucial role in this aspect.

Question Four: To what extent do student teachers and practicing teachers perceive themselves competent in the listed teacher education programme competencies?

Findings from the questionnaire show that student teachers and practicing teachers amplified their self-rating of competence in the listed competencies because responses from the face-to-face, semi-structured interviews with them found divergence views. These differing views were supported by interviewed teacher educators and principals, and their opinions towards the insufficiency of the graduates of the Colleges of Education.

There are many factors behind these deficiencies and perceived lack of competence in the listed competencies, summarised in the following list:

- lack of resources in the Colleges of Education, participants' reference to resources included teaching equipment, mathematics and science kits, school textbooks and teachers' curriculum guides
- the organisation of the Colleges of Education study plan which mixes the study of College courses and the College practicum programme in the same semester making it difficult for Scientific Field student teachers to learn course subject matter and to learn about the nature of learners and learning
- fragmentation of courses. The College program arrangement (educational and psychological foundations courses, methods courses, and field experiences) offers disconnected courses that novices are expected to pull together into some meaningful, coherent whole.
- uninspired teaching methods. Although teachers are supposed to motivate pupils towards learning, teacher preparation methods' courses are often lectures and recitation of content. Thus, prospective teachers will be expected to provide these kinds of experiences for their pupils.
- separation and disintegration. Both College subject-matter courses and educational courses are not integrated or related to Basic Education's school curricula of mathematics and science.
- the practicum is not sufficient for training of teachers in that the numbers of students sent to schools is too many, and as well, the supervision of these students in not nearly strong enough, where many supervisors are academics, and they are not specialised in teaching methods.
- the academic and educational courses of the teacher education programme in the colleges are highly theoretical in the content. There is a gap between the school's curriculum intended by developers at the Ministry of Education, and that taught in the schools and the Colleges of Education.

The components of teacher education programs, collections of courses, field experiences, and student teaching, tend to be disjointed (Goodlad, 1990); they are often taught or supervised by people who have little ongoing communication with each other. Even when the components are efficiently organised, there may be no shared philosophical base among the educational establishments.

Lecturers themselves do not model a learner-centred approach, nor do they use the methods suggested as appropriate for Basic Education. They do as instructed, but with few exceptions, do not infuse their teaching with a real understanding of the deeper aims of Basic Education.

Teaching and schooling work experience of practicing teachers significantly affected the results showing that practicing teachers had a higher rating in the self-rating competence in 32 of 48 competencies, and student teachers only in 3 of them.

Question Five: To what extent do student teachers and practicing teachers practice constructivist teaching in their science and mathematics lessons?

The study found from the observations of some of the practicing teachers and student teachers observed while teaching science and mathematics lessons, and from the follow-up interviews, that there is very little sign of constructivist teaching approaches being used in these lessons.

Although many teachers desire to use pupil-centred, constructivist, depth-versus-breadth approaches in their science and mathematics classes, they themselves present many restraints for such implementation, some of them still seeing traditional teaching approaches as more favourable for them, as they were taught in use at the college level and in their previous schooling experiences. Practicing teachers are especially influenced by the nature of the methods used in the schools in which they began their teaching.

The effects of these problems can be seen in the complaints that pre-service teacher education students have about foundations courses that seem disjointed and irrelevant to teaching practice, or are "too theoretical", and have no bearing on what "real" teachers do in "real" classrooms with "real" pupils. Participants also complain that methods courses are time consuming and without intellectual substance. When methods courses explore the theory and research bases for instructional methods and curricula, the students complain that they are not oriented enough toward practice.

The research also highlights that when student teachers enter their first classrooms, the instructional methods, curricula, and resources can be very different from the ones they learned about in teacher education programs.

Many female Scientific Field student teachers as well as practicing school teachers lack confidence in teaching mathematics and science. These teachers need to be supported by professional development and curriculum resources to build their confidence and competence to teach these subjects. There is clear evidence to indicate that science and mathematics is being taught on a traditional transitive basis in many schools. Teachers in these schools need support and encouragement to develop as constructivist teachers.

9.5 Limitations of the Study

Like any other evaluation of programmes studies, there are some limitations of this study. First of all, the researcher had developed an evaluation framework for Oman's Colleges of Education Teacher Education Programme based on a collection of some approaches and methods that could be implemented in many models (such as CIPP Stufflebeam model, Stake's Responsive model and the Lincolin and Guba Fourth Generation "Responsive-Constructivist" model). There are many other evaluation approaches and models which can be adopted to evaluate such programmes however; they are not covered in the current research.

Moreover, as mentioned on the methodology chapter, the researcher was intending to adopt the constructivist type of evaluation, such as Stake's Responsive model and the Lincolin and Guba Fourth Generation models. Unfortunately he could not follow it as he was forced to modify the methodology to meet the requirements of the research due to many reasons such as lack of time. Where as it supposes that the evaluator should spend more time with the evaluants, it was not easy for this to occur due to the distance. The researcher was not able to stay in Oman for a long time and as a result, he could not totally implement the constructivist evaluation.

Additionally, this study has dealt with the teachers graduated from the colleges which are belongs to the ministry of higher education. In Omani schools there are other teachers who have diploma degree or who graduated from other private colleges and universities and who are not included in this study.

Furthermore, there were very limited previous studies which particularly focused on the scientific field for teaching both subjects to the early schooling ages, specifically in the Omani basic education or other similar context.

A final limitation was the very few observed lessons, and these observations were obtained only in two regions, so there was no comparison between the teachers according their background regions.

Chapter Ten: Recommendations: The Long Journey to Become a Competent Teacher

10.1 Introduction

This chapter presents some recommendations to improve and strengthen the preparation of Cycle One Scientific Field teachers at the pre-service level. As well, it suggest some recommendations as to future in-service so that teachers already in schools might better meet the range of work and responsibilities they are facing in the reformed Basic Education schools. Finally, the chapter recommends areas for further research.

10.2 Recommendations

According to the findings of the study, several recommendations are put forward, directed to different institutions relating to teacher education. As the study focused on the pre-service programme of teacher preparation, this was given more consideration in these recommendations.

10.2.1 Recommendations for the Colleges of Education

The teaching methods courses in this program require improvement, and as well, Basic Education Cycle One mathematics and science teaching materials and manipulatives are required for microteaching rooms at the Colleges of Education.

The suggested modifications to this Basic Education Cycle One mathematics and science programme that I would offer as a result of this study are:

- reducing the theoretical components of mandatory mathematics or science courses as these teachers are preparing to teach grades one to four,
- rewriting the curricula for the Educational Foundations, Educational Psychology and Educational Curriculum courses to make them less theoretical, and to model and reflect the teaching, learning and assessment principles underpinning Cycle I Basic Education,
- increasing the time allotted to methods of teaching Mathematics and Science from two credit hours each to six credit hours each so that the Basic Education Mathematics and Science courses for each school grade (grades 1-4) with their corresponding learning objectives and student activities are all modelled in the College methods courses,
- restructuring the practice teaching (practicum) arrangement. It is not necessary for College students to be in student teaching situations in schools during six of the eight college semesters, especially where the visits are just once-a-week visits.

Such visits make planning of lessons nearly impossible for College student teachers, and do not allow for efficient lesson follow-up and feedback to students in the schools. In addition, while the total allotted practicum time is almost sufficient in this program, it is too spread out, and fails to provide student teachers with a realistic teaching experience. During the first or second semester of the final year of their four-year College degree program, students should spend one whole College semester of 13-15 weeks duration assigned to one cooperating teacher in one school. This cooperating teacher should arrange teaching situations with other members of the school's Mathematics and Science Department so that classes in each of the four grade levels are taught during the block practicum. During this longer block practicum, the student teacher, rather than teaching perhaps one isolated lesson per day, will experience all aspects of "being a teacher" including:

- beginning with classroom observation, and teaching one lesson per day, gradually increasing the teaching load until a full teaching load is carried for the last three to four weeks, including supervisory and co-curricular assignments or responsibilities,
- planning lessons and then developing and completing entire units in both Mathematics and Science,
- developing an assessment plan for developed each unit including creating written assignments, quizzes, projects, and then determining the assessment grade for each student (subject to approval of the supervising classroom teacher),
- helping with reporting to parents,
- being involved in parent-teacher interviews, and
- eventually working with minimal teacher supervision in the classroom to obtain a realistic understanding of classroom management.

This revised practicum program would also see a stronger commitment from the Colleges of Education and/or the Ministry of Higher Education. Practicum supervisors would become not only evaluators of practicum students, but also coaches and mentors. It is the responsibility of the Ministry of Higher Education to hire and train required supervisory personnel for the practicum experience, either from existing College staff, or hired from outside the College system.

In addition, such a semester-long practicum system would allow the College student to be located in any school in the country. The student would apply for assignment to a specific participating school, arrange for suitable housing near the school, and live in the same manner as they would half a year later when they commence their teaching career.

It is recommended that the College Curriculum courses for this Cycle I programme be revised and rewritten to include Mathematics and Science methods and practices that

- model teaching methods that are required in the Cycle I Basic Education school mathematics and science classroom
- teach and model assessment and evaluation procedures that are used in Cycle I Basic Education mathematics and science
- include the use of Cycle I Basic Education Mathematics and Science teacher guides, student books, and curriculum materials and manipulatives, all to be used in microteaching rooms.

It is recommended that the Ministry of Higher Education purchase complete sets of the Cycle I Basic Education Mathematics and Science curriculum materials and manipulatives to be housed in each Mathematics or Science Methods teaching room (or microteaching lab). These materials may be obtained by placing a tender request with the Mathematics and Science Curriculum Departments at the Ministry of Education.

The practice of pre-service and in-service training should reflect on the school curriculum or on what student teachers or practicing teachers may be called upon to do upon their appointment to a school, especially in the area of implementing and providing a constructivist learning environment. It is appropriate to promote the idea that initial teacher education should serve as a model for the kinds of teaching and learning activities that perspective teachers might be expected to practice. "Pedagogical content knowledge" (Shulman 1986, 1987) is not seriously considered at the Colleges of Education at the present time. Thus, the teacher education programme might wish to build on what Shulman (1986, 1987) has referred to as "content knowledge" and "pedagogical content knowledge". This requires that all student teachers be fully certified and able to show competence in the Basic Education Science and Mathematics subject areas they teach as well as demonstrated teaching skills.

Subject-content pedagogy for mathematics and the various sciences must be emphasized in teacher training. A teacher's repertoire of classroom skills is not based solely on knowing subject matter and general principles of learning. Teachers must understand the difficulties learners have in mastering concepts in each specific discipline, and command a variety of strategies to overcome them.

The skills which characterize the nature of scientific and pedagogical activities cannot be fully tested simply by examinations which almost exclusively test recall. The assessment of both academic and pedagogical courses including teaching practice (the practicum) would require modification in order to test student competence over a wide range of teaching skills. The teacher education programme would then have to place greater emphasis on the relationship between learning and assessment.

Pre-service programs must prepare prospective teachers to become competent in engaging their students as active learners. Prospective teachers must learn how to use a variety of instructional modes and therefore must experience:

1. Hands-on activities
2. Discovery learning
3. Collaborative learning
4. Concrete manipulatives
5. Appropriate use of technology including, but not limited to, calculators, computers, multimedia, and use of the Internet.

Methods of assessment used in courses shall be aligned with the competencies in a systematic way, enabling students to understand the connection between instruction and assessment. Specifically, this means that students must be assessed, not only by traditional written and oral examination, but also by a variety of means such as:

1. Portfolios
2. Journals
3. Performance tasks
4. Group projects
5. Oral presentations

Field experiences must be linked to subject content, subject teaching methods, and general methods courses so that student teachers are encouraged to reflect on their experiences in the classroom and make connections to their expanding base of content and pedagogical knowledge. The student teacher's emerging understanding of mathematics and science content and the teaching of these subjects may be assessed through a journal or a portfolio.

10.2.2 Recommendations to the Ministry of Education, Oman

Successful learning for teachers requires a continuum of coordinated efforts that range from pre-service education to early teaching professional development to opportunities for lifelong development as professionals. Creating such opportunities, built upon the knowledge base of the science of learning, represents a major challenge, but is not an impossible task.

Current discourse in the initial teacher education in Oman makes a broad distinction between 'teacher as technician'' and 'teacher as reflective practitioner'. The technician is seen as having a restricted role, her job being to deliver the curriculum, which is prescribed at a higher level, as effectively as possible, while the reflective practitioner is expected to play a more extended role, that may include developing the curriculum to suit the context, evaluating and trying to improve her own practice.

The role of Scientific Field Basic Education teachers is usually closer to that of the technician, for a variety of obvious reasons. However, the discourse of reflective practice is increasingly used in the context of Basic Education reform, and if teachers are to be involved in more in-service training programmes, the teacher's role must indeed expand.

The experiences during the school training (the practicum programme) should direct instructional and professional practices such as:

1. Tutoring individual students
2. Working with small groups
3. Teaching lessons to the whole class
4. Conducting practical activities
5. Assisting the teacher in planning for instruction
6. Assessing student achievement
7. Participating with the classroom teacher in the professional life of the school, including:
    i. Faculty meetings
    ii. Parent conferences (if appropriate)
    iii. Professional development activities

Co-operative teachers who mentor student teachers during their field experiences (the practicum) should be identified as exemplars of constructivist teachers. Various methods of identification may include:

1. Service as a Basic Education mentor
2. Preparation of an acceptable teaching portfolio, using the Basic Education portfolios as a guideline

3. Partnership with higher education with the College of Education's tutors mentoring student teachers' teaching
4. Contributions of the supervisors from the regional Directorate of Education.
5. Participation in professional development processes at schools by participation in an exemplary professional development program.

There is a call for student teachers and then teachers to be provided with more opportunities for career-long continuing professional development, for example through the in-service programmes of Central and Regional Training Centres. Research evidence indicates that the most successful teacher professional development activities are those that are extended over time, and encourage the development of teachers' learning communities. Thus, teacher professional development should be structured in ways that allow teachers to grow individually in their profession and to contribute to the further enhancement of both teaching and their subject disciplines.

10.2.2.1 The Professional Development Package

In order to overcome the hierarchal system of the transmission of the information within teacher education systems and professionalisation within pre-service training, and then in-service training, a design of a professional development package for teacher students and practicing teachers is suggested. This package might usefully contain:

- Videos or CDs of model lessons of experienced teachers and trainers.
- Handouts, manuals and teacher guides for specific topics such as reflections in teaching, action research, constructivist teaching, authentic assessment, and other such concepts.

This professional development package could be designed by a committee comprised of curriculum advisors, curriculum designers, inspectors, lecturers and practicing teachers. This package should be distributed to teachers in the beginning of the school year with them being asked to prepare journals and portfolios for their teaching. Experienced senior teachers and inspectors can provide some kind of mentoring particularly in these issues. These portfolios are then evaluated by self-assessment and external expert assessment, with teachers being rewarded according to their efforts and their progress in professional development.

The content of this package could be located in a specific homepage of the Ministry of Education's Website, and teachers asked to send regular feedback through this homepage. There could be specific times for online conferences or seminars between the package designers and other educators and the participating teachers. The administrative and bureaucratic borders should be diminished, to allow direct communication channels between teachers and principals and other educators.

10.3 Recommendations for Future Studies

Ongoing investigations into the structure and competencies of preservice teacher preparation programmes, as well as other areas related to teacher education, can continuously inform and extend knowledge in this important area. Further studies need to be conducted to obtain more in-depth insight into the findings of this study and hence improve the teacher education field. Such studies are recommended as follows:

- Examining the nature and competence of other teacher education programmes at the colleges of Education, e.g. science and mathematics subject specializations in the Second Cycle of the Basic Education and Post-Basic Education levels.
- Evaluating the adequacy of the competency-based teacher education programme to produce qualified teachers.
- Investigating specific components of the teacher education programmes, e.g. the Academic component, the Educational component and the Practicum component.
- A comparative study between the motivation towards teaching and attitudes towards subject specialisation between different subjects, e.g. Scientific Field and Arts Field as well as the effect of other demographic factors, such as gender and age.
- In-depth investigations on the extent of conducting constructivist learning environment in schools and in colleges level, and in different courses and subjects.
- Evaluation of teacher education programmes by using different educational evaluation models and approaches.
- Extended study of the evaluation of the importance and the degree of internalization of the listed College competencies by contributions of inspectors, head teachers and Colleges of Education supervisors in questionnaires and surveys.
- A comprehensive study of the teacher education programme including the managerial, administrative, organisational, academic and financial aspects.
- Investigating the effect of other demographic factors in teacher education, e.g. gender, the type of the college (single gender or mixed), regional culture factors, and the years of study or experience of practicing teachers.

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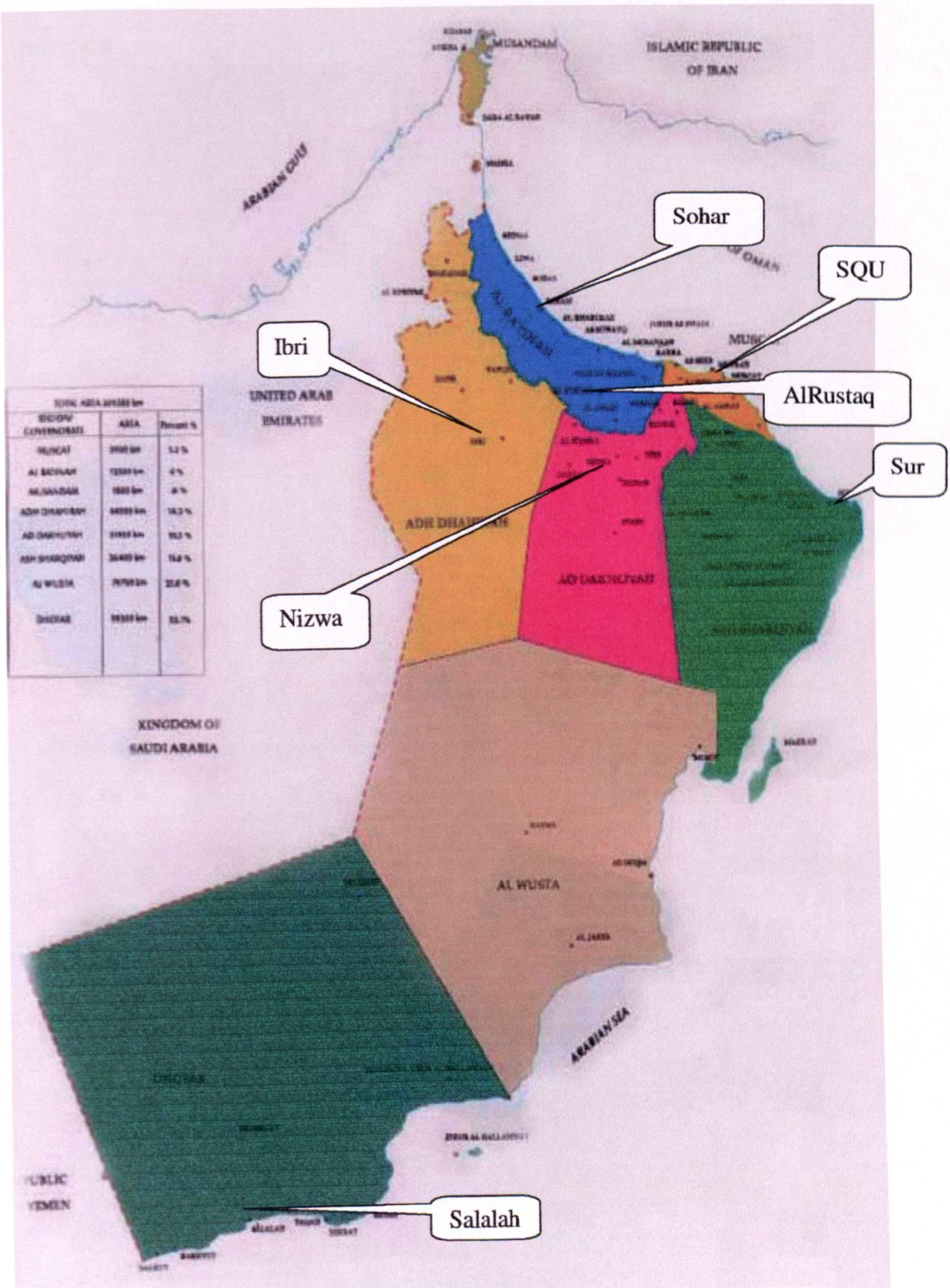
Appendix: 1 Map of Oman with Locations of the Colleges of Education & the SQU



Appendix:2 The Plan of the Research

Time	Activity/Method							
	Document Collection	Document Analyses	Questionnaire Develpment	Questionnaire Implementation	Interviews (ST, T, I. HT, L)	Lesson Observations (ST & T)	Follow-up Interviews (ST & T)	Conversational Interviews (Curriculum Advisors, Lecturers, HT, I, Senior Teachers)
Dec/2002	■							
Jan/2003	■							
Feb/2003		■						
Mar/2003		■	■					
Apr/2003			■	■	■			
May/2003				■	■			
Feb/2004						■	■	
Mar/2004								
Apr/2004								■
May/2004	■	■						

Appendix: 3.a The Questionnaire (English version)

UNIVERSITY of GLASGOW

Faculty of Education

Teaching & Learning Service
Florentine House, 53 Hillhead Street
University of Glasgow
G12 8QQ
Tel +44 (0)141 330 4864

Dear Student Teachers/ Teachers

This Questionnaire has been developed to gather information about the teacher education programme at the Colleges of Education in Oman. This questionnaire is an instrument of the collection data method as a part of my research for a PhD degree at the University of Glasgow. UK.

Your answers, comments and suggestions will be very useful for the success of this study. Could you please answer this questionnaire honestly and carefully. express your feeling freely.

All data you will present will be treated generally and will be kept completely confidential and will be used only for research purpose.

I will be grateful for your participation in this study and my best wishes.

Sincerely,

Ahmed Ibrahim Ahmed Alkindi
PhD Student
Teaching & Learning Centre
Faculty of Education
University of Glasgow - UK

The Questionnaire

First: Biographical information

1. **Your College:** Ibri AlRustaq Sure Salalah
2. **Your study year:** Third Fourth
3. **Experience Years (for teachers):** ....
4. **The Region (for teachers):**..............................

Second: Motivation and Attitudes
B. Reasons for choosing teaching profession:

Following is a list of possible reasons why someone might decide to become a Cycle One Basic Education School teacher. How much did each of these reasons influence your decision to become a teacher? (please tick the most suitable reason; you can tick more than one reason)

I like working with children
There are long holidays
It is a socially worthwhile job
Being a teacher can help improve society
My family (parents) encouraged me to become a teacher
My friends encouraged me to become a teacher
My experience as a pupil gave me a positive image of the job
The level of salary is quite good
It was the only choice for me
Teaching is the suitable work for Omani women
I like teaching profession

- Please, write any other reasons:
....
....

C. Reasons for choosing scientific field (science & mathematics) learning & teaching
How much did each of the following reasons influence your decision to learn science and mathematics and become a teacher of this field? (please tick the most suitable reason; you can tick more than one reason)

I am good at science and mathematics subject during my school study
Science and mathematics subjects are important subjects for pupils
This specialisation was the only choice for me
I have scientific interests
It is socially prestigious to teach scientific subjects
I was admired of science and mathematics teacher when I was a pupil

- Please, write any other reasons:
....
....

D. If you have a chance to change your choice, would you do so?
- Change the teaching profession yes No
- Change the specialisation Yes No
- If yes, could you write your reasons:
....
....

Third: The competencies of the Preparation Programme
Presented below are the competencies of the teacher education in the Omani Colleges of Education.

1 .In Column A
Could you indicate your opinion about each competency by circling the appropriate number of the degree of the importance of each competency for the Omani teacher education programme.

2. In Column B,
Could you indicate the degree of competence of a typical graduate from the Colleges of Education by circling the appropriate number.

Column A Importance degree					The competencies	Column B Competence degree				
Not importance	Less than average importance	Average importance	Above average importance	Essential importance	***By the end of the teacher education programme, I will be able to:***	Not competent	Less than average competent	Average competent	Above average competent	Essential competent
					1. General Competencies					
1	2	3	4	5	Consideration of professional ethics in dealing with pupils in moral, spiritual, and social situations and provide equal opportunities between them.	1	2	3	4	5
1	2	3	4	5	Belief in the teachers' role in the achievement of the comprehensive educational development of students, and effect on the pupils' future, and acquire the desired positive attitudes of her profession toward dealing with pupils in this age (grades 1-4).	1	2	3	4	5
1	2	3	4	5	Develop positive attitudes toward the nation, the Arabic world, the Islamic world, all humanity and world peace.	1	2	3	4	5
1	2	3	4	5	Consideration of societal values, inside and outside the school, and development of responsibility towards environmental and societal needs.	1	2	3	4	5
1	2	3	4	5	Develop positive attitudes toward integrated development of pupils.	1	2	3	4	5
1	2	3	4	5	Consideration of educational responsibility and demonstration of supervision of students, as well as instructional and administrative responsibilities.	1	2	3	4	5
1	2	3	4	5	Cooperate with others in order to improve individual pupil's performance, and modernize the quality of the school and general life.	1	2	3	4	5
1	2	3	4	5	Develop abilities through self-learning and continuous professional development.	1	2	3	4	5
1	2	3	4	5	Develop her competencies in the English Language and in the use of computers.	1	2	3	4	5
					2. Planning Competencies: Prepare annual, termly and daily teaching lesson plans, to achieve the following:					
1	2	3	4	5	Efficiency and integration of school curriculum content, and its connectivity with all other curricula.	1	2	3	4	5
1	2	3	4	5	Derivation and formation of the behavioural objectives in procedural, observable and measurable areas.	1	2	3	4	5
1	2	3	4	5	Determine the prerequisites for the topics studied in each subject.	1	2	3	4	5
1	2	3	4	5	Learn to use a variety of teaching styles, methods and strategies in an integrative way, in order to meet pupil's needs and abilities, and	1	2	3	4	5

					to achieve the behavioural objectives.					
1	2	3	4	5	Use environmental materials to prepare instructional media and employ them in different learning/teaching situations.	1	2	3	4	5
1	2	3	4	5	Use proper evaluation methods to insure the achievement of the behavioural objectives.	1	2	3	4	5
1	2	3	4	5	Planning and designing of both inside the classroom and extra-class activities.	1	2	3	4	5
					3. Teaching Competencies					
1	2	3	4	5	Stimulate pupils' motivation towards learning, by using outside and inside classroom activities, to develop their abilities, as well as, using individual or group work.	1	2	3	4	5
1	2	3	4	5	Maintain pupils' motivation towards learning throughout the lessons.	1	2	3	4	5
1	2	3	4	5	Implement learning principles and a variety of teaching methods and strategies to meet pupils' learning styles, particularly for special educational needs.	1	2	3	4	5
1	2	3	4	5	Use different learning resources, including audiovisual and communication techniques with the appropriate topic and time.	1	2	3	4	5
1	2	3	4	5	Implement group work activities to develop positive attitudes towards cooperation and teamwork between pupils.	1	2	3	4	5
1	2	3	4	5	Master communication and interaction skills with pupils and support them to express their ideas clearly and contribute effectively in activities.	1	2	3	4	5
1	2	3	4	5	Implement and integrate psychological and educational principles to stimulate pupil's motivation for learning.	1	2	3	4	5
1	2	3	4	5	Activate cooperation with pupils' parents, staff colleagues and other members in the local community.	1	2	3	4	5
					4. Classroom Management Competencies					
1	2	3	4	5	Employ classroom management skills and organisation in order to attain affective learning and positive relationships between teacher and the pupils.	1	2	3	4	5
1	2	3	4	5	Set clear expectations for discipline in the classroom to control pupils' behaviour.	1	2	3	4	5
1	2	3	4	5	Organise learning experiences inside and outside the classroom	1	2	3	4	5
1	2	3	4	5	Organise and provide comfort, security and safety within the classroom's physical environment.	1	2	3	4	5
1	2	3	4	5	Know, analyse and establish the proper solutions for the classrooms' behavioural problems.	1	2	3	4	5
1	2	3	4	5	Manage and utilise time for learning in lessons and classroom activities.	1	2	3	4	5
1	2	3	4	5	Organise and file pupils' records, and employ them in order to achieve effective learning.	1	2	3	4	5
					5. Assessment and Evaluation Competencies					
1	2	3	4	5	Use oral, written, practical, research reports and cumulative records to evaluate and follow up pupils' progress.	1	2	3	4	5
1	2	3	4	5	Outline assessment items and prepare performance tests in light of instructional objectives.	1	2	3	4	5
1	2	3	4	5	Discover and support pupils' strengths, and diagnose and seek to overcome their weaknesses, with assistance of the pupils' cumulative records.	1	2	3	4	5
1	2	3	4	5	Analyses of tests and observations and filing them in a simple form for interpretation.	1	2	3	4	5
1	2	3	4	5	Use self-evaluation methods in order to obtain formative data, and then performance and authentic evaluation.	1	2	3	4	5
1	2	3	4	5	Contribute in evaluation of teaching/learning process and its factors.	1	2	3	4	5
1	2	3	4	5	Contribute in writing of school reports, and provide suggestions.	1	2	3	4	5
					6. Subject Matter Knowledge Competencies					
1	2	3	4	5	Understand and implement concepts in the subject specialisation, and master the subject's content and applications.	1	2	3	4	5
1	2	3	4	5	Mastering of content of school subjects' content being taught in the First Cycle of Basic Education, learning the integration between them.	1	2	3	4	5

1	2	3	4	5	Use a variety of learning resources to meet pupils' needs.	1	2	3	4	5
1	2	3	4	5	Develop scientific and educational attitudes by research and continuous updating in the specialisation.	1	2	3	4	5
1	2	3	4	5	Understand and implement characteristics of curriculum construction and development including standard selection, analyses, classification, and sequence and consequence in curriculum development.	1	2	3	4	5
1	2	3	4	5	Employ life skills with the content.	1	2	3	4	5
1	2	3	4	5	Know in general the history and geography of Oman, the Gulf States, and the Arabic World in order to follow information and developments in the economic, cultural and political fields.	1	2	3	4	5
1	2	3	4	5	Make connections between pupils' lives and their environments in order to support preserving resources.	1	2	3	4	5
1	2	3	4	5	Follow up historical and contemporary events as well as national, social and religious occasions to support the local culture.	1	2	3	4	5
1	2	3	4	5	Understand the strong link between resources consumed by the population as well as new technologies and scientific discoveries.	1	2	3	4	5

3. Please, write some competencies you may find that are missed above and it must be included.

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4. Please, write any suggestions or comments to develop teacher education programmes and teaching.

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Note: This questionnaire will be followed by face-to-face interview, if you agree to participate this interview, could you please register your name and address in the list which is with your Headteacher.

Thank you very much for your time and cooperation

Appendix: 3.b The Questionnaire (Arabic version)

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الفاضلات / معلمات المجال العلمي بمدارس التعليم الأساسي
الفاضلات / طالبات تخصص المجال العلمي بكليات التربية

السلام عليكن ورحمة الله وبركاته، وبعد:

الاستبانة المرفقة هي إحدى أدوات البحث الذي أجريه والذي يعتبر من متطلبات دراستي العليا التي أقوم بها بمركز التعليم والتعلم التابع لكلية التربية بجامعة جلاسكو بالمملكة المتحدة.
تهدف الدراسة إلى تقويم برنامج إعداد معلمات المجال العلمي بكليات التربية التابعة لوزارة التعليم العالي بالسلطنة.
وتتضمن هذه الإستبانة ثلاثة أجزاء: يحتوي الجزء الأول على بعض المعلومات الأساسية عن مجتمع الدراسة، ويختص الجزء الثاني بالدافعية حول مهنة التدريس والاتجاهات نحو تعلم المواد العلمية، بينما خصص الجزء الثالث لتقييم أهمية كفايات برنامج الإعداد ومدى التمكن منها، وتنتهي الاستبانة ببعض الأسئلة المفتوحة.
أرجو التكرم بالاجابة على بنود الاستبانة بكل موضوعية حيث أن استجابتكم سوف تكون عاملا مهما لإنجاح هذه الدراسة وتحقيق أهدافها.
ويسرني أن اتعهد بأن كافة البيانات والمعلومات سيتم التعامل بها بصورة سرية وسيتم ترميزها وفق القواعد العلمية المتبعة بالبحوث التربوية، وسيتم استخدامها لغرض البحث العلمي فقط، ولن يكون لها أي تأثير سواءا على الوضع الشخصي أو العملي.
كما يسرني أن أتقبل أي تعليق أو ملاحظة حول كافة بنود الاستبانة.

ولكم جزيل الشكر ووافر التقدير.

أحمد بن إبراهيم بن أحمد الكندي
طالب دكتوراة في التربية
مركز التعليم والتعلم
كلية التربية – جامعة جلاسكو- المملكة المتحدة

استبانة تقويم برنامج إعداد معلمات المجال العلمي بكليات التربية

الجزء الأول:

أ. معلومات أساسية

1. الكلية: □ عبري □ الرستاق □ صور □ صلالة
2. سنة الدراسة (للطالبات): □ الثالثة □ الرابعة
3. عدد سنوات الخبرة (للمعلمات): □ سنه واحدة □ سنتان
4. المنطقة التعليمية (للمعلمات):.....................

ب. أسباب اختيار مهنة التدريس

ما هي أسباب اختيارك مهنة التدريس: أرجو وضع إشارة (√) أمام أكثر الأسباب ملائمة بالنسبة لك (يمكنك وضع أكثر من سبب)

- □ أحب العمل مع الأطفال
- □ لطول مدة الإجازات
- □ لكسب مكانة اجتماعية
- □ من خلال العمل بالتدريس استطيع تطوير وخدمة مجتمعي
- □ بسبب تشجيع أسرتي على العمل بالتدريس
- □ بسبب تشجيع صديقاتي
- □ خبرتي كتلميذة بالمدرسة شكلت لدي انطباعا جيدا عن التدريس
- □ مستوى راتب المعلمة جيد
- □ لقد كان الخيار الوحيد المتاح أمامي
- □ لأن مهنة التدريس هي المهنة المناسبة للمرأة العمانية
- □ لأن مهنة التدريس هي رغبتي الشخصية

أية أسباب أخرى:

....

....

ج. سبب اختيار تخصص المجال العلمي

ما هي أسباب اختيارك تخصص المجال العلمي: أرجو وضع إشارة (√) أمام أكثر الأسباب ملائمة بالنسبة لك (يمكنك وضع أكثر من سبب)

- □ لأنني كنت جيدة في مواد العلوم والرياضيات بالمدرسة
- □ لأنها باعتقادي مواد مهمة وأساسية للتلاميذ
- □ لأنه كان الخيار الوحيد أمامي
- □ لدي اهتمامات علمية
- □ للمكانة الاجتماعية لمعلمي المواد العلمية
- □ لتأثري وإعجابي بإحدى معلماتي عندما كنت تلميذة

أية أسباب أخرى:

....

....

د. لو أتيحت لك الفرصة لتغيير مهنتك أو اختصاصك فهل ستغيرينهما: □ نعم □ لا

إذا كانت الإجابة بنعم أرجو تحديد الأسباب:

....

....

الجزء الثاني:كفايات برنامج الإعداد

الجدول أدناه يشتمل على كفايات برنامج إعداد معلمات المجال العلمي بكليات التربية بسلطنة عمان، يرجى منك التكرم بإبداء رأيك حول هذه المخرجات وذلك كالتالي:

- **في العمود (أ) على اليمين**
يرجى تحديد وجهة نظرك حول <u>أهمية هذه المخرجات</u>، ومدى ملاءمتها لبرامج إعداد المعلمين بكليات التربية بالسلطنة، وذلك بوضع دائرة حول الرقم المناسب حسب أهميتها بالنسبة لك.

- **في العمود (ب) على اليسار**
يرجى تحديد وجهة نظرك حول <u>مدى توافر هذه المخرجات لديك</u>، وذلك بوضع دائرة حول الرقم المناسب حسب تمكنك منها.

أ مدى أهمية الكفايات					بعد الانتهاء من برنامج إعداد المعلمين بكليات التربية فإنني أعتقد بأنني قادرةعلى أن التمكن من:	ب مدى توافر الكفايات				
غير مهمة على الإطلاق	غير مهمة	متوسطة الأهمية	مهمة	مهمة بدرجة كبيرة جدا		غير متوفرة على الإطلاق	غير متوفرة	متوفرة بدرجة متوسطة	متوفرة	متوفرة بدرجة كبيرة
					أولا: الكفايات العامة					
1	2	3	4	5	الالتزام باخلاق المهنة في رعاية التلاميذ من النواحي الاخلاقية والروحية والالتزام بقيم العدالة والمساواة في توزيع الفرص بينهم	1	2	3	4	5
1	2	3	4	5	الإيمان بوظيفة المعلم ودوره واهميته في تحقيق التنمية التربوية الشاملة وإدراك تاثيره في حياةالتلاميذ في المستقبل	1	2	3	4	5
1	2	3	4	5	الالتزام بتنمية الاتجاهات الإيجابية نحو الوطن والعالم العربي والإسلامي والانسانية والسلام العالمي	1	2	3	4	5
1	2	3	4	5	مراعاة الالتزام بقيم المجتمع داخل المدرسة وخارجها وتنمية روح المسؤولية نحو الاحتياجات البيئية والمجتمعية	1	2	3	4	5
1	2	3	4	5	العمل على تنمية الاتجاهات الإيجابية نحو النمو المتكامل وبخاصة نحو الفنون التعبيرية المختلفة	1	2	3	4	5
1	2	3	4	5	الإلتزام بمراعاة الانظباط الشخصي والالمام بالمسؤولية الإشرافية والتعليمية والإدارية	1	2	3	4	5
1	2	3	4	5	الإلتزام بالتعاون والتضامن مع الأخرين من أجل تحسين أداء التلاميذ وترقية نوعية الحياة المدرسية والعامة	1	2	3	4	5
1	2	3	4	5	العمل على تنمية قدراتي من خلال العلم الذاتي والنمو المهني المستمر	1	2	3	4	5
1	2	3	4	5	العمل على تنمية كفاياتي في استخدام اللغة الإنجليزية والحاسوب	1	2	3	4	5
					ثانيا: كفايات التخطيط **إعداد الخطط التدريسية السنوية، والفصلية، واليومية بالشكل الذي يؤدي إلى تحقيق ما يلي:**					
1	2	3	4	5	الفعالية وتكامل المقرر الدراسي وترابطه مع سائر المقررات الأخرى	1	2	3	4	5
1	2	3	4	5	اشتقاق الأهداف السلوكية وصياغتها بطريقة إجرائية قابلة للملاحظة والتقدير وربطها بالأهداف العامة	1	2	3	4	5
1	2	3	4	5	تحديد المتطلبات القبلية لموضعات دراسية معينة وتوضيح طرق الكشف عنها وكيفية الاستفادة منها	1	2	3	4	5
1	2	3	4	5	تنويع استراتيجيات وطرائق وأساليب التدريس واستخدامها بطريقة وظيفية تكاملية في مجالات مقررات الحلقة الأولى بما يلبي حاجات وقدرات التلاميذ	1	2	3	4	5
1	2	3	4	5	تعرف الوسائل التعليمية وإعدادها وإنتاجها من الخامات المتوفرة في البيئة وتوظيفها في المواقف التعلمية التعليمية	1	2	3	4	5
1	2	3	4	5	استخدام أساليب التقويم المناسبة للتاكد من مدى تحقق الأهداف العامة والسلوكية المحددة للدرس	1	2	3	4	5
1	2	3	4	5	تخطيط وتصميم الأنشطة والبرامج الصفية واللاصفية	1	2	3	4	5
					ثالثا: كفايات التدريس					
1	2	3	4	5	استثارة دافعية التلاميذ للتعلم واستخدام الأنشطة الصفية واللاصفية لتنمية قدرات التلاميذ بطرق فردية وجماعية	1	2	3	4	5
1	2	3	4	5	المحافظة على دافعية التلاميذ للتعلم بصورة مستمرة في أثناء التدريس	1	2	3	4	5
1	2	3	4	5	توظيف مبادئ التعلم والتنويع في في أساليب واستراتيجيات التدريس لمقابلة صعوبات التعلم بين التلاميذ لاسيما ذوي الاحتياجاجات الخاصة	1	2	3	4	5

5	4	3	2	1	استخدام مصادر التعلم المختلفة بما فيها الوسائل السمعية والبصرية ووسائل الاتصال والتقنيات التي تسهم في تحقيق الأهداف في الموضوع الملائم والوقت المناسب	5	4	3	2	1
5	4	3	2	1	استخدام الأنشطة الجماعية لتنمية اتجاهات إيجابية نحو التعاون والعمل الجماعي بين التلاميذ	5	4	3	2	1
5	4	3	2	1	إتقان مهارات التواصل والتفاعل الصفي مع التلاميذ وتشجيعهم على التعبير عن أفكارهم بوضوح والمشاركة في النشاط بفاعلية	5	4	3	2	1
5	4	3	2	1	توظيف المبادئ النفسية والتبوية بطريقة تكاملية لإثارة الدافعية للتعلم وأساليب التعزيز المتنوعة وإصدار القرارات الحكيمة والعمل ضمن فريق وممارسة السلوك التعاوني في أثناء التدريس	5	4	3	2	1
5	4	3	2	1	تفعيل التعاون مع أولياء الأمور وزميلاتي من المعلمات والعاملات الأخريات بالمدرسة وأعضاء المجتمع المحلي فيما يتصل بتعلم التلاميذ ونموهم	5	4	3	2	1
					رابعا: كفاية إدارة الصف					
5	4	3	2	1	توظيف مهارات وتنظيم إدارة الصف بما يحقق تعلما فعالا وعلاقات إيجابية بيني وبين التلاميذ وأقرانهم وبما يمكن من حفظ النظام داخل الصف وخارجه	5	4	3	2	1
5	4	3	2	1	وضع توقعات واضحة لسلوك التلاميذ في الصف والمعايير المناسبة للإنضباط بما يتناسب مع خصائص هذه المرحلة	5	4	3	2	1
5	4	3	2	1	تنظيم خبرات التعلم داخل غرفة الصف وخارجه	5	4	3	2	1
5	4	3	2	1	تنظيم البيئة الفيزيقية في الصف بما يتناسب وطبيعة الأنشطة والخبرات التعليمية وبما يوفر الراحة والأمن والأمان للتلاميذ	5	4	3	2	1
5	4	3	2	1	تعرف المشكلات السلوكية داخل الصف ودراستها وتحليلها ووضع الحلول المناسبة لتعديل السلوك	5	4	3	2	1
5	4	3	2	1	إدارة واستثمار الوقت المخصص في التعلم والأنشطة الصفية	5	4	3	2	1
5	4	3	2	1	تنظيم وحفظ سجلات التلاميذ وتوظيفها في تحقيق التعلم الفعال	5	4	3	2	1
					خامسا: كفاية التقويم					
5	4	3	2	1	استخدام أساليب التقويم الشفوية والتحريرية والعملية والتقارير البحثية والسجلات المجمعة ومتابعة تقدم التلاميذ	5	4	3	2	1
5	4	3	2	1	صياغة مفردات الأسئلة وبناء وإعداد الاختبارات التحصيلية بأنواعها المختلفة في ضوء الأهداف التعليمية	5	4	3	2	1
5	4	3	2	1	كشف نواحي القوة في التلاميذ وتعزيزها وتشخيص نواحي الضعف والتغلب عليها عن طريق قوائم التشخيص الوصفية القائمة على سجل التلميذ وغيرها من وسائل التشخيص	5	4	3	2	1
5	4	3	2	1	تحليل نتائج الملاحظات والاختبارات وتبويب بياناتها في صورة تسهل استخلاص النتائج وتفسيرها للإستفادة منها	5	4	3	2	1
5	4	3	2	1	استخدام أساليب التقويم الذاتي لتنمية مهارات الطالب المعلم التقويمية والتقويم التشخيصي التكويني مع التوجه تدريجيا نحو التقويم الأدائي والتقويم الحقيقي	5	4	3	2	1
5	4	3	2	1	المساهمة في تقويم العملية التعليمية التعلمية وعناصرها المختلفة	5	4	3	2	1
5	4	3	2	1	المساهمة في كتابة التقارير المدرسية النوعية وتقديم الاقتراحات المناسبة في ضوء فعالية وإنتاج التلميذ في الصف	5	4	3	2	1
					سادسا: كفاية إتقان المحتوى					
5	4	3	2	1	استيعاب المفاهيم واتقان محتوى المواد والتطبيقات التي أدرسها في مجال تخصصي وتوظيفها	5	4	3	2	1
5	4	3	2	1	اتقان محتوى المواد المدرسية التي أقوم بتدريسها في الحلقة الأولى من التعليم الأساسي مع إدراك الطبيعة التكاملية بينها	5	4	3	2	1
5	4	3	2	1	استخدام مصادر التعلم المختلفة وتوظيفها بما يتناسب مع حاجات التلاميذ في إطار استراتيجيات التعلم والتعليم	5	4	3	2	1
5	4	3	2	1	تنمية الميول العلمية الثقافية عن طريق البحث والاطلاع على ما هو جديد في مجال تخصصي وبما يحقق لي النمو المهني المستمر	5	4	3	2	1
5	4	3	2	1	فهم وتطبيق أسس وخصائص بناء المناهج بما في ذلك اختيار المعايير، التحليل، التصنيف، التتابع والنتائج في بناء المنهج وتطويره	5	4	3	2	1
5	4	3	2	1	توظيف المحتوى لمهارات حياتية	5	4	3	2	1
5	4	3	2	1	الإلمام بشكل عام بتاريخ وجغرافية عمان والخليج والعالم العربي بما يمكنني من متابعة المعلومات والتطورات في المجالات الاقتصادية والثقافية والسياسية	5	4	3	2	1
5	4	3	2	1	ربط سلوك وحياة التلاميذ ببيئاتهم للعمل على المحافظة على مواردها	5	4	3	2	1
5	4	3	2	1	متابعة الأحداث التاريخية والمعاصرة والمناسبات الوطنية والاجتماعية والدينية لغرس مبادئ الولاء وترسيخ القيم الثقافية للمجتمع	5	4	3	2	1
5	4	3	2	1	فهم وإدراك الارتباط الوثيق بين استخدام السكان ومصادر البيئة ومظاهر التكنولوجيا الحديثة والاكتشافات العلمية في المجالات المختلفة	5	4	3	2	1

ثالثا: الرجاء إضافة أية كفايات لم ترد مسبقا وترى أهمية توافرها لدى المعلم:

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رابعا: الرجاء كتابة أية تعليقات أو مقترحات يمكن أن تساهم في تطوير وتحسين برنامج إعداد معلمات المجال العلمي بكليات التربية

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خامسا: سوف يتطلب البحث إجراء مقابلة ضمن موضوع الدراسة، فإذا كنت توافقين على إجراء المقابلة أرجو أن تسجلي موافقتك بالاستمارة الموجود لدى مديرة مدرستك.

شكرا جزيلا على حسن تعاونكم ولكم فائق التقدير

Appendix 4a: Interview Questions

Q1. Do you think that Graduates of the Colleges of Education are sufficiently qualified to work in a developed and well equipped schools, such as: Basic education Cycle One Schools? If No, Why not?

Q2.The graduates of the colleges of education are very competent, with high qualifications but this does not meet the underdeveloped, poor schooling system, so they do not have the opportunity to implement what they have learned, and prepared for.

- Do you agree? If yes, Why? If no, Why?

Q3. What are the positive aspects of the Colleges of Education Programmes regarding assisting student teachers to acquire the following competencies?

1. General Competencies
2. Planning Competencies
3. Teaching Competencies
4. Classroom Management
5. Evaluation Competencies
6. Subject Knowledge Competencies

What are the criticisms of these programmes regarding each of these competencies?

Q4. There are many issues related to the future of teacher education in Oman in light of international and local inconsistencies.

- What might these issues be?
- How might they be considered in the teacher education programmes?

Q5. The Ministry of Education is implementing a comprehensive educational reform by introducing of the Basic Education system.

Do you think that the programmes of teacher education in the Colleges of Education in Oman are able to prepare well qualified teachers who cope and lead the change in the educational system?

Q6. Would you like to add any suggestion or comments, for the development and improvement of the quality of the Omani initial teacher education programmes and the graduates?

Appendix: 4.b The Interview Questions (Arabic version)

أسئلة المقابلة

السؤال الأول:

هل تعتقد بأن معلمات المجال العلمي خريجات كليات التربية التابعة لوزارة التعليم العالي بالسلطنة لديهن القدرة والكفاءة على على العمل في نظام مدرسي متطور (مثل مدارس الحلقة الأولى بالتعليم الأساسي)؟ إذا كانت الإجابة بنعم أرجو ذكر الأسباب؟ وإذا كانت الأجابة بلا، لماذا؟

السؤال الثاني:

(معلمات المجال العلمي جريجات كليات التربية بالسلطنة قد تم إعداده جيدا، ولديهن التمكن الكافي من الكفايات الأساسية للتدريس، ويحملن المؤهلات المناسبة، ولكن تقابلهن أثناء التدريب العملي وعند الإلتحاق بالعمل بعد التخرج أنظمة مدرسية غير متطورة، وبالتالي لا يجدن البيئة المناسبة لتطبيق ما تم تدريبهن عليه)، إلى أي مدى تتفق مع هذه المقولة؟ أم تختلف معها؟ أرجو ذكر الأسباب؟

السؤال الثالث:

ما هي الإيجابيات التي يتصف بها برنامج إعداد معلمات المجال العلمي بكليات التربية بالسلطنة في إكساب الطالبات/المعلمات الكفايات الأساسية التالية:

- الكفايات العامة
- كفايات التخطيط
- كفايات التدريس
- كفايات إدارة الصف
- كفايات التقويم
- كفايات إتقان المحتوى

وماهي السلبيات أو المعوقات التي تتصف بها هذه البرامج في إكساب الطالبات/المعلمات هذه الكفايات؟

السؤال الرابع:

(هناك عدة قضايا وتحديات تواجه مستقبل مجال تربية المعلم في سلطنة عمان في ضوء المتغيرات المحلية والعالمية)

- ماهي أهم هذه القضايا من وجهة نظرك؟
- وكيف يمكن مراعاتها عند تخطيط وتطوير برامج تربية المعلم؟

السؤال الخامس:

تقوم وزارة التربية والتعليم بالسلطنة بما يسمى الإصلاح الشامل للتعليم، والذي يعتبر تطبيق نظام التعليم الأساسي أحد ركائزه.

- هل تعتقد بأن برامج إعداد معلمات المجال العلمي بكليات التربية قادر على إعداد المعلمات اللاتي لديهن الكفاءة والقدرة للإضطلاع بمسؤولية التغيير والتطوير في هذا النظام التعليمي.

السؤال السادس:

- أرجو إضافة أية مقترحات أو توصيات للمساهمة في تطوير وتحسين برامج إعداد المعلمين بكليات التربية في السلطنة ورفع كفاءة المعلمين والمعلميات خريجي هذه الكليات.

Appendix: 5.a The Observation Checklist

Constructivist Teaching Observation Checklist

1. Student teacher .... Teacher ....
2. The school .... The College ....
3. The Subject: Science (   ) Mathematics (   )
4. The Lesson (the task) .... 5. Class (   )

Statement	strongly agree (3)	Agree (2)	Slightly agree (1)	Not observed (0)
1. Use pupils' existing knowledge to guide teaching				
a. teacher's awareness of pupils' existing ideas				
b. elicit pupils' ideas before presenting teachers' own idea or before studying ideas from textbook or other sources				
c. challenge pupils' initial ideas				
d. make new ideas accessible to pupils				
2. Guide pupils to generate explanations and alternative interpretations				
a. pupils observe phenomenon				
b. pupils describe phenomenon				
c. pupils generate explanations and interpretations				
d. probe pupils' responses for clarification and justification				
e. pupils explain contradictions and misconceptions				
3. Devise incisive questions				
a. a question-rich learning environment				
b. questions based on pupils' responses				
c. pupils expand on their questions and justify their responses				
d. accept and value pupils' answers and suggestions				

a. pupils work with materials and activities				
b. pupils engage in scientific inquiry				
c. pupils work independently with minimal help from the teacher				
d. pupils put their ideas to test (disprove or prove what they think)				
e. pupils' suggestion about the direction of the activity/experiment				
5. Provide a classroom atmosphere conducive to discussion				
a. pupils put forward and discuss ideas with the teacher				
b. pupils put forward and discuss ideas with peers				
6. Provide opportunities for pupils to utilise new ideas				
a. relate current teaching points to previous knowledge				
b. pupils apply knowledge to new situations or real-life problems				

Comments:

....

....

....

....

....

....

Note: This form is only for the research study purpose, the information will be used for the research study.

Could you Please sign in the folowing box if you are agree with the content of this form:

Appendix: 5.b The Observation Checklist (Arabic version)

بطاقة ملاحظة

مدى ممارسة المدخل البنائي في تدريس المواد العلمية بصفوف الحلقة الأولى من التعليم الأساسي

- طالبة/معلمة (   )   - معلمة (   )
- إسم المدرسة .... الكلية ....
- المادة: علوم (   ) رياضيات (   )
- الصف .... موضوع الدرس ....

	البنود	تلاحظ بدرجة كبيرة (3)	تلاحظ (2)	تلاحظ بدرجة قليلة (1)	لا تلاحظ على الإطلاق (0)
	توظيف المعلومات السابقة للتلاميذ في توجيه التدريس				
أ	تهتم المعلمة بالخلفية المعرفية للتلاميذ				
ب	تهتم المعلمة باستخراج المعلومات المتوفرة من التلاميذ أنفسهم قبل تقديمها للمعلومات الجديدة لهم بنفسها أو من المكتاب أو المصادر الأخرى				
ج	تتسخدم المعلمة أسلوب التحدي لإستخراج الأفكار الأولية لدى التلاميذ				
د	تجعل المعلمة الأفكار الجديدة متاحة للتلاميذ				
	توجيه التلاميذ لتوليد التوضيحات وتقديم البدائل التفسيرية				
أ	يلاحظ التلاميذ الظواهر				
ب	يصف التلاميذ الظواهر				
ج	يولد التلاميذ التوضيحات والتفسيرات				
د	فحص ردود فعل التلاميذ واستجاباتهم للتفسيرات والمبررات				
هـ	يوضح التلاميذ المتناقضات والتكوينات الخاطئة للمفاهيم				
	إبتكار أسئلة واضحة ومحددة				
أ	بيئة التعلم غنية بالأسئلة				
ب	تعتمد الأسئلة على ردود فعل التلاميذ واستجاباتهم				
ج	يتوسع التلاميذ في استفساراتهم ويبررون ردود أفعالهم واستجاباتهم				
د	تقبل المعلمة وتقدر إجابات التلاميذ واقتراحاتهم				
	تقديم المواد والأنشطة بهدف اختبارأفكار التلاميذ				
أ	يمارس التلاميذ المواد والأنشطة				
ب	ينهمك التلاميذ في أنشطة التحقق والبحث العلمي				
ج	يعمل التلاميذ باستقلالية وبأقل قدر من مساعدة المعلمة				
د	يضع التلاميذ أفكارهم تحت الإختبار (لإثبات صحتها أو خطئها)				
هـ	يقترح التلاميذ خطة سير الأنشطة أو التجارب العملية				
	تجهيز المناخ الصفي المساعد على المناقشة				
أ	يقدم التلاميذ أفكارهم ويناقشونها مع المعلمة				
ب	يقدم التلاميذ أفكارهم ويناقشونها مع بعضهم البعض				
	توفير الفرص للتلاميذ لتقديم وتوظيف أفكار جديدة				
أ	ربط نقاط التدريس الحالية بالمعرفة السابقة				
ب	يربط التلاميذ معرفتهم ويوظفونها في مواقف جديدة أو تطبيقات حياتية أو في حل مشكلات حياتية يومية				

ملاحظة: المعلومات الواردة في هذه الإستمارة سوف تستخدم لأغراض البحث فقط ولا علاقة لها بتقويم الأداء الوظيفي.

- **أرجو التوقيع في المربع أدناه في حالة الإطلاع على ما ورد من معلومات في هذه الإستمارة بعد موافقتك عليها:**

Appendix. 6: The Formal letters

a. Letter form the supervisor

TEACHING AND LEARNING SERVICE
Dr Bob Matthew
Director

UNIVERSITY
of
GLASGOW

To Whom It May Concern

Re: Mr Ahmed Alkindi

Mr Ahmed Alkindi is a graduate student in the Teaching and Learning Service, Faculty of Education, University of Glasgow (his matriculation No. is 0218753) under my supervision.

He is currently conducting a research project as part of his PhD studies in this University. The main focus of his research is the evaluation of teacher education programs in the Sultanate of Oman.

I would be extremely grateful if you would provide him with the help and support to conduct his research.

Many thanks

Yours faithfully

Dr Robert GS Matthew
Director, TLS

TEACHING AND LEARNING SERVICE
Florentine House, 53 Hillhead St, University of Glasgow, GLASGOW G12 8QQ
Director: Dr R Matthew *Ext.* 3197
Reception : 0141-339 8855 *Ext.* 4864 *Direct Line:* 0141-330 4864
Fax: 0141-330 4987 *E-mail:* TLS@admin.gla.ac.uk
http://www.gla.ac.uk/services/tls/

b. Letter from the Director of Postgraduate Studies – Ministry of Higher Education

بسم الله الرحمن الرحيم

سلطنة عمان
وزارة التعليم العالي

الرقم: د.د.ع/٣٧٠
التاريخ: ... هـ الموافق ٢٩/٣/٢٠٠٤م

شهاده لمن يهمه الأمر

تشهد دائرة الدراسات العليا بوزارة التعليم العالي بأن الفاضل/ **أحمد بن إبراهيم بن أحمد الكندي** ملتحق بجامعة جلاسجو لمواصلة دراسته العليا للحصول على درجة الدكتوراه في مجال تقييم المناهج ويقوم حالياً بإعداد بحثه بعنوان (تقييم برامج إعداد المعلمين في سلطنة عمان).

نرجو التكرم بمساعدة المذكور في الحصول على المعلومات والبيانات المطلوبة لبحثه قدر الإمكان.

وتفضلوا بقبول فائق الاحترام ،،،

سعيد بن سالم الوهيبي

مدير الدراسات العليا

c. Letter from the Director of Educational Supervision – General Directorate of Education in Muscat Region

بسم الله الرحمن الرحيم

سلطنة عمان
وزارة التربية والتعليم
المديرية العامة للتربية والتعليم بمحافظة مسقط
دائرة الإشراف التربوي

الرقم: م ع ت م/ ١٠/ ٧/ ٤٠١
التاريخ: ١٥/ ٢/ ١٤٢٥هـ
الموافق: ٥/ ٤/ ٢٠٠٤م

الفاضل / مدير مدرسة المحترم

السلام عليكم ورحمة الله وبركاته . . . وبعد،،،

إشارة إلى رسالة الفاضلة / د . مدير المكتب الفني للدراسات والتطوير رقم ص.م.ن ٤٠٥ بتاريخ ٢٠٠٤/٣/٣١ بقيام الفاضل/ أحمد بن إبراهيم الكندي طالب دراسات عليا (دكتوراه) – يقوم حاليا بدراسة حول (تقييم برامج إعداد المعلمين العمانيين في سلطنة عمان) ويود تطبيق الأداة المرفقة ومقابلة عينة من المعلمين العاملين بمدرستكم .

عليه يرجى التكرم بتسهيل مهمة المذكور

شاكرين لكم حسن تعاونكم

وتفضلوا بقبول فائق الاحترام،،،

د/ عائشة بنت عبدالخالق محمد
مدير دائرة الإشراف التربوي

سلطنة عمان
المديرية العامة للتربية والتعليم
بمسقط
وزارة التربية والتعليم

d. Letter from the General Director of A'Dakhelyah Educational Region to the Headteachers

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431102

بسم الله الرحمن الرحيم

سلطنة عمان
وزارة التربية والتعليم
المديرية العامة للتربية والتعليم
للمنطقة الداخلية
مكتب المدير العام

الرقم : م ع ت و / ١١١/٢٦٨٣
التاريخ : ١٦/٢/١٤٢٥ هـ
الموافق : ٦/٤/٢٠٠٤م

الأفاضل / مديرو مدارس المنطقة ومديراتها المحترمون

السلام عليكم ورحمة الله وبركاته ... وبعد ،،،

الموضوع: تسهيل مهمة الباحث / أحمد بن إبراهيم الكندي

إشارة إلى خطاب مدير المكتب الفني للدراسات والتطوير رقم ٤٠٥ المؤرخ في ٢٠٠٤/٣/٣١م، نفيدكم بأن المذكور يقوم حاليا بإعداد دراسة حول (تقييم برامج إعداد المعلمين في سلطنة عمان) ويود تطبيق أداة الدراسة بمدرستكم ومقابلة عدد من المعلمين المعنيين بالدراسة .

عليه نرجو تكرمكم بالتعاون معه وتسهيل مهمته .

وتفضلوا بقبول خالص التحية والاحترام ،،

لعناية الفاضل / أحمد بن ابراهيم الكندي

خلفان بن محمد بن راشد الغيثي
المدير العام

٤/٥ ٢٠٠٤

نسخة إلى :-
- المدير العام
- المكتب الفني
- الملف

ص.ب : ٢٦ ، الرمز البريدي : ٦١١ نزوى ، هاتف : ٤٣١٣٣١ / ٤٣١٠٣٥ ، فاكس : ٤٣١٠٣٤
P.O. Box : 26, Postal Code : 611 Nizwa, Tel. : 431331 / 431035, Fax : 431034

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e. Letter from the Head of Curriculum & Practicum Section in Ibri college of Education to the Supervisors of the Practicum Programme

بسم الله ارحمن الرحيم

الأفاضل مشرفي التربية العملية للسنة الرابعة معلم مجال
علمي وأدبي المحترمين
السلام عليكم ورحمة الله وبركاته

الموضوع تطبيق استبيان الكفايات المعد من قبل كلية التربية
بنزوى كأداة من أدوات البحث العلمي

يرجى التكرم بتوزيع هذه اللاستمارات على الطالبات اللواتي
تشرفون عليهن في أثناء التربية العملية وإعادتها إلى مكتب
التربية العملية للأستاذة **نورة الحوسني** في موعد أقصاه
السبت ١٠ / ٤ / ٢٠٠٤
ولكم جزيل الشكر على حسن تعاونكم

رئيس وحدة المناهج وطرق التدريس
د. أحمد عصام الدبسي

Appendix. 7: The syllabus of Science Teaching Method Course – the Lecturer Guide

Department: Educational Studies
The Unit: Curriculum & Teaching Methods
The Course: Science Teaching Methods
The Code and Number of the Course: CTM 0006
Credits: 3
Teaching hours: (4) 2 theoretical + 2 Practical
Type of the Course: Compulsory (√) Elective (   )
Pre-courses: General Teaching Methods
Number of the teaching hours per semester: 60
Semester Four: Second Year
Number of teaching weeks: 15 weeks

First: Definition of the course

This course includes the nature of science, characteristics, its teaching aims, its content in the First Cycle of Basic Education, and the integrative relationship between the aims of science in the Basic Education and specifically in the Cycle One. This course focuses on the practical aspects of training student teachers the needed competencies for science teacher.

Second: Aims of the Course

A. The General Aims

1. Introduce the nature of sciences, the structure of science knowledge, and the modern trends on development of science curriculum
2. Know the modern science teaching methods
3. Introduce the concepts and practical skills in the First Cycle of The Basic Education and their teaching methods.
4. Introduce the planning and implementation competencies and their implementations in a variety of learning teaching situations.
5. Introduce the analysis content competency.

B. Specific Aims:

By the end of studying this course the student teacher is expected to be able to:

1. Know the nature of sciences, as a science and subject of study.
2. Know the structure of the scientific knowledge and the modern trends in development of sciences.
3. Analyses the content of the First Cycle of Basic Education science curriculum.
4. Determine the Basic Education science teaching aims in general and in specific for the First cycle.
5. Demonstrate the importance of science teaching aims determination for the Curriculum Designer, the teacher and the pupil.
6. Form behavioural objectives for the science curriculum of the First Cycle.
7. Deduce the integrative relation between the science teaching aims and the aims of the First Cycle of Basic Education.
8. Employ some teaching approaches to design teaching plans for teaching and learning situations in order to teacher the scientific concepts.
9. Employ some teaching approaches and methods in order to teach scientific skills and their development styles.
10. Determine teaching implementation competencies.
11. Employ competencies of the teaching implementation in teaching learning situations.

Third: The Course Content

(1) The Theoretical Content

The First Unit: Nature and Characteristics of Sciences (6 hours)

- Science essential and nature
- Sciences as a science
- Sciences as a study subject
- Structure of sciences construction
- Modern trends in science curriculum development
- First Cycle Science curriculum content

The Second Unit: the Science teaching aims in the First Cycle of Basic Education (6 hours)

- Importance of science teaching aims determination for the Curriculum Designer, the teacher and the pupil
- The general aims of science teaching within their deferent aspects in First Cycle.
- The aims of teaching science in First Cycle of Basic Education
- The integrative relation between the aims of teaching the science curriculum and the aims of the First Cycle of the Basic Education

The Third Unit: Teaching of the scientific concepts and skills (6 hours)

- The scientific concepts: their types and importance.
- Teaching of the scientific concepts
- Scientific skills and their classifications
- Teaching of the scientific skills in the first cycle
- Strategies of development of the scientific skills in the First Cycle

(2) The Practical Content

1. Analyses of the First Cycle science curriculum content (8 hours)
2. Form of behavioural objectives for teaching First Cycle science curriculum (4 hours)
3. Integration between the objectives of the First Cycle science curriculum and the general aims of First Cycle (4 hours)
4. Employ the approaches and teaching methods to design teaching plans for teaching learning situations in: teaching of scientific concepts and teaching scientific skills (14 hours)
5. Employ the following Teaching Competencies: (12 hours)
    - learning principles
    - stimulation of motivation
    - classroom interaction skills
    - contribution in activities and tasks
    - reinforcements
    - questioning

Fourth: The Course Teaching Methods and Instructional Media

1. Teaching Methods

- Lectures
- Discussions
- Illustrations
- Practical Tasks
- Learning Resource Centre visits
- Field visits

2. Instructional Media

- Transparencies

- Overhead projector
- Learning Resource Centre

Fifth: Assessment and Evaluation of the Course

1. Examinations: Quizzes (10%), Final term (40%) and Practical (50%)

Sixth: Supportive teaching Materials

1. Student Textbooks:

- Omairah, I., & AlDeek, F., Teaching Science and Science Education, AlMa'arif Publishers, Cairo, 1997.
- Tammam. I. et al. the Future Attitudes in Science teaching and Educational Technology, Ofest Publishers, Asyot, Egypt, 1997.
- Zaytoon, A., Science Teaching Methods., Alshoroq Publishers, Amman, Jordan, 1996

2. References:

- Gleen. A., Teaching Scientific Concepts, AlNahdha Publishers, Cairo.
- Bahjat, R., Teaching Contemporary Sciences: Concepts and Implications
- Demardash, S., Essentials of Science Teaching, Alfalah Publishers, Kuwait, 1994.
- Zaytoon. A., Creativity and Creative Thinking Development in science teaching, Jordan, 1989
- AlLaqani, A & Hasan, F., Effective Teaching, Books world Publishers, Cairo, 1985.
- Hassan, A., Science Education in Gulf Countries, Library of Arabic Educational Bureau for Gulf Countries, Reyadh, 1995
- Muhammed, A, Educational Planning, University Institution for Study Publishers, Beirut, 1992.
- Jaber, A., Teaching Skills, Alnahdha Alarabiah Publishers, Cairo, 1994.
- Roberts, Planning for Teaching, Aldar Aldawlyyah, Cairo, 1993
- Toaymah, R., Content Analyses in Islamic Sciences: the Concept and Applications, Dar AlFikr AlArabi, Cairo, 1995.
- AlMufti, M., Teaching Behaviour, Arabic Gulf Publishers, Cairo, 1996

Appendix. 8: Photos of pupils during their science and math lessons

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