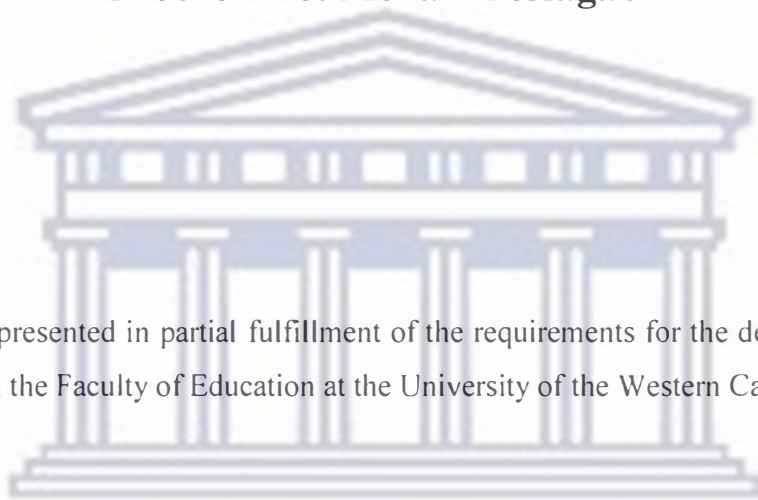


**ASSESSING THE PRE-SERVICE SECONDARY SCHOOL  
SCIENCE TEACHER EDUCATION  
PROGRAMME AT THE UNIVERSITY OF ASMARA,  
ERITREA**

**Ghebrehiwet Mehari Tesfagabir**



A Mini Thesis presented in partial fulfillment of the requirements for the degree of Masters in Education, in the Faculty of Education at the University of the Western Cape.

Supervisor: Professor Meshach Bolaji Ogunniyi

**UNIVERSITY of the  
WESTERN CAPE**

Faculty of Education  
University of the Western Cape

September 2003



## KEY WORDS

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Pre service training

Science teacher

Teaching methodology

Science Education Unit

Programme evaluation

Effort

Effectiveness

Impact

Relevance

Eritrea



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**!!MinoIta You Take my Credits, You take**

**my Reading Material**

**You Take my Reading Material, You Take my Degree!!**

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On the 24th of April 2012, at 13h00, more than 500 students gathered in GH1 to discuss key issues of concern. The Meeting has resolved on the following issues and furthermore resolved that we must have a Mass Protest on the 25<sup>th</sup> of April 2012 led by the SRC.

- ✚ That the booking system of a computer at the library must be scrapped out.
- ✚ The blocking of sites such as you-tube and facebook at the Library during 9h00 and 17h00.
- ✚ That we as students want the current service provider to remain as the service provider at the Library.
- ✚ If there is a need we need to run an independent survey with regards to general issues at the library.
- ✚ That there should not be any loss to students, with regards to credits to print and photocopy, on their student cards.
- ✚ That there should not be any employment loss to students.
- ✚ If there is a need the entire tender process for printing and photocopying across campus, including all departments must be opened up and it must be a fair and free process.

**We are inviting all students to support this Mass Protest!!**

**Date: 25 April 2012**

**Departure: CHC Offices**

**Time: 12h30 (sharp)**

This Mass Protest is supported by BMF, Gayla's, SASCO, Methssoq, YCL, ANCYL, PASMA, I Care Society, BLA, Acts and many more affiliated structures of the SRC.

**!!!MinoIta You take my Credits, Umuncu!!!!**



## ABSTRACT

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The central concern of this study is to evaluate the Science Education Unit (SEU) of the faculty of Education at Asmara University. The main aim of the SEU is not only to produce enough teachers for the nation, but also to produce science teachers who are competent in classroom instruction. This study compares the intended objectives with the attained objectives of the SEU with the stakeholders' *perceptions* of the programme. The reason for assessing the SEU programme was to determine quality of the programme in terms of its effort, effectiveness, impact and relevance in training science teachers.

The pre-service teachers' training is expected to equip the secondary school science teachers with adequate content-knowledge and pedagogical skills for their future career, i.e. problem solving, decision-making and value judgment. The government has described the educational system of the country for the last ten years as a waste of meager resources because it does not produce employable youngsters. This study was therefore undertaken to provide empirical basis for decision-making regarding the authenticity of such claims.

The study is situated within the systemic organizational evaluation models proposed by Ogunniyi (1978), Scriven (1995) and Veney and Kaluzney (1991) in which the intended objectives of the programme are compared to the outcomes. The stakeholders who participated in this study include "insiders" and "outsiders". This includes: academic staff, university lecturers, student teachers, as "insiders" and practicing science teachers, supervisors in the Ministry of Education and secondary school directors as "outsiders". This study used questionnaires, interviews and document analysis to collect relevant data with respect to the SEU teacher education programme. The interviews were audio recorded and then transcribed verbatim. The transcribed data and the data from the questionnaire were analyzed in terms of specific outcomes or indicators namely, effort, effectiveness, impact and relevance (Veney and Kaluzny, 1991). As an evaluation study, triangulation method was exploited to provide a holistic and reasonable view of the participants in the study. The collected data set was then analyzed using qualitative and quantitative procedures.



The findings of this study revealed that the stakeholders perceived the SEU to be successful in training of prospective science teachers. The stakeholders viewed the teachers produced in the SEU programme as being rich and confident in content. Similarly, they believed that the programme has appropriate leadership and organizational structures, has competent and hard working staff, and offers relevant courses. However, they also pointed out some aspects of concern such as: recruiting incompetent student teachers, inadequate staff and resources during teacher preparation, inadequate exposure of variety of teaching methods, lack of active learner-centered lessons, the practising teachers inadequacy of pedagogical knowledge (classroom management and preparation of lesson plan), problems associated with integrating theory with practice, the prospective teachers' lack of interest in the profession, inadequate feedback and large class size during pre-service training.

The stakeholders of this study suggested that maintaining the positive side of the training programme and remedying the inadequacies within the programme should involve such things as: (a) modifying the recruitment criteria to attract only the competent student teachers; (b) incorporating specific subject methodology in the training to upgrade the teacher's teaching approaches and (c) introducing follow-up and support system in collaboration with the school administration to upgrade the science teachers using seminars, workshops and other in-service training that could equip the science teachers adequately both in content and skills of teaching.

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## ACKNOWLEDGEMENTS

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*“Have I not commanded you? Be strong and courageous. Do not be terrified; do not be discouraged, for the Lord your God will be with you wherever you go” (Joshua, 1:9).*

My sincere and grateful thanks to my supervisor, Professor M.B. Ogunniyi for his valuable comments, his support to broaden my understanding about programme evaluation, dedicated guidance, encouragement and counseling in seeing to the successful completion of this study.

This study would not have been possible without the sacrifice and support of my family. I express my special appreciation to my beloved wife, Abrehet Misgina for taking all the responsibility of the family and prayer support for my success. Thanks to the letters of encouragement from my children Veronica, Filmon, Michielina and Samuel. Special thanks go to my family-in-law particularly my brother-in-law Solomon Misgina who supported my family in my absence.

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I also thank to all Science Education Unit staff at Asmara University, staff of Department of General Education, the Science Panel, Ministry of Education supervisors, secondary school directors, university students and all others who either participated in this study or who provided me with spiritual and material support.

Thanks to all UWC Faculty of Education staff, Mrs. Utji Marenga and all other colleagues who encouraged me to succeed in my studies. Finally, I would like to thank the Almighty Lord Jesus Christ for giving me the health, and potential to complete my studies successfully.

## DECLARATION

---

I declare that **Assessing The Pre-service Secondary School Science Teachers' Education programme at the University of Asmara, Eritrea** is my work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Full name: Ghebrehiwet Mehari Tesfagabir

Date: September 2003

Signed: .....



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## DEDICATION

---

I present this work in memory of my mother [Aunt] Melkam Tesfagabir who wished to see this event, however, did not have the chance.



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## ABBREVIATIONS

---

AAAS- American Association for Academy of Science

APC- Assignment and Placement committee

ESLCE- Eritrean School Leaving Certificate Examination

GPA- General Point Average

HRD- Human Resource Development

ICSU-CTS- International Council of Science Union-Council on the Teaching of Science

MoE- Ministry of Education

NEPI- National Education Policy Investigation

PCK- Pedagogical Content Knowledge

SCK- Subject Content Knowledge

SEU- Science Education Unit

ST- Student Teachers

PST- Practicing Science Teachers

UNESCO- United Nations Education, Scientific and Cultural Organisation



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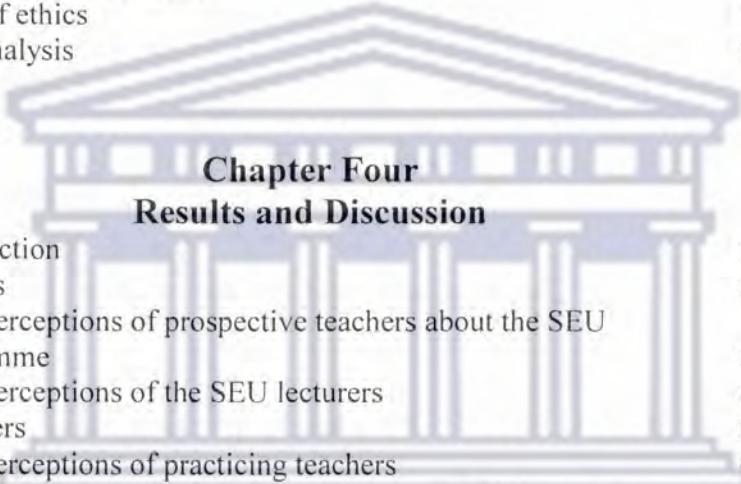
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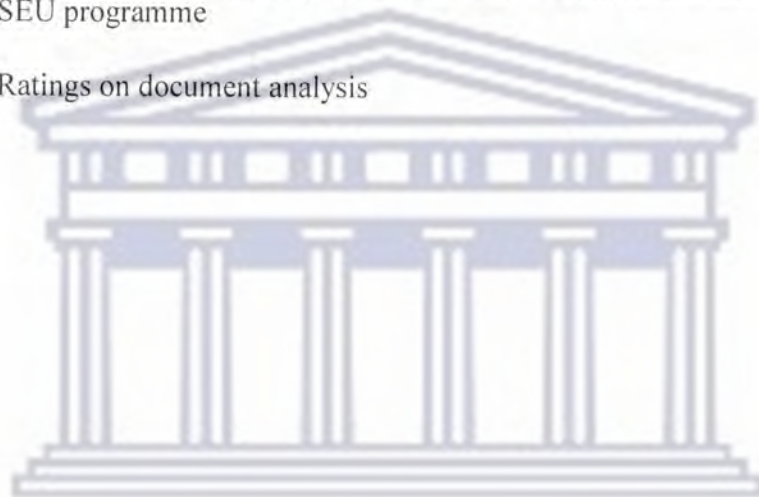
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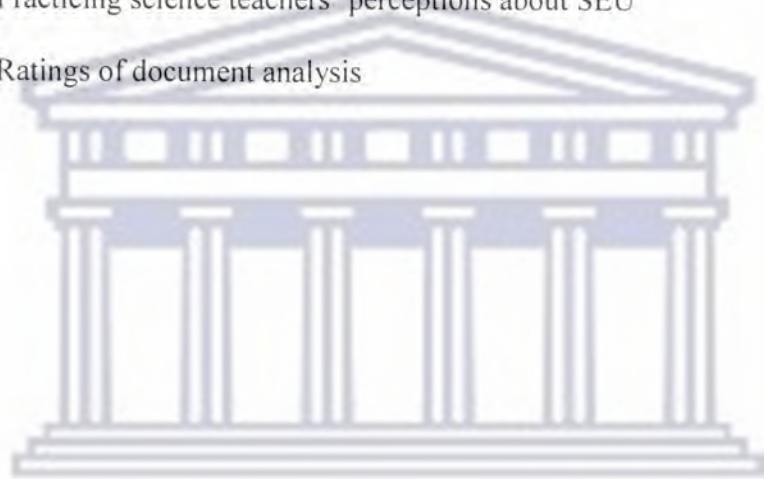


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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background

There is a general consensus today that evaluation plays an important role in the planning and implementation of an educational programme. Chinapah and Miron (1990) argue that educational evaluation is a multi-purpose and multi-dimensional activity, which entails an appraisal of the aims and objectives of an educational programme as well as the actual transactions and outcomes of that programme. To some degree, the aims and objectives of an educational programme reflects the historical, political and economic forces of a given society and the route that society has chosen for the future. Hence, the evaluation of an educational programme or project should begin with a thorough analysis of aims and objectives of that programme or project. Furthermore, the evaluator should look at the implied objectives, which may or may not be explicitly stated in the documents and policy statements that spell out the purpose of such a programme. The central concern of the present study was to examine the stakeholders' perceptions about the quality of the pre-service science education programme of the University of Asmara in Eritrea. However, before doing this, it is appropriate to provide a historical background of Western Education in Eritrea.

According to Rena (2003), Western Education was first introduced during the Italian colonial rule (1890-1941). At that time the Italians established 25 schools and Eritrean children were allowed to learn up to grade four. This implies that only a few Eritrean children were exposed to Western Education. Harber (1997) contends that, the opening of state primary schools in order to produce sufficiently educated workers for the postal and telegraphic services changed the policy of no schooling for the majority of Eritreans. The new educational policy document on colonial education made it clear that native education was to be limited to the equivalent of the first three years of elementary education in Italy. The purpose of education was to serve the needs of the colonial state rather than equip the



natives with critical ideas that might become a risk to Italian control of the colony. In keeping with Fascist ideology, which had led to the imposition of strict racial segregation in the colony, racist arguments were used to justify why education was limited for native Eritreans. Harber pointed out further that Africans, including Eritreans, were seen to be pathologically inferior to Europeans and therefore, unable to rule Africa to colonizers' satisfaction.

During the British administration (1941-1952), the educational system was expanded considerably. Sixty new schools and a teacher-training institute were established to increase the educational opportunities for a greater percentage of Eritrean children. After the ten years of British administration 1952-1962 Eritrea was federated with Ethiopia. This federation was against the will of the majority of Eritrean people. The federal Eritrean governments' educational policy laid the foundation using languages Tigrigna and Arabic as the medium of instruction. Though education was limited to the completion of the middle school, grade eight, this time was the first Eritrean educational policy to be implemented in Eritrea. The establishment of new schools and progress of education were maintained both in expansion of schools and access to Eritrean nationals (Rena, 2003). Furthermore, in 1962 the Imperial Ethiopian government under the leadership of king Haileslasie annexed the Federal Government of Eritrea. It dispersed the parliament and made Eritrea as a 14<sup>th</sup> province of Ethiopia, which led to the thirty years of war for independence of the country.

During the Ethiopian rule (1962-1991), Eritrean education was amalgamated to the Ethiopian educational system. The Ethiopian government substituted Amharic language for Tigrigna and Arabic languages to be the medium of instruction in elementary schools. They replaced the Tigrigna and Arabic textbooks with Amharic textbooks. When students failed in Amharic language, they lost the opportunity to further education in the higher institutions even if they had good results in other subjects, Harber (1997). However, since independence, in 1991, education has become the major concern of the newly independent state of Eritrea. It has discarded the Ethiopian curriculum and followed a curriculum of its own based on the experience gained in the armed struggle. In the new curriculum, the medium of instruction in the primary schools was returned to the mother tongue of the child

while English has become the medium in the junior, secondary, and tertiary levels. As Rollnick (1998) pointed out, language being a means of communication and understanding between different social groups plays an important role in the learning of science in important ways related to both cognition and attitude towards the subject. Hence, as a remedial to what has been done by colonialists and as one of the major factors affecting learning, the education policy of Eritrea declares that:

... as part of this endeavor, language of instruction in the elementary will be given to all nationalities in their own languages and the efforts that have been going on in adapting the Latin script to prepare the local languages' elementary curriculum will continue and be strengthened.

(Provisional government of Eritrea, 1991:4)

Based on the World Bank Review (1995), one of the greatest obstacles to the expansion of education in Eritrea, like most other developing countries today, is the shortage of teachers. A further problem is the decline in standards of teaching, i.e. improvement of quantity at the expense of quality. Teacher training in Eritrea, under the auspices of the Teacher Training Institute (TTI) at Asmara, started in 1943 during the British administration. According to Mengistu (1997), the institute offered pre-service training every two weeks till the year 1945. The institute was gradually upgraded from two weeks to six months, then eight months and lastly a year. Apart from the negative impact of the long war on teacher education, about 52% of all the then teachers in Eritrea were Ethiopians. However, all the Ethiopian teachers returned to their country after Eritrea gained independence in 1991. In order to cover this acute shortage of teachers, a crash programme was designed to recruit high school graduates by giving them a three-week orientation before sending them to the elementary schools to teach. This solved the immediate shortage of teachers but it brought in a large number of unqualified teachers into the education system despite the spirited effort made to expose them to one form of in-service training or the other.



Currently, Eritrea has three teacher training colleges: one teacher training institute (TTI) in Asmara, a teacher training college in Mainefhi and the Faculty of Education, University of Asmara.

## **1.2 Historical background of Science Education Unit**

The history of University of Asmara can be traced back to 1958 when Italian missionaries founded the “Holly Family University Institute”. In 1964, the name changed to University of Asmara and the medium of instruction also changed from Italian to English. In 1968, the University was granted a charter from the Ethiopian government. The first degrees were awarded in 1972.

Since independence, the University has grown rapidly by adding five colleges, two faculties and a programme, out of which, one was the Faculty of Education. In 1996, the education unit was elevated to the status of a programme, and in 1997, it became the Faculty of Education. In 1998, the Faculty of Education had three departments, namely Secondary School teachers, Educational Administration and Educational Psychology. These three units offer degrees in educational administration, educational psychology and secondary school teachers plus a diploma for middle school teachers. According to the Faculty of Education (1998), the Secondary School Teachers department offers the following disciplines for both diploma and degree students: English, mathematics, biology, chemistry, physics, history and geography. Furthermore, in late 2001, the Faculty of Education made some rearrangements, dividing the Secondary School Teachers Department into three units: (1) the Science Education Unit; (2) the Social Science Education Unit and (3) the Middle School Education Unit. The first two units offer degree programmes in their respective disciplines, and the third one offers diploma in the sciences and arts. This study focuses only on the first, namely, the SEU.

The SEU at University of Asmara has made a considerable contribution to the training of teachers for the secondary schools mainly in Mathematics, English and Science. In 1996, the

education unit of the University was upgraded to a programme and in 1997 to the Faculty of Education. The Faculty of Education at University of Asmara is the only institution that trains science teachers for junior and secondary schools in the country. Its major aim is:

To fully establish the Secondary School teachers department with sufficient and qualified staff so as to educate adequate number and competent science teachers for Eritrean middle and secondary schools. (Faculty of Education, 1998: 9)

### **1.3 Rationale of the study**

Fullan and Hargraves (1997) argue that although no society is static, the fundamental purpose of education is to prepare young people for life in a given society. They argue further that the tasks of teachers today are more complex and demanding than in the past. Teachers have to respond to the wishes of parents regarding educational outcomes. They must be alert to the social needs of the learners as well as find ways and means to equip them with the necessary knowledge and skills that would enable them to actively participate in a democratic society. The implication of this on teacher education is obvious. The teachers in Eritrean must first be equipped with adequate disciplinary and pedagogical knowledge before they can carry out their onerous task. However, it is a well-known fact that teachers do not easily change their practices despite concerted efforts that may have been made to upgrade their knowledge and skills. They tend to use old traditional methods that are not effective in the teaching- learning process (Rudduck, 1991).

After independence, certain significant changes occurred in the education system in Eritrea as the result of the new policy “Education for the Benefit of the Masses” which gave priority to remote rural areas. Unlike the colonial governments, the new government saw education as an instrument for economic, industrial and technological development (see Ogunniyi, 1986). The new policy called for an all round education which emphasized an education system which focuses not only on cognitive development but also one which



equips people with the capacity to overcome diverse life situations. Such an education system was expected to offer training in Mathematics and Science that would facilitate “ self reliance” and other essentials in life (Rena, 2003).

Although, the teacher-training programme at the University of Asmara was established in 1997, it is yet to be formally evaluated. In view of this, the need to evaluate the science teacher-training programme in terms of its effort, effectiveness, impact and relevance (See Sims, 1993; Veney and Kaluzny, 1991) has now become necessary. The thrust of an evaluation is to determine the stakeholders’ perceptions of the programme. The assumption is that the evaluation of the SEU at the Faculty of Education, University of Asmara, would give a better opportunity to address the changes necessary to make the programme fulfil the purpose for which it was set up.

Other reasons for undertaking this study were to find out: (1) the overall quality of the science education programme at the SEU, University of Asmara; (2) the quality of the teachers produced in the programme in terms of their students' achievement in science in the matriculation examination; (3) quality of the teachers trained at the SEU in terms of their instructional practices in the science classrooms; and (4) the main challenges facing the SEU at University of Asmara in its attempt to produce adequate number and at the same time a high calibre of secondary school science teachers.

#### **1.4 Problem Statement**

As indicated earlier, Eritrea emerged as an independent nation in May 1991 as a result of which virtually all the Ethiopian teachers constituting 52% of the country’s teaching population migrated back to their country leaving only about 48% Eritreans and other nationals. As in other African countries, the resources at independence were grossly inadequate to meet the demands of quality education. Hence, drastic steps had to be taken to redress the acute shortages of trained teachers particularly in science and mathematics (see Ogunniyi, 1986, 1996; World Bank, 1995). Teachers were needed quickly and in large

number. Mathivha, (1981:3) writing about the shortage of teachers in poor African countries, particularly Malawi, paints the whole dilemma quite succinctly:

There is a general shortage of trained teachers for the existing schools; and an alarming exodus of trained teachers from teaching to other more lucrative jobs; an insufficient number of recruits with the required academic standards coming for training; an insufficient number of teacher training colleges; and a shortage of training college staff. (Mathivha, 1981:3)

In the last 12 years of independence, there has been a phenomenal increase in enrolment, according to the Ministry of Education (2000/2001) essential indicators. The number of schools at all levels (Junior, Middle, Secondary and Technical schools) increased from 293 in 1990 /1991 to 870 in 2000/2001. During the same period student population increased from 208,168 to 439,206, whereas the total number of teachers increased from 5,286 to only 9,233. The above figures can also be compared using percentages. The student population showed 110% increase while the teacher population showed only 74.7% increase. i.e. the student population had a larger increase than that of the teachers. Compared to the increment in student number and the new schools built every year, the attention given to increase the number of teachers or upgrading of those on the job seems rather low.

According to the Department of General Education (1997), despite the achievements mentioned so far, the gap between the demand and supply of teachers is still wide. Even the small number of teachers is not getting adequate professional assistance with teaching and learning strategies, planning, classroom management and assessment techniques that could help them challenge the complexity of the job.

Many possible factors may contribute to the decline of the education system of any country. Such factors may include: insufficient resource materials, school administration, home environment, students' attitudes to learning, and inadequate classroom instruction conducted by teachers, just to mention a few (National Educational Policy Investigation, 1992). However, in many instances, teachers are largely blamed for the downfall of the education



system (Ware, 1992). This is because they are always at the curriculum implementation level within the educational system. This blame is sometimes extended to the teacher education institutions where these teachers are trained. The blame also tends to suggest that little is done at the teacher education institutions that may improve the education system of a particular country.

My experience as a chemistry teacher for many years is that in Eritrea, most secondary school science teachers, even those who graduated from the SEU of University of Asmara, teach science using the traditional talk and chalk method, rather than inquiry teaching or problem solving approaches recommended in the curriculum. As the Department of General Education (1997) has argued, the curriculum is still examination oriented, while the syllabus is content dominated and teacher-centred.

### **1.5 Purpose of the study**

In the light of the situation sketched above and my personal experience as a science teacher working with practising teachers trained in the SEU, Faculty of Education, University of Asmara, I have become convinced that there is a need to make a close and an in-depth study of the teacher education programme at the SEU to find out whether or not the programme is of a desirable quality.

The Ministry of Education (2002), discussing the rapid transformation of educational system, states that:

For some reasons, our school system does not produce employable graduates.

The public and the school system wonder at the calibre of the teachers trained at the teacher training institutions of the country. (p.6)

Serious improvements of education should also include or even start with paying serious attention to teacher education and all aspects of the teaching profession. Therefore, the purpose of the study was to find out the stakeholders' perceptions of the SEU at University of Asmara. Whatever else might think, the views of the stakeholders cannot be ignored. To

their views and perceptions about a programme they all share mutual interests is to reach invalid conclusion about the quality of the programme. In view of the fact that the programme has not been evaluated since its inception, it seems reasonable to find out whether or not whether or not the programme is worthy of its salt, so to speak. The underlying assumption here is that students' under achievement in science may not be unrelated to the calibre of the science teachers teaching these students. According to Ogunniyi (1998) no educational system can outperform the quality of its teachers.

In view of the perceptions alluded to above, it seems necessary to find out whether or not the SEU is equipping its graduates with the necessary subject knowledge or content, and appropriate teaching methodology for the subject they are going to teach in the secondary schools of science and mathematics classrooms.

The main aim of the study was to determine the nature of secondary school teacher education programme concerned with the training of science teachers at University of Asmara. More specifically, the study examined:

- The historical background and general objectives of the SEU.
- The recruitment strategies and experiences of the SEU.
- The existing methods of science courses and the content taught to the students within the programme.
- The general and specific challenges or constraints faced by the programme.

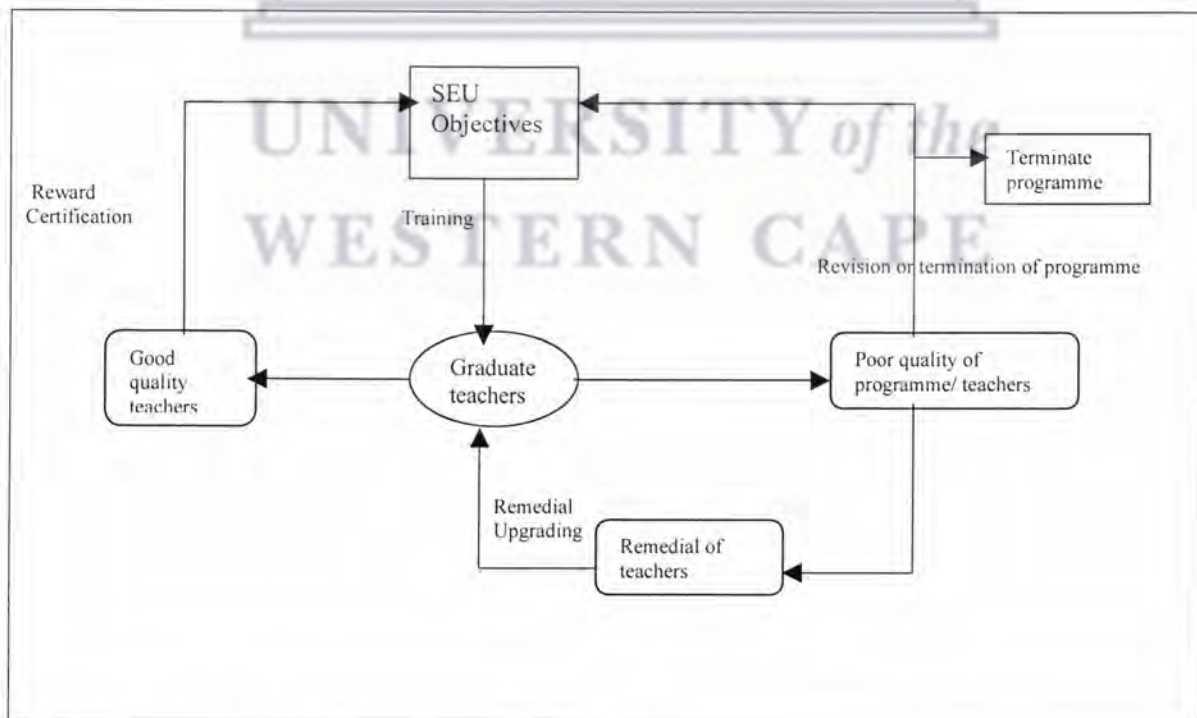
## **1.6 Conceptual Framework**

Most evaluation researchers hold the underlying assumption that programme evaluation can be useful for improving programme operations as well as ensuring quality (Guyton and McIntyre, 1990; Hopkins and Stern, 1996; Ogunniyi, 1984). Hence, a properly conducted programme evaluation provides some insights into: (1) how a programme is operating, (2) the extent to which it is attaining its programme objectives and (3) decisions about whether or not to continue or terminate the programme



As indicated earlier, the theoretical framework upon which the study is based has been derived from different sources (e.g. Ogunniyi, 1984; Veney and Kaluzny, 1991; Sims, 1993). Based on this conceptual framework, evaluation is defined as “an attempt to obtain, analyse and interpret information on a programme of study to determine the effort, efficiency, effectiveness, impact and relevance” (Seotsanyana, 2002:54).

According to Borg and Gall (1989), selecting an appropriate model and clarifying the reasons for an evaluation are useful in selecting an appropriate evaluation model. The principle of using an appropriate theoretical evaluation model necessitates specific steps or decisions leading to better programme decisions (Pettus and Smith, 1991:5). The evaluator believes that the theoretical framework represents approaches that will enable him to do significant research and insight assessment of the teacher-training programme. Hence, the theoretical model on which the study is based, through derived from various sources, aims at providing insight into the dynamic nature of the evaluation process. For instance, the model represented in Fig. 1 is derived from the systemic evaluation models of Ogunniyi (1978) and Scriven (1995)



**Fig. 1: An evaluation model for teacher education programme (SEU).**

Fig.1 illustrates the dynamic process introduced after the initial implementation of the training programme. The model suggests that the activities employed in the study to find out whether or not the predetermined objectives of the programme have been attained. Also in consonance with the evaluation model proposed by Veney and Kaluzny (1991) the model explores the various interacting elements (effort, effectiveness, impact and relevance) that are used to collect the data in order to determine the success or failure of the SEU programme. The data collected, in terms of output, are analysed and further used to interpret the situation at hand as well as to reinforce the programme design. Such analysis and interpretation of the collected data, depending on its quality, can lead to certifying, restructuring or terminating the programme. If the programme attains its stated objectives, it is certified. On the other hand, if at the end of an evaluation, shortcomings are identified, either from the learners or the programme itself, the programme is said to be unworthy. In this sense, certain remedial activities such as (workshops, seminars, or programme revision) could be employed. The assumption is that, if weaknesses are identified at an early stage, there should be a chance for improvement instead of immediate termination of the programme. Thus, the cycle begins again when the result of further action has been observed and analysed (Ogunniyi, 1978:54). Repetition of the whole circle or the smaller circles is permitted before deciding to terminate the programme. If programme outcomes do not coincide with the objectives even after remedial or restructuring activities have been carried out, in other words if problems still persist after repeated amendments without improvement, then such a programme is normally terminated.

According to Rudduck (1991), programme evaluation is a comparison of intended outcomes or objectives (input) with the actual outcomes (output). The implication of the theoretical model adopted for the study is that programme evaluation is not only dynamic, it is a continuous process. Hence, the outcomes of this study should be construed as just the beginning of a long ongoing process.



## **1.7 Research questions**

In pursuance of the above aims and objectives, answers were sought to the following questions:

- What admission strategies are used to recruit student-teachers into the SEU?
- How are the objectives of the unit related to the current outcomes of the programme?
- What is the nature of the discipline and method courses offered in the programme?
- What specific challenges or constraints does the programme face?

## **1.8 Significance of the study**

Very little research has been done in the area of pre-service science teacher education in Eritrea. Much has to be explored if the current shortage of science teachers is to be solved both in quality and quantity. Hopefully, the findings of this study reported in chapter five will contribute relevant data on the status of pre-service science teacher education in the University of Asmara, in particular and pre-service science teacher education in general. It is also hoped that the findings will contribute to the current debate and discussion about the nature of pre-service science teacher training programmes in Eritrea.

## **1.9 Scope of the study**

Eritrea is divided into six administrative regions, namely: Maekel, Debub, Anseba, Debubawi keyih bahri, Semenawi keyih bahri and Gashbarka. The study has been conducted in Maekel, Debub and Anseba administrative regions. However, it has also included the practising science teachers working in the other administrative regions.

The study attempts to assess the perceptions of the SEU administrative staff, academics and learners within the programme. Similarly, the practising science teachers of this programme, in the secondary schools, the school administration as well MOE supervisors are included. Hence, almost “all” the stakeholders that directly influence the programme are included in order to attain a more holistic view of the programme.

## **1.10 Organization of the study**

### **Chapter One: Background**

This chapter introduces the research and explains its purpose. It incorporates the background of education in Eritrea, rationale, problem statement, purpose of the study, research questions, significance of the study, scope of the study, and finally content outline.

### **Chapter two: Literature review**

This deals with the literature on current issues of importance in science education with respect to science teacher education in Eritrea.

### **Chapter three: Research methodology**

This chapter presents the research methodology underpinning this research, the data collection techniques used, the selection of the study site, selection of participants and the method of analysis adopted for analysing the data.

### **Chapter four: Data analysis, interpretation and discussion**

This chapter deals with the analysis of the empirical data obtained from the ‘insiders’ and “outsiders” of the science teacher education programme in Eritrean context.

### **Chapter five: Conclusion, implication and recommendations**

Based on the research results, conclusions regarding the SEU, at University of Asmara are drawn and the implications, limitations of the study and recommendations of the findings are highlighted.



## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

Programme evaluation is a form of social research with a unique capability to direct solutions to societal problems. A basic premise throughout this chapter is that whatever else evaluation may be, it must concern itself with outcome, i.e., with the impact of a social programme on its clients, in this context the student-teachers. With this premise in mind, an attempt will be to show how evaluation can be made into a method of generating practical and powerful suggestions for planning a successful teacher-training programme.

A review of literature on Programme evaluation of teacher training programme mainly focuses on the issue of quality assurance with respect to the graduates of a given programme. Programme evaluation is employed as a means of addressing socio-economic problems in various countries (Ware, 1992). However, the emphasis on programme evaluation in higher education is primarily to sustain institutional quality of the programme.

According to UNESCO (1998:8), institutions particularly in developing countries have been asked to carry out self-audit and quality control in order to ensure that their graduates are of high quality. However, as Ogunniyi (1996) argued, these institutions are unable to offer quality programmes because of the poor economic conditions of the countries supporting them. Many developing countries carry enormous debts.

In Africa particularly countries like Eritrea, there have been dramatic socio-economic changes that have impacted directly on the programmes of the only university in Asmara. The problems have been further exacerbated by a bloody 30 years war, drought and low level of skilled human power. The facilities for teacher training or the university are under-resourced. Example: war, draught, and poverty.

As the result of the poor economic conditions in many developing countries learning has deteriorated to a point that the products of the institutions are in doubt and hence are not considered to be suitable for the world of work. (Ministry of Education, 2002:6). This setting has motivated various governments to re-evaluate the quality of their higher education to determine how they can assist to produce quality products. Besides, various lending organizations, such as the IMF and the World Bank demand changes and new approaches to quality assurance without paying sufficient attention to the varied needs and complex circumstances in these countries (Ogunniyi, 1996). However, how relevant is that quality when it comes to academic programmes? But before determine the nature of quality assurance practiced in an instruction, it is necessary to determine the status of their current academic programmes.

Clearly no system can outperform its constituent parts. The quality of higher education to a large extent depends on the quality of the system components. A critical component in this regard is the quality of its human capital, facilities as well as the interactions and the commitment of the stakeholders to the various activities of the programme. Another component is the quality of the curricula and the need to adopt a multi- and trans-disciplinary approach in order to understand the diverse social phenomena (e.g. with respect to science education, science teacher and teacher training), and the need to relate academic programmes to regional and global changes (Ogunniyi, 1996; UNESCO, 1998).

One cannot talk meaningfully of quality higher education without high quality students who enrol in the various disciplines of the programme. With the poor achievement at the secondary level in various subjects, how does one get high quality students in sufficient number at the higher education level? Since student-teachers are one of the main inputs of the higher institutions, their quality is a precondition for the quality of the training programme. According to UNESCO's (1998) report, to ensure the efficient functioning of a training institution, there is a need to assess the quality and perception about the programme of its component parts both by insiders and outsiders. It is in this context that the quality of higher education is closely linked to systemic assessment and the regulation of its constituent elements.



## 2.2. Importance of Science Education

To put the study in the proper perspective, it might be reasonable to begin with the issue of science education. What is science education? Science education can be defined as a way of communicating the nature of science to learners (Ware, 1992). To Blosser and Helgeson (1990) science education is an endeavour, which is human and society focused, problem centred, and directly concerned with the development of scientific literacy. To them:

One of the main goals of science education is to help students develop meaningful conceptual understandings of science and its ways of describing, prediction, explaining and controlling natural phenomena. Scientific knowledge is meaningful to learners only when it is useful in making sense of the day-to-day activities they encounter (Blosser and Helgeson, 1990:3).

Blosser and Helgeson (1990) argue further that science education is becoming increasingly identified as the background for economic stability and growth. In the past only the brighter students have been encouraged to attain science knowledge. Science was viewed as knowledge accessible to the elite few. However, in recent times many nations have realized the goal of “science for all”, that is, as a subject of life long utility to all citizens.

From the foregoing, it seems obvious that the science curriculum should be designed to help students not only to modify their attitudes but also to incorporate scientific concepts and ways of thinking into their personal frameworks. According to the American Association for Advancement of Science (1993), science education should be aimed at identifying and developing science curriculum models for implementing the understandings and habits of mind essentially for all citizens in a scientifically literate society. If a society is scientifically literate, the chances for skill and economical development are much better than would have otherwise been the case. The importance of science and mathematics as an instrument for economic, industrial and technological development needs no emphasis (Ogunniyi, 1986), though the relationship is not necessarily linear. Apart from producing a scientifically and

technologically literate society, the conditions for economic development must also be suitable. Critical ingredients in this regard among others are: (1) the relevance of science education to societal needs; (2) the quality of the knowledge, skills and attitudes developed during the study of science; (3) the closeness between the knowledge and skill acquired in the education system and what is demanded of the world of work; (4) the optional utilization of the scientific /technological personnel and (5) the implementation of appropriate and progressive science and technology policies. Without a meaningful balance of these variables, the present drive to scientific literacy will only end in an unfulfilled ambition and shattered dreams (Ogunniyi, 1996; 1999).

The International Council of Science Unions-Council on the Teaching of Science (ICSU-CTS) cited in Ware (1992:11) summarizes the importance of science education to economic development as follows:

Educational programmes are directed both to the preparation of scientists, technologists and to the improvement of science literacy of the population as a whole at all levels. There is the tendency to take education for granted, but, unless it is supported on the necessary scale, long-term development will not be successfully achieved.

Improving science education is part of systemic education reform (AAAS, 1993). Ware (1992) explains further that, the science for all movement is driving curricular change at varying speed in different countries. This has led to the redefinition of the school science curricula worldwide. This redefinition again has been accompanied by the role of the teacher in the classroom. i.e. “wise on the stage”- meaning, the teacher knows everything to “guide on the side”- a teacher guides the way to learning. In addition to the “ Science for all” theme, the fading of the old disciplinary boundaries in the dynamic world of science research is also a driving force for curricular change. Science subjects are crossing the old boundaries of each other. According to Ware (1992:5), “Biology is becoming chemistry which is becoming Biology, touches on physics which shades into chemistry”. Yet the



Upper secondary science streams and the university courses of the study remain defined as chemistry, biology and physics as they were delineated almost thirty years ago.

Therefore, if the curricula for the science stream are to be modernized, secondary science teachers will be required to develop a broader knowledge of science than most have at present, including a better understanding of the relationship between disciplines. As the concern of this study is on teacher training, attention will be given to the generic skill development of the utilitarian argument. Science may develop certain general transferable skills such as problem solving.

However, certain lesser skills do develop in science education and are of direct utility: measuring accurately, recording results, tabulating and analysing data, estimating, forming hypothesis, predicting, evaluating what went wrong and so on. Furthermore the various justifications for teaching science should have practical implications for what is taught and how. An individual teacher's own lessons are gained by beliefs and principles whether they are aware of them or not (Pajares, 1992; Wellington, 2000).

### **2.3. Importance of the science teacher**

There can be no science without curiosity and no technology without creativity (Yandila and Chalebgwa, 1997). Just as society based on agriculture needs farmers, a society driven by science and technology needs not only scientists and engineers, but all need teachers to educate the present and future generations.

Pajares (1992) explains that, the areas where different bodies of science knowledge are located viz: scientist's science, children's (learners) science, curriculum science and teachers' science. These are some of the many factors that affect the way science teachers teach. All of these factors are important for science education, as every one of them attempts to construct science in one form or the other.

Wellington (2000:31) states that:

Science teachers do not just act as the gateway to the science knowledge. They themselves represent, embody, their curriculum. And in their teaching they convey not just their explicit knowledge, but also their position towards it.

Having the above concept in mind, at least two points could be mentioned on how best to train secondary science teachers. Firstly, the teacher variable must not be overlooked when implementing educational reforms. It seems to be easier to undermine the teachers' role than to address issues of teacher education (Ware, 1992). Secondly, there is evidence that the education of secondary science teachers is linked to their students' achievement (Lockhead et al, 1989). It would appear logical that the knowledge of science teachers, the teacher's attitude towards science, and the way in which the teacher delivers instruction, have an impact on students' achievements. Hewson (1995) concludes that all of these are related to the teachers' own education both as a teacher and as a former school learner

According to Ware (1992), the formal qualification and experience of both lower and upper secondary science teachers are positively correlated with the achievement of their students especially in developing countries. Similarly, Ogunniyi (2002) supports the above statement by stating that while there might be some ambiguity about the relationship between teacher academic background and student performance in developed countries, teacher qualification has consistently been shown to be more closely related to learners' performance.

Ware (1992:12) states that:

Failure on the part of science teachers to establish enthusiasm and awareness of the relevance of science among their students can have disastrous consequences and their students can turn away from further study of science.

Thus, the secondary science teacher is a significant school based variable related to students' science achievement and the students' attitude towards further study in science (Simon, 2000; Simpson and Oliver, 1990). An effective science teacher as measured by students' achievements on standardized tests, and student attitude towards further studies in science



must have a strong science background and a keen sense of professional identity. Therefore, if the role of the science teacher is so much a determinant factor of students' achievements, how should teacher-training programmes prepare secondary school teachers in pre-service education? How can one ensure the production of highly competent, well-informed and enthusiastic teachers? How does one recruit students who are comfortable both in the subject matter and its active delivery in the classroom?

According to Davies and Macro (1995) a teacher-training programme should not be a place where the right answers are guessed at; it should be a period of experimentation with ideas, venturing into controversy and questioning established views. If the risk taking is not there, it is difficult to become the experimental teacher who is so crucial both to new approaches to learning and to forging the important relationships in classroom, staff room and the teaching profession with the society as a whole (Davies and Macro, 1995:94).

## 2.4 Recruitment

According to Delors (1998), "Improving the quality supply of education depends on first improving the **recruitment, training**, social status, and condition of work of teachers ... if they are to meet the expectations placed on them". (p.48)

Teachers should first take the responsibility of preparing young people to face the future with confidence and to build it with purpose and responsibility. If they are going to take this responsibility seriously, they must be well screened during the recruitment and must be well trained. Therefore, recruitment as the entrance gate for the teaching profession needs greater attention. For it is here that the quality of the teacher starts. It should act as the bottleneck for the profession by allowing only competent and committed candidates into the profession. Despite the critical shortage of science and mathematics teachers, it will be unreasonable to recruit student-teachers in the programme whether committed or not. The problem often is that many students go into the teaching profession not because they really want to teach but because they find nowhere else to go. Therefore, it is at the recruitment stage that strict



admission requirements, (including interviews) should have been carried out to determine whether they are suitable or not.

UNESCO (1998) reported that not only the educational competency, but also recruitment and employment of teachers should be free from any form of discrimination on grounds of gender, race, colour, religion, political opinion, national or social origin or economic conditions. In many developing countries, quantitative expansion of education has often been achieved at the expense of quality. The main cause for this as Simon (2000) has observed, is that nations recruit unqualified and poorly trained youngsters to accommodate the rapidly expanding school infrastructure or just to satisfy the redress policy of ethnicity or other political reasons that are not compatible with educational objectives. Incompetent candidates or below standard recruitment criteria are deployed. Good examples of these are Eritrea and Zimbabwe. At their independence both countries had an acute shortage of trained teachers. For instance in Zimbabwe the teacher population increased from 6,000 to 27,000 within four years. Hence, while attempting to meet the demand, the quality becomes compromised. To ameliorate this, the Zimbabwean government introduced an in-service programme for the teachers. The same approach has been used in Eritrea.

Ware (1992) explains that where the status of teaching is low, those students who enter science teacher training programmes have an average, a lower level of academic achievement than those students who enter programme for science major. Similarly, where the status of the teacher is high the quality of entrants into the profession is also high. Finally, she stated that the selection of teaching as a career depends on the actual and perceived rewards of teaching. This includes, “payment, working condition, opportunities for further education, career ladder and status of the teacher in the community” (p.11).

Many countries are adopting policies to ensure that all secondary science teachers, especially those at the upper secondary school level enter the profession with a degree of some kind. Similarly, Yager (1992) explains that in order to handle the rapid expansion of secondary schooling, there has been a need to train large number of science teachers as quickly as possible.

## 2.5 Training

What is training? Training is the organized procedure by which people acquire knowledge and a training programme in teacher education is an effort by an institution to provide opportunities for the student-teachers to develop in such a way that they can become effective science teachers. According to Mengistu (1997), training is the process of changing or improving human resources in skill, knowledge, and social behaviour through learning experience to achieve effective performance in the activity or range of activities. The ultimate purpose of teacher training is to enable the trainee teach his science or mathematics class effectively.

In most developing countries, secondary school science teachers are usually educated, qualified and certified through a variety of programmes. Ware (1992:9) identified four types of training programmes. These include: a three /four year programme leading to an undergraduate degree in science followed by a year post-graduate teacher preparation for professional certification. One of the advantages of this programme is that the initial preparation of a science teacher is the same as the undergraduate education of a further scientist. However, there is also a clear disadvantage of this option, it is only possible to major in one specific science discipline, there is no time to broaden the content to include other sciences even those bridging the major and minor. This kind of programme may be too narrow for even those teaching science courses at the upper secondary level. Further more, this option seems to divorce the science contents from the pedagogy. Hence, for those science teachers who have to teach integrated science courses or science at the lower secondary school, this option is not advisable.

Another option is a four-year programme that combines science and education courses leading to an undergraduate degree in science. Having the greater percentage of the courses in science. She explains that this option combines science and education leading to an undergraduate degree in science education. Since the final degree is in science education rather than in science, this programme is perceived in some countries as of lower status than the degree in science. The student-teachers are enrolled either in the education stream of the



Faculty of Science or consecutively enrolled in science and education faculties. According to Yager (1992) science and pedagogy may be integrated throughout the four years. However, as Ware (1992) contended, the combination of science and pedagogy in one programme does not ensure that the necessary connections are made between specific science knowledge and ways of conveying this knowledge to the students. The Faculty of Science teaches the science component of the course more often and the Faculty of Education teaches the education component without a proper articulation between the two programmes.

Third, is a three or four-year programme that combines science and education courses which leads to an education degree with the greater percentage of courses in education. For Ware (1992) this option leads to an undergraduate degree in education for teachers at the lower secondary level. However, to Yager (1993), this option with its greater emphasis on the pedagogical course rather than the science does not provide the teacher with adequate science knowledge to teach effectively even at the lower secondary level. Fourth, is a two-year programme leading to a teaching diploma or certificate. It may include science content little beyond that delivered to the student-teachers while they were themselves in secondary schools.

In Eritrea, the SEU programme is similar to what Ware (1992) has mentioned as the second option. The student-teachers are enrolled in the Education Faculty, where the SEU teaches the pedagogical courses and the Science Faculty teaches the Science courses.

In view of the different types of teacher education programmes sketched above two important questions worthy of consideration are: (1) What discipline and pedagogical knowledge should the teachers possess? (2) How should prospective teachers be trained to possess such knowledge? What ever answers are given to these questions, there can be no argument about the necessity for one who would teach to possess adequate substantive knowledge in terms of the concepts and principles of the discipline as well as procedural knowledge in terms of how to communicate that knowledge to someone else. The task of communicating science to non-scientists is one of the critical goals of science teaching. The



59<sup>th</sup> yearbook of the national society for the study of Education (USA), cited by Ogunniyi (1986:25-28) suggested that professional programme of a science teacher should include:

- A study of basic aims of education in a society and the contribution that science can make to the realization of these aims;
- A study of human growth and development and learning processes;
- A study of methods and techniques of teaching science and an understanding of professional duties and responsibilities of the science teacher.
- An extensive imaginative and well planned programme of student teaching and
- Activities designed to develop an understanding of the role of science teacher in the guidance programme.

## **2.6 Curriculum of training programme**

In broadest terms the content of initial teacher education course is based on three major elements: theory of teaching and learning, teaching practice and finally the study of the subject matter (Nevo, 1995:27).

### **2.6.1 Subject content knowledge (SCK)**

The subject matter courses are regarded as necessary though at times they go into too much depth and detail for school requirements. Hewson (1995) considers the foundation courses as largely irrelevant for practice, since they are too theoretical and do not deal with the realities of the schools. However, the methods courses are clearly relevant. To him, the teaching practice, provided there is sufficient support from school and the university personnel, is the most valuable part of teacher education for most students.

Ogunniyi (1986:46) contends that the: “subject matter content is the body of knowledge that comprises a discipline, and which is represented by concepts, rules, facts, attitudes, values, skills... that the learner, has to know”. The content of a curriculum designed to prepare future teachers may be tailored to the perceived intellectual capabilities of those who will

enter the programme (Ware, 1992). But this tailor made content must not be of such nature that it lowers the standard of the whole programme.

Different researchers, (e.g. Wellington, 2000; Harris, 1993) have pointed out different forms of content knowledge needed by pre-service teachers. The first, according to Wellington (2000:28), is the general pedagogical knowledge, which relates to what teachers know about topics such as school, teachers, curriculum, teaching, learners and learning, and classroom management. In addition to these, the pre-service training programme needs to take account of issues relating to learners beliefs and prepare student-teachers adequately for such beliefs and ideas that might contradict what they are supposed to learn at school. Second, subject content knowledge to which pre-service teachers are exposed should be relevant to what they will teach at school. Finally, the pedagogical content knowledge (PCK), i.e. the knowledge of how to transform formal subject matter knowledge appropriately for students.

According to Hewson (1995:2), knowledge acquired during the certification programme has a much higher status than that acquired afterwards. Certification is the end point of teacher education. It implies that professors are the sole producers of knowledge whereas teachers are its consumers. However, Davies (1995:4) contends that formal preparation is not the only significant contributor to a teacher's knowledge. There are other major contributors for example, the observation that prospective teachers undergo while they themselves were students, and what they gain from their experience in teaching itself after completion of the pre-service programme.

Shulman (1987:280) expressed that:

A good teaching requires a deep knowledge of the content to be taught, interwoven with an adequate model of teaching. This model has a set of actions; comprehension, transformation, instruction, evaluation and reflection.



Furthermore, he notes that the methods of instruction used in the classroom are related to the teachers' content knowledge, and their influence by their personal understanding of the subject matter. However, Petus and Smith (2000) contends that understanding something important in science involves more than knowing the terms or being able to give definition. Rather, it usually involves the flexible use of theories and data to explain some interesting and important phenomena.

### **2.6.2 Pedagogical content knowledge (PCK)**

Shulman (1987) outlines seven categories of knowledge that underline teachers' understanding need for effective teaching. Out of which the pedagogical content knowledge, (PCK), has become an organizing force in the design of teacher education programme. He contends that:

The pedagogical content knowledge distinguishes a teacher from a non-teaching content specialist. The difference is reflected in the capacity of a teacher to convey the content knowledge she/he possesses into forms that are pedagogically powerful and yet adaptive to the variations in ability and background presented by students. (p.15)

For Halim (2002) there is no universally accepted conceptualisation of PCK, however, most scholars agree on two key components. These are: the knowledge of students' learning difficulties, meaning, conceptions and misconceptions of the topic and second, the knowledge for representing specific topics. Halim further believes that understanding student-teachers' PCK could also help in conceptualising how science teachers could be trained. Based on this premise therefore, it is important to understand the existing PCK of the trainee teachers. The knowledge of students' understanding, conceptions and misconceptions of a specific topics helps teachers to interpret students' actions and ideas as well as to plan effective instruction.



Studies conducted by Jong, cited by Halim (2002:216) show that experienced teachers who were very knowledgeable in their subjects but did not consider the pupil's way of thinking about the subject matter often faced difficulty in teaching content.

The second aspect of PCK is the knowledge of specific strategies that are useful in helping students to understand specific science concepts. Halim (2002) pointed out that this involves knowledge of representing specific concepts to facilitate student learning. Representations include illustration, examples, models and analogies.

He further proposed a standard for pedagogical content knowledge. The unit ensures that teacher candidates acquire an understanding of the multiple facets of PCK, and learn to apply these facets meaningfully in a context in which all student-teachers have an opportunity to learn. However, the question is, how does a teacher education programme ensure that the trainees acquire the critical element of PCK needed for their future instructional practice? This question presents a perennial challenge for a teacher education programme because it touches the very core of its mission to produce competent teachers.

### **2.6.3 Adequacy of the academic preparation**

Several science educators (e.g. Stodart et al 1993; Stofflet, 1994) believe that the academic preparation of science teachers, in its present form and emphasis, does not adequately prepare science teachers to teach for conceptual understanding. This is because, according to Abdedl Khalik and Boujaude (1997:676), teacher education programmes do not usually challenge the strongly held misconceptions in content and pedagogy that prospective teacher bring along. Teacher educators focus on helping students learn how to teach and not what to teach. This is achieved by exposing student-teachers to general methodology of teaching and classroom management techniques.

Osborne (2000) argues that only those trainees who have the knowledge, understanding and skill to teach effectively are judged to have completed a course to qualified teacher status. By the end of their course, trainees must demonstrate that they know, understand and can apply this knowledge, when teaching science. According to Adam and Krockover (1997),

teacher preparation programmes are criticized for failing to look beyond the immediate task of preparing teachers. Once the individual enter the profession, few if any attempts are made to seek substantial feedback on their performance that could be used to improve the effectiveness of the programme. As a result pre-service programmes have been accused of being stagnant, ineffective and unresponsive to the changing needs of future educators.

## **2.7 Evaluation**

Educational evaluation is defined as an act of collecting systematic data in relation to the nature and quality of educational objectives (Nevo, 1995:11). He further indicated that programme evaluation can provide useful information in the following areas: (1) the existing course for the present students, (2) future runs of the same course for subsequent students and (3) future courses for perhaps quite different students. Similarly, Cliff and Imrie (1993) argue that Programme evaluation can: (1) ascertain the extent to which the aims and objectives of a programme remain appropriate, (2) the extent to which the programme continues to meet them, and (3) in what areas major strategic development of the programme is desirable. According to Chinapah and Miron (1990), evaluating a programme gives a lot of insights, encourages a better design and above all, makes a better decision where a programme could continue or be expanded, or even terminated. The underlying assumption of the study is that University of Asmara would provide useful indicators on how the SEU has been organized such that the intended goals are achieved.

Several authors (e.g.; Patton 1987; Tessmer, 1993) refer to two types of evaluation-formative and summative evaluation. Ogunniyi (1984), and Chinapah and Mirron (1990) and Tessmer (1993) regard formative evaluation as judging the strengths and weaknesses of instruction in its developmental stage for purposes of revising the instruction to improve its effectiveness and appeal. The evaluation is conducted from a variety of sources using data gathering methods and tools.



According to Tessmer (1993), evaluating a programme is a productive strategy especially when it is done early enough because it allows change. According to Cliff and Imrie (1993), the question one should ask with respect to informative evaluation is, “are we doing it right?” The focus of formative evaluation is to correct any deficiency that might be blocking the effectiveness of a curriculum. This might lead to the reinforcement of objectives and activities of the programme. It enables one to look forward to see what might be done better rather than attribute blame for past actions or circumstances. All in all, formative evaluation seems to warrant the programme designer back into the drawing room where the programme design and specific objectives are thoroughly examined.

In this study, my intention is to adopt the formative evaluation to examine the output of the (SEU) of the Faculty of Education, University of Asmara. It is hoped that the findings will indicate strengths and weaknesses of the programme. Though the study adopts a formative evaluation model, it will also use some form of summative evaluation in terms of comparing the objectives and the outcomes of the programme. In this regard, the question that will drive my investigation is, “Is there a positive relationship between the objectives of the programme and the outcomes?” In other words, is the programme pursuing its goal in the right way?

In order to have a better understanding of programme evaluation, there is a need to identify models of evaluation. According to Patton (1987), there are two types of evaluation models. These are, goal and goal free models. The goal model uses objectives of the programme as an organizer. On the other hand, a goal free model gathers data directly on programme effects and effectiveness without being constrained by a narrow focus on stated goals. Further, a goal free model uses qualitative methods because it is an approach that: relies heavily on description and direct experience with the programme. It asks what it is that is really happening with the programme and directs face-to-face contact with people in and out around the programme.

The responsive model is one example of the goal-free model. The study will adopt the use of both the goal and goal free models. This is because the programme being investigated has



both facets. It has goals and objectives that serve as the frame of reference as well as being amendable to varied interests. In the latter, the stakeholders are concerned about the effectiveness or otherwise of the programme not only in terms of the degrees or diplomas awarded, but also the overall relevance to the educational needs of the country. This is because no nation is greater than the calibre of its teachers (Ogunniyi, 1998).

### **2.7.1 Historical development of Evaluation**

Formerly evaluation was used largely for determining students' performance, i.e. student evaluation see (Ogunniyi, 1984). Teachers were judged solely on the performance of their students in public examinations. However Murphy (1985) defines more precisely that educational programme evaluation is the process of clearly indicating boundaries, obtaining and providing useful information for judging decision alternatives.

For Chinapah and Miron (1990:26), educational evaluation is commonly referred to as an exercise in assessing the success or failure of the planned objectives of a programme after it has been implemented but not before or during implementation. They argue that evaluation is a vital component of almost any educational programme that wishes to remain competitive. Evaluation becomes the watchdog of efficiency in the planning and implementation phases, and the guarantor of effectiveness in the end results. More specifically, evaluation is viewed as the systematic application of social research procedures in assessing the conceptualisation, design, implementation and utility of a project or a programme. As a process it is seen as an attempt to assess the relevance, effectiveness and impact of a programme, usually in the light of its objectives (see Veney and Kaluzny, 1991).

Morphy (1985:160) states that:

If educational evaluation is to be of any use, it has to be useful to a stakeholder who needs answers to a particular question about the educational activity. The

definitions of evaluation adopted will therefore influence the questions that are asked and the purpose for which the data will be used.

Based on the above statements, it is evident that the main reason for evaluating educational programmes is to determine its effectiveness. Also in this regard, evaluation is construed a dynamic process which forms an integral part of a decision-making process for refining educational programmes. The implication is that educators need to constantly seek new ways to improve educational programmes, identifying the problem areas, develop and create new approaches, so that the professional abilities of the teachers are improved.

A second reason to evaluate a training programme is to be able to explain programme failure should it occur. There are many reasons why a basically sound programme may fail to meet its objectives. Perhaps training objectives were too ambitious. While trainees may have made substantial progress toward their mastery, the programme may fail because it falls short of its objectives.

According to Chinapah and Miron (1990), continuous monitoring and assessing of educational programmes provides hard data. Judgments based on hard data are hard to ignore because they narrow the gap between the reality and the intention on the one hand and enables innovations to be introduced to influence the positive results of the programme as well as increase the programme effectiveness on the other. Similarly, evaluation can be utilized to improve or adapt an on going programme, or it can be used for accountability certification or selection. Finally, one can conclude that the main purpose of evaluation is as a diagnostic tool to facilitate decisions about a programme, to improve it to attain its goals and to direct and monitor the programme as it develops.

Staropoli (1992) while discussing about the importance of evaluation argued that:

Evaluation, for the institution, when a body that has no decision-making authority and is independent of the central administration performs it, satisfies two needs. First, it makes it possible to see the institution's policy orientation more clearly, to appreciate its strengths and weaknesses, and to bring about



desirable reforms. Second, it helps in persuading external authorities to take account of specific problems of the institution, including difficulties with students or with the academic community as a result of inadequate staffing or resources. (p.134)

Further more he argues that evaluation, for the public, reflects the desire of the students themselves, the families of current and future students, and the university's contacts in the wider economic and social world to discover the worth of the institution as regards its teaching discipline by discipline. The public would especially like to know the value of the qualifications, as well as the institution's capacity to provide professional training or expert advice.

Rossi(1989) identified three classes of evaluation research: (1) analysis related to the conceptualisation and design of interventions; (2) monitoring programme implementation; and (3) assessment of programme utility. The evaluator wishes to adopt the assessment of programme utility in pursuance of how far have the science teachers been equipped by the programme. According to Apple et al (1993:52), while evaluation can play a role in decision-making, in practice there are not many instances where decisions are made only on the basis of evaluation results. It is more often the case that evaluation simply influence the determination of decisions, which can take many forms. For them, evaluation results may simply contribute to the knowledge and experience of those that make the decisions without visibly affecting the immediate decisions at hand.

In recent years, there has been an increasing awareness of the need to systematize the purpose and methods of educational evaluation. This in turn has led to a growing body of literature that challenges and defends the various evaluation models. According to Adams and Krockover (1997:636), there are three different types of evaluation according to the areas to which they ascribe themselves: (1) Process evaluation: If an evaluation assesses whether or no a programme or intervention has been implemented correctly or according to guidelines. It is further concerned whether or not the programme is directed at the intended target group. A process evaluation should attempt to pinpoint the many problems or

hindrances that an intervention with implementation. (2) Impact evaluation: As its name implies is designed to assess the impact a programme or an intervention has had on its intended target group and objectives. (3) Holistic evaluation: This should include the activities of both the process and impact evaluations.

In this study I intend to adopt a holistic model of evaluation as it includes the activities of both the process and the impact of the programme since both variables complement and support each other. In the light of the above statements, one may find it both entertaining and alarming to hear politicians, and at times programme planners and staff talk of the success of their programme when there are no set standards and data to justify or judge their assertions. To avoid these dilemmas, Chinapah and Miron (1990) have suggested that the evaluation of an educational programme or project should begin with a through analysis of the project or programme objectives. The evaluator should further look for the “implied” or “silent” objectives, which do not appear in the documents, and policy statements that spell out educational project or programme. Also, comparison or reference should be made with both the immediate and the long-term objectives of the programme.

Evaluation at the higher education level has recently become a central issue. The UNESCO conference on higher education focused mainly on the issue of quality assurance (UNESCO, 1998). According to Eurant (1994: 213-214), competence in higher education is related to the needs of the public. He notes that:

The public wants to be assured that teachers designated as qualified are competent to perform the roles and tasks normally undertaken by members of the teaching profession. Without this assurance the qualification is devalued and the purpose of having a profession is defeated.

From the foregoing, it seems that the competency of a teacher education programme does not depend only on mastery of the pedagogical content knowledge but also how much that knowledge impacts on the teachers that are trained in terms of their future careers in the teaching field (Bacchus, 1996). This means that prospective teachers are made aware of how



to perform a variety of tasks as well as creating conducive environment for the development of appropriate knowledge, skills and attitudes which students need to tackle life challenges. The competencies of the teaching staff in a training programme are ultimately judged against the performance of learners at the level of education where their graduate teachers work.

According to Mengistu (1997) evaluation involves the “Systematic collection of descriptive and judgmental information necessary to make effective decisions related to the selection, adoption, value and modification of various instructional activities”(p.20). He stresses further that evaluation of a training programme has four parts: (1) setting training objectives; (2) pre-training information or data required-this information or data sometimes called base line data because it shows the level of a trainees performance before training; (3) the data or information gathered during and after training and (4) the comparison of data before and after training.

Space limitation would not permit further review of the concept of evaluation. But before concluding this review, it is apposite to examine much more closely certain indicators that have been prodigiously used in evaluation research viz: effort, effectiveness, impact and relevance. However, in this study the concept of “efficiency” has not been included not only because of the controversy surrounding it but because its mechanistic and behaviouristic connotations.

### **2.7.2 Evaluation on Effort**

Effort refers to the amounts and kinds of programme or practice of activities necessary for the achievement of planned objectives (Veney and Kaluzny, 1991:6). Patton (1987:138) argues that an effort-based evaluation of a programme focuses on documenting the quality and quantity of activities that take place. In other words, it represents an assessment of input or energy regardless of output. For him, an effort evaluation involves making an inventory of programme operations, which includes: (1) Are necessary materials available? (2) How many clients with what characteristics are being served by the programme? (3) Are the staff

members sufficient in number and with proper qualification? To Patton an effort-based evaluation on a programme of study is critical to its success. Important as Patton's view is, it is inconceivable to evaluate effort without a goal in view or without considering possible outcomes.

As indicated in chapter one, a critical aspect of a systematic evaluation model (which underpins this study) involves a close examination of the contiguity between the aims or goals of a programme on the one hand and its outcomes as measured by the effort put into the programme and whether or not the programme is effective, has impact and is relevant to the needs of the consumers.

According to Akpe (1992), who studied a part-time teacher education programme in Nigeria which failed to achieve its objectives stated that:

Learners seemed to be dissatisfied due to no text books, delay on publication of results, irregular attendance of programme instructors, inadequate classroom accommodation, and many of them decided to gave up before they could go into practising.

From his study Akpe discovered that a lack of effort in a programme has hindered the attainment of the objectives set up for the programme. The overall emphasis on effort is the relationship between what has been done and how well it has been achieved. According to Doyle (1997) and Mclean (1993), this involves the collaborative effort of both the staff and recipients of the programme will determine whether or not a programme will succeed. This in turn brings up the necessary preconditions of the staff and student quality. The staff may do their best but if the students do not, the programme cannot succeed. It is in this context that the SEU should be appraised. That is, what is the quality of the effort put into the teacher education programme at the SEU, University of Asmara?



### 2.7.3 Evaluation on effectiveness

From a survey of the literature dealing with evaluation of programme effectiveness, the central concern has been determining how a programme sets out to fulfil the pre-determined objectives. Evaluating programme effectiveness is becoming one of the prime concerns of education and teacher training. This is an issue of concern not only to the programme administrators but also to governments and other funding agencies.

According to Davies (1994), effectiveness is defined in the context of education and training. He contends that:

Effectiveness does not directly involve a teachers' personality, the quality of his administration or the efficiency of his teaching. It is simply a function of what he does which involves the extent to which the teacher realizes the teaching objectives which he has been tasked, and then he is ineffective, no matter how efficient he may have been. (p.49)

According to Madaus, Airasion, and Kellaghan (1980:22), a programme is successful if there is congruence between its objectives and its achievements. They argue that a programme is effective if it accomplishes what it is meant for. In their view the way to assess the effectiveness for instance of a training programme, would be to compare the programme objectives with the effectiveness.

Davies and Macro (1995) studied a teacher education programme, whose objectives were to prepare graduate students for career and improve the students' curriculum vitae for the job market. At the completion of the programme, a survey of the participants' perceptions of the teacher education programme was carried out. They found a positive response from students who even recommended the programme to be given to other students who could be interested to continue in the teaching profession.

An effective training programme could achieve its objectives and even change the situation of student-teachers of the programme for which it was designed. However, the achievement of objectives in a programme depends on the value of individual students in the programme. Because values may make teachers focus on a given set of objectives and increase the rate of achievement of the programme. Hence, it is clear that effectiveness is related to the achievement of objectives. The need for activities and means necessary to facilitate the attainment of objectives is also important.

#### **2.7.4 Evaluation on impact**

What is impact and how does one determine it in an objective and clear manner? Impact refers to the totality of what the programme is doing. An impact evaluation is concerned with finding out what the programme is doing to the education system (Anderson, 1990:6).

According to Cooper and Malloof (1999) and Sykes (1999) a teacher-training programme is expected to provide scholarly graduates who when sent to the schools would raise the standard of the education system in such schools. The public also expects improved performance of the students of such newly graduated teachers.

Veney and Kaluzny (1991: 42) argue that impact-evaluation answers the questions: Are there improved results? In their view, it seems that impact evaluation reveals the outcomes of the programme activities. Impact evaluation focuses on the positive and negative consequences of the programme. Green, Carillon and Purvis (1999:213) studied a teacher education programme and discovered that it had generated both positive and negative effects among the graduate teachers. The study involved graduate teachers who were practising in secondary schools. They were admitted into a Masters of Education Programme. The programme was designed with the hope that the graduate teachers after graduation would go back to school as master teachers. However, as the result of the professional development only one-third found the programme interesting, challenging and related to the classroom. The other two-thirds were not comfortable to go back to the classroom. The attainment of



Master's degree in education stimulated them to look for better jobs where there were more prospects.

From the foregoing, one can conclude that the impact of the Master's of Education Programme met only the aspirations of only one-third of the students. Meanwhile, two thirds did not experience much positive impact on their careers. From this finding one can conclude that there is a possibility for a programme's impact to end up with an unexpected result. As Ogunniyi (1984:11) has warned that whatever evaluation techniques we employ, cognisance must be taken of unintended outcomes. He suggests that unintended outcomes must be identified and corrected to ensure the quality control of a programme functions well.

In a study by Bekola and Welford (1999:1293-1310) the lack of competence and confidence on graduating teachers was recorded. The study was on pre-service science teachers' education in Ethiopia in terms of their competence and confidence to teach practical work in science. The study examined the influence of teacher training on school practice, and to reflect on ways forward to promote reform in teacher education. The findings indicate that there was failure on the part of instructors to access pedagogical content knowledge of the students in practical work. They further indicated that teachers seemed not to do practical work in schools, even when the schools were fully equipped with resources. They pointed out the need to review the structure and system of education in order to promote teacher professionalism. This should be done based on the impact evaluation that provided useful data for corrective measures and sound decision-making.

#### **2.7.5 Evaluation on Relevance**

The programme relevance implies whether or not the programme or service is needed. It gives an idea of the rationale for having a programme or set of activities to meet the educational service (Veney and Kaluzny, 1991:5).

A perusal of the literature indicates that universities face a great challenge in preparing prospective teachers in meeting demands for skilled personnel in every segment of the

economy (Grant, 1999). Fullan and Hargraves (1991) argue that putting a programme into practice means, classroom and schools become effective where quality individuals are recruited in teaching. i.e., well-prepared graduate teachers who do not only have confidence and competence in their work but also meet with little or no problems in the classroom activities. Even when they experience problems, they easily find alternative measures for solving such problems.

Murray (1995:95) argues that schools, like any other social organization, are not immune to diverse changes in a given society. The beginning teacher therefore must seek not only how to teach, but also how to meet the needs of the school and the expectations of the community served by the school. Similarly, Darling Hammond (1999:64) stated that:

Public dissatisfaction with schools has been coupled with dissatisfaction with schools of education as well. Teacher educating programmes have been criticized as ineffective in preparing teachers for the work unresponsive to new demands, remote from practice and barriers to the recruitment of bright students in to teaching.

In a teacher education programme, relevance has been regarded as one of the major components. In this regard, Veney and Kaluzny (1991) raised two questions related to relevance: (1) Is there a problem and (2) how well defined is the problem? The assumption is that programme is considered relevant if it can answer both questions simultaneously. Further more, Austin (1982) noted that in terms of relevance, one must define excellence not only in resources and in reputation, but also changes in the students and the impact they make in their communities. This implies that higher education institutions must address the needs of the community through the teachers they train. To be relevant a training programme should ask such questions as: (1) Is the programme one of the top priorities of the community at the moment? (2) Does it solve the problem for which it was intended?

The issue of relevance seems to determine the behaviours of the stakeholders who are the consumers of the products of higher education. Relevance is frequently measured in terms of current national economic needs. Pragmatic considerations should not be the only criteria for



judging the worth of an institution. What seems irrelevant today may turn out to be relevant in the future.

In conclusion, it is clear that relevance is not an easy concept to come by. However, the literature reviewed above does support the idea that a well prepared programme with well-stated objectives articulate well with the relevance of meeting people's needs. Appropriate teacher preparation and teacher commitments often connect with programme relevance. Similarly, the training of student-teachers should be so conceptualised in such a way that the trainees can easily contribute meaningfully to the communities they are supposed to render service.

## **2.8 Conclusion**

According to Mboya and Mwawenda (1994), the quality of teacher training cannot be obtained without the presence of basic infrastructure of the school. They classify the factors into two categories namely, the human and physical resources. However, their classification seems to ignore the interactive nature of programme organization. The presence of adequate and well-trained human power and student teacher that have been selected by very narrow recruiting criteria alone does not guarantee the quality of a teacher education programme. It is the use of these resources and the nature of interactions of all the stakeholders that will determine the quality of the training programme. There is no single recipe for success as different situations require different combinations of the educational activities.

Furthermore, it seems that what is needed today perhaps is how to assess institutional quality in an objective manner as well as how to sustain that quality through programme evaluation as a maintenance or quality control system (Ogunniyi, 1996:8). Despite varied viewpoints, there is consensus among programme evaluators that evaluation promotes reflective practice in a teacher-training programme such as the SEU of the University of Asmara. With the current globalisation phenomenon, no institution can remain indifferent to the question of evaluating the quality of its academic and professional programmes. The fear of not meeting contemporary needs and future challenges would diminish when an institution is able to

adapt to change by running programmes that help its graduates to tackle practical problems they face in the teaching /learning process in particular, and the society in general.

A teacher training institution's capacity to adapt to new changes is related to its willingness to expose its programmes and standards to the public's systematic scrutiny. Although the public may base its judgment solely on students' performance on examinations, a programme's quality can also be manifested in the way the teachers impact on the lives of their students in other respects such as the exhibition of desirable behaviours and life skills by their students.



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# CHAPTER THREE

## METHODOLOGY

### 3.1 Research design

The study adopted both qualitative and quantitative designs. Best and Kahn (1993) argue that qualitative studies describe and interpret, “what is in” and it is personal in nature, has humanistic concerns and ideologies.

The term qualitative research means any type of research that produces findings not arrived at by statistical procedures or other means of quantification. It permits the evaluator to study selected issues, cases or events in-depth and detailed. It implies an emphasis on the qualities of entities and meanings that are not experimentally examined or measured in terms of quantity, amount, intensity or frequency (Denzin and Lincoln, 2000:8).

According to Patton (1987) the qualitative approach has three main perspectives. First, in terms of evaluation research, qualitative approaches are naturalistic to the extent that the evaluator does not attempt to manipulate the programme or its participants for purposes of evaluation activities and processes. These activities are “natural”, i.e. they are not planned or manipulated by the researcher as would be in the case of an experiment. Similarly, Vulliamy (1990:11) points out that qualitative research is natural in the sense that it focuses on meanings and the attempt to understand the culture of those being studied and predisposes researchers to work as far as possible in natural settings.

Second, the holistic perspective implies that evaluators using qualitative methods strive to understand programmes and situations as a whole. By using this perspective the evaluator searches for the totality and unifying nature of particular settings. This approach assumes that the whole is greater than the sum of its parts.

According to Vulliamy (1990) qualitative research is also holistic in the sense that it attempts to provide a contextual understanding of the complex interrelationships of cause and consequences that affect human behaviour. In doing so, it seeks to avoid either the deliberate manipulation of variables or the study of attitudes or indicators as variables isolated from the wider totality.

Third, qualitative research instead of testing pre-conceived hypothesis, aims at generating hypotheses from the data that emerge, in an attempt to avoid the imposition of a previous, and possibly inappropriate frame of reference on the subject of the research.

Further more, Vulliamy (1990:17) elaborated that:

One of the main contributions of a qualitative research strategy is in focusing on the actual implementation of policies in training programmes or schools and thus assessing the points at which policy and practice converge or diverge.

According to Straus and Corbin (1998) there are many valid reasons for doing qualitative research. Some of them are: (1) researcher preference or experience: some researchers are more oriented to disciplines that traditionally use qualitative methods; (2) the nature of the research problem, for example researches that attempts to understand the meaning or nature of experience of individuals and evaluation of educational programmes. They further argue that qualitative methods can be used to explore substantive areas about which little is known or about which much is known to gain novel understandings. In addition, it can be used to obtain the intricate details about a phenomenon. This second point is my main reason for including the qualitative design for this study.

Basically, there are three major steps of qualitative research design. First, the data can come from various sources such as interviews, questionnaires and document analysis. Second, coding is a procedure that researchers use to interpret and organize the data. This usually consists of conceptualising and reducing data, elaborating categories in terms of their properties and dimensions and relating themes through a series of prepositional statements.



Conceptualising, reducing, elaborating and relating often are referred to coding. The written and verbal report makes up the third component. This study has incorporated all the above three steps sequentially.

According to Denzin and Lincoln (2000:5) qualitative research involves the researcher to use and collect variety of empirical materials in his/ her study. It is inherently multi-method in focus. The use of multiple methods reflects an attempt to secure an in-depth understanding of the phenomenon in question.

The word “qualitative” implies an emphasis on the qualities of entities on process and meanings that are not experimentally examined or measured in terms of quantity, amount intensity or frequency. Qualitative researchers stress the socially constructed nature of reality, the intimate relationship between the researcher and what is studied, and the situational constraints that shape enquiry. The main purpose of the qualitative paradigm is to draw on “in-depth” descriptions (Babbie and Mouton, 1998:270) which surface in the narratives of interviews or writing on open-ended items in the questionnaire.

Vulliamy (1990:19) has argued that qualitative research techniques are especially suited to the early stages of implementation of an innovation whilst more quantitative measures of outcomes may be required to assess the impact of an innovation, once it has been effectively implemented. As the SEU is in its early years, having only the third cohort of graduates at the moment, the qualitative method seems more appropriate. This course, does not imply that a quantitative approach is inappropriate.

Traditionally, qualitative and quantitative approaches have been seen as diametrically opposed, and many evaluators still strongly espouse one approach or the other. More recently, however, this opposition is beginning to soften, and more evaluators are beginning to see the merits of combining both approaches in response to different evaluation contexts. For example, if the purpose of an evaluation is to determine effectiveness, and its outcomes are well defined, then a quantitative approach may well be appropriate. If on the other hand,

The purpose of an evaluation is to determine programme effectiveness but the programme and its outcomes are poorly defined, an evaluator might start with a qualitative approach to identify critical programme features and potential outcomes and then employ a quantitative approach to assess their attainment (Herman, Morris and Fitz-Gibbon, 1988:21).

It is in light of the statement of Herman, Morris and Fitz-Gibbon (1988:21) above, I have used both qualitative and quantitative research methods in evaluating the SEU at the University of Asmara. In differentiating qualitative and quantitative strategies however, it should be noted, that such differences are tendencies not absolute (Patton, 1987). It is not being argued quantitative strategies always test pre-conceived hypotheses or that qualitative strategies never do so. Rather, it is that such a difference in emphasis is fairly typical.

According to Cournoyer and Klein (2000:95) researchers need to recognize when the nature of research question calls for an approach that is either qualitative (inductive) or quantitative (deductive). When he has little or weak theories to guide in making prediction or offering explanation he should be drawn more to an inductive approach. On the other hand, when there is strong literature about what has been done in the past that can serve to guide him as he shapes the future, it is wasteful to disregard this knowledge by failing to utilize deductive approaches. They indicate further that researchers need to fully appreciate that the inductive and deductive questions can be informed by data that take either numeric or non-numeric forms.

Quantitative methods use standardized measures that fit various options and experiences in to predetermined response categories. The advantage of the quantitative approach is that it measures the reactions of a great many people to a limited set of questions, thus facilitating comparison and statistical aggregation of data. This gives a broad, generalizable set of findings. By contrast, qualitative methods typically produce a wealth of detailed data about a much smaller number of people and cases. Quantitative measures are easily aggregated for analysis. They are systematic standardized and easily presented in a short space. On the



other hand, qualitative responses are longer, more detailed and variable in content, the analysis is difficult because responses are neither systematic nor standardized.

As pointed by Vulliamy (1990:27) the qualitative research strategy has the following weak points: (1) the problems of generalization of data; (2) researcher bias; (3) the reliability and validity of data collecting techniques; (4) ethical considerations and (5) the difficulties of relating micro and macro theory. Similarly, Denzin and Lincoln (2000:7) regard qualitative researchers as simple journalists, or soft scientists. For them, the work of qualitative research is unscientific, or is only explanatory and subjective.

However, as stated earlier, a combination of the two methods has been adopted for this study. As Flick (1998:231) has stated:

*The combination of multiple methodological practices, empirical materials, perspective and observers in a single study is best understood as a strategy that adds rigor, breadth, complexity, richness and depth to any inquiry.*

### **3.2 Population**

The population of this study consists of both “insiders” and “outsiders” of the SEU in the Faculty of Educating in University of Asmara, the student-teachers, administrative staff and lecturers as insiders, and practising science teachers (graduates of the programme), secondary school directors (head teachers), and the Ministry of Education supervisors as outsiders.

The intention of including multiple sources is to promote comparison of facts among the stakeholders involved in the programme. According to Terreblanche and Durrheim (1999:320) the careful selection of the population should lead to a deeper understanding of the issue under discussion. However, it would be unrealistic to attempt to include all the “insiders” and “outsiders” in this study. Hence, this study involves only a sample considered representative of the total population.

### 3.3 Sampling

In this study, representatives of the “insiders” and “outsiders” were selected. Both purposive sampling and random sampling methods were employed. This was to ensure that the views and perceptions of all stakeholders involved in the SEU would provide grounds for a reasoned conclusion. The justification for the random sampling, according to Brown and Dawling (2001:33), is to ensure that: (1) each member of the “insiders” and “outsiders” who are in the sample has an equal chance or probability of being selected as a subject; (2) the evaluator is able to apply the inferences that he/she has drawn to that of the population. In other words he/she will be able to generalize his/her findings beyond the limit of the study; (3) random selection eliminates the likelihood that the selection bias might operate in favour of one group or another.

On the other hand the purpose of purposive sampling is to be sure to understand cases which are likely to be information rich because they may reveal major programme or system weakness which become a target of opportunity for the programme or system improvement (Patton, 1987:56). Frankel and Wallen (1993:383) in their studies about qualitative design confirmed that: “virtually all qualitative researchers use purposive sampling techniques. Since they want to ensure that they obtain a sample that possesses a certain characteristics relevant to the study”.

Hence, the random sampling was employed in selecting twenty to twenty-five practising science teachers, where two-three science teachers from each school were included. However, the number of schools was determined based on whether or not teachers in such schools graduated from the SEU. Similarly lecturers were those who had taught or who are still currently teaching. Supervisors are those who at least have supervised science teachers from the SEU. In selecting the student-teachers priority was given to third and fourth year students in the University. These students can be assumed to have had sufficient exposure to different science lessons and have developed some perceptions about the effectiveness or otherwise of the programme.



To sum up, eight lecturers, fourteen student-teachers, twenty practising science teachers, one SEU academic and administration officer, three MOE supervisors, three School directors, were selected. Questionnaires were for lecturers, student-teachers, practising science teachers and document analysis for SEU administrative official and one lecturer. The interviews were for MOE supervisors, three school directors.

### **3.4 Instruments**

Three instruments were developed and administered to all the subjects involved in the study. These are questionnaires, interviews and document analysis. Brayman (1992) argues that if a study is of an evaluative nature, it will require a combination of methods. Similarly, Patton (1987) suggested that triangulation involves the use of multiple indicators or the same indicator with different stakeholders to assess or measure some phenomenon. The use of triangulation in social research was employed by remembering that:

If some thing walks like a duck talks like a duck, and looks like a duck, it probably is a duck. When the researcher finds multiple independent indications that some phenomena are present at a given level, his confidence that he is measuring the intended phenomenon with some level of reliability increases (Cournoyer and Klein, 2000:102).

According to Patton (1987), there are four basic types of triangulation: (1) the use of variety of data sources in a study, for example interviewing people in different status position; (2) the use of multiple methods to study a single problem or programme, such as interviews and questionnaires; (3) to collect different kinds of data on the same question; and (4) to use different perspectives or theories to interpret a set of data.

However, this study employed only two of these which include: (1) the use of variety of data sources in a study, for example interviewing people in different status position; and (2) the

use of multiple methods to study a single problem or programme, such as interviews and questionnaires. The justification for the use of combination of triangulation types is that:

No single method ever adequately solves the problem of rival cause factors. Because each method reveals different aspects of empirical reality, multiple methods of observations must be employed. This is called triangulation. Multiple methods should be used in every investigation (Patton 1987:61).

### 3.4.1 Questionnaire

In preparing the questionnaire, Frankel and Wallen (1993) asserted that open-ended questions could be lengthy than close-ended questions such as multiple choice, or yes/no questions. Similarly, the close-ended questions seem to be easier for respondents to feel and for the researcher to compile.

Peterson (2000:30) argues that open-ended questions are very versatile and therefore play a variety of roles in research. Open-ended questions are often used in the early stages of a research project to generate ideas or obtain a fundamental understanding of the phenomenon, issue or topic being investigated when relatively little is known about it. They are also used in the early stages of research project to develop close-ended questions that might be asked in later research stages. The most obvious characteristic of open-ended questions is that they permit freedom of response.

The alternative to an open-ended question is a close-ended question. The distinguishing character of closed-ended questions is that possible answers or response are pre-specified. What is not known is the frequency with which answers will be chosen (Peterson 2000:36). Close-ended questions come in a variety of versions. If the answer alternatives for a closed end question are some how graduated to measure continuous construct, such as attitudes, opinions, and perceptions, the question is rationally referred to a rating scale.



The main weakness of such questions was that they limit the flow of ideas of the respondents and they almost lead to pre-determined conclusions of the researcher how he/she wants to conclude.

The above-mentioned points justify the reason why this study incorporated both open-ended and closed-ended questions. Hence, in preparing the questions of the questionnaire, whether they are open-ended or close-ended, care was taken to ensure the freedom of expression of the respondents and also made effort to simplify the items so as to make them easily to compile for the researcher.

The questionnaires for the lecturers, student-teachers and practising teachers used in this study have three sections, section A-personal information, section B-nature of the programme in a tabulated form to be filled, a Likert-type scale: 5=Strongly agree; 4=Agree; 3=Undecided; 2=Disagree and 1=Strongly disagree, with a brief explanation to each of the score in the third column. Finally, section C consists of open-ended questions where the participants can express their views freely.

Designing the questionnaires for lecturers, student-teachers, practising science teachers and high school students went through the following process. The main research question and the sub-questions were developed in relation to the aim of the research. After deciding that questionnaire would be one data collecting technique in this research, interview questions were designed based on the main research question and sub-questions in the area of evaluating science teacher training. I discussed with my supervisor about the questionnaires in detail and incorporated his comments and feedbacks.

Having the draft questionnaires ready I went to the research site, Asmara, Eritrea. The interview questionnaires were given to ten people (judges) composed of one supervisor, two-science curriculum developers, one secondary school director, one-teacher trainer, one lecturer in University of Asmara and four experienced science teachers for comments, to ensure that the questionnaires were relevant to the Eritrean context and to the main question they were designed for, in other word to verify their validity.

The comments made by the judges were used in revising the questionnaires before the final versions were produced. After the judges considered that all instruments were valid the questionnaires were given back to the judges for rating. The ten judges were asked to rate every question of the questionnaires out of five. i.e. 5 was excellent and valid whereas 1 was poor and an invalid item. The mean value of the ratings of the ten judges was used to calculate the inter-rater reliability based on Spearman Rank Difference formula (see Ogunniyi, 1984,1992). It is after this exercise that the questionnaires were ready for pilot test.

### 3.4.2 Interviews

According to Denzin and Lincoln (2000:633), interview is a conversation, the art of asking questions and listening. At least two people create the reality of the interview situation. Thus an interview produces situated understandings grounded in specific interaction episodes. The use of an interview to acquire information is so extensive today that it has been said that we live in an “interview society” (Denzin and Lincoln 2000:633). See also (Atkinson and Silverman, 1997).

The major advantage of interviews according to Bell (1999:135), is its adaptability. In other words, an interviewer can follow up ideas, probe responses and investigate motives and feelings, which the questionnaire can never do. Bell goes further by asserting that the question is not in terms of which method has an advantage over the other but to realize that each method has merits and demerits. For instance:

- Interviews are time consuming but questionnaires are not.
- An interview is highly subjective technique and therefore, there is always the danger of bias.
- Analysing an interview data can present problems.
- Wording the questions is also demanding and requires skill of approaching people.



- Interviewing requires a level of skill usually beyond that of a beginning researcher (Gay, 1981:166).

The interview questions were set up in such a way that they invite further questions depending to the response of the participants. Nachmias and Nachmias (1990:211) and Peterson (2000:30) recommend the use of open-ended questions in relation to qualitative data collection in that they are flexible, are more in-depth and permit freedom of responses.

Consequently, a concentrated effort was made to utilize the semi-structured interview bearing in mind its merits and limitations. Designing the interview questions went through a series of steps. The main research question and the sub-questions were developed in relation to the aim of the research. After deciding that an interview would be one data collecting technique, the items were designed based on the main research question and sub-questions. Meanwhile, I sounded the opinion of an experienced science education researcher with expertise in the area of evaluation throughout all the stages of instrumentation development.

Having the draft interview questions ready I went to the research site, Asmara, Eritrea. The interview questions were given to ten people (judges) composed of one supervisor, two-science curriculum developers, one secondary school director, one-teacher trainer, one lecturer in University of Asmara and four experienced science teacher for comments, to ensure that the interview questions were relevant to the Eritrean context and to the main question they were designed for.

The comments made by the judges were used in revising the instruments before the final versions were produced. After the judges considered that all instruments as valid, the interview questions were duplicated and given back to them. These ten judges were then asked to rate every item of the interview out of five. i.e. 5 is excellent and valid instrument whereas 1 is considered as a poor and invalid item. The mean rating of the ten people was used to calculate the inter-rated reliability based on Spearman Rank Difference formula (Ogunniyi, 1984).

### **3.4.3 Document analysis**

Finally, a thorough analysis of the SEU documents such as the syllabus, course outline, disciplinary and professional courses, annual report, Journals from University of Asmara and the Ministry of Education was carried out. A modified version of the Accreditation Form designed by the National Universities Commission (NUC, 1990) of Nigeria to evaluate the teaching programme of Nigerian Universities was implemented. The reason for the modification was to ensure that the issues under investigation are relevant to the Eritrean context. In this instrument, the items considered were in terms of the effort, effectiveness, impact and relevance of the SEU such as: the curriculum; admission criteria; programme regulation; academic staff, support staff, teaching and learning facilities, and library.

### **3.5 Validity and Reliability**

All necessary precautions were undertaken to ensure that the instruments (questionnaires, interview and document analysis) used in the study have high validity and reliability. As mentioned earlier, the ten judges rated the questionnaires and interviews out of five, meaning 5/5 is best and valid whereas 1/5 is the least and invalid. From the ratings of the ten mentioned judges the reliability values were obtained using the Spearman-Rank difference correlation coefficient (Ogunniyi, 1984,1992). The reliability using this approach stood at 0.84 this was considered adequate for the study. To be more specific, the reliability for the lecturers' questionnaire was equal to 0.95, for practising science teachers 0.80, for the student-teachers 0.75 and for the document analysis, 0.90. Similarly, the reliability value for the interview for MOE supervisors was 0.85, and 0.80. for the school directors. Frankel and Wallen (1993:149) stated, "For a research purpose reliability should be at least 0.70 or higher", therefore, all the instruments were appropriate to collect the data. Based on the expert opinions and the reliability values, the instruments were considered valid and reliable for the purpose.



### **3.6 Piloting the instruments**

The instruments (questionnaires and interviews) used in this study were pilot tested. The purpose of a piloting exercise was to get the bugs out of the instruments, so that the subjects in the main study would experience no difficulties in completing it. For this purpose the questionnaires were administered to four student-teachers, one lecturer from University of Asmara, and two practising science teachers. The interview questions for secondary school directors were administered to one school director. All the administered pilot instruments were collected within 24 hours. The piloting process was done two weeks before the main study so that the researcher could have enough time to modify the instruments. However, the interview questions for MOE supervisors, and the questionnaire for document analysis were not piloted due to the small number of the subjects involved.

### **3.7 Process of data collection**

Once the questions of the instruments were checked for validity and reliability, the main study was implemented. Appointments were made earlier with all interviewees through personal visit. To make things easier and to come for the interview prepared, the questions for the interview were given ahead of the date set for the interview. Self-administered open-ended questions were given to three MOE supervisors, and three secondary school directors. The time for the interview ranged from one hour and fifteen minutes for the directors to a maximum of two hours for the MOE supervisors. The different duration was due to nature of questions and nature of the respondents, some explain thoroughly while others just give short and brief answers. The interviews were recorded using a tape recorder and note taking. At the end of every interview, the tape was replayed to those participants that were audio taped to check for accuracy of the information, at the same time to check whether the recording was correct and clear and audible enough for later transcriptions.

The questionnaires were given in a written form to eight lecturers, fourteen student-teachers, and twenty-three practising science teachers. Most of them took the questionnaire over night and brought it the day after. This gave them enough time to think over the questions and

give reasonable answers. The time the researcher was visiting the schools coincided with the call of the science teachers for an in-service training programme in the preparation for the “Rapid Transformation of Eritrean Education” which would be implemented in 2003-2004 academic year. I sent fifteen copies of the questionnaire to the graduate science teachers through a colleague, who recently completed his Master’s in science education in Indonesia, giving detailed orientation about how to administer the questionnaires. The questionnaire was accompanied with a letter from the Human Resource Development, (HRD) demanding cooperation with the researcher from any governmental or non-governmental institutions.

In administering the questionnaires a brief explanation of how to respond to the questions was given on one-to-one basis, to the student-teachers in the University. As the instruments were in English, effort was made to read every question and explain what it is looking for before they expressed their viewpoints on each item. Similarly, the interviews were all conducted on a one-to-one situation. This method facilitated an in-depth and rich data collection (Kumar, 1996; Babbie and Mouton, 1998).

### **3.8 Code of Ethics**

Much consideration was given to ethical issues in conducting this study. Nachmias and Nachmias (1990:174) explained that ethics involve “...the right to research and acquire knowledge, and the right to the individual research participant to self determination, privacy and dignity”. Also, a written permission was obtained from the Human Resource Development (HRD) office at the University of Asmara. The letter from HRD was addressed to the Faculty of Education at the university, five secondary schools in different administrative regions asking every institution visited to collaborate with the study.

All participants in the study either for the interview or the questionnaire were selected based on their free will to participate in the study. The subjects were briefed about the purpose of the study and assured of their anonymity so that they could express their views freely.



### 3.9 Data analysis

The data were analysed qualitatively and quantitatively. Qualitatively to get detailed and in-depth information about the programme and quantitatively to measure the reactions of all the stakeholders involved in the study to a limited set of questions thus facilitating comparison and statistical aggregation of the data. This was to permit lead to broad generalizable set of findings. A thorough description of the stakeholders' responses was done in terms of the four indicators used for the study namely, effort, effectiveness, impact and relevance. As Baker (1994) has explained, cross tabulations are helpful in analysing the ratings on the levels of difficulty of the courses offered by a programme.

The qualitative data were analysed in terms of emerging themes or patterns not determined *a priori*. This is to reduce the tendency to personal bias on my part. The constant comparison method, which guided me, was done to examine possible trends in the responses and the relationship among concepts. Ultimately, the emerging themes and their implications for teacher education and instructional practices were explored and highlighted.

A quantitative analysis in form of descriptive statistics was carried out to provide observable patterns or trends in which the four evaluation indicators manifested themselves. These patterns were then supported with appropriate excerpts derived from the qualitative part of the study.

# CHAPTER FOUR

## RESULTS AND DISCUSSION

### 4.1 Introduction

In this chapter, the views and perceptions of the stakeholders, “insiders” and “outsiders” were explored to determine the extent to which the SEU programme has achieved the stated objectives. As indicated before the “insiders” include prospective teachers and university lecturers. The “outsiders” include practising science teachers, secondary school directors (head masters), and MOE officials (supervisors). Therefore, the purpose of this chapter is to analyse, interpret all the collected data in relation to success or failure of the SEU programme at University of Asmara in Eritrea.

The data collected from the different stakeholders are presented and discussed in terms of an evaluation framework underlying the study. The framework consists of four indicators: effort; effectiveness; impact and relevance. The focus is to examine the perceptions of the various stakeholders about the quality of the SEU training programme at the University of Asmara in Eritrea in terms of these four indicators.

### 4.2. INSIDERS

#### 4.2.1 Perceptions of prospective teachers

The data in Table 4.1 are derived from the responses of 14 prospective teachers undergoing training at the SEU, University of Asmara in Eritrea. None of the subjects had teaching experience before they enrolled at the SEU training programme. On why they enrolled at SEU, almost all did so because they did not meet the requirements set by the other faculties. For ease of reference, the responses of the prospective teachers are presented in percentages ranging from Strongly Agree (SA) to Strongly Disagree (SD). Also, the Strongly Agree and Agree percentages have been combined. Likewise, the strongly Disagree and Disagree have also been combined. In reality, on a Likert-type scale, the responses at the opposite ends are likely to be stable than those in the undecided zone (Ogunniyi, 1984,1992). In the following sections, the findings will be presented on each indicator separately before a summary is given afterwards.



**Table 4.1 Percentage of prospective teachers' perceptions about the SEU Programme**

| Key concepts  | SA          | A            | Ud           | D            | Sd          |
|---|-------------|--------------|--------------|--------------|-------------|
| <b>SEU Programme activities</b>   |             |              |              |              |             |
| <b>Effort</b>   |             |              |              |              |             |
| 1. Is a well-managed and organized programme.   | 0<br>(1)    | 35.5<br>(5)  | 35.5<br>(5)  | 21.3<br>(3)  | 7.1<br>(1)  |
| 2. Has adequate class instruction.  | 7.1<br>(1)  | 42.6<br>(6)  | 7.1<br>(1)   | 28.4<br>(4)  | 14.2<br>(2) |
| 3. Pays attention to students' needs extra-time tutorials.                            | 0           | 14.2<br>(2)  | 0            | 42.6<br>(6)  | 42.6<br>(6) |
| 4. Has instructors that always give class feedback.                                   | 0           | 14.2<br>(2)  | 21.3<br>(3)  | 42.6<br>(6)  | 21.3<br>(3) |
| <b>Sub-total</b>  |             | <b>28.6%</b> | <b>16.1%</b> | <b>55.4%</b> |             |
| <b>II. Effectiveness</b>  |             |              |              |              |             |
| 5. Offers appropriate teaching methods.   | 7.1<br>(1)  | 21.3<br>(3)  | 21.3<br>(3)  | 28.4<br>(4)  | 21.3<br>(3) |
| 6. Includes relevant science courses.   | 21.3<br>(3) | 14.2<br>(2)  | 7.1<br>(1)   | 35.5<br>(5)  | 21.3<br>(3) |
| 7. Involves a reasonable workload.  | 0           | 42.6<br>(6)  | 42.6<br>(6)  | 14.2<br>(2)  | 0           |
| <b>Sub-total</b>  |             | <b>35.7%</b> | <b>23.8%</b> | <b>40.5%</b> |             |
| <b>III. Impact</b>  |             |              |              |              |             |
| 8. Makes one acquire thinking skills that could be developed in pupils.               | 14.2<br>(2) | 49.7<br>(7)  | 7.1<br>(1)   | 14.2<br>(2)  | 14.2<br>(2) |
| 9. Gives one the feeling of professional development.                                 | 14.2<br>(2) | 21.3<br>(3)  | 7.1<br>(1)   | 21.3<br>(3)  | 35.5<br>(5) |
| 10. Helps one to develop a positive attitude towards the teaching profession.         | 7.1<br>(1)  | 14.2<br>(2)  | 21.3<br>(3)  | 28.4<br>(4)  | 28.4<br>(4) |
| 11. Makes one to attain the major concepts needed for further studies in the field.   | 21.3<br>(3) | 7.1<br>(1)   | 28.4<br>(4)  | 14.2<br>(2)  | 28.4<br>(4) |
| <b>Sub-total</b>  |             | <b>37.5%</b> | <b>16.1%</b> | <b>46.4%</b> |             |
| <b>IV. Relevance</b>  |             |              |              |              |             |
| 12. Gives clarity about how to teach the subject.                                     | 14.2<br>(2) | 35.5<br>(5)  | 7.1<br>(1)   | 28.4<br>(4)  | 14.2<br>(2) |
| 13. Teaches me skills on how to prepare pupils for life and service in the community. | 0           | 49.7<br>(7)  | 21.3<br>(3)  | 7.1<br>(1)   | 21.3<br>(3) |
| 14. Is an appropriate programme for teachers?   | 14.2<br>(2) | 0            | 42.6<br>(6)  | 35.5<br>(5)  | 7.1<br>(1)  |
| 15. Will assist me in making several changes to my pupils' ways of thinking.          | 0           | 35.5<br>(5)  | 42.6<br>(6)  | 7.1<br>(1)   | 14.2<br>(2) |
| <b>Sub-total</b>  |             | <b>37.5%</b> | <b>28.6%</b> | <b>33.9%</b> |             |

**Key:** Strongly agree = SA; Agree = A; Undecided = Ud; Disagree = D; Strongly disagree = Sd  
N=14

**Note:** the Values in brackets are frequency counts.

## **Effort**

A close examination of Table 4.1 indicates that just over a quarter, 28% of the subjects agree with the effort put into the teacher education programme at the SEU. About a half of the subjects (55%) does not agree with the effort put into the programme. More specifically, about one-third (35.5%) is of the view that the programme is well organized and managed; 35.5% is undecided and 35.5% does not seem to hold a positive view of the programme. In addition, 50% believes that the programme offers adequate class instruction while 43% disagree.

About fourteen (14%) of the prospective teachers, indicate that the extra time tutorials are adequately given, while about 83% think otherwise. In addition, 29% believe that lecturers provide feedback, 21% was undecided while 64% does not think so. Hence, in terms of effort, it is only one third of the subjects who seems to be in favour of the effort put into the training programme at the SEU, University of Asmara. The fact that 16% are undecided, 14% holds a positive view, while 55% holds a negative view about the programme implies that more effort should be put into the programme.

## **Effectiveness**

The response option reflected in Table 4.1 indicates that about 36% of the prospective teachers viewed the SEU programme as effective, while about 40% felt otherwise. Specifically, about 28% is of the view that the programme offers appropriate teaching methods, 21% is undecided and about 50% is in disagreement. Also, while 36% believes that the programme includes relevant science courses, 7% is undecided and 57% disagrees. With respect to workload, about 43% of the prospective teachers felt that it is reasonable, 43% is undecided and only 14% thinks otherwise.

Concerning the issue of effectiveness, the consensus, of most of the subjects, is that the programme is not very effective. None of the items under the sub-category of effectiveness carries an agreement percentage beyond 45%. In fact, if the disagreement response choice is



combined with indecision, then nearly about two third (64%) of the subjects might not be favourably disposed to the programme.

### **Impact**

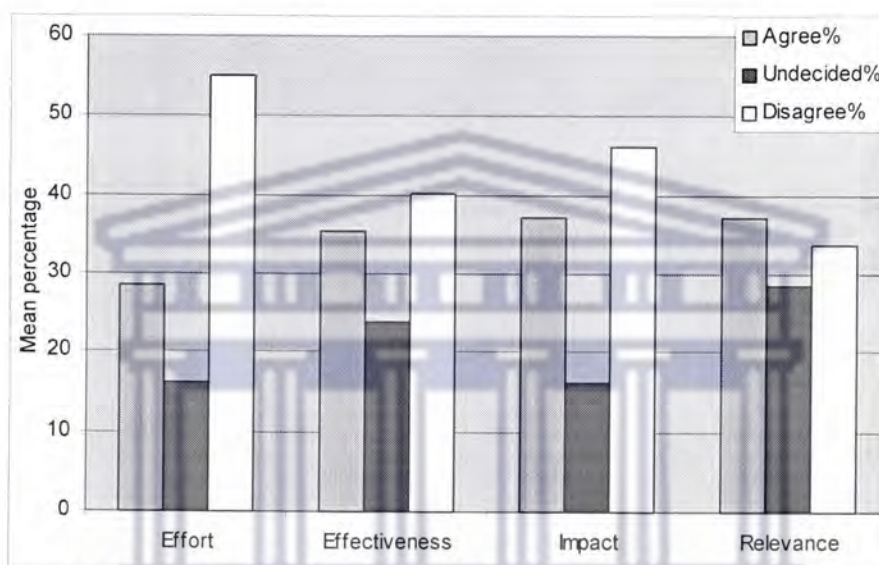
A close examination of Table 4.1 indicates that only about a third (37%) of the subjects perceived the SEU teacher-training programme to exert a positive impact on them, while the 46% felt otherwise. More specifically, 64% is of the view that the programme makes one to acquire thinking skills that could be developed in pupils. However, about 28% disagrees with this statement. In addition, while 36% believes that the programme gives one the feeling of professional development, 57% is of the view that it does not give one such a feeling. Twenty one (21%) of the subjects is of the view that the programme helps one to develop a positive attitude towards the teaching profession, 21% is undecided, and 57% disagrees. In addition, about 28% believes that the programme makes one to attain the major concepts needed for further studies in the field; 43% disagrees while 28% is undecided.

What the above amounts to, as far as impact is concerned, is that only about one-third (37.2%) of the subjects regard the programme as exerting a positive impact. Considering the critical importance of impact on any programme, e.g. in terms of pedagogical content knowledge, disciplinary or cognate content knowledge, and the provision of appropriate teaching methodology, it is worrying that a substantial percentage of the subjects (63%) holds a negative, or uncertain view about the programme's impact. A programme perceived by the clients as lacking impact cannot be expected to enhance the required capacity needed for instructional practice afterwards.

### **Relevance**

An examination of Table 4.1 shows that about 37% of the subjects perceives the SEU teacher education programme at the SEU as relevant while about 34% perceives it to be otherwise. More specifically, 50% is of the view that the programme gives clarity about how to teach the subjects while 43% disagrees. Also, while 50% believes that the programme

teaches skills on how to prepare pupils for life, and service in the community, 21% is undecided and about 28% disagrees. In addition, 14% is of the view that the programme is appropriate for teachers; 43% is undecided and another 43% thinks otherwise. Finally, while 36% believes that the programme enhances pupils' ways of thinking, 43% is undecided while 21% does not think so.



**Fig 2: Prospective teachers' perceptions about the SEU programme**

### Summary

Figure 1 above summarizes the prospective teachers' perceptions about the quality of the SEU programme in terms of the four evaluation indicators examined in the study. The highest disagreement percentage is on effort, followed by impact, effectiveness and lastly relevance. The only indicator where the disagreement is relatively less than the agreement percentage is on relevance. However, the degree of indecision is also high with respect to relevance and effectiveness compared to the other two indicators. The conflicting views of the subjects are probably indicative of their overall mixed feelings about the overall programme. This will be expounded on later. Based on the perceptions of the prospective teachers, as shown in Table 4.1 and Fig 1, it can be assumed that, the whole programme does not meet the expectations of the clients or meets only the expectations of the minority.



#### 4.2.2. Perceptions of the SEU Lecturers'

The eight subjects (L<sub>1</sub>-L<sub>8</sub>) involved in this study were lecturers from the SEU and Science Faculty at the University of Asmara. This group incorporates those who are from the SEU, teaching pedagogic courses, and those in the Faculty of Science teaching science courses. The subjects in this category have teaching experience ranging between eleven and thirty-two years. With respect to their qualifications, 25% holds Masters degree, while 75% holds PhD in their respective fields of study. In terms of their workload, 75% is of the view it is overloaded, while 25% does not think so. Further, an analysis of their perceptions and viewpoints about the quality of the teacher education programme at the SEU were clustered around the four evaluation indicators: effort, effectiveness, impact and relevance. Their perceptions on these indicators vary quite widely (Table 4.2). Again, for ease of reference, the responses to the Lecturers are presented in percentages ranging from Strongly Agree (SA) to Strongly Disagree (SD). Also, the Strongly Agree and Agreement percentages have been combined. Similarly, the Strongly Disagree and Disagree have also been combined.

In the following sections, the findings are presented on each indicator separately before a summary is given afterwards.

##### **Effort**

From the analysis of Table 4.2, it seems that about 44% of the subjects (i.e. lecturers) agrees with the effort put into the teacher education programme at the SEU, 19 % is undecided and about 37% thinks otherwise. More specifically, almost 38% of the subjects are of the view that the programme is well organized and managed, 12% are undecided and 50% does not seem to hold a positive view of the programme. Also, 63% of the subjects believes that the programme offers adequate class instruction, and 38% disagrees. With respect to extra time tutorials, about 38% of the subjects are of the view that it is adequate, 25% is undecided and 38% thinks otherwise. In addition 38% believes that the programme provides feedback, 37% is undecided and 25% does not think so. Hence, in terms of effort, less than half of the subjects is favourably disposed to the training offered at the SEU, University of Asmara.

**Table 4.2 Percentage of Lecturers' perceptions about the SEU programme**

| Key concepts  | SA           | A           | Ud           | D            | Sd          |
|---|--------------|-------------|--------------|--------------|-------------|
| SEU Programme activities  |              |             |              |              |             |
| <b>I. Effort</b>  | 0            | 37.5        | 12.5         | 37.5         | 12.5        |
| 1. Is a well-managed and organized programme.   |              | (3)         | (1)          | (3)          | (1)         |
| 2. Has adequate class instruction.  | 12.5<br>(1)  | 50<br>(4)   | 0            | 37.5<br>(3)  | 0           |
| 3. Pays attention to students' needs extra-time tutorials.                            | 12.5<br>(1)  | 25<br>(2)   | 25<br>(2)    | 25<br>(2)    | 12.5<br>(1) |
| 4. Has instructors that always give class feedback.                                   | 12.5<br>(1)  | 25<br>(2)   | 37.5<br>(3)  | 12.5<br>(1)  | 12.5<br>(1) |
| <b>Sub-total</b>  | <b>43.7%</b> |             | <b>18.7%</b> | <b>37.5%</b> |             |
| <b>II. Effectiveness</b>  | 0            | 37.5        | 37.5         | 25           | 0           |
| 5. Offers appropriate teaching methods.   |              | (3)         | (3)          | (2)          |             |
| 6. Includes relevant science courses.   | 37.5<br>(3)  | 62.5<br>(5) | 0            | 0            | 0           |
| 7. Involves a reasonable workload.  | 12.5<br>(1)  | 75<br>(7)   | 0            | 0            | 0           |
| <b>Sub-total</b>  | <b>79.2%</b> |             | <b>12.5%</b> | <b>8.3%</b>  |             |
| <b>III. Impact</b>  |              |             |              |              |             |
| 8. Makes one acquire thinking skills that could be developed in pupils.               | 12.5<br>(1)  | 62.5<br>(5) | 12.5<br>(1)  | 12.5<br>(1)  | 0           |
| 9. Gives one the feeling of professional development.                                 | 0            | 75<br>(6)   | 25<br>(2)    | 0            | 0           |
| 10. Helps one to develop a positive attitude towards the teaching profession.         | 0            | 12.5<br>(1) | 50<br>(4)    | 25<br>(2)    | 0           |
| 11. Makes one to attain the major concepts needed for further studies in the field.   | 12.5<br>(1)  | 75<br>(6)   | 12.5<br>(1)  | 0            | 0           |
| <b>Sub-total</b>  | <b>62.5%</b> |             | <b>25.0%</b> | <b>12.5%</b> |             |
| <b>IV. Relevance</b>  |              |             |              |              |             |
| 12. Gives clarity about how to teach the subject.                                     | 0            | 50<br>(4)   | 12.5<br>(1)  | 12.5<br>(1)  | 25<br>(2)   |
| 13. Teaches me skills on how to prepare pupils for life and service in the community. | 12.5<br>(1)  | 50<br>(4)   | 25<br>(2)    | 12.5<br>(1)  | 0           |
| 14. Is an appropriate programme for teachers.   | 12.5<br>(1)  | 50<br>(4)   | 25<br>(2)    | 12.5<br>(1)  | 0           |
| 15. Will assist me in making several changes to my pupils' ways of thinking.          | 12.5<br>(1)  | 75<br>(6)   | 12.5<br>(1)  | 0            | 0           |
| <b>Sub-total</b>  | <b>65.7%</b> |             | <b>18.7%</b> | <b>15.6%</b> |             |

**Key:** Strongly agree = SA; Agree = A; Undecided = Ud; Disagree = D; Strongly disagree = Sd  
 N=8 **Note:** the Values in brackets are frequency counts.



However, the fact that about 19% is undecided and another 37% holds a negative view about the programme implies the need for more effort, particularly in terms of the programme's organization and management, where only about 38% of the subjects is in agreement with the programme management. Also, a set of items in which over a third (38%) of the subjects disagrees should be a source of concern to the organizers of the programme.

### **Effectiveness**

The response option reflected in Table 4.2 indicates that about 79% of the lecturers viewed the SEU programme as effective, about 8% disagrees with the effectiveness and 13% is undecided. To be more specific, about 38% are of the view that the programme offers appropriate teaching methods, 37% is undecided and 25% disagrees. Also, all of the subjects (100%) believe that the programme includes relevant science courses and provides reasonable workload.

With respect to the issue of effectiveness, the overall consensus of most of the subjects is that the programme is effective. With the exception of the quality of the teaching methods, none of the categories under this sub-heading carries a disagreement and indecision. What makes all to agree on this item? As Chinapah and Miron (1990:20) have indicated, if a programme staff member is asked to comment on the activities of an institution he or she is working in, there is the risk that he or she may be biased.

### **Impact**

A close examination of Table 4.2 indicates that about 63% of the subjects asserts that the SEU teacher-training programme has impact on them, while 13% felt otherwise. More specifically, seventy five 75% is of the view that the programme makes one to acquire thinking skills that could be developed in pupils, however, about 12% is undecided and about 13% disagrees with this statement. Also, while 75% believes that the programme gives one the feeling of professional development, 25% is undecided. None is of the view that it does not give such a feeling. Thirteen percent is of the view that the programme helps one to develop a positive attitude towards the teaching profession, 50% is undecided, and

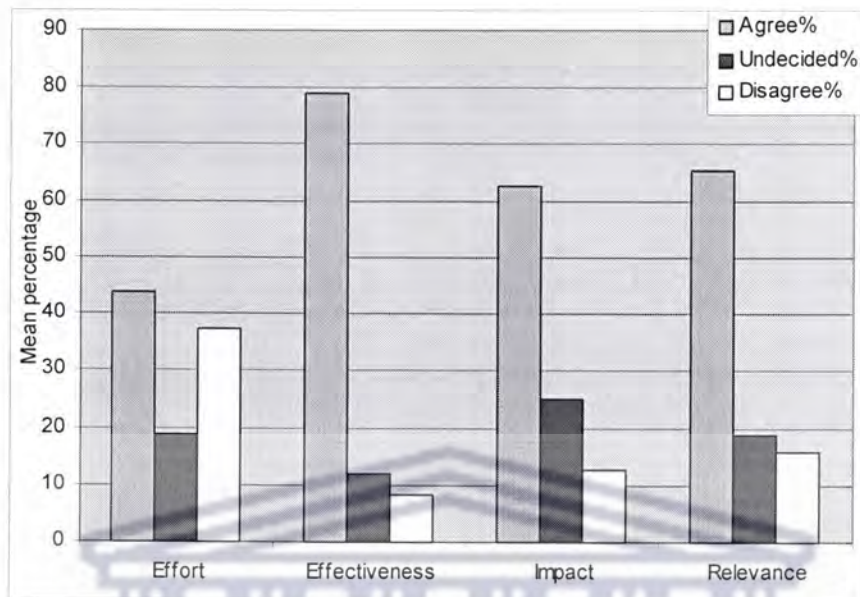
37% thinks otherwise. Also, about 88% believes that the programme provides major concepts needed for further studies in the field, 12% is undecided.

What the above amounts to, as far as effectiveness is concerned, is that only about four fifths of the subjects regard the programme to be effective. Considering the critical importance of the items involved in this indicator of programme quality viz: pedagogical content knowledge, disciplinary or cognate content knowledge and the workload, it seems encouraging that a substantial percentage of the subjects (80%) holds a positive view about the programme's effectiveness. However, it must be realised that these positive responses made by the lecturers do not accord with those of the clients, the prospective science teachers.

## **Relevance**

An examination of Table 4.2 shows that about 66% of the subjects perceives the teacher education programme at the SEU as relevant while about 16% feels otherwise. More specifically, 50% of the subjects is of the view that the programme gives clarity about how to teach the subjects, while 12% are undecided and 38% of them disagree. Also, while 63% believes that the programme teaches skills how to prepare pupils for life and service in the community, 25% are undecided and about 12% disagree. Also, 63% is of the view that the programme is appropriate for teachers, 25% is undecided and 13% thinks otherwise. Finally, while 88% is of the view that the programme assists in making several changes to their pupils' ways of thinking, 12% is undecided.





**Fig 3: Lecturers' perceptions about the SEU programme**

### Summary

As can be seen in fig 3, the majority of the lecturers hold a positive view about the programme. Nearly 80% believes that the programme is effective. The next in rank is the programme's perceived relevance, then impact and lastly effort. Only about two-fifths are of the view that the effort exerted on the programme is adequate, with the exception of impact. Less than 20% of the subjects disagrees with the idea that adequate effort was made or that the programme was either effective or relevant. The lecturers' perceptions of the programme seem to be a reversal of those of the prospective teachers. Also, with the exception of "effort" carrying about 38% of indecision, the other indicators have less than 20% of the subjects expressing indecision. Apart from the items around "effort" on which about 38% expressed uncertainty, most of the subjects maintain a clear position on their perceptions of the programme.

## 4.3. OUTSIDERS

### 4.3.1 Perceptions of practising teachers

The data in Table 4.3 are derived from the responses of 20 practising secondary school science teachers trained at the SEU, University of Asmara in Eritrea. Of the 20 teachers, 25% had teaching experience ranging between one and five years while the rest 75% had no teaching experience before they enrolled at the SEU training programme. On why they enrolled at the SEU, about 90% did so because they did not meet the requirements set by the other faculties. Only about 10% of the practising science teachers indicated that they enrolled at the SEU because they wanted to teach. Further, an analysis of their perceptions and viewpoints about the quality of the SEU teacher education programme in terms of the four indicators: effort, effectiveness, impact and relevance (Veney and Kaluzny, 1991) vary quite remarkably.

#### Effort

A close examination of Table 4.3 indicates that about three fifths (63%) of the subjects agree with the effort put into the teacher education programme at the SEU, and about a quarter (25%) does not agree with the effort put into the programme.

More specifically, about 65% of the subjects is of the view that the programme is well organized and managed, 13% is undecided and a quarter (25%) does not seem to hold a positive view of the programme. Also, 55% of the subjects believes that the programme offers adequate class instruction, 20% is undecided and 25% disagrees. Eighty percent of the subjects indicates that the extra time tutorials are adequately given and about 15% thinks otherwise. Also, 50% believes that the lecturers provide feedback, and the other 50% does not think so. Hence, in terms of effort, it is fair to say that almost two-thirds of the subjects are favourably disposed to the training offered at the SEU, University of Asmara. However, in view of the fact that about 13% are undecided and another 25 % holds a negative view about the programme implies the need for more effort be put on the programme, particularly in terms of quality of instruction and class feedback where only about a half of the subjects is in agreement with the quality of the programme



**Table 4.3**Percentage of the practising teachers' perceptions about the SEU programme

| Key concepts  | SA           | A         | Ud           | D            | Sd        |
|---|--------------|-----------|--------------|--------------|-----------|
| SEU Programme activities  |              |           |              |              |           |
| <b>I. Effort</b>  |              |           |              |              |           |
| 1. Is a well managed and organize programme.  | 20<br>(4)    | 45<br>(9) | 25<br>(5)    | 10<br>(2)    | 0         |
| 2. Has adequate class instruction.  | 15<br>(3)    | 40<br>(8) | 20<br>(4)    | 25<br>(5)    | 0         |
| 3. Pays attention to students' needs extra-time tutorials.                            | 45<br>(9)    | 35<br>(7) | 5<br>(1)     | 15<br>(3)    | 0         |
| 4. Has instructors that always give class feedback.                                   | 30<br>(6)    | 20<br>(4) | 0            | 50<br>(10)   | 0         |
| <b>Sub total</b>  | <b>62.5%</b> |           | <b>12.5%</b> | <b>25.0%</b> |           |
| <b>II. Effectiveness</b>  |              |           |              |              |           |
| 5. Offers appropriate teaching methods.   | 20<br>(4)    | 15<br>(3) | 35<br>(7)    | 30<br>(6)    | 0         |
| 6. Includes relevant science courses.   | 10<br>(2)    | 40<br>(8) | 10<br>(2)    | 35<br>(7)    | 5<br>(1)  |
| 7. Involves a reasonable workload.  | 10<br>(2)    | 30<br>(6) | 40<br>(8)    | 20<br>(4)    | 0         |
| <b>Sub total</b>  | <b>41.6%</b> |           | <b>28.3%</b> | <b>30.1%</b> |           |
| <b>III. Impact</b>  |              |           |              |              |           |
| 8. Makes one acquire thinking skills that could be developed in pupils.               | 20<br>(4)    | 20<br>(4) | 15<br>(3)    | 45<br>(9)    | 0         |
| 9. Gives one the feeling of professional development.                                 | 60<br>(12)   | 20<br>(4) | 5<br>(1)     | 10<br>(2)    | 5<br>(1)  |
| 10. Helps one to develop a positive attitude towards the teaching profession.         | 50<br>(10)   | 30<br>(6) | 10<br>(2)    | 10<br>(2)    | 0         |
| 11. Makes one to attain the major concepts needed for further studies in the field.   | 20<br>(4)    | 30<br>(6) | 20<br>(4)    | 25<br>(5)    | 5<br>(1)  |
| <b>Sub total</b>  | <b>62.5%</b> |           | <b>12.5%</b> | <b>25.0%</b> |           |
| <b>IV. Relevance</b>  |              |           |              |              |           |
| 12. Gives clarity about how to teach the subject.                                     | 10<br>(2)    | 20<br>(4) | 10<br>(2)    | 45<br>(9)    | 15<br>(3) |
| 13. Teaches me skills on how to prepare pupils for life and service in the community. | 40<br>(8)    | 10<br>(2) | 35<br>(7)    | 10<br>(2)    | 5<br>(1)  |
| 14. Is an appropriate programme for teachers.   | 15<br>(3)    | 15<br>(3) | 20<br>(4)    | 40<br>(8)    | 10<br>(2) |
| 15. Will assist me in making several changes to my pupils' ways of thinking.          | 10<br>(2)    | 25<br>(5) | 25<br>(5)    | 30<br>(6)    | 10<br>(2) |
| <b>Sub total</b>  | <b>36.3%</b> |           | <b>22.5%</b> | <b>41.3%</b> |           |

**Key:** Strongly agree = SA; Agree = A; Undecided = Ud; Disagree = D; Strongly disagree = Sd  
N=20 **Note:** the Values in brackets are frequency counts

## **Effectiveness**

The response option reflected in Table 4.3 indicates that about 42% of the practising teachers views the SEU programme as effective while about 30% disagrees with the effectiveness of the training programme. In other words, 35% thinks that the programme offers appropriate teaching methods, 35% is undecided and 30% does not think so. Also, while 50% believes that the programme includes relevant science courses, 10% is undecided and 40% disagrees. With respect to workload, about 40% of the practising teachers feels that the work is reasonable, 40% is undecided and 20% thinks it is not reasonable. With respect to the issue of effectiveness, the overall consensus of most of the subjects is that the programme is not very effective. None of the categories under these sub-headings carries an agreement percentage above 50%. In fact, if the disagreement response choice is combined with indecision, then nearly three-fifth (58%) of the subjects might not be favourably disposed to the programme.

## **Impact**

A close examination of Table 4.3 indicates that about 63% of the subjects asserts that the SEU teacher education programme has impact on them while 25% thinks otherwise. In terms of the specific items constituting this indicator, 40% is of the view that the programme makes one to acquire thinking skills that could be developed in pupils while about 45% disagrees with this statement. Also, while 80% believes that the programme gives the feeling of professional development, 15% is of the view that it does not give one such a feeling. Further, about 80% is of the view that the programme helps to develop a positive attitude towards the teaching profession, while 10% thinks otherwise. Also, about 50% of the subjects believes that the programme provides major concepts needed for further studies in the field, 30% disagrees and 20% is undecided.

What the above amounts to, as far as effectiveness is concerned, is that only about two-fifths of the subjects regard the programme to be effective. Considering the critical importance of the items involved in this category, it should be of some concern that (58%) holds a negative



or uncertain view about the programme's impact. A programme perceived by the consumers to exert low impact is unlikely to influence them in any significant way.

### Relevance

The relevance of the programme as reflected in Table 4.3 shows that about 36% of the subjects perceives the teacher education programme at the SEU as relevant, while about 42% feels otherwise. More specifically, 30% of the subjects is of the view that the programme gives clarity about how to teach the subjects, while 10% is undecided and 60% disagrees. Also, while 50% believes that the programme teaches skills how to prepare pupils for life and service in the community, 35% is undecided and about 15% disagrees. Also, 30% is of the view that the programme is appropriate for teachers, 20% is undecided and 50% thinks otherwise. Finally, 35% is of the view that the programme assists in making several changes to their pupils' ways of thinking, 25% is undecided and 40% does not think so.

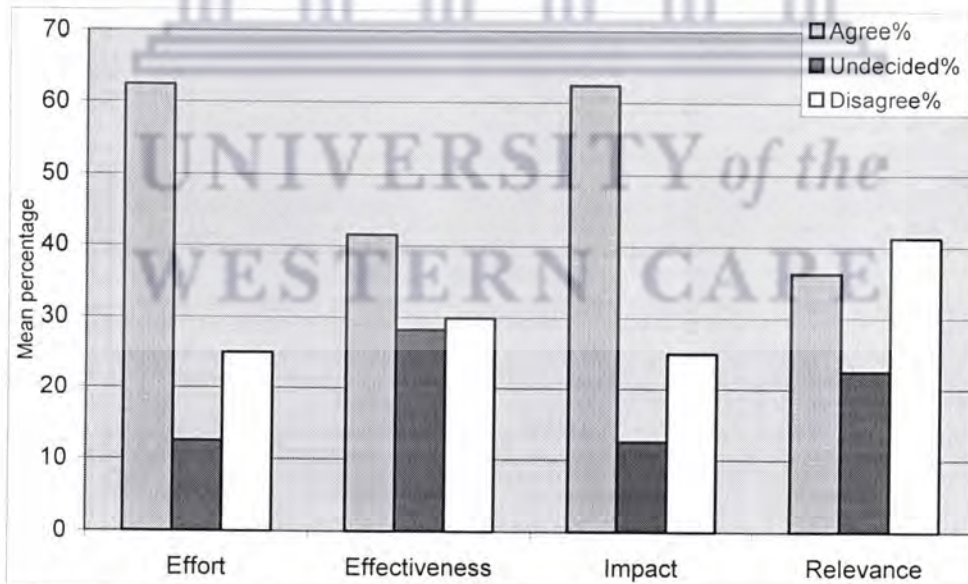


Fig 4: Practising science teachers' perceptions about the SEU programme

## Summary

Fig 4 summarizes practising teachers' perceptions of the quality of the SEU programmes. As can be seen in Fig 4, a considerable percentage (63%) of the subjects is of the view that the effort put on the SEU programme is reasonably adequate. However, only about 42% thinks that the programme has been effective. As with effort, nearly two third (63%) believes that the programme has impact on their training compared to only about a thirds (36%) who feels that the programme is relevant.

The highest mean disagreement percentage is on relevance. Overall, the practising teachers, like the lecturers, seem generally positive about the programme. Nevertheless, the fact that about two-thirds of the subjects disagree, or are less certain about the relevance of the programme, is worthy of closer consideration.

### 4.3.2 Perceptions of MOE supervisors of about the SEU Programme

To recapitulate, the study involved the implementation of a number of instruments. In addition to the questionnaires of the prospective teachers, student-teachers, and lecturers, the supervisors of MOE were interviewed to find out their views about the quality of the SEU teacher education programme. The supervisors were asked whether or not what the practising teachers teach is relevant to the students' daily lives. For ease of reference, the three subjects (supervisors) are represented by  $S_1$ ,  $S_2$  and  $S_3$ . Their overall years of work experience are 28, 32 and 36 respectively. These supervisors often visit the secondary schools to observe the teaching-learning process, and to offer suggestions on how teachers could improve their instructional practices. The supervisors were interviewed in terms of the four programme quality indicators: effort, effectiveness, impact and relevance. In line with Ferguson's (1976) suggestion about the small size of  $N$ , only excerpts of their responses, rather than the percentages of responses, are presented in this report



## **Effort**

In answering whether or not the practising teachers are adequately equipped for their work, the supervisors expressed different viewpoints. Two of the supervisors were of the view that the science teachers have acquired adequate content knowledge. However, the third one thought that the teachers were not adequately prepared. For instance, S<sub>3</sub> asserts:

Yes, because the SEU teachers are found to have mastered the subject matter they teach, they don't seem to have any shortcomings with the content they teach. They have been seen explaining the concepts to their learners. They have also been very confident in tackling challenging questions from their students.

On the other hand, all the supervisors felt that these teachers lack methodology of teaching. In elaborating on this, the supervisors added that the teachers were not good enough on preparing lesson plans, lesson notes and classroom management skills. In this regard, S<sub>2</sub> says that, "these practising teachers in my school want to teach without any preparation. i.e., no lesson plan and no lesson note. They just read from the textbook and give lecture". Teaching is demanding and is not just the transmission of instruction. It involves the learners as much as possible. Mboya and Mwawenda (1994) state:

Effective teachers are those who design lessons, utilize appropriate teaching strategies and implement management techniques to optimise learning for all students...such teaching and learning is referred to as quality teaching. (p.387)

## **Effectiveness**

In terms of the effectiveness of the programme, the supervisors are of the view that the teaching strategies employed by the practising teachers, while teaching science, are largely teacher centred. The emphasis is transmission of information through the talk-and-chalk method. They elaborated further that the teachers lacked experience in the application of the

participatory approach. For instance, S<sub>2</sub>, while elaborating the teacher-centred approach used by the teachers said, "...they simply use the lecture method of presentation without participation of their students. Even in the laboratory it is the teacher who is demonstrating".

According to Straus and Corbin (1998:30), "A teacher-dominated instruction tends to inhibit pupils' learning". The pupils need to participate in classroom activities in order to achieve several skills such as: decision making, value judgment, problem solving and critical thinking which constitute an important goal of science education (Stuart, 1991).

The supervisors were also asked whether or not the teachers clearly stated the objectives of the lesson, and made their learners aware of what they were supposed to learn. In response to this question the supervisors said that even though teachers normally wrote their annual and weekly lesson plans, they often did not apply them to the classroom setting. They further indicated that even the experienced teachers who were not trained at SEU hardly made their learners aware of what they were expected to learn. In regard to this observation S<sub>3</sub> says:

I believe they don't make their pupils aware of what the students are supposed to learn even though the teachers from SEU could sufficiently disclose their objectives of teaching in their annual and weekly plans. I think, it is not only the SEU graduates who are failing in this aspect, all teachers in general do not seem to make their students motivated in making them aware ahead of time on the knowledge benefits that students would gain and how that knowledge would help them in their future life.

He further recommended that all teachers (including the non SEU graduates) should be in the position of preparing their students to eagerly grasp the knowledge they transmit by clearly expressing the benefits the students would get from each topic, chapter or unit prior to their teaching the subject matter.



## Impact

As explained earlier, some of the SEU's objectives that are related to this study are: to equip students of the faculty of education with basic theories, and practices that will enable them to become qualified secondary school teachers in Eritrea. In other words, the aim is to equip the teachers with subject content knowledge and pedagogical content knowledge. In the light of these objectives, the supervisors were asked to comment whether or not the programme had achieved its intended objectives. According to S<sub>2</sub>, the intended SEU's objectives have achieved only to some extent. As far as he is concerned, the quality of science teachers produced at the SEU does not meet the required standard. He expresses his view as follows:

I don't think so. These science teachers are those who are relatively low academic performers in their first year, those who could not fulfil the requirements of other faculties that demand higher academic performance, (e.g. engineering, law, medicine, pharmacy, and accounting) and almost all are said to have joined the SEU because they do not have other choice or alternative. Then, how can one expect these to be effective teachers?

Teacher training programmes may be designed to accommodate the expected lower intellectual profile of the applicants, or lower achieving students provided of course the overall quality is not compromised. Ware (1992:32) contends that, "...it is not logical to offer the future science teachers with weak background in science fewer science courses". For her, this tends to lower the content knowledge of the teachers to be trained. There is no simplistic solution to this problem. However, to accomplish desirable outcomes, it is imperative that some academic development activities are embedded in the training programme to upgrade the overall capacity of these relatively weak but willing students. However, unless the students have the necessary motivation, even the best academic development programme will fail to attain the desired goal.

## Relevance

A programme is said to be relevant if it satisfies the needs of the beneficiaries, and enables them to develop problem-solving skills. In relation to this, Hewson (1995:249) stated, "Learners can construct knowledge in ways that are coherent and useful to them and produce relatively stable pattern of belief".

I asked the supervisors if what the teachers teach is relevant to the students' daily lives. In responding to this question, the three supervisors are of the view that what the teachers teach is partly relevant to the students' needs. In this regard S<sub>3</sub> expresses his view as follows:

I do not think, because they do not seem to be practical in their teaching- they do not teach with the help of demonstrations and/or experiments. They are reluctant in taking their students to educational trips. They do not participate in related clubs such as in science and technology or HIV/Aids and Agriculture clubs.

### 4.3.3 Perceptions of secondary school directors about the SEU programme

In addition to the MOE supervisors' interview, three directors from secondary schools were also interviewed to assess whether or not the practising teachers are adequately equipped, and what strategies they employ in the teaching learning process. Moreover, the directors were asked to state whether or not the SEU objectives were being achieved. Further more, the directors were asked whether what the practising teachers taught was relevant to the students' way of living or not.

These directors are officiating in the secondary schools where the practising teachers are working. For convenience, the subjects are represented by D<sub>1</sub>, D<sub>2</sub> and D<sub>3</sub>. The years of work experience of D<sub>1</sub>, D<sub>2</sub> and D<sub>3</sub> are: 21, 26 and 24 respectively. Moreover, the subjects' responses about the SEU, via its outcomes, will be presented by classifying their perceptions



and viewpoints about the quality of the teacher education in terms of the programme's effort, effectiveness, impact and relevance.

In the following sections, the findings on each indicator will be presented separately, before a summary is given. Due to their small number, only some excerpts of the statements rather quantitative descriptions are presented (see Ferguson, 1976).

### **Effort**

In answering whether or not the practising teachers are adequately equipped as science teachers, the supervisors have different views. Two out of the three directors are of the view that, the science teachers possess adequate content knowledge and the third one felt otherwise.

On the other hand, all the three directors felt that practising teachers lack the basic methodology of teaching. The directors elaborated further that the practising science teachers do prepare their lesson plans, lesson notes and ably handle disciplinary matters in their classrooms. However, the teachers are generally weak in providing their students with the necessary feedback. According to Martin and Ketner (1996:7), the feedback of a well-managed human service programme promotes improved performance. If learners are not aware of how they are performing, they might lack the necessary incentive to work harder, particularly in cases where they are under-performing. The implication of the directors' comments is that teachers should be trained on the modalities of remedial activities based on appropriate feedback information.

### **Effectiveness**

The second emphasis was on the strengths and weakness the directors observed in the teaching approaches of the practising teachers. In the view of the directors, the teaching strategies employed by the practising teachers is largely dominated by lecturing method; an approach quite susceptible to rote learning.

In Rowell's (1995) view, teacher-centred learning tends to deprive students from developing the necessary experiences in generating meaning, or finding solution by themselves. In her view, learners need to participate in classroom activities in order to achieve problem solving and critical thinking skills.

The directors were also asked about the advantages of these science teachers. In response to this one of the directors, D<sub>1</sub>, listed the benefits of these teachers as follows:

- They solved the shortage of science teachers in our school.
- The school got a chance to get pedagogically oriented teachers.
- These practising teachers are very active participants in extra-curricular activities such as debating, and general knowledge clubs.

However, the other two directors, D<sub>2</sub> and D<sub>3</sub> do not agree with the view of D<sub>1</sub>. For them, the only benefit they agree with D<sub>1</sub> is, with respect to the solution of shortage of teachers.

Responding to whether the practising science teachers motivate their students learn science or not, D<sub>2</sub> and D<sub>3</sub> are of the view that these teachers do not motivate their learners, because they neither come regularly nor well prepared to teach. Whereas D<sub>1</sub>, had a different view and said that they gave extra classes and tutorials to help their students. The contradictory views of the directors indicate their experiences with different teachers. The problem may be related to the learning culture of each school, rather than the teachers themselves. However, this will need further investigation.

### **Impact**

The science teacher education programme at SEU is expected to provide scholarly graduates who on duty would raise the standard of the education system in the secondary schools. One of the SEU's programme objectives is to equip student-teachers with basic subject content knowledge and methodology of teaching.



In regard to this, the directors were asked whether or not the programme had achieved its intended objectives. As far as D<sub>1</sub> is concerned, “The intended SEU’s objectives are achieved partially”. For him, though the programme is supplying pedagogically oriented teachers, they have some shortcomings with respect to the methodology of teaching and communication skills within the classroom, as well as with the school administration.

### **Relevance**

According to Grant (1999:196), universities face a great challenge in preparing prospective teachers to meet the needs of the government and should intensify their programmes to be relevant to the societal needs as well. In relation to this, the directors were asked whether or not what the teachers teach is relevant to the students' ways of living. In responding to this question, all the directors are of the view that what the teachers teach is relevant to the students needs.

The directors are of the view that the content of the science teaching of the SEU is relevant. However, the Ministry of Education, in its report of (2002) indicated that the educational system in the last ten years has been experiencing wastage. One of the reasons given is that the secondary schools are not producing employable graduates. This contradicts the directors' views. The questions are: (1) What does the MOE imply by “unemployable graduates”? (2) How does this relate to the directors views about the teachers meeting the shortage problem? Certainly, these and similar questions are worthy of closer attention in future studies.

### **4.4 Document analysis**

Documents relating to the SEU programme were collected and analysed to provide additional insight into the nature of the programme. According to Hall and Hall (1996:21) the use of organizational records is of particular relevance to evaluation. For them, the evaluation of organizational records plays two major roles: (1) the records provide an insight

into the programme activities; (2) statements could be identified that either incorporates or rejects the data collected for a given study.

The documents collected using the adopted Nigerian Universities Commission (NUC, 1990) questionnaire includes; curriculum materials, admission criteria, academic regulations, academic staff, support staff and physical facilities such as library and offices of SEU. In order to examine the programme credibility from the documents, different rating scales to suit individual documents, were used. The justification for the variety of scales was because the documents deal with different issues on teacher education. The rating scale used for the documents includes: the curriculum, academic staff, supporting staff and physical facilities. The scale ranges between “very adequate =5 to very inadequate =1”. However, in some instances 0 was included to indicate that an item does not exist.

#### **4.4.1 The curriculum**

The responses of the SEU official and the researcher to the documents based on the scale 0 to 5 show that the adequacy of the curriculum for SEU programme has been rated 3, meaning fairly adequate for the teacher training degree programme. The programme includes educational foundation, curriculum and teaching, and their respective science content courses. The SEU students take 31 credit hours of pedagogical courses divided into three: twelve, thirteen, and nine credit hours in second, third and fourth year respectively. These courses are given in combination with their respective subject courses. From these three sections, the student-teachers were expected to acquire what to teach, how to teach and how to assist every pupil to understand the subject content. The Faculty of Education offers the pedagogy courses and the Science Faculty offers the science courses.

The pedagogical courses offered by the Faculty of Education, SEU includes:

Epsy 201 Introduction to Psychology.

Epsy 232 Developmental Psychology.

Educ 211 General Methods of Teaching.

Educ 222 Instructional Media.



Educ 301 Principles of Curriculum Inquiry.  
Easy 311 Introductions to Education Measurement and Evaluation.  
Educ 302 Social Foundation of Education.  
Educ 311 Curriculum Development.  
Educ 401 Subject Methods and Teaching (Practicum).  
Educ 411 Advanced curriculum Design.  
Educ 402 Advanced Instructional Media Methods.

Faculty of Education(1998:2-3)

All have three-credit hours except Social Foundation of Education that have four credit hours. The programme was assessed as being adequate and relevant with necessary content appropriate for science teacher's preparation. However, there are certain aspects of the curriculum, such as specific subject methodology which needs to be included as well as the need to incorporate teaching practice as early as second year in order for the prospective teachers to reflect upon their practice.

#### **4.4.2 Programme admission**

A close examination of the questionnaire shows that admission into the programme was rated 2 out of 5 because even though the students enrol in the programme after they have fulfilled their first year programme successfully. However, most of them enrol against their choice. Most of the students who enrolled into the programme met the admission requirements written on paper, but not the main drive or interest. The document analysis revealed the following admission requirements. The SEU commences after the completion of the first year or freshmen programme. The general criteria to be admitted to the University of Asmara includes the following:

- Passing marks in the Matriculation, Eritrean School Leaving Certificate Examination (ESLCE) certificate or its equivalent from neighbouring countries.
- National service certificate

- Being physically fit for science teaching, as mobility is one of the requirements in science teaching, the candidate should not be visually impaired, or with major physical disability.
- Completion of first year freshmen or first year programme in the university of Asmara.

However, the third and fourth are specific to the SEU programme.

Given the above criteria for admission, the SEU expects that the admitted students would exert enough effort and handle the teaching and learning with enthusiasm, aiming at attaining skills that would make them effective science teachers in Eritrean secondary schools. However, the majority of students who join the SEU are those who could not join other departments due to their low performance in the first year programme within the university of Asmara. The Assignment and Placement Committee (APC), of the university normally assigns some of the students to the Faculty of Education.

#### **4.4.3 Academic regulation of the programme**

The regulation governing the whole University of Asmara has been rated 2, because only the lecturers and administration officials have the copy of the book with all the information regarding the academic activities as regulation of the university. Students do not have access to this book, only chapters related to registration, adding and dropping of courses are placed on the notice board for their information.

#### **4.4.4 Academic staffing**

The records of the staff attendance book indicate shortage of staff for science teacher education in the SEU, the item on academic staff was rated 2. This is because staff members, though of good quality, are inadequate in number. The majority of the lecturers, involved in this study, indicated that they are overloaded, and suggested the need for additional staff.



#### **4.4.5 Non-teaching staff**

The issue of non-teaching staff was rated 2, because the support staff was inadequate in number though of good quality and reasonably computer literate. From the above example, one can deduce that some of the teaching staff were also engaged in administrative and other non-teaching activities beyond what is optional for their effectiveness. Though administrative activities are part of the teaching profession, they must not be done at the expense of the teaching-learning process.

According to Millen et al (2000) teacher education programmes suffer because teacher educators are involved in other faculty activities besides preparing teachers. It seems reasonable to assume that additional support staff could improve the quality of the SEU programme, so that the lecturers could focus on the academic activity.

#### **4.4.6 Physical facilities**

##### **4.4.6.1 Offices and lecture halls**

The aspect of physical facilities on office accommodation was rated 1. This is due to the following: (1) the offices are ill equipped and inadequate in number. In some offices there is no privacy because they are only separated by wooden frames within a larger room, to make small compartments; (2) shortage of teaching or lecturing hall; (3) inadequacy of important equipment such as overhead projectors and slide projectors; and (4) inadequacy of essential or basic equipment such as computers, photocopiers and scanners.

It can be concluded looking at the responses to the questionnaires sent to the lecturers and student-teachers. There is inadequacy in the provision of physical facilities within the SEU programme. i.e. classrooms are inadequate in size and number and are poorly equipped. According to Mboya and Mwawenda (1994) the quality of education can not be obtained without the presence of basic physical facilities or infrastructures of an institute, which includes offices, classrooms, laboratory, library and so on.

#### 4.4.6.2 Library

Examining the programme documents on library it was rated 3 because it was of a fair quality, though inadequate books and Journals. To get more information about the library, informal discussion with education students and SEU staff were carried out. I visited the Library informally to verify the information obtained from the SEU staff and students. From the discussions, personal observation, and comparing the present student population at the University, the Library seems very small and uncomfortable to study in. The faculty is sharing the library with all other faculties in the University of Asmara. Despite the spirited effort of the university administration to furnish it with new books and journals, it is still not adequate both in terms of space and resources. With general shortage in resources, it is necessary for the library to adequately stocked with essential books, current journals and other references

The SEU officinal and I did the document analysis of the SEU. The ratings were done individually and finally average value was taken and presented on Table 4.4

**Table 4.4 Rating of the SEU documents**

| <b>Analysed documents</b>  | <b>Effort</b> | <b>Effectiveness</b> | <b>Impact</b> | <b>Relevance</b> |
|----------------------------|---------------|----------------------|---------------|------------------|
| 1. Curriculum              | 3             | 1                    | 3             | 3                |
| 2. Programme admission     | 2             | 1                    | 3             | 1                |
| 3. Academic regulation     | 2             | 1                    | 2             | 2                |
| 4. Academic staff          | 2             | 3                    | 3             | 1                |
| 5. Non teaching staff      | 2             | 2                    | 3             | 1                |
| 6. Office and lecture hall | 1             | 1                    | 3             | 2                |
| 7. Library                 | 3             | 2                    | 2             | 2                |
| <b>Average</b>             | <b>2.1</b>    | <b>1.6</b>           | <b>2.9</b>    | <b>1.6</b>       |

#### **Effort**

A close examination of Table 4.4 indicates that the effort put on curriculum of the SEU, which incorporates educational foundation, curriculum and teaching, and subject knowledge was rated 3/5. This means that it is fairly adequate for the degree programme of teacher



training. On the other hand, the effort put to equip the library is rated 3/5 meaning, inadequate but of good quality and up-to-date.

As far as the effort made on physical facilities such as offices, lecture halls are concerned, these facilities were rated 1/5, indicating that the physical facilities are not adequate in number and size they are ill equipped. According to the SEU official's comment, the faculty is sharing classrooms with other faculties of the whole university. For him, such an arrangement was not conducive for the faculty of education which has large class sizes.

### **Effectiveness**

The response reflected in Table 4.4 indicates that programme admission, academic regulation, office and lecture hall were rated as the lowest, i.e., 1/5. The SEU admits weak student-teachers and the academic regulation is accessible only to the administrative and academic staff. The physical facilities are also poorly equipped. Even though they are few in number, the SEU official evaluated the teaching staff to be effective. Their effectiveness was rated, as 3/5. In my view however, the rating of the SEU official seems too generous in view of the obvious shortages in facilities and staff.

### **Impact**

A close examination of the parameters listed in Table 4.4 is indicative of the poor quality of the variables critical to quality of science education at the SEU. The impact of these parameters was rated 3/5. For instance, the admission of poor student-teachers is bound to affect the quality of future teachers negatively. This implies that even though majority of the candidates enrolled in the programme seems to meet the written requirements, the enrolment of the students to the faculty does not seem to fulfil the basic requirements (interest of the learners), because most of them are joining the faculty against their choice.

## Relevance

Table 4.4 indicates that the relevance of curriculum was 3/5 relevant. It can be assumed that it is fairly adequate for the degree programme and therefore, it adequately prepares the prospective teacher for their chosen profession. From the point of view of the SEU official, the relevance of the curriculum depends upon the content of the courses offered (subject content and methodology of teaching). However, during the study I identified some irrelevant courses within the syllabus of SEU or the course outline documents.

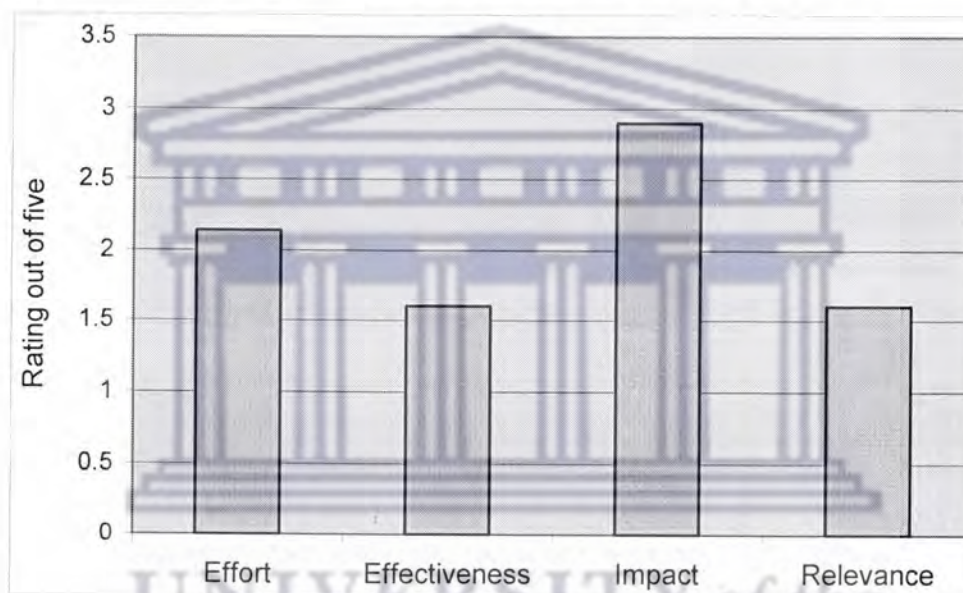


Fig 5: Average of rated document analysis

## Summary

As indicated in figure 5, the inadequacies of the seven parameters depicted in Table 4.4 suggest that the training programme for science teachers at the SEU is less than desirable. By the NUC standard any parameter below 3.0 is considered inadequate. This implies that the programme requires a drastic improvement within six months to be creditable by the NUC. A programme rated below 2.5 is in danger of being terminated (NUC, 1990). By extension, the teacher education programme at the SEU warrants an urgent attention.



## 4.5 Discussion

The primary aim of this study was to evaluate the SEU of the Faculty of Education at University of Asmara in terms of its teacher education programme. The study explored the stakeholders' perceptions, and views to determine the extent to which the SEU programme has achieved the stated objectives. There are moral, ethical and social grounds for the incorporation of different stakeholders. Waks and Barak (1996:173) stated that, "Evaluation of quality shall be conducted with the participation of all the directly involved actors in school education". According to UNESCO's (1998) report, when properly used, the stakeholders' views and perceptions could allow informed decision to take place that is relevant to the programme. Hence, using the stakeholders' perceptions was one way of collecting relevant data that could be used to judge the nature of the SEU programme. The purpose of this chapter is to interpret, discuss and draw conclusions on all the collected data in reference with respect to the literature to the success or failure of the science teachers' training programme at the SEU, University of Asmara.

What ever is enacted in a given programme, the concept of "concentricity," must apply. i.e. the responsiveness of a programme to the "criteria of fitness" to a reference model such that the participants are well aware of what is expected of them and what is not, cannot be ignored. Eston (1997) has clarified the concept of concentricity in terms of the following questions:

- What have the people involved in the programme learnt?
- How have they been able to use what they have learnt?
- How satisfied are the stakeholders with the outcomes of the programme?
- Are the courses of such quality that the participants find them enhancing their knowledge, skills, attitudes and professional developments?
- What ought to have been done to make the programme more responsive to the needs of the participants.

Evaluating a training programme, if carefully conducted, can provide useful insights about the programme. It encourages a better design and above all, makes for a better decision

where a programme could continue or be expanded or even terminated (Chinapah and Miron, 1990). For convenience, and as has been reported thus far, the data set was organized and discussed under the four themes or indicators of the theoretical framework: effort, effectiveness, impact and relevance.

#### **4.5.1 The SEU's effort to attain its objectives**

The term effort, concerning educational programme evaluation, refers to the degree to which programme implementation complies with its plan (Veney and Kaluzny, 1991:6). In this regard, I have limited the discussion to questionnaire items that are related to effort. These items include such things as programme management and organization, adequacy of class instructions, the attention given to students' needs and the provision of class feedback within the programme. However, the discussion focuses on the extremes and area of discrepancy. The effort made in teacher education preparation is often regarded as an important aspect of the training (Patton, 1987) because without it, one will be unsure of what is being evaluated. Of course, the matter is made more complex in that the relationship between effort and outcomes is anything but linear. The complex setting in which a programme operates, and the possible influence of various intervening variables make it difficult to assume a linear relationship. For instance, the lecturers, students, administration, support staff, and the learning environment influence the overall outcome of a programme. Besides, there are unexpected outcomes that are situation specific, or have been evoked by default. (e.g. see Ogunnyi, 1978, 1984; Veney and Kaluzny, 1991).

The findings of this study seem to show that despite the effort applied to the teacher education programme at the SEU, there are aspects that need prompt attention by the programme lecturers, such as the provision of feedback and extra time tutorials. For instance, all the stakeholders complained about the fact that the lecturers did not make provision for extra-time after class to explain concepts and principles more thoroughly or provide feedbacks. As Van der Linde (1998) has explained, teacher evaluation is basically without value if there is no adequate feedback. He regards a feedback conference as indispensable for a mutual understanding and the solution of problems.



More specifically, the conflicting views about the extra time tutorials and feedbacks expressed by the practising teachers on the one hand, and prospective teachers on the other hand might be related to differences in expectations and experiences. While the former were concerned with the reality of the secondary school classroom, the later were probably referring to their current experience at methods courses at the SEU, University of Asmara. The interesting insight one gains from these conflicting views is that the terrain between theory and practice is often clouded with all forms of complexities between idealization and reality. What ever is learnt in the SEU programme must be tested in the secondary school setting? Perhaps this is what the practising teachers have come to realize.

Although, the participants in this study often pointed out some programme limitations, the lecturers indicated how fully engaged they were with their assignments. The lecturers pointed that despite certain constraints (such as extraordinary class size - (200 and above), and shortage of facilities, they held tutorials, marked tests and gave feedback. Further more, they believed that more effort would have been exerted had the class size, and shortage of other facilities, not hindered their work. The issue of lecturers/ students ratio is a critical issue in any programme evaluation (NUC, 1990; UNESCO, 1998), this in it self does not necessarily imply that a high quality is unattainable. What is necessary perhaps is to train lecturers on how to teach large classes. (e.g. see Onwu,1998).

Based on the practising teachers, lecturers, and student-teachers' views, the pedagogic courses did not seem to include sufficient effort in terms of tutorials to expose the student-teachers to various instructional strategies required to teach the specific subject of their specialization. According to Galluzzo and Craig (1990) the need for more effort from the teacher educators in order to prepare competent teachers who could perform all duties demanded by the curriculum of the secondary school would help to overcome the shortcomings of the programme.

The mean percentage of indecision is relatively high. In this regard, the reasons might be either the subjects could not distinguish what effort means (despite the list of items

provided) or the way the questions were set was not clear to them. Whatever the case, it is an index of programme quality that cannot be easily ignored, without grave consequences. Of course, one cannot isolate this index from the other three. There is consensus that the programme is in need of greater effort to achieve a desirable outcome.

#### **4.5.2 The Effectiveness of the SEU Programme**

Effectiveness is concerned with why training is being done, and whether or not it has been successfully accomplished (Davies, 1994:21). In discussing this index, I was guided by the sub-questions under “effectiveness” such as whether or not the programme, offers appropriate teaching strategies, includes relevant science courses and a reasonable workload.

The SEU teacher education programme received positive perceptions from the majority of practising teachers, prospective teachers and lecturers. On the other hand, the MOE supervisors and secondary school directors viewed it as effective as it should be. For instance, the results show that the majority of the subjects are of the view that the programme does not offer appropriate teaching methods. Most of the stakeholders do not seem to be pleased with teacher-centred lecture methods prevalent in the programme and that course offering and the methods courses do not expose the learners to different teaching strategies. However, in view of the large classes, shortage of staff and facilities, the lecture method seems to be the most obvious option for the lecturers. In such a setting, a creative balance of lectures, tutorials, group work and other tactics used in large classes might prove effective.

Moreover, the findings of this study also indicate that the traditional teacher-centred approach seems quite dominant either during the pre-service science teacher training or when these teachers teach at the secondary school level afterwards. At this stage it seems reasonable to explore various instructional approaches that would enhance learners to take the ownership of their own learning such that they are able to express themselves freely, though in a responsible manner.



In her evaluation of the teacher education programme at the University of Lesotho, Seotsanyana (2002) finds that the teachers trained in the programme also emphasize a teacher-centred instructional practice. She wonders if students taught through the lecture method could be expected to emphasize a student-centred instructional approach. She contends further that there is no convincing empirical evidence to show for instance, that participatory teaching is superior to expository teaching. No doubt, the former is popular currently, but it probably promises more than it can deliver, and science teachers in secondary schools are not prepared to change their teaching strategies (Fuller et al, 1999:5). Certainly, more investigations are required in the area. The newly revised curriculum 2005 in South Africa (like other outcomes-based science curricula) encourages a learner-centred, cooperative and constructivist instructional approach, than expository teaching (see Department of Education, 2002).

As Gibson (1998:345) has suggested that, reforming teacher education and paying attention to interactive methods might help improve the learners' academic achievement and build a community of learning. The attempt to explore various instructional approaches without mobilising teacher trainers, policy makers, curriculum planners, schools, and the nature of examinations implies that teachers would still maintain their traditional way of teaching. Success is only possible when all the stakeholders are prepared to make a paradigm shift. But all would be to no avail if the curriculum and science instructions are examination driven.

The knowledge of the subject matter is important to the teacher because it empowers the teacher to handle his/her instruction in an effective manner (Stuart, 1991:129). The results of this study indicate that the majority of the stakeholders perceived the SEU programme as providing relevant science courses. For example, the MOE supervisors and directors (headmasters) perceived the practising science teachers to be rich and confident in content knowledge. However, this is not the way student-teachers perceive the programme. Also, the document analysis indicates that some of the courses are not relevant to the secondary school level. I will discuss this later.

Research studies on teacher education in relation to workload such as those of Macdonald (1993), Housego and Badali (1996), and Seotsanyana (2002) have shown that the education students often experience heavy workload during their pre-service training. However, contrary to these studies, this study indicates that all of the stakeholders are of the view that the SEU programme offers a reasonable workload for the learners. According to the results of this study, the education students seem to study three areas; the content, curriculum and teaching and educational foundation courses, yet the majority of the subjects do not seem to be overloaded. However, the issue of workload has the highest mean percentage on undecidedness from the practising teachers. Perhaps the problem here is that the practising teachers misunderstood the term “work-load” to refer to their present jobs, rather than the workload (study-load) they had at the training programme. Whatever the case, the issue of workload demands further investigation.

From the document analysis and the student-teachers’ responses there are some science courses that are not relevant to the secondary school level. Based on the stakeholders’ perceptions and views, the fact that the content is offered by the Faculty of Science is one of the factors that make the teachers rich in content knowledge. On the other hand, this integration of courses from the two faculties has also led to the inclusion of courses that go well beyond what teachers need to teach at the secondary school level. Much as it is necessary to challenge the discipline knowledge of student-teachers, the temptation to overburden them with esoteric courses is always there. In reality, what prospective science teachers need are not “high power” science courses needed for further studies in science, but courses that would make them teach secondary school science in a confident manner.

#### **4.5.3 Impact of the SEU on the learners**

Anderson (1990) argues that impact refers to what the programme is doing. It answers questions like: Were objectives achieved? Did any change occur? Are the clients satisfied with what they got from the programme? In this regard the focus of evaluation is to determine the nature of the knowledge, skills and values derived by the prospective teachers from their training at the SEU. More specifically, the thrust of this evaluation is to find out



whether those exposed to the programme have been helped to acquire the necessary knowledge, skills professional development and attitudes for their task of teaching, or further studies in the field of education.

The results of the study show that despite all the limitations, the programme seems to impact positively on the subjects of the study. For instance, most of the practising teachers accepted the way their lecturers taught them how to think logically, and in decision-making. Similarly, some of the supervisors and directors viewed the programme as helping the teachers to gain some level of confidence. For them, the science teachers trained in the programme were able to handle their classes reasonably well to evolve alternative solutions as well as enhance pupils' thinking skills. However, the prospective teachers do not seem to believe that the programme has contributed significantly to confidence development.

The differences between the perceptions of the practising teachers on the one hand, and the prospective teachers on the other, could be the differences in expectations. Perhaps the prospective teachers' expectations are hypothetical, while the practising teachers are talking about the real working environment of the secondary schools. Both perceptions are probably valid since they are based on distinctly different contexts.

Teacher professionalism is important in that it makes a teacher understand how students learn, what and how they need to be taught (Schirer, 2001:7). In this regard, the findings of this study indicate that with the exception of the student-teachers, all other stakeholders are of the view that the SEU programme helps its student-teachers to have a feeling of professional development.

The student-teachers who participated in this study do not seem to appreciate the contribution of SEU towards the development of positive attitude towards the teaching profession. For instance, ST<sub>14</sub>, responding to whether or not the programme helps student-teachers to develop positive attitudes towards the teaching profession stated:

From the beginning, I did not join the unit by choice, and yet I haven't accepted it. Furthermore, some of the lecturers want just to finish their lectures on time without explaining the concepts well, how could I develop positive attitude?

Despite the above-mentioned limitations, the programme's impact made the student-teachers acquire thinking skills, develop positive attitudes towards the teaching profession, and even to acquire knowledge for further studies. From their own evaluation the MOE supervisors and school directors are of the view that the teachers produced at the SEU are rich, confident in content knowledge, and even pedagogically sound in their instructional practice.

According to Loboskey (1994:124), "A reflective teacher training programme must know what it is trying to accomplish, in order to accomplish it". The majority of stakeholders involved in this study is of the view that that the SEU has achieved some of its objectives. For instance, the directors are of the view that the programme is not only helping to solve the problems related to shortage of science teachers but also supplying schools with pedagogically sound teachers. However, some of the science lecturers in the Faculty of Science claimed not to be well aware of the objectives of the SEU. If the science lecturers are not familiar with the objectives of the SEU programme how can they equip the student-teachers with the critical discipline knowledge needed at the secondary school level? Similarly, the document analysis also revealed that the book of academic regulation is accessible only to some administrative and academic staff, while the main target of the programme, the student-teachers are more or less unaware of the details of the regulations. How could these student-teachers be expected to work towards objectives of which they are not thoroughly familiar? To compound the matter further, the SEU programme has shortage of facilities and teaching staff, a motley cohort of weak and disinterested student and large class sizes.

Certainly, these constraints are likely to affect the quality of the outcomes of the programme. This is not the same as stating that the programme has not exerted any positive



impact on the clients, but that the impact has, as a result of the several constraints, been less than what it should have been under a more conducive learning environment.

#### **4.5.4 Relevance of SEU programme**

Relevance deals with whether or not a programme is needed. It gives an idea of the rationale for having a programme or set of activities to meet the education service (Veney and Kaluzney, 1991:5).

In this context, the subjects of the study have viewed the SEU teacher-training programme as relevant. As far as the issue of relevance is concerned, unlike the lecturers (see Table 4.2) about one third of the student-teachers and practising teachers is of the view that the programme is relevant while another one third thinks otherwise, and yet nearly another one third is undecided. Hence, the student-teachers and practising teachers seem to have a rather mixed feeling about the relevance of the programme (see Tables 4.1 and 4.3).

The beginning science teacher must be equipped with necessary subject knowledge and pedagogical skills that enables him to convey scientific knowledge claims and concepts (Bianchini and Solomon, 2003:54). In this regard, the subjects are of the view that the programme provided them with skills that could help them improve pupils' ways of thinking and to introduce pupils to problem solving skills. On the other hand, the supervisors and some of the secondary school directors, blamed the practising teachers for not integrating theory with practice.

Further more, from the findings of this study and with the exception of the practising and prospective teachers all the other stakeholders are of the view that the programme is appropriate for teachers. The truth is probably between these two extreme positions. While most of the programme implementers have positive views about the programme, the consumers (i.e. the prospective and practising teachers) seem to be hesitant in according the programme such a positive status. Conflict of

opinions can only be resolved after more detailed investigation, than the present study, has been carried out. Before concluding this discussion it is apposite to re-examine whether or not the foregoing discussion has addressed the research questions sufficiently enough. Much as there is much to say on each question, space limitation would not permit much elaboration. Hence, only a summary discussion on each question is made in the following sub-sections.

#### **4.6. Overview of the research questions**

##### **4.6.1. Question 1:**

*What admission strategies are used to recruit student-teachers into the department?*

In the teacher-training programme of the SEU, University of Asmara, like any other training programmes recruitment of the trainees is one of the priorities. According to a Delors (1996):

Improving the quality supply of education depends on first improving the recruitment, training, social status and conditions of work... of teachers if they are to meet the expectations placed on them. (p.36)

Realizing the importance of the recruitment criterion, the SEU document claims that most of the students enrolled in the programme fulfil the admission requirements of the department. However, from the data gathered from the SEU officials and the questionnaires, it is evident that majority of the students who join the SEU are those who could not join other departments due to their low performance in their one-year stay in the university. The admission of low performers after first year coincides with Simon's (2000) observation. According to him, "to accommodate the rapidly expanding school infrastructure, educationally incompetent candidates or below standard recruitment criteria is deployed, hence, lowering the quality of the training programme".(p 367)



However, in terms of equity considerations e.g. gender balance and ethnicity, the admission criteria of the SEU programme are relatively compatible to the UNESCO's (1998) view point, namely that recruitment in training programme and employment in Eritrea are free from any form of discrimination on the grounds of gender, race, colour, political opinion, national or social origin, religion or economic conditions. Furthermore, to redress the gender inequalities in the tertiary level of education, the entrance grand point average (GPA) for female students is usually 0.2 less than that for the males. This is not to state that the female students are less academically endowed, but that for various socio-cultural factors they have not been afforded the same opportunities as their male counterparts. Unless the equity factor is considered and addressed, the female students will still be disadvantaged in a male dominated traditional society as Eritrea.

According to Fuller et al (1999:34), "What student-teachers learn during their initial training is as much influenced by who is responsible for teaching them as it is the content of the curriculum". This is because teachers in schools typically have access to different forms of professional knowledge from teacher educators in the colleges and universities. The other factor for improving the quality of the training is the qualification of the trainers. According to Mebrahtu (1999:24), "Training can be as good as the quality of the trainers". The SEU staff documents indicate that there are two Phd holders and four with Master's of education degree. However, they are very few in number compared to the number of students. The lecturer/students ratio in 2002-2003 academic year is 1:55, which makes it difficult for the lecturers to follow up every student teacher.

The motive that drives the students to enrol in the Faculty of Education is mainly that of expediency. Mebrahtu (1999) argues that the motive for their enrolment is driven largely by their survival instincts rather anything else. The consuming passion to enrol in higher education can hardly be deterred by any limitations on their part especially as education is construed as a means to social mobility (Ogunniyi, 1992). After high school education, students can enrol in higher institutions such as the University of Asmara, Nursing College, Commercial College, Naval College, Teacher Training Institute and the College of Agriculture. Out of the 34 student-teachers who responded to the question on motive for

enrolling in the Faculty of Education, University of Asmara, only 6% said it was by choice, 41% said it was the lack of access to other departments, 50 % said it was by assignment and 3% who did not seem to know why they did so. This indicates that almost 94 % (32) of them did not join the faculty willingly. In view of this, how can these student-teachers be expected to be effective, if they were working and learning against their will? Of course, there is no simple answer to this question. In the course of their training, some might find that they actually like the teaching profession, while others might see the training as a stepping-stone to another career. Whatever the case, unless the status of the teaching profession is raised the Faculty of Education will continue to have academically weak students.

The lecturers are well aware of the problem associated with the admission criteria used by the Faculty of Education, and the consequences of admitting relatively weak students. One option would be to tighten the set of criteria used. However, in view of the low image of teaching in Eritrea, using a more stringent set of criteria would reduce enrolment in the Faculty, and consequently warrant the reduction of the present limited academic and support staff to meet the requirements of quality assurance now in vogue in the university. The dilemma the SEU faces in this regard is that even the “unwilling horses” now enrolling in the unit would be drastically reduced, resulting in possible closure of the unit in the face of shortage of secondary school science teachers. With the tight budgetary constraints, the university can ill-afford the need to cross-subsidize any department or unit to keep it afloat. There is certainly no easy solution to the problem of enrolment at least for the foreseeable future. Hence, the sensible route to take, in this regard, might be not to increase the present admission criteria or to make them more stringent, but to incorporate a rigorous and well-resourced academic development activity within the current teacher education programme to upgrade the disciplinary and pedagogical knowledge of the student-teachers. Other options might be to attract graduating science students (most who might not find employment) to undergo a year post-graduate training in teacher education. However, this might warrant the need for the government or other funding agencies to provide bursaries for these academically strong students. Alternatively, an extra year may be added to present undergraduate programme to enable the academically weak students to make up their academic deficits, but this also has financial implications.



#### 4.6.2. Question 2

*What is the nature of the discipline and method courses offered in the programme?*

The SEU programme consists of courses such as: (1) foundations in education; (2) curriculum and teaching; and (3) science content (Biology, Chemistry, Mathematics and Physics). The content courses are supposed to equip the prospective teachers with the subject content knowledge. On the other hand the pedagogic (curriculum and teaching) studies prepare them on approaches to the teaching of the subject, while the educational foundation courses expose them to a variety of methods courses aimed at preparing them for their teaching assignment. The courses are offered from the second year to the final, fourth year of the programme.

The essence of teacher education programme at the SEU is to equip the prospective science teachers with the necessary disciplinary and pedagogical content knowledge, as well as prepare them for their future work at the secondary school level (see Hewson, 1995; Ogunniyi, 1996). Possessing a sound scientific knowledge is a necessary but insufficient condition for teaching science at the secondary school level. Also, there is a world of difference between “teaching chemistry” and “teaching learners chemistry”. The former focuses on knowledge transmission, while the latter focuses on making learners learn chemistry. Presumably, the emphasis at the SEU is the latter.

This study has revealed that in both the SEU and the secondary schools, the lecture method is the dominant approach of teaching. Despite the claims by the SEU officials that the programme is student centred. The student-teachers are of the view that the emphasis at the SEU is the lecture method of teaching. This could be one of the main reasons why the practising teachers mainly use the lecture method. The way teachers were trained in the pre-service programme or even in the lower grades do affect their way of teaching. As Maskil (1995: 608) has asserted, teachers’ views, understanding and practice evolve from their own education and training. This experience strongly influences not only what science is taught but also how it is taught.

According to Tien et al (2002:607), some of the reasons why the majority of the undergraduate science courses continue to be taught predominantly through the lecture format include the instructors' concern that they would lose control of the class, if they teach otherwise. Faced with the need to cover a vast amount of information in a class of over 200 students makes the lecture method the most viable option. Of course, the lecture method is not necessarily a bad instructional approach; it is the quality of its presentation that really counts. Also, lectures in conjunction with other approaches viz a group work, individual and collaborative activities, the use of overhead projectors, demonstrations etc. can actually result in meaningful learning. As Ausbel (1970) has argued, an inquiry science lesson can be as routine as the worst type of expository instruction. A lecture is perceived in a negative light when the teacher skims through his or her presentation rather than in a logical and sequential form. However, Johansson, et al (2002: 538) argue that teachers must bear in mind, "The creation of a positive learning climate is the most important factor in effective teaching". With respect to the SEU, the need for collaboration between the Faculty of Education and the Faculty of science to implement a variety of teaching methods, which could be practical both in the university and the secondary schools, cannot be over exaggerated. This problem arises when lecturers in both Faculties work in isolation rather than collaborating in their instructional endeavours. This unfortunately, as was found by Seotsanyana (2002) is the current practice at the University of Asmara.

According to Wise (1999:158) the basic assumptions that are important regarding the subject content knowledge especially with science teaching and learning are: (1) the need to know the content in order to avoid misconceptions of scientific concepts that might occur in the teacher himself and his learners and (2) the procedural knowledge in terms of communicating the content in such a way that the learners grasp the concepts and can apply them rather than simply rely on rote memorization of facts. However, several research studies have revealed that, teachers cannot teach what they do not know. According to Darling-Hammond, (1999: 14):



Teachers need to understand the subject matter in such a way that allows them to organize and present it so that their learners can create useful cognitive maps of the basic concepts.

Based on the student teacher's responses to the questionnaire (see Table 4.1), and interview comments it seems obvious that they expect the programme to equip them with the necessary knowledge and skills for their teaching career. Further more, the programme should not only emphasize to provide the subject content knowledge and skills on the use of teaching materials, but it should also provide the teaching strategies or curricular activities such as classroom management and communication skills. Seotsanyana (2002:175) contends that "The teaching strategies are a way of communicating the teaching and learning situations and if used properly impact positively on the learners".

The building of competence in a teacher preparation programme is vital. Whity (1994) argues that the characteristics of professional competencies includes: subject knowledge, scientific terminologies and interpretations, presentation methodology, knowledge of curriculum, knowledge of educational system, knowledge of ways children learn, classroom management and subject application. As reported by Davies (1994:6):

Skilled teachers of science have special understanding and abilities that integrate their knowledge of science content, curriculum, learning and students that result in the pedagogical content knowledge they use in the teaching process.

However, if the SEU pre-service science teacher education concentrates its effort on subject content knowledge and the theoretical aspect of teaching methodology, when will the teacher education programme build competent teachers that can perform all the duties of the classroom in the future at the work place? This is a matter warranting a closer attention by the administrators and lecturers of the programme. With the current emphasis on quality assurance (see UNESCO, 1998), it seems necessary that teacher education programmes

(including the SEU at the University of Asmara) take a hard look at the content of their programmes to make them responsive to the consumers' demands.

According to Ogunniyi (1986:46), "subject matter content is the body of knowledge that comprises a discipline, which is represented by concept, rules, facts attitudes values, and skills that the learner has to know". The document analysis rated the curriculum of SEU programme 3, meaning that it is fairly adequate for the degree programme to prepare students for their chosen profession. According to Stafflett (1994) possessing a good understanding of content knowledge is a pre-requisite for pedagogical content knowledge. If Bank and Parker's (1990) contention that, "Teachers cannot teach what they do not know" is valid, then the present emphasis of this knowledge component at the SEU is well placed. Research has shown that teachers with sound subject knowledge teach better (Shallcross et al, 2002:1295). However, as indicated earlier, good teaching requires the integration of subject content knowledge with pedagogical knowledge as well as the understanding of curricular issues and management principles. All the student-teachers of SEU have to take all the courses namely: (1) foundation of education; (2) curriculum and teaching; and (3) the science content. The consensus of the stakeholders involved in this study is that the present programme is adequate in terms of the subject content knowledge and some aspects of the pedagogical content knowledge. However, they are of the view that the method courses are inadequate in preparing the prospective teachers for their work afterwards.

The programme's academic regulations have been rated 2 out of the scale of 5 meaning that though available, it is not well publicized. However, an informal interview with SEU student-teachers and SEU officials revealed that the manual containing the regulations was accessible only to the administration and lecturers while the students are only informed through the notice board. The students are more or less unaware of the details of the regulations. According to Heywood (2000:30) regulations governing assessment of higher education, are some of the most important regulations that enhance learning. In an information age, among others, the availability of the regulations manual for every student teacher should have been a matter of priority.



If a training programme is to attain its objectives, the existence of physical facilities is indispensable. As Mboya and Mwawenda (1994:387) have asserted, the quality of education cannot be obtained without the presence of basic infrastructure of the school or institute. They classify the factors contributing to quality of education into two categories namely, human and physical. The human category includes academic background of the learners, qualifications of the lecturers and so on. The physical facilities include building, computers, laboratory, library, teaching aids and other facilities. However, as indicated earlier these prerequisites do not guarantee quality of education. It is the optimum utilization of these resources, and the nature of the interactions of all the stakeholders, which will determine the quality of the educational outcomes of training of programme or school. At the time of the study, the physical facilities seemed inadequate for the teacher education programme and warrant a closer attention by those responsible for the programme.

#### 4.6.3 Question 3:

*What specific challenges or constraints does the programme face?*

The major challenges facing the SEU programme includes among others:

- a. Large class sizes with more than two hundred.
- b. Most of the students enrolled in the programme have weak academic background and are poorly motivated for their studies.
- c. Shortage of administrative and academic staff is creating an overload of work for the staff.
- d. Shortage of facilities such as lecturing class or hall, teaching aids and books are, creating a learning environment that is not as conducive as it should be.
- e. The integration of Education and Science faculties is not satisfactory.

Finally, if SEU is to attain its objectives as stated in the very beginning, the programme should focus mainly on the development of adequate, relevant and applicable science and education courses. In addition adequate staff should be employed to reduce the current overload and hence allow both academic support staff to do their work in an efficient and effective manner. Also, the need for the two Faculties to collaborate cannot be overemphasized.

## CHAPTER FIVE

### Conclusion, Implication and Recommendation

#### 5. Conclusion

##### 5.1. Overview of the study

In chapter four, the perceptions of, student-teachers, lecturers, practising science teachers MOE supervisors, and secondary school directors (headmasters) towards the current teacher-training programme were analysed and discussed. The purpose of this chapter is to provide an overview of the whole study, draw conclusions, highlight some implications warranting further considerations and make recommendations.

In chapter one a brief background history of the Eritrean educational system, particularly the establishment of University of Asmara was examined. This was followed by the SEU, the purpose of the study and specific questions relating to the stakeholders' perceptions about the quality of the teacher education programme at the SEU. The quality of the programme was examined in terms of the systematic evaluation model proposed by a number of scholars (e.g. Ogunniyi, 1978; Ogunniyi, 1984; Veney and Kaluzny, 1991).

Essentially, the model consists of five major constructs or indicators used in evaluating a programme. These are: effort, efficiency, effectiveness, impact and relevance. However, this study uses only four indicators, namely, effort effectiveness, impact and relevance to avoid getting embroiled in the controversies and negative connotations normally attached to the notion of efficiency in a human organization.

Chapter two explores these indicators further by citing relevant literature based on theoretical considerations and actual studies. The chapter justifies the need for the study in terms of the inconclusive findings in the area. Chapter three provides the details of the research methodology including the development of the instruments and the collection of the data. Chapter four deals with actual data analysis and the discussion of the findings. Based on the findings of this study, the following conclusion has been reached



### 5.1.2. Summary of the main findings

The stakeholders in this study perceive the programme of science teacher training at the SEU in the following ways:

#### Achievements of the SEU programme

- Although considerable effort has been made to enable the programme achieve its goal in terms of upgrading the academic level of the majority weak students, and to equip them with the necessary pedagogical skills for their teaching career, the consensus is that more effort needs to be put into the programme.
- Apart from the lecturers, the view of most of the other stakeholders is that the programme has not been very effective.
- With the exception of the prospective teachers, the consensus of the other stakeholders is that the programme has exerted a positive impact on the consumers.
- While the majority of the prospective and practising teachers has a negative view about the programme's overall relevance, the majority of the other stakeholders is of the view that the programme is relevant to the needs of the consumers.
- The majority of the practising teachers is of the view that the programme is rich in content and enhances their confidence in their teaching.
- Though the integration of the SEU courses with science courses is perceived to be useful, there is concern that it is not effectively done as it should be. There are complaints about the inclusion of esoteric and irrelevant science courses.
- While the products of the SEU are believed to be solving the problem of shortage of secondary school science teachers, concerns are raised about the quality of their work.
- There are mixed feelings about whether or not the practising teachers produced at the SEU are pedagogically sound. While some stakeholders feel they are, others feel otherwise.

## Limitations of the SEU programme

- The Faculty of Education faces the challenge of enrolling academically weak students.
- The majority of the students recruited into the programme is not motivated well enough to pursue a teaching career.
- The SEU programme has shortage of academic and administrative staff, physical facilities (lecture hall, teaching aid, books etc.) that might affect the overall quality of their products.
- The large class size is one of the main problems that will remain for the foreseeable future.
- The curriculum of SEU does not include specific subject methodology courses.
- The lecturers do not seem to provide adequate feedback for their learners.
- The teaching-learning process in the SEU is dominated by the teacher-centred approach. i.e. the lecture method.
- There seems to be a mismatch between the science courses taught in the programme and the science taught at the secondary level.
- For the same reason of mismatch between the university science courses and secondary school science, supervisors have noticed that some practising teachers have been inadequately prepared for their task.

## 5.2 Conclusion, Implications and Recommendations

The data obtained in this study have been analysed in terms of four theoretical constructs or indicators; effort, effectiveness, impact and relevance (see Veney and Kaluzny, 1991). From the foregoing discussion, it is safe to say that despite the concerted input into the teacher education programme at the SEU, a lot has to be done particularly in terms of the four indicators examined in this study to make the programme achieve its objectives. Whatever the lecturers and those responsible for the programme may feel, the testimonies of other stakeholders, particularly the prospective teachers must be borne in mind in any future review of the programme. This is not to say that, in the face of so many constraints, the



programme has not been useful but rather that there is room for improvement to make the programme responsive to the needs of the consumers, namely the prospective teachers and the learners they will later on teach at the secondary school level. The issues surrounding enrolling weak students in the programme warrant a closer attention, not only by the lecturers in the programme, but university administrators and policymakers. As Ogunniyi (1996) has argued, no nation is greater than the calibre of its teachers. To ignore this saying is to settle for mediocrity. However, the consequences of producing poor science teachers for the secondary school level has devastating effects on the whole education system, and the country's scientific and technological development efforts.

### **5.2.1 Implications of the findings**

The findings of the study have important implications for the pre-service science teacher training at the University of Asmara as well as the Eritrean educational system. Some of the implications of the findings in this study are discussed in terms of teacher education and the curriculum.

The outcomes of the SEU programme, for one reason or the other, have not succeeded in implementing what they have learned in an effective manner. Despite what may have been done in the methods courses at the SEU, there exists a gap between the theory learned at the pre-service stage, and what is practiced at secondary schools.

The failure to combine theory with practice in the teaching and learning process has not allowed the outcomes of the teacher education programme to achieve a desirable end. A science teacher who is not able to combine theory with practice cannot be regarded as a reflective practitioner, because most of the science taught in secondary schools is often abstract and remote to the students' daily experiences. Moreover, the practice teaching is probably inadequate to equip the student-teachers for their future tasks. Many practising science teachers actually feel that it would have been better, if they had been introduced to the kind of situation in secondary schools, prior to the actual assignment.

Similarly, this study has shown that though the practising teachers may have been exposed to adequate content knowledge, they seem not to possess adequate teaching strategies. The inadequacy of teachers' methodology would not produce the desired outcome at the end of their pre-service training. Perhaps at this point, one needs to stress that teachers with limited methods of teaching would not convey as much content as they possibly can in the way it should be conveyed. A lack of subject mastery would result in teachers who lack confidence in what they are teach. They are most likely to have a lot of disciplinary problems as they perceive able students to be challenging their authority.

Finally, the success or otherwise of a teacher educating programme depends on the quality of its graduates. The results of this study indicate that, the practising science teachers, lecturers and MOE supervisors have similar perceptions about the training programme. This includes their view about the good quality of the content knowledge, which they believe to have very little impact on the development of positive attitudes towards teaching. Considering the fact that the majority of these student-teachers did not want to go into teaching, it should be no surprise that they still held negative views even after been exposed to the programme.

### **5.2.2. Teacher Education**

According to Brett (1996), teaching is very demanding and deals with more than classroom interactions. It also includes other classroom responsibilities such as giving extra time to pupils, giving them tests, marking their work promptly, and ensuring regular attendance, management of the teaching-learning process, dealing with disciplinary matters, planning curricular activities and counselling students. The teacher is not only perceived by the students as their instructor but also as a model, a surrogate parent, a big brother, sister, aunty, uncle etc. He or she fulfils many roles and is involved in many other activities. Probably the underlying reason why teachers, including those involved in this study, do not embark fully in a number of classroom activities is that they were not adequately prepared for their task or were not fully aware of the demands of the teaching profession, including



classroom management, providing motivation to learn, and disciplining students. In view of the findings of this study, it seems the student-teachers may have been exposed to the general pedagogy and related responsibilities during their preparation. They either lack the needed confidence in implementing what they have learnt, or have not been afforded to learn all they need to know to be effective in their work.

An important component in the whole education system is the training of teachers. Teachers require specialized training in the art of teaching, an art that is continually changing. The intention of the MOE's Department of General Education, when developing the science syllabus in 1992-1993, was to accomplish as much as possible through classroom interactions and inquiry activities. However, according to the views of the stakeholders in this study, the expository style of instruction in SEU, has failed to equip the science teachers with adequate teaching methods. Hence, it seems imperative that the prospective teachers should be exposed to models of classroom interactions, which would include problem solving, analytical thinking and inquiry skills in their teaching.

According to Yosief and Tekeste (1998:8), effective teaching and learning of science requires teachers to employ a student-centred approach. Furthermore, as there is no single method of teaching that can bring a complete behavioural change in the pupils, it would be advisable to use; variety of teaching methods. At this point, one would argue that it is essential to stress learner-centred methods as a way that pupils could practice problem solving and decision-making.

### **5.2.3 The curriculum**

The need to evaluate the quality of the curriculum of a given teacher education programme cannot be ignored in any study concerned with determining the worth of that programme.

Whatever the case, the initiation of new teachers to the teaching process cannot be done successfully without involving them in curriculum development or review. If the teachers are not conversant with curricular objectives it will be too much to expect them to teach

towards a specific goal. Hence, curriculum planning and implementation should have a competent of a teacher education programme. In fact, the usual negative attitude of teachers to newly implemented curricula is often because they were ignored during the planning stage of such curricula (e.g. see Ogunniyi, 1978, 1986, 1996).

### **5.3. Recommendations**

In order to improve the SEU teacher training programme, the following recommendations seem apposite.

#### **5.3.1. Revising the recruitment criteria**

The acceptance of students after their completion of the first year, school involve other screening techniques such as interviews and other forms of assessments. This could lead to the improvement of the quality of the teachers being trained at the SEU. The recruitment policy needs to be revised. As suggested in chapter four, alternatives of teacher-training models such as a one-year post-graduate training should be considered to attract graduating science students. Another model could be the academic development activities to upgrade weak student-teachers.

Although there is still shortage of properly trained teachers, it seems necessary to have a selection board to ensure the recruitment is not based only on competent candidates, but also those interested in the teaching profession. This suggestion is based on the fact that every year there is a large number of qualified teachers who go straight into other jobs rather than teaching. It is quite clear that training programmes sometimes waste much resources training people who have no interest in teaching. Although this will not totally solve the problem, it is my view and firm belief that introducing the selection approach can minimize such a problem.



As long as the SEU recruits weak students so will it continue to produce less competent teachers. As a result, the quality of the pupils in secondary schools and the whole educational system could be negatively affected. Therefore, to solve this problem the SEU should provide an intensive training on the content of the courses to bridge the programme; revise the selection criteria and set a competitive future as a vision for teachers so that the programme will attract candidates. Otherwise, the quality of the graduates of the SEU will remain poor unless the Faculty of Education brings to an end the recruitment of weak candidates.

### **5.3.2. Provision of more practice teaching**

Most young teachers are very naive about the problems related to the classroom situation. The solution to this problem could be minimized if student-teachers are given more opportunities to be in contact with pupils they are going to face after their training. It is my view that, if at least about half of the time is spent in the actual teaching situation, the student teacher will be better prepared for the task he or she will face after the completion of his or her training.

The student teaching component of the course should be integrated with course work over the total period of the programme, and not just delayed to the last few weeks of the last year of training. The reason is that student-teachers need the opportunity to reflect on the school lessons they have taught during formal “debriefing” sessions in college, to give meaning and perspectives to their own experiences. Once they are actually teaching, there will be little time for reflection, and less of an opportunity to share pedagogical problems and solutions with their peers.

One of the practising science teachers indicated that the way they were taught how to write a lesson plan and the format they found in the schools were different. This indicates that there is a gap between what is taught at the SEU and what the Ministry of Education emphasizes. To narrow the gap between the two it is necessary that both parties meet to evolve a more

realistic format. This will reduce the confusion that the new graduates encounter when they start at school. Furthermore, the SEU should include topics related to the advantage and importance of lesson plan, lesson note, classroom management and the importance of variety of teaching methods.

The training of teachers should focus not only on making them academically fit but also professionally competent. In other words, they should also be made acquainted with student-centred approaches to teaching. According to Barclay and Benelli (1996: 91), if quality of education is to be maintained, evaluation must be an ongoing systematic activity. A continuous evaluation system should constantly monitor and revise programme activities. Such a review should be done in consultation with the MOE supervisors, and the Department of General Education (Curriculum Department) to specify what areas the science teachers are weak. Through continuous dialogues the weakness of the science teacher education programme can be identified and rectified accordingly.

### **5.3.3. In-service training**

It is clear that the various secondary schools have to make the best use of the potential teachers already in service. The teacher undoubtedly has a crucial role in maintaining educational standards in the school. Maintaining these in the profession is as important as attracting new candidates. For this reason, a purposeful and effective system of in-service instruction is imperative for the re-training and upgrading of teachers, working at a level beyond their original academic professional qualifications.

It would have been better had the SEU programme followed its graduates at least for the first six months to a year. This could help the teachers to be guided and supported by their lecturers. The visible challenge for such follow-up could be the shortage of staff in the SEU. This could be solved by giving workshops about supervision organized by the Faculty of Education and the MoE for a certain number of science teachers as well as forming a support group at each school. The members of the support group could assist in coaching these new graduates by serving as mentors. The SEU staff then can act as facilitators or



coordinators of the newly formed support group in every school. According to Duke and Candy (1991:119) training alone will not be enough if the school principals, subject department heads and supervisors are so burdened with their responsibilities that they lack sufficient time to support and guide the new graduates.

#### **5.3.4. Collaboration**

There is a need for collaborative effort between the Faculty of Education teaching the methods and the Science Faculty teaching the content courses. Lecturers in both faculties should collaborate to create a common goal in preparing prospective teachers to effectively teach science concepts at the school level. In relation to content knowledge, a link between the schools and the teacher education programme should be developed in order to achieve a common goal. The nature and content of the training programme should be agreed upon by both faculties as well as the schools in order to bridge the gap between the university content and school content in science, Chuen, Lubben and Newson (1999). On the other hand, the Faculty of Education could have its own science staff to minimize the problems associated with poor coordination of the courses in the two faculties but there are cost implications for this type of arrangement.

#### **5.3.5. Supervision**

Supervisors who participated in this study admitted that they lacked adequate content knowledge to supervise the practising science teachers in the secondary schools. As Shallcross et al (2002:1308) have stated, “teachers cannot be adequately assessed by observing their teaching performance without referring to the content being taught”. This indicates that, supervisors should have adequate subject knowledge in order to supervise science teachers.

### **5.3.6. Recommendation for future research**

Further studies are needed to determine the effectiveness or otherwise of the SEU in training science teachers for secondary schools of Eritrea. In this study the perceptions of a small percentage from the whole population were involved. In future, a larger sample should be used to provide a more holistic assessment of the training programme. An attempt should be made how to motivate and recruit academically strong student-teachers to join the programme willingly and to pursue teaching profession as a long-term career.

### **5.4. Limitations of the study**

Educational research, like any other studies in social science, is burdened with a number of unpredictable circumstances. For instances, the time chosen for data collection coincided with several activities in the country. Some of these include; (1) the call of the practising science teachers and the Faculty of Education staff as trainers for an in-service training for the new curriculum to be introduced in 2003-2004 academic year; (2) the setting up of the examination papers for the end of term at the university; (3) the end of first semester examinations in the university and the secondary schools, a period in which there was a lot of paper work for the school directors and the lecturers. Hence, most of the selected participants were occupied in one way or another.

During data collection, it became very difficult to get straightforward data especially for the programme documents. Despite these limitations, it is hoped that the findings would be found to be informative and useful for the teacher education programme at University of Asmara and the educational system as a whole.



## 5.5. Conclusion

A good science teacher is the one adequately prepared both in the subject content and in methods of teaching. He/she must be able to transform his/her knowledge and understanding of science to the level of his/her students. Lucas (1996) argues that through initial teacher training can lay the basis for professional development, it cannot adequately prepare the teacher for all the changes of the future. Initial training has often been regarded as an end in itself rather than the beginning of a process of professional development. The findings of this study have revealed that teacher educators are faced with the challenge of bridging the gap between pre-service training and service at the school level. The SEU should give proper preparation to the prospective teachers in order to meet the needs of the pupils in schools.

In regard to this, Bauer (1992:135) states:

The quality of a training programme hinges on its capacity for understanding the needs of its society and catering for those needs from its available resources. Every country's education system then must offer educational opportunities which taken together meet the nation's requirements.

The evidence from the study suggests that the SEU at University of Asmara is an appropriate programme for teacher preparation. The stakeholders have indicated that considerable effort is made during pre-service, to enable the teachers to perform their task well at the school level. In other words, there are some areas that indicate the effectiveness and relevance of the programme. These include reasonable workload, commitment to duty, acquiring thinking skills, attainment of major concepts for further studies. However, there are limitations such as inadequate staff and facilities, teacher-centred courses, inadequate specific subject methodology, and classroom management that need to be addressed before the programme can be regarded as effective, relevant and to exert some impact.

Adequate facilities are required to support the process of implementing the teacher education programme. Overall, it could be said that, should the identified problems hindering the programme process be addressed, the SEU at the University of Asmara, could attain its status as a quality teacher education programme.

According to Bauer (1992:139), the main purpose of evaluation system for higher education has become quality promoting and development oriented, instead of focusing on accounting and control. He further advises that educators should develop evaluation concepts for higher education, starting with the most characteristic nature of education. The fact that the material under evaluation is living and thinking students, who act and react, demands more dynamic evaluation methods and development procedures, than routine and prescribed assurance procedures can bring about.

The programme evaluation has provided valuable information of science teacher education starting from recruitment, training and application of what has been learnt in SEU, to the secondary schools. All the stakeholders' should share the responsibility of such a programme in order to attain the stated objectives.

Undertaking programme evaluation with the use of a systemic organizational evaluation model to compare the "intended" with "attained" objectives using the indicators (effort, effectiveness, impact and relevance) provides a baseline for proper restructuring of a teacher education programme. In this regard, some of the inadequacies revealed in this study could be improved upon by incorporating in-service training such as seminars, and workshops. Similarly, inadequacies that require programme modification or revision should include the recruitment of interested and committed students and incorporating student-centred course offerings within the programme. Future modifications of the programme or in-service training of the practising teachers might use the above information as a starting point.



## REFERENCES

- Abdelkhalik, F. and Boujaude, S. (1997). An exploratory study of the knowledge base for science teaching. *Journal of Research in Science Teaching*, 34 (7): 673-699.
- Adams, P. and Krockover, G. (1997). Beginning science teacher cognition and its origins in the pre-service secondary science teacher programme. *Journal of Research in Science Teaching*, 36 (6): 633- 653.
- Akpe, C.S. (1992). Consumer evaluation of a part time teacher education programme in a Nigerian College of Education. *Studies in Educational Evaluation*, 19 (2): 243 - 245.
- American Association for the Advancement of Science (1993). Project 2061: *benchmarks for science literacy*. New York: Oxford University Press.
- Anderson, C. (1990). *The role of education in academic disciplines in teacher preparation*. Paper presented at the Rutgers invitational symposium of education. The graduate preparation for teachers, NJ, New Brunswick. November 23-25,1990.
- Apple, M., Brunkhorst, B.J., Yager, R.E. and Andrews, D.M. (1993). The Salish consortium for the improvement of science teacher preparation and development. *Journal of Science Teacher Education*, 4 (7): 51-53.
- Aschroft, K. and Palacio, D. (1996). *Researching into assessment and evaluation in colleges and universities*. London: Stirling, Kogan Page.
- Atkinson, P. and Silverman, D. (1997). Kunderas immorality: the interview society and the invention of self. *Qualitative Inquiry*, 3 (2): 304-325.
- Ausbel, D.P. (1970). *Educational psychology: a cognitive view*. New York: Holt Rienhart and Winston.
- Austin, M.J. (1982). *Evaluating your agency's programs*. Beverly Hills: Sage Publications.
- Babbie, E. and Mouton, J. (1998). *The practice of social research*. London: Oxford University Press.
- Bacchus, M.K. (1996). The role of teacher education in development in south countries. *Alberta Journal of Educational Research*, 42 (2): 77-86.
- Baird, J.R. (1995). Teachers in science education. In P. Fensham (ed.), *Development and dilemmas in science education*. London: The Falmer Press: 12-35.
- Baker, T.L. (1990). *Doing educational research*. New York: McGraw-Hill Inc.
- Bambi, L., Baily, N., Kathryn, C., Scantlebury, T. and Ellen, M. J. (1999). Encouraging the beginning of equitable science teaching in practice: collaboration is the key. *Journal of Science Teacher Education*, 10 (3): 159-173.
- Banks, J.A. and Parker, W.C. (1990). *Social studies teaching education in handbook of research on teacher education*. New York: MacMillan Publishing.
- Barclay, K. and Benelli, C. (1996). Programme evaluation through the eyes of the child. *Childhood Education*, 72 (2): 91-96.



- Bauer, M. Marianne, B. (1992). Evaluation criteria and evaluation system: reflections on developments in Sweden and some other OECD countries. In A. Craft (ed.), *Quality assurance in higher education. Proceedings of an International Conference*. London: The Falmer Press: 118-143
- Bekalo, S. and Welford, A. (1999). Secondary pre-service teacher education in Ethiopia: its impact on teachers' competence and confidence to teach practical work in science. *International Journal of Science Education*, 21 (12): 1293-1310.
- Bell, B. and Gilbert, J. (1996). *Teacher development: a model for science education*. Washington, D.C.: The Falmer Press.
- Bell, J. (1999). *Doing your research project: a guide for first-time researchers in education and social sciences*. Buckingham: Open University Press.
- Best, J.W. and Kahn, J.V. (1993). *Research in education*. Boston: Allyn and Bacon.
- Bianchini, A. and Solomon, M. (2003). Constructing views of science tied to issues of equity and diversity: a study of beginning science teachers. *Journal of Research in Science Teaching*, 40 (1): 53-76.
- Biddington, R. (1982). Three Government errors in teacher recruitment in Victoria, 1859, 1893 and 1931. *Journal of Further and Higher Education*, 6 (1): 36-45.
- Blosser, P. and Helgson, S. (1990). Clearing house for science, mathematics and environmental education. *ERIC/SMEAC Science Education Digest 2* 1-6, [Online]. Available <http://search.epnet.com>
- Borg, W.R. and Gall, M.D. (1989). *Educational research*. New York: Longman.
- Brayman, A. (1992). *Quality and quantity in social research*. London: Routledge.
- Brett, M. (1996). Teacher extended class periods. *Social Education*, 60 (2): 77-79.
- Brown, A. and Dowling, P. (2000). *Doing research/reading research: a mode of interrogation for education*. London: Routledge.
- Chinapah, V. and Miron, G. (1990). *Evaluating educational programs and projects: holistic and practical considerations*, UNESCO. Belgium: Duculot, Gemblov.
- Chuene, K., Lubben, F. and Newson, G. (1999). The views of pre-service novice teacher on mathematics: teaching in South Africa related to their educational experience. *Educational Research*, 41 (1): 23-34.
- Cooper, R.M. and Maloof, V.M. (1999). Parents' involvement in teaching elementary Chinese, Japanese, Korean. *Journal of Education Research*, 92 (3): 176-183.
- Courneyer, D.E. and Klein, W.C. (2000). *Research methods for social work*. Boston: Allyn and Bacon.
- Darling-Hammond, L. (1999). *Case of university based teacher education: the role of university in the preparation of teachers*. London: The Falmer Press.
- Davies, I. (1994). Initial teacher education in the new Europe. *Journal of Further and Higher Education*, 18 (1): 14-20.
- Davies, I. and Macro, E. (1995). The reactions of teachers, tutors and students to profiling student competence in initial teacher education. *Journal of Further and Higher Education*, 19 (2): 28-41.



- Davies, J.K. (1997). Style and effectiveness in education and training, a model of organizing teaching and leaning. *Instructional Science*, 6 (1): 45-82.
- Delors, J. (1996). *Learning: the treasure within*. Report to UNESCO of the International Commission on Education for the 21<sup>st</sup> Century: UNESCO.
- Denzin, N.K. and Lincoln, N.S. (2000). *Handbook of qualitative research*. California: SAGE Publication Inc.
- Department of Education (2000). Revised national curriculum statement-grade R-9 schools policy. Pretoria: Department of Education.
- Department of General Education, MOE. (1997). *The curriculum in Eritrean schools: a situation analysis*. Asmara. Ministry of Education. Unpublished paper.
- Doyle, M. (1997). Beyond life history as a student: pre-service belief about teaching and learning. *College Students Journal*, 31 (4): 519. [Online]. Available <http://search.epnet.com>.
- Duke, D.L. and Candy, R.L. (1991). *School policy*. New York: McGraw-Hill.
- Duggan, S. and Gott, R. (1995). The place of investigations in practical work in the UK national curriculum for science. *International Journal of Science Education*, 17 (2): 137-147.
- Easton, P.A. (1997). *Sharpening our tools: improving evaluation in adult and non-formal education*. UNESCO Institute for Education. Hamburg: Robert Seaman.
- ElHares, H. (1994). *Higher education staff development: directions for the twenty-first century*, UNESCO, ED. 94/ WS. 16.
- Emerole, H.U. (1996). Model for the development of appropriate technology. In M.B. Ogunniyi (ed.), *Promoting public understanding of science and technology in southern Africa*. Bellville: SSME, University of the Western Cape: 22-30.
- Eurant, M. (1994). *Developing professional knowledge and competence*. London: The Falmer Press.
- Faculty of Education (1998). *Project proposal for strengthening the Faculty of Education*. Asmara: University of Asmara. Unpublished paper.
- Ferguson, G. (1976). *Statistical analysis in psychology and education*. London: McGraw-Hill Inc.
- Flick, U. (1998). *An introduction to qualitative research: theory, method, and applications*. London: SAGE Publication Inc.
- Frankel, J. and Wallen, E. (1993). *How to design and evaluate research in education*. New York: Routledge.
- Fullan, M. and Hargraves, A. (1997). *Teacher development and educational change*. Washington, D.C.: The Falmer Press.
- Fuller, R., Cheetmen, J., Medov, G. and Petch, A. (1999). *Evaluating social work effectiveness*. Buckingham: Open University Press.
- Gay, R.J. (1981). *Educational research: competencies for analysis and application*. Toronto: Charles Meriel Publishing Company.
- Galluzzo, G.R. and Craig, J.R. (1990). *Evaluation of pre-service teacher education programmes*. *Handbook of research on teacher education*. New York: McMillan



Publication.

- Gibson, J.T. (1998). Discussion teaching through case methods. *Education*, 118 (3): 345 [Online]. Available <http://www.infotrac>
- Grant, C. (1999). Multicultural education and the university's mission: change and opportunity for change. *The role of the universities in the preparation of teachers*. London: The Falmer Press.
- Green, L.M.; Carilon, R.P. and Purvis, R. (1995). The forgotten link-transition from graduate school to classroom teaching. *Alberta Journal of Educational Research*, 41(2): 213-229.
- Guyton, E. and McIntyre, D.J. (1990). *Student teaching and social experiences handbook of research in teacher education*. New York: MacMillan Publishing.
- Halim, L. (2002). Science trainee teachers' pedagogical content knowledge and its influence in physics teaching. *Research in Science and Technological Education*, 20 (2): 215-224.
- Hall, D. and Hall, I. (1996). *Practical social research*. London: MacMillan Hampshire.
- Hammrich, P.L. (1998). What the science standards say: implication for Teacher Education. *Journal of Science Teacher Education*, 9 (3): 165-186.
- Harber, C. (1997). *Education, democracy and political development in Africa*. London: Sussex Academic Press.
- Harris, A. (1993). Prior experience in initial Teacher Education. *Journal of Further and Higher Education*, 17 (3): 40-48.
- Herman, J.L., Morris, L. and Fitz-Gibbon, C. (1988). *Evaluators' handbook*. California: SAGE Publication Inc.
- Hewson, P. (1995). Professional development of science and mathematics teachers: the pre-service curriculum. In C. Stoll, & D. Feiter (eds), *Improving science and mathematics teaching in southern Africa: effectiveness of intervention*. Amsterdam: VU University Press.
- Heywood, J. (2000). *Assessment in higher education-student, learning, teaching programmes and institutions*. London: Jessica Kingley Publishers.
- Hodson, D. (1993). Re-thinking old ways: towards a more critical approach to practical work in school science. *Studies in Science Education*, 22: 85-142.
- Hopkins, D. and Stern, D. (1996). Quality teaches, quality schools, international perspective and policy implementation. *Journal of Teaching and Teacher Education*, 12 (5): 501-517.
- Housego, B.E. and Badali, S.J. (1996). One year later: beginning teachers revisit their preparations from programme experiences. *Alberta Journal of Educational Research*, 42 (4): 372-395.
- Johannssen, T., Harkin, J. and Mikalsen, O. (2002). Construct used by 17-19 year old students in northern Europe when informally evaluating their teachers. *European Educational Research Journal*, 1 (3): 803-817.
- Kumar, R. (1996). *Research methodology*. Australia: Longman.
- Kvale, S. (1996). *Interviews: an introduction to qualitative research interviewing*.



Thousand Oaks, California: SAGE Publication Inc.

- Laboskey, V.K. (1994). *Development and reflective practice: a study of preservice teachers*. London: Teachers' college Press.
- Lockhead, E., Fonacier, J. and Bianchi, J. (1989). *Effective primary level science teaching in the Philippines*. The World Bank: Population and Human Resource Department.
- Lucas, N. (1996). Teacher training agency. Is there anyone there from further education? *Journal of Further and Higher Education*, 20 (1): 54-85.
- Macdonald, C.J. (1993). Coping with stress during teaching practicum: the student teachers' perspective. *Alberta Journal of Educational Research*, 39 (4): 407-418.
- Madaus, G.H., Airasion, P.W. and Kellaghan, T. (1980). *School effectiveness: a reassessment of the evidence*. New York: McGraw-Hill Book Company.
- Martin, L.L. and Kettner, P.M. (1996). *Measuring the performance of human service programmes*. London: Sage Publication.
- Maskill, R. (1995). The preparation and support of science students teaching practice: student teachers' and tutors' perceptions of what is required. *International Journal of Science Education*, 17 (5): 607-619.
- Mathivha, M.R. (1981). *Teacher-training in South Africa homelands and Malawi during the decade 1964-1974: a pedagogical study*. Unpublished Master's thesis. Durban: University of the Natal.
- Mboya, M. and Mwawenda, T. (1994). Quality of education in black schools of South Africa. *International Journal of Educational Development*, 14 (4): 385-391.
- McLean, L.D. (1993). Bold projects prudent measures. *Alberta Journal of Education Research*, 39 (2): 279-282.
- McManus, M. (1986). Teacher training: the voice of recent, substantial and relevant experience. *Journal of Further and Higher Studies*, 10 (2): 27-28.
- Mebrahtu, B. (1999). *Assessment of the effectiveness of training programme: a case study in Asmara Teachers Training Institute*. Unpublished undergraduate project paper. Asmara: University of Asmara.
- Mengistu, K. (1997). *Primary school directors' in-service training: a case study in Asmara Teacher Training Institute*. Undergraduate unpublished project paper. Asmara: University of Asmara.
- Miles, B.M. and Huberman, A.M. (1994). *Qualitative data analysis*. London: SAGE Publication Inc.
- Millen, J.F., Berger, J.B. and Dey, E.L. (2000). Faculty time allocation. *Journal of Higher Education*, 71 (4): 454-471.
- Ministry of Education (2001). *Basic education statistics 2000/2001*. Asmara: Ministry of Education.
- Ministry of Education (2001). *Essential education indicators 2000/2001*. Asmara: Ministry of Education
- Ministry of Education (2002). *Concept paper: rapid transformation of the Eritrean educational system*. Asmara: Ministry of Education. Unpublished report.



- Murphy, J.G. (1985). *The evaluation of an in-service project for black primary school teachers in South Africa in the early 1980's*. Unpublished Doctoral thesis. Cape Town: University of Cape Town.
- Murray, F.B. (1999). *The challenges teacher education presents higher education: the role of university in the operation of teachers*. London: The Falmer Press.
- Nachmias, C. and Nachmias, D. (1990). *Research methods in social sciences*. London: Hodder and Stoughton.
- National Education Policy Investigation (1992). *Teacher education*. Cape Town: Oxford Press.
- National Universities Commission, NUC (1990). *Programme evaluation form*. Ibadan: University press.
- Nevo, D. (1995). *School based evaluation: a dialog for school improvement*. Oxford: Pergamon.
- Ogunniyi, M.B. (1978). Determinants of successful in implementation of the integrated science programme in Nigeria. *Journal of Science Teachers Association in Nigeria*, 16 (2): 50-58.
- Ogunniyi, M.B. (1984). *Educational measurement and evaluation*. Ibadan: Longman Group Ltd.
- Ogunniyi, M.B. (1986). *Teaching science in Africa*. Ibadan: Salem Media Ltd.
- Ogunniyi, M.B. (1992). *Understanding research in social sciences*. Ibadan: University Press.
- Ogunniyi, M.B. (1996). Science, technology, and mathematics: the problem of developing critical human capital in Africa. *International Journal of Science Education*, 18 (1): 267-284.
- Ogunniyi, M.B. (1998). Prepared to teach or cheat? A graduation address, Caprivi College of Education. Mullilo, Namibia: *University of the Western Cape Seminar Series*, 2 (2): 83-87.
- Ogunniyi, M.B. (1999). *Assessment of grades 7-9 pupils' knowledge and interest in science and technology*. STL project. Bellville: University of the Western Cape.
- Ogunniyi, M.B. (2002). Effects of an exemplary instructional programme in science on learners' understanding of force, acid and bases. Cape town: The Scientific and Technology Literacy Project.
- Onwu, G. (1998). Teaching large classes. In P. Naidoo and M. Savage (eds), *African science and technology education into the new millennium: practice, policy and priorities*. Cape Town: Juta and Co Ltd: 119-132.
- Osborne, J. (2000). Science for citizenship in M. Martin and J. Osborne (eds), *Good practice in science teaching: what research has to say*. Buckingham: Open University press.
- Pajeres, M.F. (1992). Teachers' beliefs and educational research, cleaning up a messy construct. *Review of Education Research*, 62: 307-332.
- Patton, M.Q. (1987). *How to use qualitative methods in evaluation*. California: SAGE Publications, Inc.



- Peterson, R.A. (2000). *Constructing effective questionnaires*. California: SAGE Publications Inc
- Pettus, A.M. and Smith, W.D. (1991). Programme assessment for a teacher education programme. *Education*, 112 (2): 228. [Online]. Available <http://www.search.epnet.com>
- Provisional Government of Eritrea (1991). *Declaration of policies on education in Eritrea*. Asmara: Department of Education.
- Raynolds, M. and Salters, M. (1998). The reflective teacher and the teacher training agency. *Journal of Further and Higher Education*, 22 (2): 193-199.
- Rena, R. (2003). *Eritrean education historical perspective*. Contributed article in annual conference, Asmara, Ministry of Education, 20 January. Unpublished paper
- Rollnick, M.S. (1998). The influence of language teaching and learning of science. In W.W. Cobbern (ed.), *Socio-cultural perspectives on science education: an international dialogue*. Dordrecht: Academic Publishers: 18-33.
- Rossi, H.P. and Freeman, H.E. (1989). *Evaluation asymmetric approach*. Newbury Park: Sage Publications.
- Rowell, P. (1995). Perspectives on pedagogy in teacher education: the case of Namibia. *International Journal of Educational Development*, 15 (1): 3-13.
- Rudduck, J. (1991). *Innovation and change: developing involvement and understanding*. London: Open University Press.
- Schirer, A.M. (2001). Improving the quality of teaching force: A conversation with David C. Berliner. *Educational Leadership*, 58 (8): 6-10.
- Scriven, M. (1995). Unified theory approach of teacher evaluation. *Studies in Educational Evaluation*, 21 (1): 111-129.
- Seotosanyana, M.M. (2002). *A case study of the bachelor of education program in development studies at the National University of Lesotho*. Unpublished Ph. D. thesis. Bellville: University of the Western Cape.
- Shallcross, T., Spink, E., Stephenson, P. and Warwick, P. (2002). How primary trainee teachers perceive the development of their own scientific knowledge: links between confidence, content and competence. *International Journal of Science Education*. 24 (12): 1293-1312.
- Shulman, L.S. (1987). 150 different ways of knowing: representation of knowledge in teaching. In J. Calderhead (ed.), *Exploring teachers thinking*. London: Castel Publishers: 104-124.
- Silverman, D. (1993). *Interpreting qualitative data: strategies for analysis talk, text and interaction*. London: SAGE Publication Inc.
- Simon, S. (2000). Students' attitudes towards science. In A. Monk and M. Osborne (eds), *Good practice in science teaching: what research has to say*. Buckingham: Open University Press: 27-34.
- Simpson, R.D. and Oliver, J.S. (1988). Influence of attitude towards science, achievement motivation, and science self concept on achievement in science: a longitudinal study. *Science Education*, 72 (2): 143-155.



- Sims, R.R. (1993). Evaluating pupil's sector training program. *Public Personnel Management*, 22 (4): 591. [Online]. Available <http://www.search.epnet.com>.
- Staddart, T., Connell, M., Stafflett, R. and Peck, D. (1993). Reconstructing elementary teacher candidates' understanding of mathematics and science content. *Teaching and Teacher Education*, 9: 229-241.
- Stofflett, R.T. (1994). The accommodation of science pedagogical knowledge: the application of conceptual change pedagogy as a function of prior content learning experience. *Journal of Research in Science Teaching*, 31 (1): 31-35.
- Staropoli, A. (1992). The French committee national d'évaluation. In, A. Craft (ed.), *Quality assurance in higher education: proceedings of an international conference*. London: The Falmer Press: 176-194.
- Strage, A. and Boll, L. (1996). High school biology what makes it a challenge for teachers? *Journal of Research in Science Teaching*, 33 (7): 753-772.
- Strauss, A. and Corbin, J. (1998). *Basics of qualitative research, techniques and procedures for developing grounded theory*. Newbury Park: SAGE Publications.
- Stuart, J. (1991). Classroom action research in Africa: a Lesotho case study of curriculum and professional development in *educational innovation in developing countries*. London: Macmillan.
- Sykes, G. (1999). *No standards or new standards, the future of teacher certification: the role of the university in the preparation of teachers*. London: The Falmer Press.
- Terreblanche, M. and Durheim, K. (1999). *Research in practice*. Cape Town: University of Cape Town Press.
- Tessmer, M. (1993). Planning and conducting formative evaluations: improving the quality of education and training. London: Kogan Page.
- Thakway, B. (1997). *Effective evaluation of training and development in higher education*. London: Stirling, Kogan Page.
- Tien, L., Roth, V. and Kampmeier, J. (2002). Implementation of peer led team learning instructional approach in an undergraduate organic chemistry. *Journal of Research in Science Teaching*, 39 (7): 603-637.
- UNESCO (1998). *World declaration on higher education for the twenty-first century: vision and action*. A conference held in Paris, 5-9 October.
- Veney, J.C. and Kaluzny, A.D. (1991). *Evaluation and decision-making for health services*. Michigan: Health Administration Press.
- Vulliamy, G. (1990). The potential of qualitative educational research: strategies in developing countries. In G. Vulliamy, k. Lewis, and D. Stephens, (eds), *Doing educational research in developing countries: qualitative strategies*. London: The Falmer Press.
- Waks, S. and Barak, M. (1996). Role of evaluation in an interdisciplinary educational programme. *Studies in Educational Evaluation*, 22 (2): 171-179.
- Ware, S.A. (1992). *The education of secondary science teachers in developing countries*. The World Bank: Education and Employment Division.
- Wellington, J. (2000). *Teaching and learning secondary science: contemporary issue and practical approach*. London: Routledge.



- Whity, G. (1994). *The use of competencies in teacher education*. London: The Falmer Press.
- Wise, A.E. (1999). *Moving towards performance-based accreditation systems for the teaching profession: the role of university in the preparation of teachers*. London: The Falmer Press.
- World Bank (1995). *Priorities and strategies for education*. Washington, D.C.: A World Bank Review.
- Yager, R.E. (1992). What we did not learn from the 60s about science curriculum reform. *Journal of Research in Science Teaching*, 19 (8): 905-910.
- Yandila, C.D. and Chalebgwa, K. (1997). *Preparation of teachers in science and technology*. Gaborone: University of Botswana.
- Yosief, K. and Tekeste, H. (1998). *Science methodology training manual for senior secondary school biology, chemistry and physics*. Asmara: MoE Department of General Education Curriculum Development Division, Science Panel.



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## APPENDIX A

### PROSPECTIVE SCIENCE TEACHERS' QUESTIONNAIRE

**Note.** The result of this questionnaire is purely for academic purpose.

You are kindly asked to fill in this questionnaire. The questionnaire is intended to find out your perceptions about the science teacher education programme SEU at Asmara University.

There are three sections in this questionnaire; Sections A, B and C. Please respond to all items.

#### SECTION A

Please put [X] in the appropriate brackets and fill in the blank spaces.

1. Gender: Male [ ] Female [ ]
2. Age \_\_\_\_\_
3. Grade or level 2<sup>nd</sup> year [ ], 3rd year [ ] or 4<sup>th</sup> year [ ] year student.
4. Department: \_\_\_\_\_
5. Teaching experience in years before coming to the SSTEP:
  - a. None [ ]
  - b. 1– 5 [ ]
  - c. 6 – 10 [ ]
  - d. More than 10 [ ]
6. How did you join the SEU programme at the University?
  - a. By choice [ ]
  - b. By assignment [ ]
  - c. I don't know.[ ]
  - d. Lack of access to other departments [ ]
  - e. Other reasons \_\_\_\_\_
7. While you were in high school you were studying in \_\_\_\_\_ stream.
  - a. Arts
  - b. Science
  - c. Business
  - d. Vocational
  - e. others, mention \_\_\_\_\_

#### SECTION B

This section tries to examine the nature of the SEU Programme at the University of Asmara. Please rate the following items as you find them applicable to you. Give a brief explanation to each of your scoring in the third column.

Use the following scoring key: **Strongly agree = 5; Agree = 4; Undecided = 3; Disagree = 2; Strongly disagree = 1**

| Statement                                 | Scoring | Explanation of scoring |
|---|---------|------------------------|
| SEU - Program activities<br><b>Effort</b> |         |                        |
| 1. Is a well managed and                  |         |                        |



|   |  |  |
|---|--|--|
| organized programme.  |  |  |
| 2. Has adequate class instruction.  |  |  |
| 3. Pays attention to students' needs, extra-time tutorials.                           |  |  |
| 4. Has instructors that always give class feedback.                                   |  |  |
| <b>Effectiveness</b>  |  |  |
| 5. Offers appropriate teaching methods.   |  |  |
| 6. Includes relevant science courses.   |  |  |
| 7. Involves a reasonable workload.  |  |  |
| <b>Impact</b>   |  |  |
| 5. Makes one to acquire thinking skills that could be developed in pupils.            |  |  |
| 6. Gives one the feeling of professional development.                                 |  |  |
| 7. Helps one to develop a positive attitude towards the teaching profession.          |  |  |
| 8. Makes one to attain the major concepts needed for further studies in the field.    |  |  |
| <b>Relevance</b>  |  |  |
| 9. Gives clarity about how to teach the subject.                                      |  |  |
| 10. Teaches me skills on how to prepare pupils for life and service in the community. |  |  |
| 11. Is an appropriate programme for teachers.   |  |  |
| 12. Will assist me in making several changes to my pupils ways of thinking.           |  |  |

### Section C

Please express freely and candidly your views about the following items:

1. Are you prepared to be a "teacher"? Elaborate.

---

2. What are your expectations from the SEU:
  - a. Are you confident enough that you are well prepared subject wise?

---

---

b. Are you confident enough to use variety of teaching methods in your teaching practice?

---

---

3. While in the SEU programme what teaching methods were you exposed to most frequently? Do you like or dislike it? Elaborate.

---

---

4. How far do you feel free to ask your lecturers questions whenever you face academic related problems? Elaborate.

---

---

5. Are there any specific challenges that you face with in the SEU programme?

---

---

6. What other comments do you have about improving the SEU programme?

---

---

**Thank you**

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## APPENDIX B

### The SEU Lecturers' questionnaire

**Note :** The result of this questionnaire is purely for academic research purpose.

The questionnaire is intended to find out your perceptions about the science teacher education programme (SEU) at Asmara University. It is hoped that the result of this questionnaire might help the researcher to fulfill his requirement for the Masters degree at the University of the Western Cape, South Africa. As well as provide useful information for the department of the SEU at Asmara University. The information of this questionnaire is purely academic and highly confidential. There are three sections A, B and C.

#### Section A

Please put [ X] in the appropriate brackets and fill the blank space

1. Gender \_\_\_\_\_
2. Age \_\_\_\_\_
3. Educational qualification \_\_\_\_\_
4. Years of experience as a lecturer or a Teacher \_\_\_\_\_
5. The subject you teach at present \_\_\_\_\_
6. Workload in hours compared to other departments.  
 Very low [ ]      low [ ]      average [ ]      high [ ]      very high [ ]

#### SECTION B

This section tries to examine the nature of the SSTE Programme at the University of Asmara. Please rate the following items as you find them applicable to you. Give a brief explanation to each of your scoring in the third column.

Use the following scoring key: Strongly agree = 5; Agree = 4; Undecided = 3; Disagree = 2; Strongly disagree = 1

| Statement   | Scoring | Explanation of scoring |
|---|---------|------------------------|
| SSTEP - Program activities<br><b>Effort</b>                 |         |                        |
| 2. Is a well managed and organized programme.               |         |                        |
| 2. Has adequate class instruction.                          |         |                        |
| 3. Pays attention to students' needs, extra-time tutorials. |         |                        |
| 5. Has instructors that always give class feedback.         |         |                        |

|   |  |  |
|---|--|--|
| <b><u>Effectiveness</u></b>   |  |  |
| 5. Offers appropriate teaching methods.   |  |  |
| 6. Includes relevant science courses.   |  |  |
| 7. Involves a reasonable workload.  |  |  |
| <b><u>Impact</u></b>  |  |  |
| 13. Makes one to acquire thinking skills that could be developed in pupils.           |  |  |
| 14. Gives one the feeling of professional development.                                |  |  |
| 15. Helps one to develop a positive attitude towards the teaching profession.         |  |  |
| 16. Makes one to attain the major concepts needed for further studies in the field.   |  |  |
| <b><u>Relevance</u></b>   |  |  |
| 17. Gives clarity about how to teach the subject.                                     |  |  |
| 18. Teaches me skills on how to prepare pupils for life and service in the community. |  |  |
| 19. Is an appropriate programme for teachers.   |  |  |
| 20. Will assist me in making several changes to my pupils ways of thinking.           |  |  |

### Section C

Please express freely and candidly your views about the following items:

1. What activities are you actually engaged to promote the success of the SEU in (science education)?
  - a. Administrative
  - b. academic and administrative
  - c. academic only
  - d.



- others, mention \_\_\_\_\_
2. Does your students show interest during the lessons? \_\_\_\_\_  
Elaborate \_\_\_\_\_
  3. Which teaching methods do you use most frequently? \_\_\_\_\_  
Why? \_\_\_\_\_
  4. Which teaching methods are the student teachers encouraged to use during their teaching practice or when they go to their work place? Elaborate.  
\_\_\_\_\_  
\_\_\_\_\_
  5. How do you motivate your students to be active participants in
    - a. Class activity?  
\_\_\_\_\_
    - b. Home work and assignments  
\_\_\_\_\_
    - c. Tests and Exams  
\_\_\_\_\_
  6. How do you know that the student teachers at the completion of the course have attained the programme objectives?  
\_\_\_\_\_  
\_\_\_\_\_
  7. Do you feel the programme achieves the stated objectives with in the limited resources and time? If yes how? If not why not?  
\_\_\_\_\_  
\_\_\_\_\_
  8. Comparing the SEU in science with other departments of the University, how is it performing in attaining its objectives:  
\_\_\_\_\_  
\_\_\_\_\_
  9. Are you satisfied with the progress of the programme? If yes why? If not why not?  
\_\_\_\_\_  
\_\_\_\_\_
  10. If you were to revise this programme, what important factors would you consider as a way of making this programme more successful?  
\_\_\_\_\_  
\_\_\_\_\_
  11. Are there any comments that you would like to give concerning the improvement of the programme?  
\_\_\_\_\_  
\_\_\_\_\_

**Thank you**

## APPENDIX C

### PRACTICING SCIENCE TEACHERS' QUESTIONNAIRE

**Note:** The result of this questionnaire is purely for academic purpose.

You are kindly asked to fill in this questionnaire. The questionnaire is intended to find out your perceptions about the science teacher education programme SEU at Asmara University.

There are three sections in this questionnaire; Sections A, B and C. Please respond to all items.

#### SECTION A

Please put [X] in the appropriate brackets and fill in the blank spaces.

1. Gender: Male [ ] Female [ ]
2. Age \_\_\_\_\_
3. Educational qualifications \_\_\_\_\_
4. Grade level you teach at present \_\_\_\_\_
5. Subject you teach at present: \_\_\_\_\_
6. Teaching experience in years before coming to the SSTEP:  
a. None [ ] b. 1–5 [ ] c. 6–10 [ ] d. More than 10 [ ]
7. How do you join the SSTEP programme at the University?  
a. By choice [ ] b. By assignment [ ] c. I don't know. [ ]  
d. Lack of access to other departments [ ] e. Other reasons \_\_\_\_\_
8. While you were in high school you were studying in \_\_\_\_\_ stream.  
a. Arts b. Science c. Business d. Vocational e. others, mention \_\_\_\_\_

#### SECTION B

This section tries to examine the nature of the SEU Programme at the University of Asmara. Please rate the following items as you find them applicable to you. Give a brief explanation to each of your scoring in the third column.

Use the following scoring key: **Strongly agree = 5; Agree = 4; Undecided = 3; Disagree = 2; Strongly disagree = 1**

| Statement                            | Scoring | Explanation of scoring |
|--------------------------------------|---------|------------------------|
| SSTEP - Program activities<br>Effort |         |                        |



|   |  |  |
|---|--|--|
|   |  |  |
| 3. Is a well managed and organized programme.   |  |  |
| 2. Has adequate class instruction.  |  |  |
| 3. Pays attention to students' needs, extra-time tutorials.                           |  |  |
| 6. Has instructors that always give class feedback.                                   |  |  |
| <b><u>Effectiveness</u></b>   |  |  |
| 5. Offers appropriate teaching methods.   |  |  |
| 6. Includes relevant science courses.   |  |  |
| 7. Involves a reasonable workload.  |  |  |
| <b><u>Impact</u></b>  |  |  |
| 21. Makes one to acquire thinking skills that could be developed in pupils.           |  |  |
| 22. Gives one the feeling of professional development.                                |  |  |
| 23. Helps one to develop a positive attitude towards the teaching profession.         |  |  |
| 24. Makes one to attain the major concepts needed for further studies in the field.   |  |  |
| <b><u>Relevance</u></b>   |  |  |
| 25. Gives clarity about how to teach the subject.                                     |  |  |
| 26. Teaches me skills on how to prepare pupils for life and service in the community. |  |  |
| 27. Is an appropriate programme for teachers.   |  |  |
| 28. Will assist me in making several changes to my pupils ways of thinking.           |  |  |

## SECTION C

Please express freely and candidly your view about the following items:

16. Are the teaching methods to which you have been exposed in the SEU applicable to the current situation in the secondary schools? How?

---

---

17. How far do you think that the SEU has equipped you to teach in Eritrean secondary schools?

a. Content of the subject matter (knowledge)

---

b Teaching methods (skill)

---

18. Which teaching method do you use in your teachings (lecture, demonstration, experimentation, group discussion, project work,...etc). List in a descending order of frequency.

(Most frequent).....(Least frequent)

Give reasons for:

a. The most frequently used teaching method

---

b. The least frequently used teaching method

---

19. Have your expectations both in the training programme and the work place been well satisfied? Elaborate.

---

20. Do you like to continue in the teaching profession? Elaborate.

---

21. If you were to develop a teachers' programme in science education, indicate the most important points you would consider.

---

22. Please comment freely on any other aspect of the SEU.

---

---

**Thank you**



## APPENDIX D

### MOE SUPERVISOR S' INTERVIEW

**Note:** The result of this questionnaire is purely for academic purpose.

**Years of experience in the job** \_\_\_\_\_

This interview is intended to find out the views of the administrators at the Ministry of Education in relation to science teaching and learning relative to the SEU teachers. It is hoped that the results of this interview might help the researcher to fulfill his requirement for the Masters degree at the university of the Western Cape, South Africa as well as provide useful information for the department of the SEU at Asmara University.

#### Questions:

1. Do you think that the SEU has sufficiently prepared the science teachers for their work? Elaborate.
2. What strategies do the SEU teachers employ to teach their students?
3. Would you say that his/her teaching is pupil-based?
4. Is he/she usually confident about the content he/she teaches?
5. Based on the performance of these teachers, do you think that the objectives of SEU are achieved?
6. In your view, as an administrator, would you say that the graduates from SEU who teach science are aware of the school development goals?
7. Do you think what the SEU teachers teach is relevant to the students' ways of living?
8. Are the criteria for recruitment in the Ministry of education similar or different from those used by the SEU programme to train them in the university?
9. If you have any other comments in regards to the science education.

Thank you.

## APPENDIX E

### SECONDARY SCHOOL DIRECTORS' INTERVIEW

**Note:** The result of this questionnaire is purely for academic purpose.

**Years of experience in the Job:** \_\_\_\_\_

As we are all concerned about the quality of our teachers, the purpose of this interview is to find out the views of head teachers about the performance of the SEU graduates of Asmara University, teaching science in their schools.

**Questions:**

1. In your school, you have SEU science teachers who were trained in the SEU Education Department of Asmara University to teach science in the secondary school pupils. What strengths or weaknesses have these teachers demonstrated in the teaching of their subjects E.g. (Chemistry/Biology/ Physics/Math)?
2. Based on your observation, would you say these teachers have succeeded in motivating their students to want to study science?
3. What specific benefits have your school derived by the SEU trained teachers?
4. What strategies do the practicing teachers employ to teach their subjects?
5. What would you say about the adequacy of the preparation /training in the SEU at Asmara University?
6. How do you evaluate the relationship of the teachers' teaching and the students' way of life?
7. Based on the performance of these teachers, do you think that the SEU objectives are achieved its objectives? Explain.
8. What other comments do you have about improving the SEU?

Thank you.



## APPENDIX F

### PROGRAMME EVALUATION FORM (Adopted from National Universities Commission of Nigeria).

Title of Programme \_\_\_\_\_

#### **CONFIDENTIALITY OF THE REPORT**

Information contained in this report is strictly for academic research purpose .

The areas to be assessed have the following components.

#### 1. Academic Matters

- 1.1 The curriculum
- 1.2 Admission requirements
- 1.3 Academic regulations

#### 2. Staffing

- 2.1 Teaching staff
- 2.2 Non-teaching staff

#### 3. Physical Facilities

- 3.1 Classroom facilities and equipment
- 3.2 Office accommodation
- 3.3 Library

## 1.ACADEMIC MATTERS

### 1.1THE CURRICULUM

The curriculum of Programme/Sub-Discipline/Discipline is the totality of the experiences that is offered by the institution to achieve the philosophy, goal and objectives of the type and level of education. Specifically for the degree programme, the curriculum should give the student total education that enables and equips him/her with knowledge and professional skills to be able to practice his chosen field at the appropriate level. The curriculum and structure of the programme should be assessed against the stipulations in the Minimum Academic Standards as follows:

|     |  | Score   |        |
|-----|--|---------|--------|
|     |  | Maximum | Actual |
| (a) | Very adequate for the degree programme and therefore, adequately preparing the student for his chosen profession/ discipline | 5       |        |
| (b) | Adequate for the degree programme and therefore adequately preparing the student for his chosen profession/ discipline       | 3       |        |
| (c) | Fairly adequate for the degree programme and not adequately preparing student for his chosen profession/discipline           | 2       |        |
| (d) | Not adequate for the degree programme and inadequate for preparing the student for his chosen profession/discipline          | 0       |        |

Comments:



## 1.2 ADMISSION INTO THE PROGRAMME TO BE ACCREDITED

Minimum admission requirements into the programme as stipulated in the Particular SEU requirements Minimum Academic Standard document.

### Entry Requirements

|  | Score   |        |
|--|---------|--------|
|  | Maximum | Actual |
| (a) All students enrolled in the programme to be accredited meet the admission requirements. | 5       |        |
| (b) About 80% of Candidates meet the admission requirements                                  | 4       |        |
| (c) Most candidates enrolled in the programme did not meet the admission requirements        | 1       |        |
| Comments:  |         |        |



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### 1.3 ACADEMIC REGULATIONS

There should be academic regulation/students handbook which should include rules and regulations governing the conduct of sessions and final examinations, the grading system, penalties for malpractices, requirements for graduation, etc. These should be well publicized and strictly adhered to.

Academic regulations are:

|     |   | Score   |        |
|-----|---|---------|--------|
|     |   | Maximum | Actual |
| (a) | Available, quite clear, is in use and Well-publicized | 5       |        |
| (b) | Available, not clear, but in use and Well-publicized  | 3       |        |
| (c) | Not available   | 1       |        |

Comments:



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## 2. STAFFING

### 2.1 TEACHING STAFF

The minimum qualifications for lecturers should be assessed against the stipulations in the Minimum academic Standards.

The quality of staff may be determined by:

- (a) qualifications of staff, as stated above and by confirmation of originals of the degree certificates where necessary;
- (b) the teaching competence of staff teaching the core courses of the programme could be confirmed by visitors sitting in class, tutorials, laboratory or workshop/studio/clinic sessions.

Ratio of staff to students should be in accordance with SSTEP Guidelines.

Teaching Staff for the programme are:

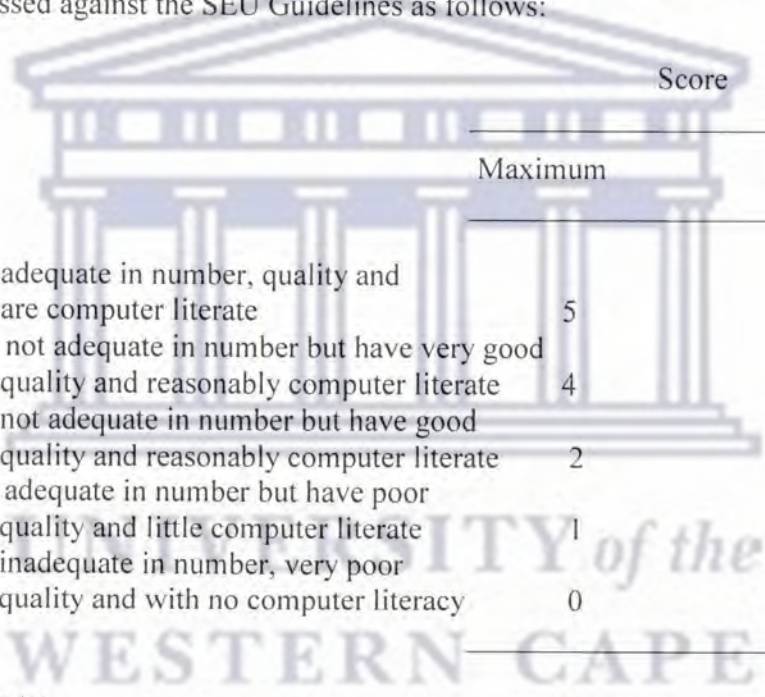
|     |   | Score   |        |
|-----|---|---------|--------|
|     |   | Maximum | Actual |
| (a) | Adequate in number and of good quality        | 5       |        |
| (b) | Adequate in number but of fairly poor quality | 4       |        |
| (c) | Inadequate in number but of good quality      | 3       |        |
| (d) | Inadequate in number and of poor quality      | 1       |        |

Comments:

## 1.2 NON-TEACHING STAFF

These are support staff, which is indispensable in the proper running of the laboratories, clinics/studio etc. and the administration. Effort will be made to assess the quality and number of the staff in relation to their adequacy in providing the needed support. All laboratories/clinics/studio etc. should have technicians/technical officers/technologists to run these in addition to the lower cadre of technical staff. There should be qualified typists/secretaries and clerical officers etc. to perform administrative duties where necessary. Or alternatively all academic staff should be computer literate such that only a few non-academic staff is employed.

For the programme for which accreditation is sought, the non-teaching staff should be assessed against the SEU Guidelines as follows:



|  | Score   |        |
|--|---------|--------|
|  | Maximum | Actual |
| (a) adequate in number, quality and are computer literate                              | 5       |        |
| (b) not adequate in number but have very good quality and reasonably computer literate | 4       |        |
| (c) not adequate in number but have good quality and reasonably computer literate      | 2       |        |
| (d) adequate in number but have poor quality and little computer literate              | 1       |        |
| (e) inadequate in number, very poor quality and with no computer literacy              | 0       |        |

Comments:



### 3. PHYSICAL FACILITIES FOR PROGRAMME

#### 3.1 CLASSROOM/LECTURE THEATRE

The sizes of classrooms/lecture theatres should not be smaller than those specified in the ministry of education Space Standards. There should be adequate chairs and tables to sit all the students in the classrooms and basic facilities should form the basis of the evaluation.

|     |   | Score   |        |
|-----|---|---------|--------|
|     |   | Maximum | Actual |
| (a) | Adequate in number and size, well equipped and maintained | 5       |        |
| (b) | number but adequate in size and well-equipped             | 4       |        |
| (c) | Inadequate in size and number but well equipped           | 3       |        |
| (d) | Inadequate in size and number and poorly equipped         | 1       |        |

Comments: State actual number of classrooms available for teaching the programme/sub-discipline/discipline in relation to those listed in the Self-Study Form and SSTEP list of equipment for the programme. If sharing classroom with other departments, indicate:

- (i) if the present arrangement is satisfactory;
- (ii) if not, suggest improvement that can be made.

### 3.2 OFFICE ACCOMMODATION

Lecturers require adequate offices where they counsel students, prepare materials for teaching and mark students' work. Such offices should be furnished with basic items of furniture and storage. They should be well ventilated. In the case of the sciences the staff should have adequate Office/Research Laboratory space as stipulated in University of Asmara guidelines.

Score

| Maximum | Actual |
|---------|--------|
|---------|--------|

Staff offices are:

- |  |   |
|--|---|
| (a) adequate in number and well equipped   | 4 |
| (b) inadequate in number but well equipped | 3 |
| (c) adequate in number but ill-equipped    | 2 |
| (d) inadequate in number and ill-equipped  | 1 |

Comments:

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### 3.3 LIBRARY

#### Books, Journals & Other Resource Materials Available In Central/Departmental Library for the Programme

The place of books, journals and other resource material in the library of a University cannot be over-emphasized. Availability of local and overseas journals for the programme serves as a means of updating textbooks and the curriculum.

Library books, periodicals and reference materials available for the programme for which accreditation is required are:

|     |  | Score   |        |
|-----|--|---------|--------|
|     |  | Maximum | Actual |
| (a) | adequate in number and of good quality/current       | 4       |        |
| (b) | inadequate in number but of good quality/current     | 3       |        |
| (c) | adequate in number but have poor quality/not current | 2       |        |
| (e) | inadequate in number and of poor quality/not current | 1       |        |

Comments:

Thank you