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# **MINI - DISSERTATION**

## **GUIDELINES FOR THE IMPROVEMENT OF TEACHING SCIENCE AT COLLEGES OF EDUCATION**



UNIVERSITY  
OF  
JOHANNESBURG

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JANUARY 1995***

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**GUIDELINES FOR THE IMPROVEMENT OF  
TEACHING SCIENCE AT COLLEGES OF EDUCATION**

by

**NELWAMONDO MMBENGENI ALEX**

**MINI - DISSERTATION**

**Submitted in partial fulfilment of the**

**requirements for the degree**

of



in the

**DEPARTMENT OF CURRICULUM STUDIES**

in the

**FACULTY OF EDUCATION**

at the

**RAND AFRIKAANS UNIVERSITY**

**SUPERVISOR: DR M.C. VAN LOGGERENBERG**

**JANUARY 1995**

(1)

I declare that: **GUIDELINES FOR THE IMPROVEMENT OF TEACHING SCIENCE AT COLLEGES OF EDUCATION**, is my work and that all sources that I have used or quoted have been indicated and acknowledged by means of complete references.

NELWAMONDO M.A.

.....

JANUARY 1995 VENDA



(II)

**Dedication**

**This work is dedicated to my mother Vho-Munzhedzi and Father Vho-Ratshili - I am paying you back a fraction of debt I owed you.**



## ACKNOWLEDGEMENTS

It scarcely needs to be said that I take full collective responsibility for the contents of this work. What actually needs to be said is that it has been immeasurably improved as a result of the generous assistance that I have received from thousands of individuals and dozens of institutions.

Some well-wishers have even undertaken the heavy task of giving a detailed critique of the entire work from the genesis to the completion of this undertaking. For their searching work to this degree, I am especially indebted to my supervisor Dr. M.C. Van Loggerenberg who produced hundreds of pages of valuable comments. I cannot thank her enough for our ongoing conversations over the telephone on a broad range of related issues especially how she helped me discover what I was trying to say and how I might find arguments and evidence with which to say it.

On a similar note, I have turned again and again to Dr. H.C. Geysler for her remarkable background guidance and knowledge she transmitted to me in the formation of my understanding of the Anatomy of Curriculum, Curriculum design, Curriculum dissemination, Curriculum implementation and Curriculum evaluation.

Hundreds of students, Teaching Science lecturers, Heads of Education Department, principals and beginner teachers at Former Gazankulu Homeland Teacher Training Colleges and Schools deserve a heartfelt thanks for participating in the data collections. But even if I could, I would not because I pledged to them complete confidentiality.

I take great pleasure in making it clear that Zifundiswa Maphosa has contributed substantially in the correction of language errors, the standardization of terminology, and updating of this effort. A similar vote of thanks goes to N.A.P. Buaduo who subsequently provided the necessary research sources in teacher effectiveness.

I also wish to record the wealth of experience which my colleague Edward Tshivhase afforded me in the preparation of this study. I am also truly grateful to my friend Khakhati Mandiwana for sharing with me the story of his life and for the warm hospitality which always culminated in the partaking of a cup of tea.

Great thanks to my sisters Nakie Makatu and Elisa Tshivhula who not only neatly typed and retyped this manuscript but often made me accountable, word for word, for what I was trying to say.

Above all, I wish to register my appreciation to my wife Elelwani and my daughters Musadzi Ndivhuwo and Mavhungu without whose patience and support this study would not have been completed.

## **ABSTRACT**

Dozens of Teaching Science practitioners and educational administrators are asking fundamental questions today about the objectives of teacher education programs, the content of programs, instructional methods and quality of education of teachers. They recognised that current Teaching Science practices must be examined, evaluated, and in some cases, developed. There are obvious limits to the effectiveness of these Teaching Science programs to give prospective teachers skills necessary to be successful in their classrooms.

This study investigates the guidelines for the improvement of Teaching Science at Colleges of Education that can ensure prospective teachers with ways of understanding the culture of classrooms and schools. The research was based on the assumption that, for prospective teachers to learn to teach effectively, they should be inculcated with an enriched structure and content of the subject Teaching Science curriculum, and valuable teaching knowledge should be communicated to them during their professional training process.

In order to understand this problem in its total context, an indepth study of the literature survey on the process of teacher education in the Republic of South Africa and the selected areas in the world was done. Data was collected from the interviews with the Heads of Education Department and beginner teachers, and questionnaires were administered with principals of schools, Teaching Science lecturers and second and third year student-teachers.

The data corpus includes case observations from prospective teachers on Teaching Practice. Their lesson plans, presentation of the teaching skills and post class reflection notes were analysed. Their subject expositions were also audiotaped to provide contextual descriptions.

Findings indicate that there are many areas in which the subject Teaching Science curriculum needs improvement if it is to maintain its high degree of producing school teachers which the community will recognise and respect. The findings corroborated the hypotheses that the subject Teaching Science curriculum helps prospective teachers to be autonomous and active agents in their classrooms.

The following are some of the most important findings:

- With regard to their lecturing, the majority of students claimed that many Teaching Science lecturers are ineffective classroom practitioners. It is revealed that Teaching Science lecturers who are less qualified are unfamiliar with the subject Teaching Science lecturing strategies whereas the highly qualified staff is always satisfied with its lecturing.
- Many student-teachers regarded Teaching Practice as a stressfull time because they were not guided effectively by their Teaching Science supervisors on how to write genuine lesson preparations and schemes of work. Teaching Practice sessions are usually held at the beginning of the professional course.

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At that time students do not have maturity and knowledge of the theory on which teaching is based. Overall it appeared to show that theory and practice at Colleges of Education are still far apart and student-teachers are not given direct experience with the children they are going to teach.

-In all Colleges of Education, Teaching Science facilities such as micro-teaching laboratory, dark room and media centre, are inadequate.

-The study also revealed that the subject Teaching Science curriculum at Colleges of Education is more boring, less fun, more repetitious, discouraging, unattractive and less competitive. Students are not equipped with the subject Teaching Science curriculum to present interesting lessons. Beginner teachers are incapable of controlling their classes, marking registers and writing accurately on the chalkboard. It is because of this and other reasons that most student-teachers were always absent for Teaching Science periods.

-The survey further revealed that the majority of beginner teachers are shy, self-centred and unable to establish good order in the classroom.

-The traditional lecturer/teacher-centred approach in which the educator transfers information to learners is outdated. It was found that new approaches to assist prospective teachers may have important potential which needs to be explored diligently.

-Based on the data collected and literature review the researcher provides proposals for the improvement of the subject Teaching Science curriculum at Teachers' Training Colleges. It is the wish of the researcher that this set of recommendations be effective tools in helping preservice teachers become successful teachers.



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## CHAPTER ONE

### INTRODUCTORY ORIENTATION AND PROBLEM SETTING.

#### 1.1. INTRODUCTION

One way of organising the curriculum that we are all familiar with, is to break it up into units called subjects, namely: History, Mathematics, English, Teaching Science and so on. It is important to note that educative teaching can be seen as a series of activities in which teacher and pupil are actively involved. These activities take place on the basis of the subject matter as contained in the syllabus of the various subjects.

It can be argued that the Teaching Science curriculum has certain logical features of subject matter which put restraints upon how the curriculum might be organized. The understanding, development and use of this subject matter in a disciplined way requires patient initiation and training. According to Macleod, McIntyre and Griffiths (1977:09) the effectiveness of professional education courses in helping students to become skilled classroom teachers has been questioned for many years. What evidence there was on the effectiveness of these programmes was largely limited to their effect on students' attitudes, and generally showed that the effects of professional education on attitudes were nullified by the first few months of employment in teaching (Macleod, McIntyre and Griffiths, 1977:09)

Although research evidence is lacking, there seems good reason to believe that apart from socio-political problems, the standard of teaching by so called newly appointed teachers has deteriorated tremendously. Indications are that teacher competence in all levels of schools depends on the subject Teaching Science offered at Colleges of Education. Macleod, McIntyre and Griffiths (1977:06) remark that not only the unqualified teacher is incompetent but also the qualified teacher can be incompetent in a number of ways: a qualified teacher who does not know good methods of teaching the subject or his knowledge of the subject is ineffective.

According to de Witt (1981:01) in training courses in RSA, Education students do indeed receive sufficient child orientated knowledge and insights but there is little said about Teaching Science as a subject that deals with the nature of teaching as a profession. The sort of argument in the present research is to investigate guidelines that can improve the subject Teaching Science curriculum offered at Gazankulu Colleges of Education. Nevertheless, it is believed that the subject Teaching Science contributes towards shaping the attitudes of the prospective teacher and contributes towards the cultivation of a professional approach to the teaching profession (Walters, 1987:01). Gorton (1987:299) mentions that curriculum improvement usually involves teachers and administrators' representatives from different sectors within a district.

There is a general feeling among academics and rectors of colleges that the present Teaching Science curriculum is irrelevant because the educator's participation is less or not taken into consideration.

## 1.2. STATEMENT OF THE PROBLEM

It seems unlikely that the current situation of Teaching Science curriculum by the educators at Gazankulu Colleges leaves much to be desired. In particular, the complexity of the activity in a classroom at any one time, and the many aspects of teaching are such that a student beginning to learn how to teach cannot give his attention to more than a small part of it (Macleod, McIntyre and Griffiths, 1977:09). That is, student teachers produced by these colleges can hardly apply any aspect of Teaching Science such as micro-teaching skills and educational media. They lack sufficient knowledge, theory and attitudes in the learning environment for pupils.

It is common knowledge that the same student teachers do not have the interest of the pupils at heart with the unfortunate results that the child continues to suffer (Thulare, 1993:01). According to de Witt (1981:01) one of the chief characteristics of Teaching Science as a subject is to help the new teacher to cope in his first year of profession and to provide him with opportunities to do his job satisfactorily. Regrettably, every generation of teachers in turn blames its mentors for some or other sort of neglect during their training. The turbulence that emanates from the situation explained above drastically alters the niche in which the teaching profession begins to lose its credibility and pupils are no longer trusting their educators as it seems they did not do their homework. The concomitant questions which therefore, need thorough attention are:

- How can Teaching Science educators prepare all their students for an effective teaching profession?
- What are the primary objectives for the Teaching Science curriculum?
- What are the correct choice and use of different media against the background of Teaching Science in general?

Clearly, the confusion in the Teaching Science curriculum is extensive and will require a major shift in a focus by Teaching Science lecturers such as the present researcher to draw guidelines that can put it on track.

## 1.3. DEFINITIONS OF KEY TERMS

It is necessary to start this research with a definition of terms which may create confusion, especially with regard to curriculum studies.

These terms may be regarded as independent or dependent variables according to a scientific research method. The researcher manipulates these terms when administering the problem introduced above.

### 1.3.1. Guidelines

The Oxford Dictionary defines guidelines as advice on policy. Now in this context the emphasis falls inter alia on the instructions that should be followed when improving Teaching Science curriculum. In fact, guideline in this case of study is an independent variable.

That is, there are certain variables (terms) which depend on guidelines to develop teacher competence.

### 1.3.2. Teaching Science

According to Yssel & Engelbrecht (1985:01) Teaching Science as a subject in Teacher Training refers to the point where knowledge, theory, skills and attitudes culminate in effective teaching experiences. Teaching Science, i.e. Didactics is described as a theory or science which occupies itself with the phenomenon of instruction as a whole. That is, it concerns with what, why and whom we teach (Yssel & Engelbrecht, 1985:02)

In this case, Teaching Science is the dependent variable which depends on guidelines in order to provide students with insight and skills into teaching.

### 1.3.3. Curriculum

The following definitions can be regarded as proper description of what curriculum entails: Marsh (1992:73) defines curriculum framework as a ground of related subjects which fit together according to a pre-determined set of criteria to appropriately cover an area of study. Wheeler (1983:11) defines curriculum as the planned experience offered to the learner under the guidance of the school.

Barrow (1984:11) defines curriculum as a programme of activities by teachers and pupils designed that pupils will attain as far as possible certain educational and other schooling ends or objectives. It can be concluded from the above mentioned definitions that a curriculum apparently can be regarded as the means by which experience of trying to put an educational proposal into practice is made publicly available.

Actually, curriculum in terms of this research may also be taken as an independent variable on which guidelines depend. Having noted in the above definition of the variable guidelines, it can be realised that it is sometimes impossible to have good guidelines in the absence of a qualitative curriculum.

### 1.3.4. Teaching Science curriculum

Fraser (1990:188) defines subject curriculum as the interrelated totality of particular aims, selected and organised learning content, appropriate evaluation procedures and meaningful teaching-learning opportunities, experiences and activities as detective guidelines and minimum requirements for the implementation of the didactic activities, as far as they relate to a particular subject or a course.

It is of course a fact that the Teaching Science curriculum depends on guidelines for the improvement of the teaching skills.



### 1.3.5. College of Education

The Oxford Dictionary refers to a College of Education as an institution for higher education or professional training. This means that this research will look into guidelines that can improve Teaching Science curriculum at Teacher Training Institutions.

### 1.3.6. Teacher

According to Fraser (1990:15) the teacher is a person who is professionally and didactically trained and who is qualified as far as his respective subject occupation is concerned to carry educative teaching.

### 1.3.7. Teaching

The Oxford Dictionary defines the term teaching as the act of imparting knowledge or skills. In this context the term means an act of imparting student teachers with skills, methods and knowledge of enabling them to bring about positive pupil change.

## 1.4. AIMS OF THE RESEARCH

In this study, the researcher is concerned with professional success and professional aptitude of teachers-to-be through the Teaching Science curriculum, since teacher competence involves both professional aptitude and professional success.

The following observations will be covered in this study:

- 1.4.1. How to give the prospective teacher the opportunity to practise effective teaching in practical teaching-learning situations.
- 1.4.2. How to guide the student in teaching skills, in a simulated environment, in such a way that sound didactic principles are practised.
- 1.4.3. How to provide the student with the necessary skills in the making and use of educational media that will assist in creating a better learning environment for pupils.
- 1.4.4. To compare the activities of the subject Teaching Science at Gazankulu Colleges of Education.
- 1.4.5. To analyse how newly appointed teachers present their lessons.

According to Macleod, Macintyre & Griffiths (1977:09) successive generations of teachers have tended to report that they had to learn to teach on the job and that their preservice training seemed to be of little or no help. Fraser (1990:15) maintains that teachers are the persons who are qualified professionally and didactically to carry out educative teaching in their respective subjects.

That is, they are expected to be aware of their responsibility to society for formal educative teaching. Fraser (1990:15) further remarks that teachers must also have sufficient knowledge of and insight into the meaning and cultural value of the aspects of reality which are taught as the learning content of the curriculum. All the above-mentioned factors must be inclusive in the subject Teaching Science curriculum.

To achieve his aim, the researcher looks into the qualifications of Teaching Science lecturers, their methods of lecturing and the availability of teaching/learning facilities. This study is also conducted on the assumption that the better the role of the lecturer in the Teaching Science curriculum, the stronger the possibility that student teachers improve their ability to bring about pupil change. The researcher's opinion is that, should lecturers have the knowledge and ability to set realistic objectives and to implement different and alternative teaching strategies and evaluation techniques to the Teaching Science subject, they may be able to help in the improvement of Teaching Science curriculum.

Lastly, in this study a number of guidelines that can improve the Teaching Science curriculum will be developed which will help the new teacher (or student-teacher) in whatever situation he may find himself when teaching a lesson.

#### 1.5. DELIMITATIONS OF THE STUDY.

Attempts to provide information and insights into specific problems in the subject Teaching Science curriculum offered at former Gazankulu homeland Colleges of Education is the primary purpose of this study.

One of the major reasons for undertaking research on the subject Teaching Science curriculum is the hope that a number of problems such as the following will be addressed:

- 1.5.1. How can we have effective teaching in our schools?
- 1.5.2. Selection criteria of the subject Teaching Science staff.
- 1.5.3. Why are many student-teachers always absent from Teaching Science periods?
- 1.5.4. College facilities and the subject Teaching Science curriculum.

There are five(5) Teacher Training Colleges in the former Gazankulu homeland, namely: Giyani, Lemana, Shingwedzi, Hoxana and Tivumbeni. To survey the Teaching Science activities of this whole population would be a lengthy task. Three colleges Lemana, Shingwedzi and Tivumbeni were selected for the study. The researcher gives each college a fictitious code name such as colleges A, B and C. The colleges studied differ in location, size, characteristics of the student population and types of training courses. Nonetheless, the colleges share many similarities, particularly in modes of teaching and learning. To avoid conjuring up stereotypic images of these colleges, the researcher includes ten (10) principals of schools and four (4) beginner teachers in the sample.

## 1.6. LIMITATIONS OF STUDY

This kind of study is not without its problems.

- 1.6.1. The first problem is the scarcity of literature in the subject Teaching Science curriculum on university library shelves.
- 1.6.2. A second problem is that beginner teachers, student-teachers and principals of schools fail to articulate clearly on all questions they were asked. Because of all this, self-addressed questionnaires are not returned to the researcher.
- 1.6.3. In such a study, it is probably difficult to attribute all guidelines in Teaching Science because of the lack of curriculum development centre-where different matters of Teaching Science are discussed and Teaching Science lecturers centre-where lecturers discuss various problems they encounter in the didactic situation.
- 1.6.4. The study is limited to a period of three months at colleges and two months at schools.

## 1.7. METHOD OF RESEARCH

This research was undertaken with the assumption that teachers as adults and professionals should always act responsibly in the best interest of the child and use better teaching methods, more efficient instructional strategies and acquire more knowledge on learning theories (Fraser, 1990:15).

It should be noted right from the beginning that the problem which this study investigates touches on the whole range of questions which can only be answered by a variety of methods and techniques in order to gain usable evidence.

- 1.7.1. A review of literature on the process of teacher training in selected areas in the world.
- 1.7.2. Interviews and questionnaires will be done with second and third year student-teachers, newly qualified teachers, Heads of Education Department, Principals of schools and Teaching Science lecturers which can be used as the population of this study.
- 1.7.3. In this study, the researcher is the Teaching Science lecturer at a College of Education and he observes the final year students during their school practicum sessions.
- 1.7.4. The researcher will undertake a descriptive study on the teacher competence of newly qualified teachers.

## 1.8. ORGANISATION OF STUDY

### CHAPTER 1

This is an introductory chapter. It identifies problems, examines selected relevant variables through a literature review, constructs a hypothesis and collects valid and reliable data collection instruments. To bring everything to a nutshell, the study emanates from a need to solve practical problems which arose from teacher effectiveness through the subject Teaching Science curriculum at Colleges of Education.

### CHAPTER 2

In this chapter, the researcher identifies literature sources that aim at both relevance and completeness to the research problem. Most of the review articles are on the components of Teaching Science. Particular attention is also given to the guidelines that can improve the subject Teaching Science curriculum at Colleges of Education.

### CHAPTER 3

In order to determine the extent to which empirical findings can be generalised beyond the immediate situation in which the research took place, the researcher evaluates the reality-referent of a particular undertaking in terms of various procedures and techniques. That is, this chapter examines the available research tools that are most appropriate for the purpose of the research. The questionnaires, interviews and descriptive study will be administered by the researcher when collecting data. Observation of teaching procedures by newly qualified teachers and views of lecturers, students, Heads of Education Department and Principals of schools on the teaching activity and Teaching Science curriculum form the main theme of this chapter.

### CHAPTER 4

After understanding and interpreting the data on the role of Teaching Science lecturers in Teacher Training Colleges, how worthwhile knowledge is transmitted to learners, the state of our Teacher Training Colleges and a need of curriculum development that is directed at empowering the learner, significant educational improvement of the subject Teaching Science curriculum could be successfully accomplished. In summary, chapter Four Focuses on the findings with regard to the subject Teaching Science curriculum at Colleges of Education.

## CHAPTER 5

**Chapter Five is central to the entire research work. It draws on conclusions and recommendations from the earlier chapters and these should lead to producing the very best teachers through the Teaching Science curriculum.**



## CHAPTER TWO

### REVIEW OF THE RELATED LITERATURE

#### 2.1. INTRODUCTION

Chapter two presents a review of the literature pertinent to the research problem. Furling, Hirst, Pocklington and Miles (1988:01) assert that initial teacher training of all qualified teachers should include studies closely linked with practical experience in school, and involve the active participation of experienced practising school teachers. More precisely, this research focuses on guidelines that can improve the subject Teaching Science curriculum offered at Colleges of Education.

It is assumed that there are many excellent teachers in Gazankulu and there are those who appear to have precious little creative inspiration for teaching and very little interest in children. Although there appears to be no shortage of ideas about what should be done to redress the problem of teacher incompetence, Teaching Science as a subject represents an initial hitherto uncharted area and seeks to illuminate this important problem (Bridges, 1986:03).

This study reflects much of the experience, thinking and research which has accumulated in recent years about the lives and work of school teachers in developing countries. In fact, an attempt is made in this programme that will make teachers more visible. Dove (1986:01) states that school-teachers spend their working days in the classroom with young learners, doing jobs which are almost invisible to the community at large. It is convenient to suggest that the intention in this study is to discover who the teachers are, what society expects of them and how the very best teachers through the Teaching Science curriculum can be produced (Dove 1986:01).

Whether it is true or not that good teachers are born, not made, student-teachers accurately perceived that bad teachers, at least in many cases, are made not born (Claxton, 1989:05). Admittedly, these students want to know how they could immunize themselves so that they would not succumb in their turn (Claxton, 1989:05). Tabachnick and Zeichner (1991:1) remark that in the last decade or so, there has been a growing acceptance within the United States of America teacher education community, of what has been referred to by many, as inquiry teacher education. This general approach to preparing teachers emphasises the development of knowledge, skills, and dispositions by prospective teachers and teachers that enable them to be reflective about their teaching and the social context in which their teaching takes place (Tabachnick & Zeichner, 1991.01)

In discussing the guidelines that can improve the subject Teaching Science at Colleges, Beyer,Feinberg, Pagan and Whitson (198:11) remark that as long as teachers require

to study a great deal more than they are expected to teach, the mass of teachers will not go into the normal schools and consequently will not receive that professional instruction which every one feels so necessary for the highest success.

With the above preamble in mind, the following aspects are discussed in this review: aims in teacher education curriculum in developing countries, curriculum as a field of practice, microteaching and teaching practice, classroom discipline and communication and the effects of Teaching Science lecturers' qualifications and competence in teaching.

## 2.2. AIMS IN TEACHER EDUCATION CURRICULUM IN DEVELOPING COUNTRIES.

Research studies conducted by Dove (1986:240) reveal that the professional literature on teacher training over the last twenty years has focused on organisation and structure whilst serious study of the curriculum is ultimately the process of training which determines quality and it is to this important and complex theme that the researcher turns on to this study. In fact, it should be noted from Dove's remarks that teacher training does improve teacher performance and pupil achievement (Dove 1986:05). As Furlong, Hirst, Pocklington & Miles (1988:05) point out, the primary aim in teacher education is to produce the good teacher. They further suggest that the subject must be dominated by a differentiated curriculum with strong boundaries between different elements such as education theory, methods of teaching and most influential of all- an academic discipline studied in its own right.

The primary aim in any teacher education curriculum is to equip the student-teachers with analytic and intellectual skills to enable them to evaluate and improve their classroom performance (Furlong, Hirst, Pocklington & Miles, 1988: 06). To cite an example, the main aim in teacher education in Brazil is to provide prospective educators with grounded understanding about schooling and teaching as manifested in the beliefs of those most directly involved in the school related world - namely the instructional staff, students and parents (Sharpes 1988: 24).

It is believed in Brazil that those educators who have received had better grounded training and a broader knowledge of the values, priorities and expectations, and who are aware of the importance of using such information in their own work, are better prepared to provide high quality professional educational experience for pupils (Sharpes, 1988:02).

According to Dove (1986:253) the general aims of initial teacher education curriculum should:

- (a) relate closely to roles and functions expected of the teacher today and prepare the future teacher not only for his instructional role but also for the variety of roles and functions demanded of him by the society and the development of education. Teachers are now more and more involved in various extra-curricular and out of school activities and should be prepared so that they will be able to combine teaching and up-bringing into the single process of developing personality.

- (b) Prepare prospective teachers to use effectively and for the benefit of their learners all the facilities and resources offered by the social and cultural environment.
- (c) Give an opportunity for student-teachers to experience these new roles and functions during the training period, by giving them responsibilities in the administration of teacher education institutions, by establishing closer links with various education institutions and providing practical training so as to develop the students' initiative, responsiveness, resourcefulness and adaptability to change and so enable them in the future to assume such new roles and functions as they appear.
- (d) Provide for and ensure the student-teachers' personal and professional self-development so that they will be prepared to continue their education and development in the future either by self-education or by seeking to attend courses of in-service training and also prepare them to develop the same aptitudes in their pupils.
- (e) Prepare the prospective teacher for the effective use of educational technology including the media of mass communication.

In further describing the aims of professional studies curriculum, Graves (1990:23) shows that good teachers should be retained in the classroom and that they should be educated persons, and recognizable as such in the community, not least in respect of the subject of education itself. After gaining insight into the aims in teacher education curriculum, there is a need to review literature on curriculum as a field of practice.

### 2.3. CURRICULUM AS A FIELD OF PRACTICE

Vallance (1993:154) writes that curriculum as a field of study demands complex responses to complicated problems, and only gradually and occasionally does the discipline look as though it offers any kind of consensus on how to deal with its practical problems. It is interesting to note that the creation of curriculum tacitly acknowledges that yet another answer has been provided to another generation of participants, viz. students and teachers (Vallance, 1983:161). The following major points emerge from literature review on curriculum:

#### 2.3.1. Educators as curriculum makers.

Davies (in Skilbeck, 1984:116) maintains that teachers need to acquire expertise in examining current practice, in responding constructively in areas where shortfalls are revealed, in building new purposeful programmes, and, most of all, in questioning critically the quality and relevance experiences presented to the learner. Davis (in Skilbeck, 1984:117) goes on to say that the teacher is an effective change agent who can successfully introduce an innovation to a school. According to Donald (in Skilbeck, 1984:176), to be able to influence decisions affecting the curriculum, the message for those at or near the bottom of the lecturer scale is clear: direct your energies towards involvement in those committees and working parties set up to consider curriculum design.



What is more questionable is whether there is sufficient representation of teachers who will actually implement the curriculum decided upon (Donald, in Skilbeck 1984: 176).

Donald (in Skilbeck, 1984: 176) shows further that the information may fail to disseminate downwards through the hierarchy because the departmental structure is seen by many as a constraining influence, ill equipped to respond to rapid change and the adoption of interdisciplinary courses requiring cross-modular assignments. Nevertheless, it would appear that there exists limited opportunity for lecturers at the lower levels to influence curriculum change significantly. It is to be hoped of course that teacher participation in national projects, together with advances in initial and in-service training is essential in school-based perspective (Holt, 1979:62).

Grundy (1987:23) suggests that a dressmaker might be exceedingly skilled in the art of making button holes, but if the pattern calls for a zip fastener, her choice of exercising her skill of button holing is limited. That is, unless she is both the designer and maker, she cannot change the pattern. To take an example to our concerns, if a new syllabus document is developed which requires the learning of number facts through other rote learning methods, the educator's range of teaching options is limited (Grundy, 1987:23).

Grundy (1987:23) continues to suggest that educators must be part of the decision-making process which is involved in deciding which skills or methods will be used in the didactic situation. However, it must always be remembered that the curriculum is developed even as it is implemented through the making actions of teachers. It can be deduced that if the Teaching Science curriculum is designed elsewhere, the educator will be under pressure to be productive in the ways envisaged by the designers. That is, the quality of the educator will then be judged by the input he gives in the curriculum organization (Grundy, 1987:23).

According to Marsh (1992:45) empowerment of teachers occurs when they have opportunities to create meaning in their respective schools. Holt (1979:57) argues that the educator must contribute in the Teaching Science curriculum organization because she (as educator) knows the student well, how the student learns, why he learns, the essentials of effective and efficient teaching and how to organize her teaching in the classroom in particular and in the school in general.

Marsh (1992:46) maintains that teachers can and do identify problems and progress to defining them and seeking solutions. He goes on to say that teachers are the implementors of the subject curriculum, users of textbooks in class and leaders, in the didactic situation and they are therefore empowered to enquire into matters critically in order to improve their own practice (Marsh 1992:46)

It stands to reason that the educator sees himself as an authority in this area (Teaching Science curriculum), having the right and duty to judge a problem, to provide a correct solution and to arrange the subject to be absorbed by the learner (Holt 1979:58). Grundy (1987:42) maintains that we must turn to classroom practitioners to seek evidence of the real curriculum design. Research indicates that the sources of information about the

teachers, classroom curriculum practices are mainly accounts of the curriculum developments written by teachers themselves and supplemented in some cases by the interviews (Grundy 1987:42).

### 2.3.2. How does an educator participate in Teaching Science curriculum development?

Although there is no recipe for this, many techniques may be posed to include the Teaching Science lecturer in curriculum development. Goodson (1988:170) notes that plans for subject associations must be drawn. That is, a Teaching Science Association must be formed to further the knowledge of Teaching Science and the lecturing of Teaching Science in all categories of educational instructions at Teacher Training Colleges and universities in the RSA (Goodson, 1988:170). Goodson, 1988:171) further maintains that all causes increasing dissatisfaction in the subject committees must be identified. He further notes that inertia problems such as established textbooks, syllabi and examinations are being successfully overcome and a new wave of interest is sweeping through the schools. It is interesting to observe that the presence of the teacher in the Teaching Science curriculum is just great and rewarding results can be yielded (Goodson, 1988:171).

Because of the Teaching Science lecturers' qualifications or lack thereof (some are undertrained and others badly trained), little contribution is attained in the development of Teaching Science lecturers. Techniques of study are changing more rapidly in modern Teaching Science than at any previous time in the subject's history (Goodson, 1988:172). As a result of this, Goodson (1988:175) maintains that there should be a great need for dialogue between research workers and those being admitted to the mysteries of subject teaching. Goodson (1988:175) notes that teachers provide the necessary link between subject matter and learners; and it is dangerous for the vitality and future health of Teaching Science that some educators find content developments either incomprehensible or unacceptable. It goes without saying that it would be the best solution to include lecturers in Teaching Science curriculum development (Goodson, 1988:176) •

Tanner and Tanner (1988:623) recognize that curriculum development rests on teacher development and on professionalism of the teacher. To end with, Tanner and Tanner (1980:623) suggest that teachers are expected to be architects of the core curriculum, and teacher education must prepare them with the necessary skills. The mandate of curriculum improvement is given to teachers through the establishment of teacher centres (Tanner and Tanner 1980:634). Thus, according to Tanner and Tanner (1980:635), teacher centres focus on practical, inservice education through courses, lecturers, and workshops, and the dissemination of curriculum materials. It should be mentioned that along with interest in teacher centres has grown the theory that teachers can solve their own curriculum problems if they just have centres where they can congregate and pool their collective ideas (Tanner & Tanner, 1980:635).

### 2.3.3. Teachers as curriculum evaluators

Geysers (1992:16) defines curriculum evaluation as "die insameling van inligting op grond

waarvan 'n waarde-oordeel oor die kurrikulum uitgespreek kan word en besluite oor vernuwing geneem kan word". This process (curriculum evaluation) includes the examination of criteria, goals & objectives or aspirations (Russel in Skilbeck, 1984:246). Geysler (1990:20) indicates that curriculum evaluation "vorm 'n geïntegreerde deel van die strategie vir praktykverbetering".

In summary, Russel (in Skilbeck, 1984:246) suggests two types of purposes that seem to occur commonly in public debate when evaluating curriculum:

- using formal assessment in education for student placement or selection (e.g. external examinations for certification and tertiary entry;
- developing procedures to improve teaching and learning and the relevance of programmes in schools.

Arguing on the role of educators as curriculum evaluators, Geysler (1992:23) shows that "baie kurrikulumvernuwingspogings is nie lewensvatbaar nie, omdat die onderwyser nie daarin geken is nie". It should be mentioned that the teacher's curriculum evaluation role in particular educational institutions will be determined by the relative emphases or priority placed on the three key purposes of improvement, accountability and placement (Russel in Skilbeck, 1984:246). In describing the teacher's curriculum evaluation role, Russel (in Skilbeck, 1984:247-253) and Orlosky & Smith (1978:417) suggest three different levels in which the teacher may operate, viz.

- (a) whole school level - teachers using this method are involved in a process which seeks to obtain information on a wide range of programmes and administrative aspects of the entire school and uses an external committee to validate its findings. Teachers are provided with a manual of evaluation processes prepared by the education department and conduct an evaluation of the school against published school objectives.
- (b) programme level - this includes choosing the issue or area to be evaluated (e.g. guidelines that can improve Teaching Science curriculum offered at Colleges of Education, identifying questions to ask, plan, report and implement the evaluation findings. To establish a curriculum evaluation of a school programme the following desiderata are recommended:
  - invite all those who will be involved in implementing evaluation findings. If the area is Teaching Science in colleges of Education then obviously all Teaching Science staff should be participants.
  - determine what is being evaluated and why
  - establish an evaluation team with clear roles for those involved with the evaluation; in particular if there are outsiders in the evaluation team (that is, people not teachers, parents or students at the college) ensure that roles

are clear particularly in the area of who owns the information and who releases information and judgements.

- follow an evaluation plan which allows people to see all of the steps in the process from the outset.
- make a point of trying to give time to evaluation participants by reducing commitments in other areas where possible.

- (c) Individual teacher level - this focuses on the evaluation of the individual teacher in his or her own classroom. That is, the teacher identifies an issue or problem in his or her classroom and invites a critical friend (another teacher or tutor at tertiary institution) to assist in clarifying the issue, collecting information and coming to conclusions for action.

When gathering information, Russel (in Skilbeck, 1984:254) and Marsh (1992:172) identify the following techniques : questionnaire, interview, folio methods, content analysis, diary method, observation, standardized test results, external consultant and meetings. It goes without saying that evaluation theory is as important to the individual teacher for the making of those day-by-day, minute by minute evaluation of his or her own work as it is to project directors or those concerned with monitoring or developing the curriculum on a national scale (Kelly 1989:200). Kelly (1989:23) further maintains that the teacher is the person who possess a good deal of the data the evaluator needs so that he or she can be seen as having an important contribution to make to evaluation at that level. He goes on to say that full involvement of teachers in all aspects of curriculum development is crucial to maximizing its success.

Research evidence by Russel (in Skilbeck, 1984:254) indicates that curriculum evaluation results must be implemented immediately when an evaluation has been completed; and as an ongoing process, curriculum evaluation must be done, at least every four to five years, to improve teaching and learning in schools.

## 2.4. INVESTIGATIONS OF MICROTEACHING AND TEACHING PRACTICE

### 2.4.1. Microteaching in perspective

According to Hargie and Maidment (1979:01) microteaching is a technique whereby trainees are introduced to the component skills of teaching, and are given an opportunity to practise these skills in a scale-down teaching encounter. Most of the researchers have shown microteaching to be effective in terms of improving the teaching performance of trainees (Hargie and Maidment, 1979.01). It seems important to note that trainees may imitate teachers who have a lot to be desired and may end up having learned nothing from their period of observation (Maidment and Hargie, 1979.01). Therefore, student-teachers are expected to master the skills presented in Fig 1 and Fig 2 (on page 16)

**FIG 1**

**The Development of Microteaching - A review**

**TABLE 1.1.**

**TYPICAL MICROTEACHING PROGRAMME**

<u>Week</u>	<u>Activity</u>	
1	Introduction to Microteaching	
2	Pre-Tape	5 minute teach
3	Questioning	10 minute teach
4	Reinforcement	10 minute teach
5	Intergration of Questioning and Reinforcement	10 minute teach
6	Stimulus Variation	10 minute teach
7	Integration of Questioning, Reinforcement and Stimulus Variation	15 minute teach
8	Explanation	10 minute teach
9	Illustration and use of Example	10 minute teach
10	Integration of activities in weeks 3,4,6,8 & 9	15 minute teach
11	Set induction	15 minute teach
12	Closure	15 minute teach
13	Integration of all skills	15 minute teach
14	Tutorials for week 13	NO TEACH
15	Remedial	10 minute teach
16	Post-Tape. Comparison of pre- and post-tape	10 minute teach

- No tutorials on week 13 owing to length of teaches. Tutorials to take place on week 14.

**FIG 2.**

Allen & Ryan (1969) present the following list of "general skills that can be applied at many levels, for teaching many different subjects"

- stimulus variation
- set induction
- closure
- silence and nonverbal cues
- reinforcement of student participation
- fluency in asking questions
- probing questions
- higher-order questions
- divergent questions
- recognizing attending behavior
- illustrating and use of examples
- lecturing
- planned repetition
- completeness of communication

(Hargie and Maidment, 1979:09 and Brusling, 1974:57). Thus the efficacy of the tutor in microteaching depends on the structure of the skills of the training programme, viz. stimulus variation, set induction, closure, non-verbal behaviour, reinforcement, asking question, probing questions, higher order questions, divergent questions, recognizing attending behaviour, illustration and use of examples, lecturing, planned repetition & completeness of communication (Hargie & Maidment, 1979:11).

When stimulating a teaching situation by having students teach groups of their peers or small groups of school pupils, the following standard procedure has begun to emerge:

- (a) a particular skill is defined to student-teachers in terms of a pattern of teaching behaviour and the objectives which such behaviour is aimed at achieving; some attempt is made to justify the value of objectives and the suggested efficiency of the skill.
- (b) Videotapes are shown of a teacher using the skill, in microteaching or in normal classroom teaching, together with a commentary drawing attention to specific instances of the teacher's use of the skill.
- (c) The student-teacher plans a short lesson in which he can use the skill and teaches it to one group of pupils.
- (d) A videotape of the lesson is replayed to the student, who observes and analyses it with the help of a supervisor; the supervisor attempts to make reinforcing comments about instances of effective use of the skill and draws the student's attention to other situations which arose where the skill could have been exercised.
- (e) In the light of the videotape feedback and the supervisor's comments, the student replans the lesson in order to use the skill more effectively.
- (f) The revised lesson is retaught to a different but comparable group of pupils.
- (g) A videotape of the re-teach lesson is replayed and analyzed with the help of the supervisor.
- (h) The re-teach cycle may be repeated (McIntyre, Macleod and Griffiths, 1977:10-11).

According to McIntyre, Macleod and Griffiths (1979:14-15), the education courses in the third, fourth and fifth semesters which had initially been of fairly conventional kind must be redesigned so that microteaching becomes an integral part of them. McIntyre, Macleod and Griffiths (1977:14) suggest that the reconstruction of the curriculum is based on the following assumptions:

- (a) that it was possible to specify many of the basic skills and strategies required for competent classroom teaching;

- (b) that the primary objectives of the education curriculum should be that students should master these basic skills and strategies;
- (c) that this could only be done by planning tasks specifically designed so that students could deliberately practice using these skills and strategies;
- (d) that theoretical components of the curriculum should be closely related to these practical tasks and should primarily be aimed at helping students to understand the principles upon which the skills and strategies might be justified.

Brusling (1974:17) recommends that the student-teachers must be capable of that richness and imagination that enable them to comprehend the complexities of pupils and their learning, and of knowledge, and to invent or to know ways of bringing the two together into productive relationships. Having shown that microteaching is effective the way it is now, Hargie and Maidment (1979:26) indicate that a programme of microteaching should be an important element in any teacher training course and that it is a more useful technique from the traditional method of practice of teaching. At the same time, it should be noted that a programme of microteaching is intended to complement the teacher training course, and it is not intended as a complete replacement for traditional teaching practice (Hargie and Maidment, 1979:26).

#### 2.4.2. Teaching Practice

In this context, student-teachers are given opportunity to further practice teaching during normal school situations (Piek, 1986:273). Piek (1986:273) recommends that during the period of Teaching Practice, from the first to the last day, the student-teacher is similar to every member of that school under the direct supervision and control of the school principal and the departmental regulations are also applicable to him.

The argument at stake is that the most useful teaching theories are those which trainees formulate for themselves on the basis of practices which they find morally acceptable and conducive to pupil learning (Dove, 1986:251). For trainees to involve personal theories of teaching, Dove (1986:251) suggests that they need opportunities to practise and test out a repertoire of different teaching skills and styles. Teaching Practice in schools should be the opportunity for trainees to develop competence, confidence and habits of self-evaluation (Dove, 1986:251).

Helm (1986:01) notes that teaching is a very complex activity and practising teaching in normal classroom situations is not only a potentially threatening experience for beginning student-teachers, but also does not easily provide them with both the feedback about their teaching performance and the time for analytical and reflective thought that are necessary for swift learning gains. According to Helm (1986:02) student-teachers learn to teach through teaching. In further looking at Teaching practice, Helm (1986:14) points out that its role and objectives need to be clarified and that redirection is required to forge stronger links between the practice situation and theories of teaching. Student-teachers learning during Teaching Practice sessions will equip them to solve pedagogical problems in a

variety of teaching situations through a grasp of some general principles of teaching that transcend the teaching of a specific subject to specific group of pupils (Graves, 1990:67).

Piek (1986:273-276) considers the following points when dealing with the supervision of student-teachers in schools: good relationship of student-teachers with the principal, staff, pupils, lecturers and student-leader must be maintained. However, in maintaining this relationship, the student-teacher fairly represents his training college or university where he studies (Piek, 1986:273).

In looking at Teaching Practice from all angles, Dove (1986:251) argues that though it is a common feature of teacher training, it is frequently poorly conceived, inadequately organised and under resourced. Thus, it usually comprises on paper at least between one quarter and one half of the total training time, arranged for single days over many weeks with trainees attending college on other days or it may be for longer blocks of times during which trainees have little contact with their training institutions (Dove, 1986:251-252).

Ideally, Teaching Practice should be an opportunity when trainers and experienced school teachers partner each other in supporting and supervising trainees (Dove, 1986:252). In teaching, the kind of practical knowledge required can neither be taught nor learned from the book, but only imparted and acquired (Hadley, 1982:10). Hadley (1982:12) ends up by recommending that this knowledge only exists in practice and the most potent way of acquiring it is to contact known expert practitioners who appreciate the needs of students and with whom there is the change of developing a tradition of collaboration and teaching.

To sum up, Teaching Practice if properly carried out should provide the context for trainee teachers to begin to integrate any practice (Dove, 1986:252). Dove (1986:252) further suggests that Teaching Practice should not be merely an apprenticeship whereby student-teachers model themselves on experienced teachers without a basis for evaluating sound and unsound practice. Nor should it be a test of endurance, and experience of practical teaching for which theories offered by training prove irrelevant, untestable and useless. That is, training institutions must develop outreach facilities or extension wings if they are to provide better supervision of trainee teachers in schools (Dove, 1986:252-253).

## 2.5. STUDENT-TEACHER. DISCIPLINE AND COMMUNICATION IN THE CLASSROOM.

### 2.5.1. Discipline in the classroom

Howell and Howell (1979:01) believe it is impossible to teach effectively without considering classroom discipline carefully. That is, good classroom discipline is more than having the students obey you and it is the total process of teaching children to participate



voluntarily and fully in your classroom educational activities (Howell & Howell, 1977:12). Howell and Howell (1979:12) point out that teachers should constantly reinforce the desirable behaviour that is basic to the development of the total classroom instructional program, for example:

- (a) getting all of our students participating willingly in all classroom activities
- (b) getting your students to pay attention to your directions
- (c) getting your students to complete assignments
- (d) getting your students to pay more attention to you and the lesson than to antics of the classroom clown, to the acting out of disruptive students, to the hottest gossip on school, or to their own daydreams
- (e) getting your students to cooperate with you.

Commenting on a more effective teacher, Howell & Howell (1979:13) state that effective discipline programmes are strongest, in the years when patterns of school behaviour are being developed and before the biggest benefit of the aging process, maturity begins to appear and makes a real difference in student performance. According to Piek (1986:27), it is the teacher's duty to take action against pupils who do not abide by the stipulated norms and regulations of the school in general and classroom in particular. In order to maintain good discipline, Piek (1987:27) suggests that the teacher must understand the causes of disciplinary problems and these must be put into account when disciplinary measures are applied.

Learning is facilitated and student behaviour may be changed to become desirable when the teacher is in control. Bearing this important theme in mind, Howell and Howell (1979:15) suggest that the student-teacher must practise the following disciplinary teaching:

- (a) Preventive teaching - an aware, knowledge-based type of teaching that will allow the teacher to be in command of all instructional/disciplinary situations regardless of his or her own anxiety levels;
- (b) Anticipative action - teacher's management of variables affecting discipline in the classroom can lessen teaching anxieties while improving the total instructional program.

Howell and Howell (1979:16) mention that foundation for a sound disciplinary structure in the class is laid by managing the following variables: school physical environments; classroom interpersonal dynamics; curriculum management; student misbehaviour and the motivation of appropriate classroom behaviour; student-teacher communication - both verbal and non-verbal and interpersonal relationship between the teacher and parents, fellow teachers, school administration and non-teaching staffs.

That is, it would be more correct to say that while the educator may teach without his pupils' attention, they will not necessarily learn without it and learners' attention will be greatly determined by the teacher's management of the six educational variables listed above (Howell and Howell, 1979:16)

### 2.5.2 Communication in the classroom ✓

Howell and Howell (1979:148) suggest that learning depends upon both the effective sending and receiving information. Howell and Howell (1979:148) further note that the manner in which these messages are sent and received will determine whether your classroom teacher-student relationship is negative or positive, whether learning is facilitated or hampered.

When differentiating communication, Howell and Howell (1979:149) state that positive communication is that in which understanding is increased or information is transmitted in such a way that the teacher and student learn from each other in a pleasant, workable atmosphere whereas negative classroom communication is that which conflicts with or towards acquisition of knowledge or understanding of ideas, statements or feelings of either the teacher or the student. Arguing on proper communication in the classroom, Van Loggerenberg (1981:38) suggests that "onderwysers en leerlinge moet met mekaar praat - openhartig en sonder huiwering; sonder vrees vir 'n reaksie wat verkleinerend, kwetsend of spottend kan wees".

Seiler, Schuelke and Brillhart (1984:72) recommend that all teachers should be educated to understand how children develop communication competence and should view the classroom as a place where effective communication can be learned and developed. They almost point out the following suggestions that the teacher can follow to enhance the child's communication development:

- (a) selection of words in which to convey the ideas and connection of them according to commonly accepted forms
- (b) discovery of a situation in which some goals can be achieved through the use of speech
- (c) specification of the modifications desired and selection of ideas that will help bring about the changes
- (d) adaptation of the ideas the speaker wishes to communicate to the particular audience and situation, and arrangement of them in order
- (e) Articulation of the words, modulating delivery to suit conditions
- (f) Observation of the responses of others and assessment of success in order to have information on which to base another attempt.

Having the students clearly understand all the teacher's message, Howell and Howell (1979:148) regard it as a major instructional communication goal. When considering the importance of classroom communication, Van Loggerenberg (1981:39) argues that "as onderwysers en leerlinge nie met mekaar kan praat nie, kan daar van opvoeding in die ware sin geen sprake wees nie". In conclusion, Van Loggerenberg (1981:41) recommends the following guidelines for a better flow of classroom communication:

- (a) "onderwysers moet met oorgawe luister na wat hul leerlinge sê
- (b) onderwysers moet op leerlingvrae reageer
- (c) die kind moet daarin geoefen word om self tot 'n gevolgtrekking te kan kom. Hy moet leer om die probleem stap vir stap te ontleed, van alle kante te bekyk, argumente te weeg, en tot 'n selfstandige besluit te kom.
- (d) Die onderwyser moet die gesprek lei sonder om dit te oorheers. Die onderwyser moet aan die gesprek rigting gee, die koers na 'n moontlike oplossing aandui."

## 2.6. THE EFFECTS OF TEACHING SCIENCE LECTURERS' QUALIFICATIONS AND COMPETENCE IN TEACHING

Teaching Science lecturers' academic qualifications do not solely guarantee effective lecturing but they improve teachers' competence and raise the quality of teaching (Elton, 1987:75). Since lecturers' competence bring about the desired student change, it is highly desirable that the lecturers should be competent (Bridges, 1986:09). In order to develop lecturers' competence, Bridges (1986:06) suggests that lecturers have to -

- (a) learn theoretical knowledge to enable them to understand teaching;
- (b) observe lectures given by highly qualified lecturers in the college;
- (c) practise continuously on how to lecture in the college.

Elton's (1986:76) credo is that the academic profession needs training in much the same way as academics consider that other professions need it and indeed provide it for them. According to Elton (1986:76), the vast majority of Professional Studies (Teaching Science) lecturers have never received education courses or any teacher training whatsoever. Therefore experience indicates that a training programme in teaching is a good starting point for a more general development programme. This is plausible, for it is through his teaching that a Teaching Science lecturer interacts most with students. Thus, if he is more knowledgeable, better skilled and qualified and more favourable in his attitudes

towards teaching, then the college should benefit in terms of results and the lecturer in terms of job satisfaction (Elton, 1987:55)

Hoover (1980:13) points out that today's extremely complex society is creating pressures on our educational system not even imagined a decade or so ago, resulting in the young college graduate not ready to assume his or her place in the working world. Hoover (1980:13) goes on to say that Teaching Science instructors are often ill-prepared for teaching students to become selfdirected learners and although they may be experts in their field, they have little or no education in instructional technology.

It is interesting to note that competency of student-teachers produced by our colleges depends entirely on the Teaching Science instructors (Hoover, 1980:13). In order to improve the quality of the future teachers, Hoover (1980:13) suggests that Teaching Science instructors should keep abreast of new instructional methods. Hoover (1980:13) argues that there is nobody who has natural competence and so the Teaching Science lecturer should acquaint himself with the changing education techniques and methods since they are designed to deal with the complexities of modern society.

When giving Teaching Science lecturers basic skills of lecturing and introducing new Teaching Science staff, Elton (1987:58) suggests that the following staff development activities should be performed:

- (a) a brief induction course on some preliminary experience of lecturing;
- (b) Teaching Science experts lead discussion groups at which problems on lecturing and learning can be discussed
- (c) Full details of the course which is open to staff from other colleges is given;
- (d) Short workshop courses on specific topics are provided on demand
- (e) Teaching Science staff evaluates its own lecturing with the help of questionnaires and other evaluation materials which have been constructed in the college;
- (f) Experts in teaching technology are available to act as consultants to Teaching Science staff.

According to Hoover (1980:13), this case of the Teaching Science instructors' qualifications and their methods of lecturing are of most useful aspects to any college or university concerned with maintaining a high quality of instruction for its student-teachers. In the modern society, Hoover (1980:13) suggests that Teaching Science lecturers as professionals should improve their work related instructional techniques and procedures. He goes on to say that the Teaching Science alone must assume full responsibility for maintaining competence in instructional-related techniques. The framework, which related closely to the processes operating at the time of actual

learning, provides college instructions with a systematic, flexible means of teaching students to learn (Hoover, 1980:13).

In setting the stage for effective instruction, the Teaching Science lecturer should be skillful predictor of events, has thorough knowledge of the subject field and of students (Hoover, 1980:01). In conclusion, Hoover (1980:01) asks, "If, as believed student-teachers end up not applying what they were lectured in Teaching Science, should they be taught at all?"

That is, a well qualified Teaching Science instructor knows how to organise facts to promote the application of facts; maintains proper class discipline; treats student-teachers properly; raises the quality of lecturing; accepts lecturing advice from superiors and produces the intended or desired results in the lecture room (Bridges, 1986:05).

## 2.7. CONCLUDING REMARKS

This research study takes up an important specific issue in looking for guidelines that can improve the subject Teaching Science offered at Gazankulu Colleges of Education. Eble (1983:01) suggests that although all courses at a college of education are very useful, Teaching Science affects an ever-increasing number of human lives. As regards Teaching Science curriculum's main focus is not so much on what one does as a teacher but on how one becomes a competent teacher through effective drawn guidelines in the course (Eble, 1983:01).

Stating the aims of college teaching, Eble (1983:03) emphasises that the college must sought ways of helping student-teachers to work with learners in more appropriate and effective ways. It is believed, however, that student-teachers should be better prepared to face the challenges they will find in their schools and classrooms in particular. Watson and Osobodu (1987: 13) suggest that Teaching Science curriculum must help teacher trainees to:

- (a) plan and prepare for presenting new knowledge in the classroom in the light of their understanding both of the knowledge and of children;
- (b) organize learning experiences so that children can effectively and efficiently incorporate information into their conceptual framework of knowledge;
- (c) evaluate the effectiveness of lessons to see how much children learned from the experience.

This chapter draws together much of the experience, thinking and research which has accumulated in recent years about aims in teacher education curriculum as a field of practice. In plain words, teachers are still vital elements in modern system (Dove, 1986:03). With this view in mind, the chapter brings together major scholars who are

**This chapter further concentrates on classroom discipline and communication; and also suggests to curriculum implementers to pay attention to some of dynamics of lecturer's qualifications and competence for educational change. Unless these suggestions and others are properly addressed, innovations are unlikely to succeed and adequate teacher training will be a dream (Dove, 1986:04).**



## CHAPTER THREE

### THE EMPIRICAL RESEARCH AND GATHERING OF DATA

#### 3.1. INTRODUCTION.

Future generations of South Africa's children will be guided in their school experiences by college students currently preparing to teach. According to Eble(1983 : 01) college teaching affects an ever-increasing number of human lives. It should be noted right from the beginning that the quality of the educational opportunity available to these children will depend to a large degree upon the kind of teachers our colleges prepare now through various subjects such as Teaching Science.

This study is designed to find out all high quality learning opportunities for prospective teachers which are provided by Teaching Science programs. There appears to be a global anxiety, not just confined to the developing world about the low quality of teacher training, particularly its failure to equip teachers with sound pedagogical knowledge and Teaching Science skills (Dove, 1986 : 271).

This chapter examines in detail on how student-teachers learn effective teaching practices at the college and how they continue to learn about teaching on the job. That is, teacher training should be viewed as a process that continues even after the teacher has left the college. According to Eble(1983 : 172) the main theme of teaching is to recognize that teaching carries with it an obligation that any teacher is developing more than a subject matter competence. It is significant for the researcher to find ways in which a student-teacher could develop his or her stature.

#### 3.2. SELECTION OF THE SAMPLE.

The population of this study is Heads of Department of Education, Teaching Science lecturers, second and third year student-teachers, beginning teachers and principals of schools. Since it is not feasible to use the entire group, it is necessary that the individuals must be selected to serve as a sample.

In this study, various effective methods of gathering facts apart from a study of relevant literature were considered. It was eventually decided by the researcher to utilize interviews with all three(3) Heads of Department of Education and eight (8) beginner teachers who were randomly selected from a group of sixty(60).

From these three(3) colleges, there are 2800 second and third year students and the desired sample size is 5% of the group. That is, hundred and forty student - teachers will be randomly selected using a table of random numbers; and questionnaires will be sent to them.

In order to obtain all data that would be useful, the researcher sends questionnaires to all twenty eight (28) Teaching Science lecturers from these three (3) colleges. The technique of systematic sampling is used to select a sample of ten (10) principals of schools from a census list of forty (40) group and questionnaires are sent to them.

### 3.3. PROCEDURES FOR COLLECTING DATA

In subsequent section the researcher considers questionnaires, interviews and observation as specific tools of collecting data.

#### 3.3.1. QUESTIONNAIRES

In the course of investigating guidelines for the improvement of Teaching Science at Colleges of Education, the researcher employs questionnaires to convert into data the information directly given by a person in order to discover the experiences that has taken place and what is occurring at the present time. Although questionnaires have some limitations, certain information cannot be obtained in any way other than by asking person, and even when the alternative is available, the asking route may be the most efficient. Based on the researcher's experiential encounters, it is evident that, many people do not give thoughtful consideration to questionnaires; they either fill out the forms carelessly or ignore certain questions while others falsify their answers especially if they are not free or qualified to divulge information. To avoid such discrepancies and to prevent a poor number of mailed-questionnaires returns, the researcher personally present them to respondents; and he explains the purpose and significance of the study, clarifies points, answers questions and motivates respondents to answer questions carefully and truthfully.

In this section three types of questionnaires have been administered with the students, Teaching Science lecturers and principals of schools to provide a specific bit of information that contributes to the guidelines for the improvement of Teaching Science at Colleges of Education.

The researcher constructs a questionnaire to test the attitude of student-teachers towards the subject Teaching Science curriculum (SEE APPENDIX A). Thus, it is possible to gather information from student-teachers because they are learning about teaching and they have knowledge and understanding about Teaching Science as a course at Colleges of Education. In this questionnaire, the researcher is interested in determining whether the college student-teachers subsequently obtained knowledge or skills in Teaching Science and to investigate whether they are satisfied by the course.



In Appendix B, the researcher administers the questionnaire for Teaching Science lecturers. It should be clearly borne in mind that valuable information could be obtained from these respondents because they spend their working hours in lecture halls dealing with the subject Teaching Science.

The point of view advocated in Appendix C is that the principal is directly responsible for supervising and evaluating teachers, counselors and librarians within the building complex. It is clear, however, that the principal can provide data about the beginning teachers' methods and techniques for teaching and strengths and weaknesses of the curricular programs and instructional materials.

Impressive as these questionnaires are, the researcher notes that curriculum evaluation improves a faculty members' teaching; and the students, Teaching Science lecturers and school principals play a major role in measuring all teaching activities at the college.

### 3.3.2 INTERVIEW.

The method used in collection of data apart from a study of literature, questionnaire and case observation is the interview. The researcher believes that the main aim of this interview with Heads of Education Department and beginning teachers is to draw attention to those aspects of teaching and learning in colleges which are important for the effectiveness of the educational experiences the teacher can provide. The researcher further believes that all respondents selected for the sample are able to reflect critically on and evaluate their own teaching.

In an eye ball-to-eyeball situation, the researcher was able to encourage respondents and to help them probe more deeply into a problem. Interviews are useful tools because through respondents' incidental comments, facial and bodily expressions, and tone of voice, the researcher acquired information that would not be conveyed in written responses. Interviews conducted in this study were rigidly standardized and formal : the same questions were presented in the same manner and order to each subject. The researcher used a tape recorder during interviews that helped him to verify responses later.

The central need in these interviews through highly structured questions is to invite attractive comments from all respondents which can make the development of effective teaching possible. Appendix D considers how the beginner teachers orient themselves to the teaching profession and Appendix E is the interview schedule for Heads of Department of Education. The researcher also had chance of discussing teacher effectiveness with Heads of Education Department who attended Southern African Society for Education Seminar in 1994 at Venda. Interviews with them were, therefore, unstructured.

### 3.3.3 OBSERVATIONAL CASE STUDY.

Except the administered questionnaire that is sent to second and third year student-teachers, the researcher employs an observational case study in which an audiotape recorder is used to collect the more straight forward behaviours of student-teachers' real teaching. That is, the researcher directly observes the interaction between the student-teacher and pupils during teaching practice sessions and this offers a bountiful source of information which can be of help to student-teachers in the preparation of their work and the management of their classes.

In this observational research, the researcher starts with a set of hypotheses and develops an observational form (See Appendix F) that is designed to collect specific information related to the subject Teaching Science curriculum. As the implementer of Teaching Science curriculum, the researcher can thus play a major role such as changing subject content, media, organization, school architecture or methods of teaching. Accordingly, the researcher is a Teaching Science tutor in the college which provides him with the opportunity to collect data using participant observation and gives the feedback of the results of Teaching Science; and this ensures that curriculum development becomes a cyclical progress. Such observations could, in turn, be followed up through informal interviews with student-teachers by examining their preparation notes and classworks that were written.

### 3.4. DATA PRESENTATION.

The main focus of this section is to provide data collected through questionnaires, interviews and observational case study on teacher training at Colleges of Education. At the time the information was collected, there was a virtual absence of cooperation from respondents who claim that they provide information to researchers but the results of the research and development are not transmitted to them.

This researcher is aware of this difficulty and takes care to point out that the aim of the present study is to determine the effects of the subject Teaching Science curriculum offered at Colleges and surely these results and experiences should be known to the people. This data does seem to provide solutions to various basic questions such as : 'What is teaching?' 'What makes a good teacher ?' 'How should student-teachers be prepared for their career in teaching?'

However, the study reports of what appears to be the current state of teacher training in our country, made real by the illustrative use of data carefully gathered from a small, diverse sample studied in detail. As he sifts through the data and sorts out the pieces, the researcher endeavours to interpret his growing understanding against a background of related knowledge and his own experiences in and around the teaching profession.

### 3.4.1. DATA COLLECTED THROUGH QUESTIONNAIRES WITH STUDENT-TEACHERS.

Appendix A provides a questionnaire consisting of twenty questions sent to second and third year student-teachers at Colleges of Education. The primary purpose of what follows is to gather various responses in this necessary understanding of the subject Teaching Science.

#### 3.4.1.1. What led you to go to College?

**Responses :** In this question many reponses were given for attending college training. Out of 140 student-teachers, 20% of respondents went to the college because they were interested in children. 5% of the respondents claim that they were instructed by their parents. 30% responded that they went to the college since teaching was the only striking and promising profession when they completed Std 10. 22% of respondents answered that they went to college because it is the only place where they got admission. A handful students went to the college because they wanted to imitate their teacher who was helpful, patient, kind and pleasant.

#### 3.4.1.2. Is teacher training worthwhile?

**Responses :** More than 30% of student-teachers who responded to this question suggest that teacher training is worthwhile because they have ample chance to practice teaching. On the contrary, most students perceive teacher training as very much boring because they do many courses in Primary teachers' diploma. Few student-teachers point out that it is worthwhile because they are equipped with skills needed to present lessons which are educative, informative and attractive. The prime effectiveness of teacher training to some student-teachers is the learning to write on the chalkboard and to socialize with colleagues and pupils.

#### 3.4.1.3. Describe the feelings you are having as you think of your Teaching Science lecturer.

**Responses :** Out of hundred and forty student-teachers who responded to this question, 40% like their Teaching Science lecturer very much, 8% like him as all right, 3% like him not much and those who hate him tend to account for 41%.

#### 3.4.1.4. Looking at the above picture, what makes you to say so?

**Responses :** More that thirty reasons were given for liking or not liking a Teaching Science lecturer, but the most important are given below:

**3.4.1.4.1. Reasons for liking the Teaching Science lecturer.**

- He divides us into groups and all of us have ample time of practising chalkboard work.
- He knows how to transmit knowledge effectively to his students.
- He helps us in making teaching aids.
- He is an educational manager who always has the interest of the students at heart.
- He is always in class on time and his work speaks for itself that he is a gifted and experienced teacher. He is happy at all times and he lectures us on all aspects of the syllabus such as micro-teaching skills, demonstration lessons, social relationships and classroom discipline and communication.

**3.4.1.4.2. Reasons for not liking the Teaching Science lecturer.**

- He cannot organize his work properly. When he takes us out for the chalkboard work, he doesn't supervise us. A class of 40 or 50 students cannot work on the same chalkboard at the same time and so the entire chalkboard work exercise is a waste of time.
- He doesn't give us time to practise micro-teaching skills, what he preaches is that most of us know what teaching is.
- The lecturer cannot express himself fluently in English. Our minds fluctuate when he delivers the subject matter.
- He enjoys being absent from class and if he comes he spends the whole lesson re-teaching the same content he treated in the past. He doesn't like questions and discussions. If we write practicals, he doesn't correct them.

**3.4.1.5. Evaluate your entire Teaching Science course in terms of knowledge you accumulated for the last one or two years, which criteria will you use?**

**Responses:** The main trends of the evidence to the above stated question are summarised. More than 50% of students reveal that they did not learn much in Teaching Science. Very few students tend to evaluate their lessons in Teaching Science positively and responded that they learnt a great deal. 20% percent of students judged the whole Teaching Science program as a waste of time. No one chose the comment about a fair amount of learning. Close to 2% of the students remarked that they learnt quite a bit in Teaching Science.

**3.4.1.6. Rank various activities that you have learnt in Teaching Science in terms of their usefulness to you.**

**Responses:** It is indeed in the quality of students' evaluation of Teaching Science program that one is likely to find the best indication of how much knowledge they accumulated from the course.

Broadly, analytic reflection implies that students who learnt a great deal and quite a bit tabulate the following activities in terms of their usefulness to them : chalkboard work, educational media, school management and control, time-tables, demonstration lessons and micro-teaching.

The survey shows that on solutions provided on paragraph 3.4.1.5, it is only respondents who learnt nothing or not much who didn't record down the various activities they learnt in Teaching Science program.

**3.1.4.7 and 3.1.4.8. Do you ever feel skipping Teaching Science periods? Do you find the time you spent in Teaching Science class to be interesting?**

**Responses :** Questions 7 and 8 on Appendix A seem to provide similar evidence as to the conceptualisation of the importance of Teaching Science program offered at Colleges of Education. Respondents who like Teaching Science periods are glad that they are doing it and don't feel like skipping the subject whereas those who hate it are not at all glad that they are doing it at the college and they always feel like skipping it.

**3.1.4.9. Looking at the above picture, what makes you to say so?**

**Responses :** In so far as the interpretation of the teaching is concerned, both students who like and dislike Teaching Science course provide facts supporting their evaluative statements.

**3.4.9.1. Reasons for liking Teaching Science subject.**

- I like it because we learn various skills such as writing on the chalkboard.
- I like it because I see myself on the video while delivering the subject matter.
- I like it because we acquire various skills and strategies for teaching.
- I am glad that I am doing the subject because I want to be like my competent Teaching Science lecturer.
- I don't ever feel skipping Teaching Science period because Teaching Science is the centre for the teaching profession - we learn ways and means on how pupils should be managed in the classroom.

- The lecturer gives us Teaching Science periods to study for examination subjects.
- I like it because I pass all practicals even though I don't do them.

**3.4.1.9.2. Reasons for not liking Teaching Science.**

- I dislike it because I learn nothing; our lecturer is very much ignorant with chalkboard work, micro-teaching and demonstration lessons.
- I hate it because the Teaching Science lecturer doesn't know my name whereas all other lecturers know it.
- I always feel like skipping Teaching Science periods because we don't write exam at the end of the year.
- I dislike it because the Teaching Science lecturer is very passive and I hardly understand what he teaches.
- I am not glad at all that I am doing Teaching Science because my lecturer comes to class unprepared and he ends up reading from the book word by word.
- I always feel like skipping this subject because the Teaching Science lecturer talks about the media that must be used by us but he has never demonstrated on how effectively a media must be used.
- I dislike the subject because it is a combination of theories and improper handling of practical parts.
- I am not at all glad that I am doing this course because I hear of the names of the media such as epidiascope, slides, filmstrips, episcopes and others, but my lecturer and students have never operated them. In the class we sometimes talk of TV and computers as teaching media - I personally know TV for news, drama and stories and our college doesn't have a single computer to be used as teaching media.

**3.4.1.10. Do you like the way Teaching Science is taught ?**

**Responses :** The results from the systematic observation on the question asked on para 3.4.1.12 show the following : 10% of respondents like the way Teaching Science is taught; less than 5% like it quite a bit whereas 43% reflect the misappropriateness of the way Teaching Science is taught.

**3.4.1.11. If you had to improve the way Teaching Science is taught, what would you recommend ?**

**Responses :** Much can be done over the short run to improve the way Teaching Science is taught. The survey reflects the following viewpoints :

- I will make it a point that all aspects in Teaching Science are taught. Some lecturers take it for granted that all students know how to write on the chalkboard and so they end up not giving us time to practice chalkboard work.

- I recommend that the subject Teaching Science must be handled by a lecturer who has positive attitude towards it.
- I recommend that students must fulfill the requirements of the Teaching Science syllabuses before they are promoted to the next standard.
- Our lecturer doesn't know the patterns for cursive writing, so I recommend that a skillful lecturer who knows this matter must be appointed.
- A lecturer must first demonstrate to students on how effective a lesson is delivered, from there he can expect a student to do it on his own.
- I recommend that the college as a fountain of knowledge must obtain substantial equipments (media) to be used to facilitate the learning of students. That is, if we talk of the Teaching Science program we must attend to it correctly by doing both its theory and practice but not to theorize the whole textbook.
- I recommend that students must be given a greater say in the affairs of the way Teaching Science is taught. That is, students must keep on evaluating their Teaching Science tutors to keep them informed in as clear a method and style of their teaching as possible.

3.4.1.12. Does the Teaching Science lecturer give you help when you need it ?

Responses : Very few student-teachers (less than 5%) perceive the Teaching Science lecturer as always caring about students. Some students chose "sometimes" as their response when asked whether their Teaching Science tutor gives them help when they need it, but the percentage was small (less than 2%). Nearly one respondent in three chose "Never" as his response on the help rendered by the Teaching Science tutor and this was nearly 40% of students.

3.4.1.13, 3.4.1.15 and 3.4.1.16. Do you find the time spent in Teaching practice sessions at schools to be useful ? Were the comments made by the lecturers on criticism helpful ? Evaluating your Teaching practice Journal (T.P.J) offered at your College, which criteria will you use ?

Responses : It is revealed from the survey that 36% of respondents find the time they spent in schools to be useful. Over 50% view the school environment negatively. Less than 2% remarked that they learnt nothing while at home schools.

3.4.1.14 and 3.4.1.17 Drawing from the above comments what prompts you to state thus?

Responses : The total number of lessons to be taught during the entire teacher training is 110. Unfortunately, lecturers do not guide us in preparing these lessons and we end up making many mistakes.

The Teaching Science tutor does not control our preparation lessons and this motivates us to copy some from our friends in order to fulfill the task.

Because we spend two weeks in schools, it is impossible for us to teach all prepared lessons within a short span of time. We have learnt nothing in T.P. J because lecturers do not check them and if they do, they don't give comments. Teaching Practice sessions at schools is a waste of time because the whole exercise is disorganized and principals of schools put the stamp on all forms without reading the contents.

The way in which criticism lessons are conducted gives us a discouraging element because no proper program is followed by evaluators. One tutor recommends what another rejects. It seems the main mission at home schools is to award marks.

More than 50% of respondents remarked that there appeared to be less controlling and supervising at home schools. Few respondents were more than satisfied with Teaching Practice sessions because they applied their teaching theories into practice and they were properly guided and controlled by their lecturers.

3.4.1.18. Many student-teachers are always absent to Teaching Science periods, what do you think is their main reason?

Responses : In my point of view, we are not willingly discarding the value of Teaching Science but are forced by various conditions such as improper learning environment and incompetent lecturers who fail to organize the various learning activities.

- Students take the subject as a waste of time because they don't write examinations.
- Some students are bored to attend the periods because Teaching Science tutor usually tells them to concentrate more on examination orientated subjects.
- Some students are always absent because they are shy to practise micro-teaching skills.
- Many students do not see any reason for attending Teaching Science periods because they pass even if they do not attend.
- They are always absent because tutors give the same opportunities to brighter students to practice micro-teaching skills.
- It seems students realize that the lecturer is unable to manage them. He does not care whether they attend or not.



**3.4.2. DATA COLLECTED THROUGH QUESTIONNAIRES WITH TEACHING SCIENCE LECTURERS (SEE APPENDIX B)**

**A. GENERAL INFORMATION.**

In table II, which covers questions 1 and 2 of the questionnaire in Appendix B, seven (7) Teaching Science lecturers are graduates with either Education 100 or 200, ten hold B.A. and Education 300, 9 hold Bachelor of Education and 2 hold Bachelor of Science with Education 300 as one of the majors.

**TABLE II TEACHING SCIENCE LECTURERS' ACADEMIC QUALIFICATIONS.**

COLLEGE	DIP- LOMA	B.A.+EDU 100 OR EDU 200	B.A. + EDU 300	B.ED	BSC. EDU 300	B.COMM+ EDU 300	
A	0	2	1	3	1	0	7
B	0	3	4	2	0	0	9
C	0	5	2	4	1	0	12
	0	10	7	9	2	0	28

The data above shows that the subject Teaching Science is taught by under qualified lecturers because many of them hold Bachelor's DEGREE with Education 100 or Education 200. This factor is identified as limiting the teaching effectiveness. Only nine (9) lecturers out of twenty eight (28) modified their potential through completing a Bachelor of Education degree.

**TABLE III: TEACHING SCIENCE LECTURERS' SATISFACTION ON TEACHING.**

COLLEGE	MOST OF THE TIME	A GOOD DEAL OF TIME	ABOUT HALF OF THE TIME	OCCAS- SIONALLY	SELDOM	
A	2	1	1	0	2	6
B	3	0	1	1	4	9
C	3	1	2	1	5	12
	8	2	4	2	11	27

What emerges from Table III is that eleven (11) Teaching Science lecturers (40,74%) are seldom satisfied with their Teaching Science lecturing whereas a combination of lecturers who are satisfied most of the time and a good deal of time constitute ten (10) lecturers (or 37,04%).

**B. DISTRIBUTION OF WORK**

Table IV summaries the data on allocation of subjects provided by a sample of Teaching Science lecturers at three Colleges of Education. Clearly, respondents at colleges A and B hate it when subjects are allocated to them by the Rectorate or Heads of Departments. They see this as a serious problem because they are given subjects to teach that they do not know how to transmit the content effectively and by so doing they (Rectorate and Heads of Departments) relegate those subjects to lesser status.

For college C, respondents are very much satisfied when the subjects are allocated by the H.O.D with the help of concerned lecturers. They think this method meets the expectations and good experiences that lecturers went through in their academic studies; and it also develops teachers' potentialities.

**TABLE IV: DISTRIBUTION OF WORK**

COLLEGE	ALLOCATION OF WORK
A	Allocation is done by the Rectorate
B	Allocation is done by the H.O.D.
C	Allocation is done by H.O.D. and lecturers

**C. FACILITIES IN THE TRAINING COLLEGES**

In the first instance, the data shows clear similarities between Heads of Education department and lecturers' views on facilities available in the Teacher Training Colleges. Most obviously, all facilities recorded by second and third year student teachers at colleges A, B and C were exactly perceived by twenty eight (28) Teaching Science lecturers at the same colleges (see Table A).

**D. STUDENT TEACHERS.**

The researcher asked three groups of respondents, namely students, Heads of the Education Department and Teaching Science lecturers to determine why some student-teachers are always absent to Teaching Science periods. In almost every group of respondent, the researcher finds consistent, significant similarities in the information about students' poor class attendance (see para. 3.4.1.18 and 3.4.6.1.).

From the list of Teaching Science lecturers, 5,4% of respondents disagree with the statement that some student-teachers are always absent to Teaching Science periods. These respondents perceive the subject Teaching Science as very valuable that a student will not compromise to be absent if she needs useful teaching skills.

Responding to question 13 on Appendix B, respondents see self-motivation as the source of power both inside and outside the classroom. Thus, if the Teaching Science lecturer is always in charge of his subject, student will be self-motivated to attend his lessons every period.

**E. VARIOUS TEACHING SCIENCE ASPECTS.**

The issue in this section is whether students as a consequence of the Teacher Training Colleges happen to attend the classes to which they are assigned, and/or have equality of access knowledge. In the colleges of my sample, it is deduced that all aspects (themes) as appear on question 14 Appendix B are very valuable in training professional teachers. It appears from the data that 35,4% of lecturers ignore the following aspects (themes): chalkboard work, micro-teaching and educational media.

It becomes apparent that all respondents are satisfied with these themes (aspects) in the subject Teaching Science curriculum if they are taught effectively to student-teachers.

**F. RECOMMENDATIONS.**

Responses: In order to improve the subject Teaching Science curriculum, Teaching Science lecturers suggest that the following aspects must be addressed as a system:

- (a) A sound Teaching Science personnel must be appointed - That is, experienced, dedicated and innovative Teaching Science lecturers must be appointed.
- (b) The mode of training student - teachers must be changed - This is possible if retraining of trainers of teachers is done. That is, the educator should become the manager of his teaching and should guide learners by directing their learning activities in a dynamic way.

### 3.4.3. DATA COLLECTED THROUGH INTERVIEWS WITH PRINCIPALS OF SCHOOLS.

The results will be reported in five main sections corresponding to research questions listed on Appendix C.

#### 3.4.3.1. In selecting teachers of your staff, what would you look for?

Responses: Despite the large amount of available information, the principals of schools did not seem very knowledgeable about the selecting process of teachers. Only a minority of principals (9,4%) could be said to have detailed knowledge about staff selection procedures.

Principals say they go for an applicant (teacher) who controls his class effectively, knows how to present the content accurately, has good social relationship with all members of school community, is sober and duty conscious, is interested in extra-mural activities, is willing to help pupils and colleagues and has an excellent curriculum vitae.

#### 3.4.3.2. Please share with us your thoughts on teaching by the beginning teacher.

Responses: The main argument put forward by principals in this question was that classroom discipline and communication remain basic problem to the beginner teachers. About 12% of principals responded that beginner teachers know how to use educational media effectively and write genuine lesson preparations. Almost all respondents replied that many beginner teachers are shy and self-centred, unable to interpret the syllabus and they have less respect to their seniors as they show disinterest in learning from them.

#### 3.4.3.3. How are the beginning teachers' relationships with members of the school community?

Principals were fairly divided in their responses, 43% say the beginner teachers have significantly more negative relationship with members of school community and 46% reveal that the beginner teachers have healthy relationship with members of school community. Only 6% of respondents claim that beginner teachers in secondary schools are involved in immorality with school pupils.

#### 3.4.3.4. Looking at the above picture, what makes you to say so?

Those respondents who commented negatively appeared to base their judgement on the beginner teacher's poor working relationship with her

colleagues, pupils and seniors. The following comment was typical of several: She has pride, does not greet her fellow teachers and pupils, and she wants to compete with everybody.

On the other hand, the remaining respondents considered that beginner teachers love, respect and trust their colleagues, parents and pupils. These respondents made explicit reference to what they observed as beginner teachers' good relationship with members of the school community: "Beginner teachers share ideas with their colleagues and seem very interested in the pupils' welfare".

3.4.3.5. Please evaluate beginner teachers at your school and tell us about qualities (themes) you think should be included in the curriculum of Teacher Training College to ensure a high standard of training of teachers.

Responses: The questionnaire responses showed various teaching strategies as the main problem in this survey. That is, more than 50% of respondents suggested that the following themes should be spread in Colleges of Education:

- teacher professionalization.
- staff development programs.
- teacher's personality guidance.
- effective instructional program in the classroom.
- effective classroom discipline.
- school management and control.
- the teacher and human relationships.

Ten% of principals do not believe in presenting a new curriculum for Teacher Training Colleges, for the good reason that there is much that is excellent in the existing curriculum. What they proposed is a shift in emphasis in both curriculum and theory that justifies it. That is, they believe that what is normally done in Teacher Training Colleges is enjoyable, useful and quite fulfilling our high hopes for its educational potential if properly implemented.

These respondents (principals) tend to assume that if the student- teachers do not show their competence in teaching, it does not necessarily mean that teacher competence is altogether lacking in college curriculum. However, they propose for curriculum innovations that have at their core the best teaching and learning at Teacher Training Colleges

### **3.4.4. DATA COLLECTED THROUGH INTERVIEW SURVEY WITH BEGINNER TEACHERS (SEE APPENDIX D)**

This section analyses the results of empirical research in which beginner teachers were interviewed about how they recognise effective and ineffective teaching in schools. The analysis was based on transcripts of eight beginner teachers being interviewed. The results show that teachers' responses are consistent and their teaching seemed to have little relevance to the instructional program in the classroom.

#### **3.4.4.1. How do you feel about teaching now?**

Responses: The data reflects that these teachers experience numerous problems in their first years of teaching because they are left on their own by the principals. There were clear differences between the eight beginner teachers interviewed in schools in their overall classroom organization and management, classroom communication, process of motivation and problem solving. Most obviously three beginner teachers A,B, and C either run out of material before the end of lesson or have the lesson ending prematurely.

Teacher "D" seemed to fail to stick rigidly to his lesson plan and teacher "E" had too many discipline problems, that is, he lacks confidence and cannot hide it. All other teachers have higher teaching satisfaction in school, greater commitment, effective attempts to motivate the class at the outset of the lesson and positive teacher - pupil relationship.

#### **3.4.4.2. There are some radical reformers who think teacher training is a waste of time. What is your comment on this statement?**

Responses: In response to this question, all the beginner teachers reported that Teacher Training College is very useful because of the following major reasons:

- prospective teachers are gently introduced to teaching through learning to teach in a safe, controlled environment.
- prospective teachers obtain specialised subject matter and knowledge.
- prospective teachers develop skills and abilities of teaching pupils.
- prospective teachers get the opportunity of knowing the child, how he learns and why he learns.
- prospective teachers are prepared for effective teaching and classroom management and discipline.

#### **3.4.4.3. Did you admire any lecturer at the college with regard to good teaching? If so what characterised the teaching of that lecturer?**

Responses: Of all the beginner teachers in the sample, teachers "C" and "E" were the only ones who paid most attention to the above stated question. They responded that their lecturers had the intention that students will learn something when they were in class. These respondents also commented that students came to accept the discipline of the lecturers and the subject because they were dedicated to their work.

The other three respondents "A", "B" and "D" were happy with the lecturer "X" because she was always well prepared for the lesson and she motivated them to be receptive, observant and to pay attention throughout the lesson. Three other remaining beginner teachers kept quite on the above stated question.

#### 3.4.4.4. What suggestions can you make which can be incorporated in the training of teachers?

Responses: This interview question explores respondents' suggestions, understanding, predictions and explanations of the teaching phenomena in their own terms and to then probe further specific ideas relating to scientific recommendations as listed below:

-There must be a formation of highly structured, centralised and effective Teaching Practice Committee (T.P.C.) at college level to stimulate, support and provide good teaching programs for prospective teachers. This Teaching Practice Committee (T.P.C.) should also focus on improving the teaching mistakes made by student - teachers during practice teaching.

-A second set of recommendations pertains to college tutors or lecturers. What the respondents are proposing is that each tutor or supervisor is to be held responsible for criticising a batch of the same student - teachers every year for consultative assistance.

That is, the tutor administers whether the student - teacher is improving on her teaching mistakes or not.

-A third set of recommendations pertains to the subject Teaching Science Curriculum. The guiding principle put forward here is that student - teachers should be taught the essence of professionalism, for example, duty conscience, teacher-human relationship, keeping and control of registers and interpretation of various syllabi.

-The problems of beginner teachers are centred around the organisation and administration of the classroom. In this regard, classroom communication and discipline should be stressed at Colleges of Education.

-Support by the college tutors in order to solve various problems such as frustration during the first year of teaching by most of teachers is not only deemed necessary, but will determine whether the student - teachers will survive the first years of teaching

#### 3.4.5. DATA COLLECTED THROUGH INTERVIEW SURVEY WITH HEADS OF EDUCATION DEPARTMENT (SEE APPEDIX E)

This data arose out of interview survey conducted in three Teacher Training Colleges A,

B and C with Heads of Education Department. The primary objective of the survey is, therefore, to determine to what extent the Heads of Education Department organize the subject Teaching Science and how they go about managing Teaching Science lecturers.

3.4.5.1. Some lecturers at various Colleges of Education are complaining that student - teachers are no longer attending Teaching Science periods. What is your viewpoint on this statement?

Responses: The responses rate to the interviews varied widely from college to college, but notice in the subsequent paragraph is the summary of the data collected on the above stated question:

-students are no longer complying with the demands of authority, that is, they lack self-discipline and self-motivation.

-the resources available to the college are severely limited, that is, it is especially difficult to convince student - teachers to attend Teaching Science periods in the absence of necessary resource materials and technical aids.

-poor competence of some Teaching Science lecturers.

-lack of Teaching Science specialists.

3.4.5.2. How are Teaching Practice Committee members at your college selected?

Responses: According to one respondent (H.O.D.) at college A, Teaching Practice Committee members are selected by the Rector of the college. The problem with this selection is that some members have not got that much information about the Teaching Practice organization.

In colleges B and C, Teaching Practice Committee members are selected either by the Head of Education Department or by virtue of being a Teaching Science lecturer, an individual automatically constitutes the committee. All respondents suggest that Teaching Practice Committee members need a staff development program directed to Teaching Practice organisation.

3.4.5.3. Principals of schools are putting their blame on the college for the standard of education which is deteriorating, what is your comment on this statement?

Responses: In line with the above stated question, three Heads of Education Department supply the following reasons:

-Head of Department at college A suggests that many people are to take the bigger slice of the blame for the deteriorating standard of education, for an example parents are not playing their role as primary educators. That is, they ignore the development of the moral and ethical aspects of their children.



-The Head of Department at college B suggests that for the school pupils to do better, practically in all school subjects, pressures are exerted on teachers. Dissatisfaction and class boycotts of student - teachers at universities and Teacher Training Colleges affect students' performance negatively and this disturbance leads to poor teacher competence.

-The Head of Department at college C suggests that as the school's role enlarged, veteran teachers should improve their performance from initial employment to retirement. That is, all teachers should undergo staff development program such as classes and courses, professional reading and writing, research and inservice training centres.

#### 3.4.5.4. What suggestions can you make which can be incorporated in the training of teachers?

Responses: In any attempt such as this to provide their exposition, all three respondents were concerned with task orientated information about teaching. They propose the following recommendations which are important in the training of student - teachers:

-All college lecturers should be exemplary when they participate and take responsibility in lecture halls, because student - teachers tend to imitate the behaviour of their advisers.

-Admission criteria for the student - teacher should be an MD and above with symbol D in English; the main aim of raising the admission requirements is to register potential student- teachers who will be successful on their studies.

-All Teaching Science lecturers should obtain a minimum qualification of Bachelor in Education degree with specialisation in Teaching Practice (Educational Technology).

-Colleges of Education should establish and develop a micro-teaching laboratory and media centre. These college facilities will help Teaching Science lecturers to provide the best possible educational and teaching guidance to their student- teachers.

#### 3.4.6. DATA COLLECTED THROUGH OBSERVATIONAL CASE STUDY WITH STUDENT - TEACHERS (APPENDIX F)

The work in this section is based on an intensive observational case study of student-teachers at Teaching Practice sessions in home schools (see para. 3.3.3.). The general impetus for this study is to investigate a conceptualization of student - teachers' classroom image and how they make lessons happen. The researcher as a Teaching Science supervisor evaluated twenty critic lessons. Critic lessons lasted for only fourteen days. The student- teachers on Teaching Practice were requested to select one lesson which they felt would best land itself to close scrutiny and from which they could derive benefit.

The researcher's comments were recorded in Teaching Practice: lesson evaluation form (see Appendix F). Here under the researcher uses classroom features on Appendix F as criteria to explain student - teachers' teaching experiences more systematically. The report

would then consider such factors as how student - teachers grow into the profession of teaching; to what extent the lesson objectives had been achieved; the appropriateness of the subject matter of the lesson in relation to the age and ability of the children; the effectiveness of teaching and learning methods and management and control of pupils (see Appendix F).

### 3.4.6.1. Student - teachers' initial attitude towards lesson evaluation.

#### 3.4.6.1.1. Personality and teaching style.

Six student - teachers faced the chalkboard rather than pupils. Seven were not confident with their work and they were shy. The appearance of all students was satisfactory. Only four students had positive attitude towards their pupils and they applied the eye-contact skill.

#### 3.4.6.1.2. Lesson preparations.

The preparations of seven students were very vague. That is, their introduction, exposition of the subject matter, teacher's presentation skills, strategies, aims and objectives were not clearly stated. Five students wrote excellent lesson preparations.

#### 3.4.6.1.3. Presentation of the lesson

Eight students evaluated their pupils only at the end of the lesson by giving them classwork. Three evaluated their pupils throughout the lesson. Ten students had poor subject knowledge whereas four were the source of knowledge. Seven students frequently used an African language as a medium of instruction in English lessons. Five students used a wide range of examples. Six students kept on narrating all along without involving pupils.

When one student taught Std. III pupils he did it as if he was teaching Std. 6 pupils. Five students praised good work by words such as good girl, good boy and keep it up; and their lessons proceeded at lively pace. One student rewarded two pupils with R3 each and the researcher was dissatisfied. The introduction part of ten students was very poor because they were not using media and relevant questions. One student had a soft voice and she didn't raise up her voice. Two students demanded solutions throughout the lesson to the content that they had never taught.

One student asked questions such as 'are you with me?' or "Do you understand?" Five students liked reading from the book or paper. In the classes of seven students, pupils made noise while the lessons were in progress. Five students concentrated only on brighter children and little attention was given to average and less average children. Only three students applied all micro-teaching skills successfully. One student gave her pupils solutions when they experienced

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difficulties. Five pupils highly stimulated their pupils by means of the audible voice.

#### 4.4.6.1.4. General comments.

Two students explained the meaning of concept to pupils; and Std. 4 pupils used them successfully in full sentences of their own. Four students managed their time appropriately whereas six failed to give pupils classwork or homework. Those students who gave their pupils classwork checked and monitored their pupils properly. Four pupils managed to give their pupils notes. Two students gave one word exercise. Six did not know how to conclude a lesson while five came to their classes late.

### 3.5. CONCLUSION

This chapter has provided a general orientation to the subject Teaching science curriculum offered at Teacher Training Colleges. It began by listing selection procedures of the sample. Data was then collected through questionnaires with student-teachers, Teaching Science lecturers and principals of Schools; interview with beginner teachers and Heads of Education Department and an observational case study on lesson evaluation with student - teachers. However, this data was driven in part by the nature of the questions asked, and the dimensions are the researcher's interpretation. In the light of all these, chapter four serves essentially as the analyses of findings.

## CHAPTER FOUR

### RESEARCH FINDINGS AND ANALYSIS OF RESULTS

#### 4.1. INTRODUCTION

Chapters two and three had evoked thought about wide ranging issues which focused upon the subject Teaching Science curriculum offered at Teacher Training Colleges. These chapters also accumulated more information about what is actually going on in Teaching Science classrooms and teacher education; and they drew critics about approaches and media for the teaching of the subject Teaching Science curriculum.

To this end, Chapter four reports the findings of the study which links the analysis based largely on the information gathered in the previous sections of the study.

#### 4.2. RESEARCH FINDINGS AND ANALYSIS OF RESULTS

##### 4.2.1. Findings on the data collected with student-teachers

The questionnaire explored student-teachers' perceptions of, and attitudes towards their Teaching Science lecturer, the subject Teaching Science curriculum, Teaching Practice, Teaching Science students and resource centre.

The data reveals several uninteresting results. It appears that there is an increased awareness of the shortcomings in the subject Teaching Science curriculum offered at Teacher Training Colleges. The mere fact that students develop negative attitudes towards this subject is very informative that teacher education is at a risky situation. The majority of students (60%) claimed that more Teaching Science lecturers are ineffective classroom practitioners and they (students) have been disadvantaged in any way by being taught by them.

The minority of students (27%) claimed that few Teaching Science lecturers made a good impression with their students. It is revealed that those lecturers are liked by students because they are industrious, dedicated, modest and initiative. Students had a great deal of knowledge from all lessons taught by industrious lecturers because they knew how to teach effectively.

On question regarding Teaching Practice the results show that 36% of students claimed that the time they spent in home schools was very useful because college tutors gave them feedback about their performance; and they also had much time of teaching pupils in a real classroom situation. On the negative side, more than 58% of students regarded Teaching Practice as a stressful time because they were not guided by their Teaching Science supervisors on how to write genuine lesson preparations and schemes of work.

On the facilities available at Teacher Training Colleges, the survey found that colleges have inadequate Teaching Science facilities such as micro-teaching laboratory, dark room and media centre.

The survey shows that overall 61% of students thought that the present Teacher Training Colleges are to be blamed for teachers who are badly trained and inadequately prepared for the classroom.

#### 4.2.2. Findings on the data collected with Teaching Science lecturers

This survey on the subject Teaching Science lecturers had focused on the six classes of sections: general information, distribution of work, facilities in colleges of teacher education, student-teachers, various Teaching Science aspects and recommendations. The data shows that less than 45% of the Teaching Science lecturers have extensive training while the majority are barely schooled beyond the level of those they are lecturing.

It is revealed that Teaching Science lecturers who are less qualified are unfamiliar with the subject Teaching Science lecturing strategies whereas the highly qualified staff is always satisfied with its teaching. The data shows further that student-teachers do not know much about the importance of teacher training and about how prospective teachers become effective teachers.

The data leads to the conclusion that the subject Teaching Science curriculum is more boring, less fun, more repetitious, discouraging, unattractive and less competitive. It is revealed that the central recommendation in this regard is to improve the quality of lecturing the subject Teaching Science through appointing effective and highly qualified Teaching Science lecturers and helping teachers to effectively transmit knowledge and manage pupils' behaviours.

#### 4.2.3. Principals' beliefs about effective teaching

These are the findings of the study of the principals as agents of knowledge utilization for school improvement. When selecting individuals who will be successful and will remain with the school district for a reasonable period of time, the study finds that principals focused on an applicant who excels in classroom teaching and who is willing to help all members of school community.

It was found that the beginner teachers are overwhelmed by feelings of guilt because most of them are shy, self-centred and have poor classroom discipline. This suggests that beginner teachers are helpless to children and easily become isolated as they are shy to share their teaching experience with their colleagues.

The study further reveals that majority of beginner teachers are unable to establish good order in their classroom. To begin with, pupils carry all instructions from experienced authoritative teacher. In this case the beginner teacher is always at war with her pupils because she keeps on forcing them to accept her authority without question. It is found that most beginner teachers are confronted by some or all of their senior pupils with real rejection of their teaching approaches.

The results of the research indicate that principals of schools are for curriculum development and innovation. It was further found that new approaches to assist student-teachers may have important potential which needs to be explored more diligently. In this particular section curricular activities such as staff development programs, effective instructional programs in the classroom and effective classroom discipline were found as a role model for ensuring a high standard of training of teachers.

#### 4.2.4. Beginner teachers view teacher education

A relatively small but representative number of beginner teachers from various schools has been involved in this study. As indicated in chapter I and para. 3.4.5., the main aim in this section is to consider how the beginner teacher goes about classroom teaching after he has completed his training.

When asked to talk about their teaching experience, most beginner teachers concentrated on their relationship with pupils, colleagues and principals. That is, the study reveals that the beginner teacher is left without support necessary to him in the beginning; and pupils also regard him accordingly. The study further finds that the first year of teaching is regarded as a painful experience for many teachers.

It seems in Colleges of Education theory and practice are still far apart and student-teachers are not given direct experience with the children they are going to teach. That is, most beginner teachers run out of material before the end of a lesson.

At it is seen from para. 3.4.5.1 teaching actually comes as a shock to most beginner teachers at schools. Yet the fact remains, that they fail to stick rigidly to their lesson plans and they have too many discipline problems. It can also be seen that beginner teachers lack confidence and effective classroom communication.

The data on para. 3.4.5.2. indicate that respondents are highly satisfied with Teacher Training Colleges because they are capable of preparing prospective teachers for effective teaching and classroom management and control. To test whether beginner teachers

admired any lecturer at the college with regard to good teaching, the data reveals that some college lecturers are able to demonstrate certain effective teaching practices such as motivating their students to pay attention throughout the lesson, etc.

When respondents were asked to propose ways of improving their Teacher Training Colleges, it is found that hundred % of beginner teachers concentrate on various aspects such as improving Teaching Practice committee, appointing competent lecturers and guiding students on classroom communication and essences of teaching profession. Thus applying these proposals effectively would mean that Teacher Training Colleges will produce the most able and fine classroom teachers.

#### 4.2.5. Findings on the data collected with Heads of Education Department

This section attempts to respond constructively to those findings gathered from data collected through interviews with Heads of Education Department. Data analyses reveal that student-teachers are always absent to the subject Teaching Science periods because they want to become more independent and they regard the subject as a waste of time. It seems clear that in a college where there are no resource materials, less qualified Teaching Science lecturers and poor Teaching Science lecturing conditions, there is a slight but consistent bad Teaching Science periods attendance than in those colleges where there are few or more teaching and learning media.

As previously mentioned in Chapter one and Chapter two, the researcher suggests that one reason why the Teaching Practice committee (T.P.C.) is one of the valuable components of Teaching Science curriculum is that it (T.P.C.) makes effective decisions to the development of the subject Teaching Science curriculum. Present findings suggest that at two colleges T.P.C. members are appointed either by Head of Department of Education or all Teaching Science lecturers by virtue of their positions become the members of the committee. It has been shown that in one Teacher Training College, members of T.P.C. are appointed by the Rector.

The pattern of results, however, indicates that many factors such as parents, students and teaching-learning contents contribute towards the downfall of the standard of education. In this survey, it was found that the teacher is the most central participant in the overall deterioration of the standard of education because he knows about the how, the why and what of teaching.

All suggestions made by the respondents (Heads of Education Department) are intended to improve the preparation of teachers or to make teaching a more rewarding and respected profession. For example, it was found that college lecturers should be exemplary in their behaviour, competent Teaching Science staff should be hired and admission requirements for the student-teachers must be MD with D in English.



#### 4.2.6. Findings on the data collected through observational case study with student-teachers

In order to ascertain how student-teachers practice teaching, classroom observations were made on twenty student-teachers (see para 3.4.). The results indicate that student - teachers' level of performance on teaching style and personality is very low. It was found that sixty five percent (65%) of students who were observed are governed by old feelings of dependence and they fail to make difference in pupil's learning. Marks obtained by student-teachers were on average or below average. Less than thirty two % of students had positive attitude towards their pupils.

In analysis of their lesson preparations, it was found that fifty five % of respondents had problems in formulating lesson aims and objectives purposefully, deciding the best method of preparation and writing the actual lesson notes systematically. Only less than forty of the respondents had thorough, meaningful and adequate lesson preparations.

Using data on para 3.4.7.1.3. of twenty student-teachers observed, this study finds that seventy % of student-teachers are unable to demonstrate certain effective teaching practices when called upon to do so.

However few respondents (less than 30%) presented their lessons effectively. It was found that this group excelled in management and control in classroom setting, exposition of new subject matter, practice of microteaching skills and frequent evaluation of pupils to check understanding.

A general analysis of the results obtained for this data indicates that students are sent to home schools without acquiring a thorough grasp of a few basic teaching techniques such as lesson preparation, lesson introduction, lesson evaluation, teaching and learning experiences and proper classroom interaction.

One of the pressing educational issues of our times is the need to improve the quality of teaching in our schools. The work collected in Chapter four is intended to recognise the place of professional practice itself in the realm of research on teaching . Chapter five draws conclusions and recommendations based largely on the information gathered in the previous chapter of the study.

## CHAPTER FIVE

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1. INTRODUCTION

In chapter one, an initial problem of what appears to be the current state of the subject Teaching Science curriculum was presented. It seems realistic beyond any shadow of doubt that Teacher Training Colleges are not producing the cream. The reason is that no marked effort is being exerted in improving pedagogical methodology. The most serious problem, however, is that even those who complete the studies leading to the teaching diploma have acquired meagre material in the subject Teaching Science curriculum. Furthermore, the study reveals that student-teachers who are trained at our colleges are perceived exactly in the same way as their untrained counterparts in schools. The argument lies in the fact that prospective teachers lack the craft of teaching aspects such as application of micro-teaching skills, organization of the learning content, understanding of the pupils' levels of sophistication and inability to use media effectively.

#### 5.2. CONCLUSIONS

Drawing from the responses from interviews, questionnaires and observations the subject Teaching Science curriculum has much to do with prospective teachers who are badly trained and inadequately prepared for the classroom. While the entire college curricula are remarkably important for the preparation of teachers-to-be, Teaching Science curriculum remains answerable in proding student- teachers with necessary adequate teaching strategies and skills.

The student-teachers surveyed clearly believed that they are not equipped through the subject Teaching Science curriculum to present interesting lessons. The student-teachers are incapable of: controlling their classes, marking registers and writing accurately on the chalkboard. Despite its limitations the questionnaire with student-teachers provided some information that competent Teaching Science lecturers are better preferred to those who are lazy or leave a lot to be desired. Classes of the incompetent Teaching Science lecturers were always empty whereas student-teachers liked to be in classes of the effective Teaching Science lecturers. Despite the enormous shortage of the subject Teaching Science facilities at Teacher Training Colleges, prospective teachers still wanted to be counted among the effective teachers upon commencement of their noble career.

The Teaching Science lecturer in this study were not satisfied with their Teaching Science lecturing. Many Teaching Science lecturers were not prepared to lecture this subject

because they had little or no interest in the subject Teaching Science curriculum at all. For most of the Teaching Science lecturers, the highest academic qualification was a Bachelor's degree with Education 100 or 200. The data lend support to the hypothesis that pre-service training seemed to be little or no help. The fact is that Teaching Science lecturers avoided lecturing some difficult Teaching Science curriculum aspects because they were reluctant to expose their deficiency in the subject matter. They did this in order not to engage themselves in passive lesson presentations.

A survey of the principals' reactions to effective teacher training programs revealed an inclusion of major themes in the college curricula such as management and instructional aspects. All school administrators had a responsibility of making things clear to beginner teachers in the field of study. All the same the overall supervision and guidance rests with the educator of the prospective teachers.

The observational case study was originally intended to evaluate the student-teachers' progress. The results of this study indicate that student-teachers had the desire to teach effectively. It is revealed that many prospective teachers failed to allocate time, structure homework and assignments. Most of them failed to formulate good questions and how to deal with problem of pupils' misunderstanding. In order to equip student-teachers to undertake these roles, it was found that Teaching Science lecturers should best guide them to sense the progress they are making.

Reporting on their first year of teaching, beginner teachers felt they were always experiencing difficult times. It seems relevant that beginner teachers did not have enough time initially to gain experience with children in schools during Teaching Practice. It is for this reason and others that beginner teachers had the baptism of fire in their first year of teaching. All beginner teachers regarded Teacher Education as one of the vital elements in modern education systems. While providing suggestions that can be incorporated in the training of teachers, Teaching Science lecturers' role had been recognised as central to what constitutes effective teacher training.

It was clear from what the Heads of Education have said about the standard of education which is deteriorating. In a more fundamental sense, the standard of education has declined because most of the trainers of prospective teachers are ill equipped educationally and do not understand the nature of curriculum development and differences in instructional approaches. Finally, the crux of the issue is that teachers- to-be should go for better training and be able to do a good job after completing their studies.

### 5.3. RECOMMENDATIONS

The recent survey confirmed that there are many areas in which the subject Teaching Science curriculum needs improvement if it is to maintain its high degree of producing school teachers which the community will recognise and respect. Improving the subject

Teaching Science curriculum for the preparation of better classroom teachers is a matter of urgency. This research adopts the view that the subject Teaching Science curriculum should help prospective teachers to be autonomous and active agents in their classrooms.

A point is made throughout the research which supports the idea that the quality of the subject Teaching Science curriculum is the major factor contributing to student-teachers' effective learning of the activity of teaching. In addition, the findings reveal that the student-teachers and only those student-teachers who are effectively trained are concerned with enabling learners to develop to their full potential as human beings.

Based on the data provided on previous chapters, the researcher provides proposals for the improvement of the subject Teaching Science curriculum at Teacher Training colleges. It is the hope of the researcher that this set of recommendations are effective tools in helping preservice teachers become successful teachers.

#### 5.3.1. The subject Teaching Science curriculum organization

My plea is that the course structure of the subject Teaching Science curriculum should be designed in such a way that a student-teacher is basically qualified to teach in schools and to carry out his Teaching Science studies further to a post graduate level. That is, students at degree level must be able to choose Teaching Science curriculum as one of the courses.

#### 5.3.2.. Admission requirements

It was found in this research that students who hold standard ten (Std. 10) qualification less than M.D. are very often the less capable or the less prepared students in Teacher Training Colleges. As a result, Teacher Training Colleges should admit any student who passes Std. 10 with M.D and above. This requirement helps in improving the mode of training of prospective teachers who will be successful with the subject Teaching Science curriculum.

#### 5.3.3. Staff development programs

The traditional lecturer/teacher - centred approach in which the educator transfers information to learners is outdated. The educator should become the manager of his teaching and should guide learners by directing their learning activities in a dynamic way.

If the Teaching Science tutor is to implement the curriculum effectively, he should undergo staff development programs such as workshops, correspondence study, extension courses, and the reading circle. In these programs the educators will realise that, in order to achieve the goal of facilitating the learning process, where students are given the

opportunity to be actively involved in mastering knowledge and skills and focus is placed on productive learning, some traditional teaching methods may have to be discarded. Teaching Science tutors may need to adapt to different styles of teaching and become facilitators of learning. These programs will also keep the trainers of teachers abreast with educational and professional betterment.

#### 5.3.4. The role of the educator in the subject Teaching Science curriculum

One of the most disturbing findings reported in Chapter three is the dissatisfaction by the prospective teachers in the procedures for the lecturing of the subject Teaching Science curriculum. The view that if a student was badly brought up, the teachers concerned are largely to blame is still upheld in our society today. It is recommended that Teaching Science lecturers should be of superior intellectual quality, academic competence and achievement and healthy personality characteristics with which the student-teacher would gladly identify. It is further recommended that Teaching Science specialists must be secured. That is, the candidate must hold a senior degree in Education (Specialisation in Educational Technology) and have valuable knowledge in teaching skills, the subject Teaching Science curriculum and of that phase of student development for which he/she will be responsible. This candidate must have interest in the subject Teaching Science curriculum.

#### 5.3.5. Teaching -learning experiences

The present researcher acknowledges that the subject Teaching Science curriculum consists of all the learning experiences the student-teacher has under the auspices of the college. The curriculum includes not only the more organized aspects of classroom learning such as classroom discipline, teacher-pupil relationship, time-tables, micro-teaching skills, to mention a few, but also the formal learning which goes on both in the school practicum sessions. It is, therefore, clear that all Teaching Science curriculum activities seem very useful and take account of the better trained prospective teachers. It is recommended that all these activities must be lectured in order to involve student-teachers more meaningfully and actively in the preparation of an effective classroom teacher.

#### 5.3.6. The Subject Teaching Science facilities

To accomplish a goal of training skilled classroom teachers, it is recommended that various Teaching Science facilities such as media centre, micro-teaching laboratory, dark room and classroom with one way view must be developed in every Teacher Training College. It must be borne in mind that these facilities enable teaching and learning activities to become meaningful and a sheer pleasure to everyone involved. Student-teachers must be trained on how to use these facilities effectively in order to produce agreed upon results.

### 5.3.7.. School practicum sessions

The data on the school practicum revealed that both college tutors and students attached very little importance to school practicum sessions. The researcher strongly recommends that a minimum of hundred and ten (110) days should be used for the school practicum sessions during the three years of study. The programme for these days should be distributed as follows: First year of study: 30 days, second and third years of study: 40 days each.

It is essential that all student-teachers be subjected to a thorough orientation in the practice programme, viz. School practicum session, lesson plans, time-tables, forms and Teaching Practice journal (T.P.J). All Teaching Science tutors must form a team of Teaching Practice committee (T.P.C). This committee must plan, supervise and evaluate the entire Teaching Practice programme.

### 5.3.8. Student-teachers

It should be noted that learning of the various Teaching Science curriculum activities such as chalkboard work, micro-teaching skills and media usage should not be imposed but must be an involved activity of mind of the student-teachers. Student-teachers should be helped in the understanding of curriculum theories, principles and processes. Opportunities for student-teachers to participate in Teaching Science curriculum decision-making must be created. That is, student-teachers should evaluate their Teaching Science tutors, learning experiences and environment, textbooks and teaching procedures.

### 5.3.9. Teaching Science curriculum centres

According to Dove ( 86:235) teacher centres are a part of in-service training provision. In these centres, teachers become active in the planning of the Teaching Science program; and they also discuss their classroom problems, techniques, and progress with one another. Dove ( 86:235) further suggests that Teaching Science curriculum centres serve as feedback and dissemination for curriculum projects, research into teaching methods, local curriculum development, counselling, receiving centres for materials and contact points with teacher colleges.

The central point to be recommended is that Teaching Science curriculum centres must be established in order to provide attractive participation of Teaching Science curriculum tutors in curriculum planning and development at least to the extent of gaining an adequate understanding of students' learning activities. In these centres, therefore, the Teaching Science tutors as the implementers of all decisions for the curriculum planning and development will also discuss various problems they encounter in the didactic situation.

### 5.3.10. Feedback method

The Department of Education or Teaching Training Colleges should provide several alternative methods such as questionnaires or interviews to Teaching Science tutors as strategies to collect evidence that demonstrates effort, progress, achievement and mastery of specified skills and strategies. The evaluation of Teaching Science tutors should take place at least after every three years.

## 5.4. FINAL REMARKS

The five chapters of this study presented an overview of Teaching Science as a segment of the total college curricula. The challenge in teacher education is to enable prospective teachers to take what they have learnt about teaching and to use it on their own in the teaching situations in which they find themselves or put this in the terms of this work, to engage in practical reasoning as teachers (Pearson 1989: 154).

Teachers must form intentions based on their beliefs, moreover they should change their beliefs and intentions in the light of experience. Enabling teachers to experience these changes reasonably is a central objective of the Teaching Science curriculum. The account the researcher has given of Teaching Science is clearly incomplete in the sense that each aspect of Teaching Science analysed in the study is still being discussed today in a way which suggests that the debate will continue for some time.

Chapters one to three explored the nature and development of Teaching Science as a specialised field of study that contributes to the improvement of teaching. This was followed by a more extensive discussing, on chapter four, that attempted to establish the scope of Teaching Science and served as a basis for the analysis of the findings. There has been, as the final chapter has shown, a set of recommendations on the guidelines for the improvement of Teaching Science at Colleges of Education. Thus applying these recommendations effectively would mean that Teaching Science will enable prospective teachers to be more successful in their day to day classroom teaching.

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**APPENDIX A**

**A QUESTIONNAIRE TO SECOND AND THIRD YEAR STUDENT-TEACHERS AT COLLEGES OF EDUCATION**

1. This is not a test.
2. We are only seeking professional information and would appreciate your friendly assistance.
3. The aim of this survey is to investigate guidelines for the improvement of Teaching Science at Colleges of Education.
4. The success of this survey will therefore depend entirely on your cooperation.
5. All information will be treated as confidential.
6. In this questionnaire you will find the following types of questions:
  - (a) Open questions in which you have to express an opinion.
  - (b) Questions in which you are requested to choose the correct statement among alternatives provided.
7. An addressed, postage paid envelope is enclosed for this purpose:  
NELWAMONDO M. A.  
Box 1042  
THOHOYANDOU  
VENDA

1. What led you to go to college?

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2. Is teacher training worthwhile?

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3. Describe the feelings you are having as you think of your Teaching Science lecturer.

- A. I like him/her very much
- B. I like him/ her quite a bit
- C. He/she is all right
- D. I like him/ her not much
- E. I hate him/ her

4. Looking at the above picture, what makes you say so?

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5. Evaluating your entire Teaching Science course of knowledge you accumulated for the last or two years, which criteria will you use?

- A. Learnt a great deal
- B. Learnt quite a bit
- C. Learnt a fair amount
- D. Learnt not much
- C. Learnt nothing

6. Rank the various activities that you have learnt in Teaching Science in terms of their usefulness to you.

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18. Many student-teachers are always absent to Teaching Science periods, what do you think is their main reason?

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19. Does your college have a resource centre?

( i. e. special room where students can make their teaching aids and acquire materials like tapes, projectors, prescribed textbooks, etc.)

A. Yes

B. No

C. Yes but it is in inadequately equipped

20. What other facilities does your college have?

( Indicate with X)

Micro-teaching Lab

Library

Science Laboratory

Dark Room

Classroom with one way viewing glass

Any other ( Please specify)

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21. What improvement would you like to bring in Teaching Science course if given a say.

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22. Looking at your present situation what would you like to achieve at your school when you start teaching?

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**APPENDIX B**

**A. A QUESTIONNAIRE TO TEACHING SCIENCE LECTURER**

1. This is not a test.
2. We are only seeking professional information and would appreciate your friendly assistance.
3. The aim of this survey is to investigate guidelines for the improvement of Teaching Science at Colleges of Education.
4. Your answers to all questions will assist us in making meaningful suggestions for the improvement of the training of teachers in our colleges.
5. The success of this survey will therefore depend entirely on your co-operation.
6. In this questionnaire you will find the following types of questions:
  - (a) Open questions in which you have to express an opinion.
  - (b) Questions in which you are requested to choose the correct statement among alternatives provided.
7. The completed questionnaire should be posted to:  
NELWAMONDO M. A.  
Box 1042  
THOHOYANDOU  
VENDA



**SECTION A: GENERAL INFORMATION**

1. Have you done Education course at University?

If yes, specify the highest course.

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2. Did you receive training for the Teaching Science subject for which you are now lecturing?

A. Yes

B. No

If yes, please explain

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3. Check one of the following to show how much of the time you feel satisfied with your Teaching Science lecturing.

A. Most of the time

B. A good deal of time

C. About half of the time

D. Occasionally

E. Seldom



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4. Looking at the above picture, what makes you say so?

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5. Check one of the following to show how you think you compare with other people.

A. I like my subject Teaching Science much better than most people like theirs.

B. I dislike my subject Teaching Science more than most people dislike theirs.

C. I dislike my subject Teaching Science than most people dislike theirs.

D. I like my subject Teaching Science about as well as most people like theirs.

E. I dislike my subject Teaching Science much more than most people dislike theirs.

6. Looking at the above picture, what makes you say so?

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**SECTION B: DISTRIBUTION OF WORK**

7. Who allocates subjects to lecturers in your college?

- A. The Rector
- B. The Vice- Rector
- C. Senior Head of Department
- D. Head of Department
- E. Other ( Please specify)

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8. Are you satisfied with this method of allocating subjects to lecturers?

- A. Very much
- B. Quite a bit
- C. It's all right
- D. Not much
- E. Hate it



9. Looking at the above picture, what makes you say so?

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**SECTION C: COLLEGE FACILITIES**

10. Does your college have a resource centre?

( i. e. a special room where students can make their teaching media and acquire materials like tapes, projectors, etc)

- A. Yes
- B. No
- C. Yes, but it is inadequately equipped

11. What other facilities does your college have?

(Indicate with X)

- A. Library
- B. Language lab
- C. Science Laboratory
- D. Micro-teaching laboratory
- E. Any other ( Specify)

**SECTION D: STUDENT TEACHERS**

12. Most students are always absent to Teaching Science periods?

What do you think is the reason?

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13. How will you convince student-teachers who say the subject Teaching Science is a waste of time?

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**SECTION E: VARIOUS TEACHING SCIENCE ASPECTS**

14. Using a cross, indicate the main aspect you lecture in Teaching Science

	YES	NO
(a) Chalk board		
(b) Educational Media		
(c) The role of the teacher		
(d) The teacher and human relationships		
(e) Time - tables		
(f) Classroom organization and routine		
(g) The keeping and control of registers		
(h) Classroom discipline		
(i) Classroom monitors and guardian teachers		
(j) Planning, Preparation and record of work for the teacher		
(k) Control and evaluation of pupils' work		
(l) Micro-teaching		
(m) Demonstration lessons		

15. What other aspects ( themes) would you like to be included in Teaching Science curriculum? List them.

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**SECTION F: RECOMMENDATIONS**

16. In a few lines, please write specific suggestions for improving Teaching Science and anything else you would care to share about your experiences in this course.

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**APPENDIX C**

**A QUESTIONNAIRE TO PRINCIPALS OF SCHOOLS**

1. This is not a test.
2. We are only seeking professional information and would appreciate your friendly assistance.
3. The aim of this survey is to investigate guidelines for the improvement of Teaching Science at Colleges of Education.
4. Your answers to all questions will assist us in making meaningful suggestions for the improvement of the training of teachers in our colleges.
5. The success of this survey will therefore depend entirely on your co-operation.
6. The completed questionnaire should be posted to:  
NELWAMONDO M. A.  
Box 1042  
THOHOYANDOU  
VENDA

**1. In selecting teachers of your staff, what would you look for?**

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**2. Please, share with us your thoughts on the teaching by the beginning teachers.**

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**3. How is the beginning teacher's relationship with members of school community?**

- A. Excellent
- B. Good
- C. Average
- D. Fair
- E. Poor



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JOHANNESBURG

**4. Looking at the above picture, what makes you say so?**

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**5. Please evaluate beginning teachers at your school and tell us about qualities (themes) you think should be included in the curriculum of College of Education to acquaint a high standard of training of teachers.**

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**APPENDIX D**

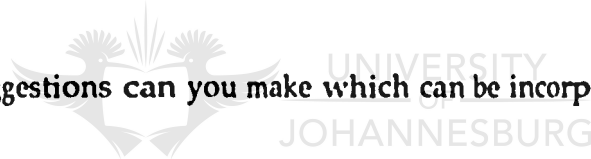
**INTERVIEW SCHEDULE OF THE BEGINNING TEACHERS AT SCHOOLS**

**1. How do you feel about teaching now?**

**2. There are some radical reformers who think teacher training is a waste of time, what is your comment on this statement?**

**3. Did you admire any lecturer at the college with regard to good teaching? If so what characterised the teaching of the lecturer?**

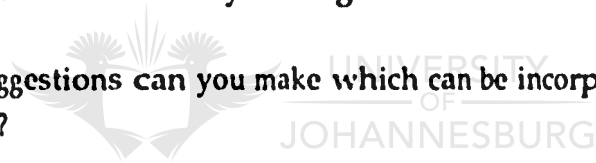
**4. What suggestions can you make which can be incorporated in the training of teachers?**



**APPENDIX E**

**INTERVIEW SCHEDULE OF THE HEADS OF EDUCATION DEPARTMENT  
AT COLLEGES OF EDUCATION**

- 1. Some lecturers at various Colleges of Education are complaining that student-teachers are no longer attending Teaching Science periods because they take the subject as a waste of time. What is your viewpoint on this statement?**
- 2. How are members of Teaching Practice committee at your college appointed?**
- 3. Principals of schools are putting their blame on the college for the standard of education which is deteriorating. What is your view point on this statement?**
- 4. Tell us more about how you recognize effective teaching.**
- 5. What suggestions can you make which can be incorporated in the training of teachers?**





TEACHING PRACTICE: LESSON EVALUATION

STUDENT: \_\_\_\_\_ DATE: \_\_\_\_\_  
 COURSE: \_\_\_\_\_ NO. OF PUPILS: \_\_\_\_\_  
 SCHOOL: \_\_\_\_\_ STANDARD: \_\_\_\_\_

FINAL MARK

%

SUBJECT \_\_\_\_\_  
 TOPIC \_\_\_\_\_  
 LANGUAGE MEDIUM \_\_\_\_\_

Circle the mark awarded for each particular criterion and write the total of each section opposite the relevant heading

CRITERIA	EVALUATION						TOTAL	REMARKS
<b>1. PERSONALITY AND TEACHING STYLE</b>							25	
1.1. Appearance: Groomed/Neat/Untidy/Flashy	4	3	2	1	0	.....		
1.2. Bearing: Self-confidence; movement; mannerisms; facial expression: animated/dull; spontaneous/tense	9	8	6	5	3	1	.....	
1.3. Teaching style: Attitude towards pupils; enthusiasm; motivating ability; gaining pupil's attention	9	8	6	5	3	1	.....	
<b>2. LESSON PREPARATION</b>							25	
2.1. Teaching aims/objectives: Meaningful; clear; relevant; adequate	4	3	2	1	0	.....		
2.2. Method(s): Appropriate; correct; original; does it fit the particular subject and topic	4	3	2	1	0	.....		
2.3. Lesson design: Quality of lesson scheme/notes; lay-out; system; sufficiency; neatness; spelling; grammar	4	3	2	1	0	.....		
2.4. Choice of subject matter: Correctness; arrangement; logical sequence; relevancy to aims/topic	9	8	6	5	3	1	.....	
<b>3. PRESENTATION OF THE LESSON</b>							20	
<b>3.1. Introduction</b>							20	
(a) Creating relationships: Desirable atmosphere; affecting motivation and inclination to learning	5	4	3	2	1	0	.....	
(b) Pre-knowledge: Recalling relevant pre-knowledge; linking it to new matter	9	8	6	5	3	1	.....	
(c) Posing the problem: Were pupils led to observe the problems of new matter in the context of pre-know.	5	4	3	2	1	0	.....	
<b>3.2. Exposition of the new subject matter</b>							20	
(a) Mastery of subject matter: Has student mastered content? Has it been presented logically and clearly?	9	8	6	5	3	1	.....	
<b>3.3. Teaching aids</b>							20	
(a) Trouble taken; originality; suitability	9	8	6	5	3	1	.....	
(b) Effective use; integration with lesson	9	8	6	5	3	1	.....	
<b>3.4. Teaching strategy</b>							20	
(a) Questions: Clear? Well-aimed? Properly timed and spaced? Reaction to pupil's questions/answers?	5	4	3	2	1	0	.....	
(b) Chalkboard work: Neatness, legibility, lay-out, effectiveness, used throughout, sufficient	9	8	6	5	3	1	.....	
(c) Method/techniques: Suitability, meaningfulness, effectiveness, success	5	4	3	2	1	0	.....	
<b>3.5. Conclusion</b>							20	
(a) Actualisation of content: Opportunity of gaining insight/productive thinking, schematising of insights	9	8	6	5	3	1	.....	
(b) Functionalising: Integration of pre-knowledge and new matter, application of new knowledge, mastery	9	8	6	5	3	1	.....	
<b>4. GENERAL</b>							50	
4.1. Gaining of objectives: Have aims/objectives been achieved?	9	8	6	5	3	1	.....	
4.2. Delivery and language usage: Clarity, fluency, correctness	9	8	6	5	3	1	.....	
4.3. Class control: Quality of guidance; control; spontaneous reaction encouraged? (disregard discipline)	9	8	6	5	3	1	.....	
4.4. Time allocation: Realistic for each part of lesson? Steady tempo? Time spent profitably throughout?	9	8	6	5	3	1	.....	
4.5. Didactic flexibility: Continuous evaluation? Accommodation of circumstances; reaction to pupils	9	8	6	5	3	1	.....	

Adjudicator: \_\_\_\_\_

TOTAL