



**University of Fort Hare**  
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**ENABLING AND CONSTRAINING FACTORS IN ZIMBABWE'S 3-3-3  
TEACHER EDUCATION CURRICULUM MODEL: THE CASE OF A  
SECONDARY TEACHER EDUCATION COLLEGE.**

BY

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DOCTOR OF PHILOSOPHY IN EDUCATION IN THE SCHOOL OF POSTGRADUATE  
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## DECLARATION

I hereby solemnly declare that, to the best of my knowledge and belief, this thesis entitled, “Enabling and constraining factors in Zimbabwe’s 3-3-3 teacher education curriculum model: The case of a secondary teacher education college” is my original work. It has not been submitted to any institution of higher learning for the award of any degree or qualification. Where I have used information from the published or unpublished work of other scholars, I have acknowledged such sources both in the text and in the list of references.

Signature-----  
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Date

## **ABSTRACT**

This study offers an explanation of enabling and / or constraining factors in Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science. It is a theory driven study that derives its theoretical foundation from Roy Bhaskar's critical realism and Margaret Archer's morphogenetic approach to reality. The study therefore offers explanations about structural, cultural and agential influences that facilitate and / or hinder the 3-year program for Post 'O' Level Science.

This was a qualitative case study of one secondary teacher education college in Zimbabwe. Qualitative data were collected through interviews, focus group discussions and document analysis. One official from the Department of Teacher Education(DTE) at the University of Zimbabwe(UZ),the Principal, the Vice Principal and 10 lecturers from the studied college,3 Heads of Science department in secondary schools,3mentors and 5 groups of 10 and 11eleven student teachers participated in the study. The DTE Handbook (2012), vision and mission statements and core values of the Ministry of Higher and Tertiary Education Science and Technology Development (MHTESTD),DTE and the studied college, syllabuses, teaching practice reports, policy documents, external examining reports, College Academic Board (CAB) minutes, admission records, mark profiles and pass lists among other relevant documents complemented interview data.

As a theory driven study, structural, cultural and agential influences were found to be enabling and / or constraining the model. The acute shortage of Science teachers in secondary schools and the few Post 'A' Level Science graduates led to the re-introduction of the 3- year Post 'O' Level Science program in secondary teacher education colleges. The bureaucratic structures in educational institutions, the In-Out-In structure, institutional structures such as the family, the University, the studied college, secondary schools, infrastructural facilities, material and financial resources, transport facilities and utilities such as water, electricity and the internet were established as some among other structural factors affecting the 3-3-3 model.

Discourses held about the teaching profession, the vision, mission and core values of the MHTESTD,DTE and the studied college, beliefs about what Science teachers should learn, knowledge, skills, attitudes and values they should acquire and how they should be taught were established as cultural factors enabling and / or constraining the 3-3-3 model.

Agential influences offering causal explanation for enablers and / or constrainers of the model were established as the decision by the Principal and the CAB to re-introduce the 3- year Post 'O' Level Science program, the decision by the students to enroll for the program, the recruitment of under qualified students, the use of various teaching methods, conducting staff development and mentorship workshops and failure to increase staff establishment.

The study has put forth recommendations for the improvement on constraining factors in pre-service teacher education programs. With the understanding that agency has power to reinforce or transform structures and cultures, it should not be seen to be reinforcing disadvantaged structural positions and cultures; instead, after having identified structural and cultural constrainers, it should engage in communicative and meta-reflexivity to come up with the best possible solutions to the hindrances. Courses of action should then be taken accordingly.

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## **DEDICATION**

This work is dedicated to my 91year old mother, who taught me perseverance, my husband George who taught me hard work and my children Garry and Glady, thank you for your love, support, perseverance and encouragement.

## **ACRONYMS**

'A' Level      Advanced Level

APEC Asian Pacific Economic Cooperative

EWP Education With Production

Bed            Bachelor of Education

BSc (Hons) Bachelor of Science (Honours)

CAB            College Academic Board

CBE Competency Based Education

CBTE Competency Based Teacher Education

CE      Certificate in Education

CHE Council for Higher Education

CK      Content Knowledge

CPD Continuing Professional Development

DHET Department of Higher Education and Training

DTE Department of Teacher Education

EDU Educational Development Unit

FET Further Education Training

FGD Focus Group Discussion

HE      Higher Education

HIV/AIDS      Human Immunodeficiency Virus/Acquired Immuno Deficiency

Syndrome

HLS Health and Life Skills

HOD Head of Department

HOS Head of Subject

ICT Information and Communication Technology

IGCSE International General Certificate of Secondary Education

LIC Lecturer in Charge

M Mentor

Med Mgnt Masters in Educational Management

MHTESTD Ministry of Higher and Tertiary Education Science and Technology  
Development

MSc Ed Masters in Science Education

NASS National Strategic Studies

NBPTS National Board for Professional Teaching Standards

NCATE National Council for Accreditation of Teacher Education

NSFAS National Students Financial Aid Scheme

NSTA National Science Teachers Association

'O'Level Ordinary Level

OBE Outcomes Based Education

P Principal

PCK Pedagogical Content Knowledge

PDS Professional Development Schools

PGD Post Graduate Diploma

PK Pedagogical Knowledge

PS Professional Studies

SABER Systems Approach for Better Education Results

SHOD School Head of Department

SMT Senior Management Team

SRC Students Representative Council

SGCSE Swaziland General Certificate of Secondary Education

TOE Theory of Education

UNESCO United Nations Educational Scientific and Cultural Organization

UNICEF United Nations International Children's Education Fund

UZ University of Zimbabwe

VP Vice Principal

WB World Bank

ZIMSEC Zimbabwe School Examinations Council

ZINTEC Zimbabwe Integrated Teacher Education Course

ZESA Zimbabwe Electricity Supply Authority

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# CHAPTER ONE

## BACKGROUND INFORMATION

### 1.1 Introduction

Education has long been regarded all over the world as a fundamental instrument for developing human capital that services various institutions and other structures (Kenya's National Development Policy of 2002--2008). Teacher education, in particular, is seen as the backbone of most education systems, as it develops teachers who are the most important resource along with the pupils they teach (Nziramasanga, 1999). The American Commission on Teacher Education also notes that the quality of a nation's citizens depends on the quality of its education, and the quality of education depends largely on the quality of its teachers (National Council of Teacher Education, 1998). Darling-Hammond (2006) observes that the quality of teachers largely depends on the policies, programs and procedures that equip teachers with the knowledge, skills, values and attitudes they require to perform their duties in the classroom, school and wider community. This clearly indicates that teachers are not technicians who only assimilate a body of theoretical knowledge, but professionals who also reflect on their work and take conscious decisions (Tsafos, 2010). Although teacher education policies are stipulated, programs and processes clearly stated and specified, the initial preparation of teachers is a complex process that has never been easy, hence the ongoing debate on how best teachers can be initially prepared. This study, therefore, sought to interrogate enabling and / or constraining factors in the initial preparation of teachers in general and in Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science in particular.

## 1.2 Background to the Study

Teacher education is generally viewed as the formal and systematic preparation of teachers for professional work. It is a process of education and development that prospective teachers go through as they prepare to enter the classroom for the first time as teachers (Ahmed, 2012). It develops knowledge, skills attitudes and values considered desirable so as to make teachers efficient and effective in their work in accordance with the needs of a society at any point in time (Osuji, 2009). Teacher education is considered in three phases, that is, Pre-service, Induction and In-service.

The pre-service, or the initial phase, refers to all programmes that aim to prepare teachers to enter the teaching profession, whether these programmes concern subject-specific learning or teacher training curricula (Irving, 1999). In other words, pre-service teacher education and training refers to the process in which student teachers grow professionally, through involvement in practical training, knowledge construction and teacher behavior acquisition for the first time. Pre-service teacher education and training is the most crucial phase as it provides the foundation for teacher education.

The induction phase is the period when the newly qualified teacher is initiated or oriented into the teaching profession. In-service training is the continuous professional development of teachers throughout their teaching career. Teacher education basically aims at how the behavior of an individual in preparation for teaching can be made to conform to acceptable standards. Darling-Hammond (2006) advises that for any education system to yield positive results, all the three phases should be implemented, since they complement each other. However, the focus of this study is the pre-service phase.

### 1.2.1.1 Supra-national institutions on teacher education

Supra-national institutions, like the World Bank (WB) and the United Nations Educational Scientific and Cultural Organization (UNESCO), play a significant role in

teacher education, without which teacher education programs would not be effectively implemented.

#### 1.2.1.2 The World Bank on teacher education

The World Bank helps countries to achieve their educational goals by providing financial assistance, policy advice and technical assistance. Working with governments, the WB analyses the needs of individual countries and collaborates with donors to design programs in response to countries' respective needs. Using the Systems Approach for Better Education Results (SABER), the WB assesses teacher education policies of individual countries and advises accordingly (World Bank Group, 2013).

SABER-Teachers uphold that an education system is only as good as its teachers. It strongly believes that teacher effectiveness is the most important predictor of student learning, thus empowers countries with information they need to align their teacher education policies towards making teachers as effective as possible (World Bank Group, 2013). The WB's ultimate goal is to improve the quality of learning for all children by enforcing eight core teacher policy goals namely; setting clear expectations for teachers, attracting the best into teaching, preparing teachers with useful training and experience, matching teachers' skills with students' needs, leading teachers with strong principles, monitoring teaching and learning, supporting teachers to improve instruction and motivating teachers to perform (ibid).

SABER-Teachers also evaluate teacher education programs for individual countries and provide reports with the intention of improving teacher education policies that will in-turn improve teacher effectiveness (World Bank Group, 2013). These reports help countries adjust their teacher education curriculum models, teaching strategies and the content of teacher education curriculum. As such, the WB plays a crucial role in assisting countries improve their education systems such that they address the demands of the society and the global community at large.

### 1.2.1.3 United Nations Educational Scientific and Cultural Organization (UNESCO) on teacher education

UNESCO was set up in 1945. It is mandated to look into educational development from pre-school through to higher education, including technical and vocational education and training, non-formal education and literacy (UNESCO, 1966).

UNESCO (1966) upholds that quality education can only be achieved through teacher education programs that adequately prepare teachers for effective teaching and learning in the classroom. This was asserted by Irina Bokova, the Director General of UNESCO when she said teachers are the single most influential and powerful force for equity, access and quality in education. The quality of an education system cannot exceed the quality of its teachers (UNESCO, 2004). In essence, if nations are to develop, they should improve the quality of their teacher education programs in order to prepare high quality teachers who in turn will provide quality education in schools. UNESCO (2004) aims at improving the quality of education by working with governments and a wide range of partners in designing policies that ensure that education develops relevant knowledge and skills for effective teaching and learning.

In addressing the quality of teachers, UNESCO (2004) came up with a UNESCO Teachers Strategy 2012—2015, that it uses in designing and implementing viable national policies for pre-service and continuous teacher education and training programs. Using this strategy, UNESCO reinforces teacher education and training institutions by reviewing current teacher preparation approaches and aligning them with classroom requirements and intended curricula (ibid). A major effort is made by UNESCO to ensure that teacher preparation programs balance theory and practicum. UNESCO (2004) observes that contemporary school curricula adopt student-centered approaches, active learning, focus on outcomes and processes and emphasize competencies; hence encourages teacher preparation to be in line with this paradigm shift. Teacher education programs should be aligned to the contemporary school curricula (ibid). This can only be achieved if teacher educators are supported to upgrade their competencies to be in line with the latest developments in the educational

landscape. Continuing Professional Development (CPD) courses are recommended to upgrade teacher educators' knowledge and skills. UNESCO encourages governments to prioritize the education and training of teachers, and every year on the 5<sup>th</sup> of October, UNESCO and its partners ensure that the World Teachers' Day is celebrated (UNESCO, 1966).

Supra-national institutions like the World Bank and UNESCO rightly observe that for any development to occur, education is the key. The quality of an education system heavily depends on the quality of the teachers. Therefore, it is of paramount importance for all nations to adopt the best preparation programs in order to produce an effective teaching force.

#### 1.2.1.4 International trends in teacher education

Globally, teacher education is offered in different institutions. In some countries it is offered in Universities or University Colleges, whilst in other countries Colleges of Education are responsible for training and developing teachers (Darling-Hammond, 2006 and Villegas-Reimers, 2003). America, a leader in the global economy, has Professional Development Schools (PDS) (Mary, 2010) that offer teacher education courses. These schools partner with universities for the sake of controlling standards.

The period of study also varies with individual countries. While some countries like Singapore and South Africa offer a four-year teacher education course, Finland trainee teachers go through a five-year teacher training program, and Namibia trains its teachers for three years (OECD, 2005). In Zimbabwe, some teachers are trained for two years whilst others undergo a three-year program (Department of Teacher Education Handbook, 2012). The qualifications that are obtained are certificates, diplomas or degrees, depending on the educational policies of individual countries.

The recruitment criteria for teacher education are also not the same for all nations. While some countries like Finland (OECD, 2005) recruit the most talented school graduates, other countries like New Zealand recruit relatively weaker secondary school graduates. The key issue in teacher education is how the course is offered, that is,

models of teacher education. The National Science Teachers Association (NSTA) (1990) observes that the success of professional development of student teachers depends on the balance between theoretical and practical teaching applications offered in teacher education programs. The Professional Development Schools model used in America emphasizes on-the-job training (Mary, 2010 and Darling-Hammond, 2006); while the three-year Basic Education Teacher Diploma course in Namibia gives more time to subject content. In Zimbabwe the 2-5-2 model offers more practice than theory, whilst the 3-3-3 and 2-2-2 models give more time to theory than practice.

These variances clearly indicate that there is no consensus on how much theory and how much practice a student teacher should receive during his/her initial training. Neither is there agreement on what should be considered first, theory or practice (Tshuma, 2009). It is also not clear how extensive knowledge of content and pedagogy should be in pre-service teacher education programs (ibid); hence the general feeling that pre-service teacher education programs inadequately prepare teachers (Rust, 2010 and Darling-Hammond, 2006). It is therefore imperative for all nations to identify enabling and / or constraining factors in pre-service teacher education programs in order to develop, adopt and implement effective teacher preparation programs.

#### 1.2.1.5 The organizational context of teacher education in Zimbabwe

In Zimbabwe, teacher education has evolved from the early days of missionary education in which only one government teacher education institution (The Teacher's College) presently known as Hillside Teachers' College was established in 1956 and affiliated to the University of Zimbabwe. To date, teacher education has expanded, with twelve primary and three secondary colleges of teacher education (Department of Teacher Education Hand Book, 2012). All fifteen colleges of teacher education are associates of the University of Zimbabwe.

Under the Scheme of Association, the university, through its Department of Teacher Education is the accrediting authority with a mandate of monitoring the quality of teacher education programs throughout the country. The University of Zimbabwe, as the

responsible authority also approves the syllabi for all colleges, examines the students and finally awards the diploma qualification. Each of the colleges is autonomous in terms of curriculum and examinations (Mamvuto, Kangai, Chivore and Zindi, 2012).

Teacher education in Zimbabwe is part of higher education, which is regulated by the Ministry of Higher and Tertiary Education, Science and Technology Development (MHTESTD). The MHTESTD is also tasked with the responsibility of financing, developing and coordinating academic activities in Universities, Polytechnics, Vocational Training Institutions and Teacher Education Colleges (Tshuma, 2009).

In Zimbabwe, teacher education is divided into Primary Teacher Education that produces teachers to teach from Grade 0 to Grade 7 using the 2-5-2 model and Secondary Teacher Education that trains teachers to teach from Form 1 to Form 4 using the 3-3-3 and the 2-2-2 models. The 'A' Level classes (Form 5 and 6) are taught by University graduates. Pre-service teacher education programs are constantly reviewed and revamped to ensure that the end product is sufficiently inducted into the teaching profession (National Report on the Development of Education in Zimbabwe, 2004).

The minimum entry requirements for the teacher education course are 5 Ordinary levels ('O' Level) including English Language and Mathematics. Secondary Teacher Education also enrolls Advanced level school leavers ('A' Level) who would have failed to qualify for University entry. Post 'A' Level students undergo a 2-year program (2-2-2) whilst Post 'O' Level students, through the 3-3-3 model, which is the focus of this study, complete the pre-service teacher education course in 3 years.

The 3-3-3 model (3 years) of Secondary teacher education replaced the 3-3-3-3(4-years) model in 1988. It ran concurrently with the 3-1-2 model (2-years phased out in 2013) up to 1992 when it was phased out. Secondary teacher education colleges were to enroll Post 'A' Level graduates only, as there were many secondary school graduates who could not meet University entry requirements. Post 'O' Level graduates were to train as Primary school teachers. The problem started when Zimbabwe was faced with an economic crisis that forced people to migrate to other countries seeking for greener

pastures (Chronicle, 2002/02/09). More than 400 teachers are recorded to have left the country for greener pastures. Science and Mathematics teachers left for South Africa, Swaziland, Botswana and Namibia among other countries where they were better remunerated (Chronicle, 2007/01/09). The brain drain created problems in the school system as there were no Science teachers; hence, very few students studied Sciences up to 'A' Level. Because schools were churning out very few 'A' Level Science graduates, teacher education was affected in Sciences. Post 'A' Level Science graduates enrolling at teacher education colleges became fewer and fewer. Urgent measures were to be taken before Sciences became extinct in colleges. The Post 'O' Level 3-3-3 model re-surfaced in 2007 specifically for Science students.

Under this model, pre-service trainees spend the initial 3 terms of 3 months each (first year) at college studying academic content in Science, their area of specialization and core subjects such as Theory of Education, Professional Studies, National Strategic Studies, Health and Life Skills and Information and Communication Technology. In their second year, they are attached to secondary schools where they do their teaching practice under the mentorship of experienced teachers and the last year is spent back at college finalizing the syllabuses, revising and writing examinations, hence the term 3-3-3 (DTE Handbook, 2012).

The Post 'O' Level Science program has been churning out Science teachers since 2011 to date. There are informal reports that these graduates, though trained to teach at lower and middle secondary school levels, are hesitant to teach at the middle level and prefer teaching at the lower level. Sentiments are also raised by schools that these teachers are inadequately prepared as they are incompetent in handling the three common Science subjects, that is: Physics, Chemistry and Biology. Some schools claim that Post 'A' Level untrained teachers teach better than Post 'O' Level Science College graduates. Inadequate teacher preparation by pre-service teacher education programs is also observed by Robinson and Latchem (2003) when they say initial teacher training is often criticized for its inadequacy in preparing students for teaching.

Rust (2010) suggests that the way American teachers are trained should be changed; whilst UNESCO (2004) emphasizes that more attention needs to be focused on the

practical components of teacher training courses. The South African Committee (2000) that reviewed Curriculum 2005 recommended experiential and co-operative learning. It has been noted earlier on that the National Science Teachers Association (1990) advocates for teacher education programs that strike a balance between theory and practice. With all these varied recommendations, it is necessary to establish what enhances and / or hampers initial teacher preparation that is blamed for teacher inadequacy, so that effective pre-service teacher education programs may be developed.

It is against this background that the study sought to establish the factors that promote and / or hinder pre-service or initial teacher preparation in general and Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science in particular.

### 1.3 Rationale of the Study

The rationale behind the study on enabling and / or constraining factors in Zimbabwe's 3-3-3 secondary teacher education model was to validate, through gathering data that were to explain, confirm or refute the claim that the model is inadequate. Furthermore, knowledge is needed to establish what has enabled this model since its inception in 2007, and what is constraining the model. Information is also needed about the structural, cultural and agential mechanisms that enable and / or constrain teacher education programs in general and the 3-3-3 secondary teacher education model for Post 'O' Level Science in particular.

### 1.4 Statement of the Problem

Zimbabwe, like all other countries, recognizes the importance of teacher education in improving classroom practice and overall learning outcomes in schools. This is evidenced by the tremendous expansion from one Teacher Education College in 1956 to fifteen to date (DTE Handbook, 2012). Although the expansion increased access to education for many secondary school graduates, challenges have been noted in

teacher education. These challenges are not only peculiar to Zimbabwe, but the world over as shown in the literature review chapter.

Studies have shown that pre-service teacher education programs do not adequately prepare teachers (Robinson and Latchem, 2003, Darling-Hammond, 2006 and Beare, Paul, Marshall, James, Torgeson and Colleen, 2012). What is taught within two, three or four years seem not to produce the desired product as there are weak, unsatisfactory and incompetent teachers in schools (Nziramasa, 1999 and Hezborn, Koder, Misigo and Catherine, 2011). In grey literature, there are also indications that teachers are inadequately prepared. Darling-Hammond (2006) asserts that teachers themselves are less satisfied with their training as they have problems in planning, managing the classroom and diagnosing pupils' learning needs. This is in line with informal reports from some of Zimbabwean secondary school Heads that the Post 'O' Level Science College graduates refuse to teach at the middle level, preferring to teach at the lower level. Kwenda and Robinson (2010) also note that, *"until research into teacher performance goes beyond statistics and outcomes, to interrogate the more qualitative aspects of teachers' understandings of their professional and social roles, our understanding of why teachers in the region largely fail to meet the expectations of society will remain partial and incomplete."*

The World Bank also reports that hundreds of millions of children around the world lack professionally well trained and well supported teachers (World Bank Group, 2013). Commissions of inquiry into education in Kenya (Koech Commission, 1999), Zimbabwe (Nziramasa Commission, 1999) and South Africa (Report of the Review Committee on Curriculum 2005 ) also found some deficiencies within the education systems in general and teacher education in particular, hence the need to reform. This is a clear indication that in education, there will always be gaps that need to be filled, since societies are in a constant state of flux and it is through education that the demands of the societies are addressed.

While all these observations have been made, limited literature identifies where the inadequacies of pre-service teacher education and training lie. Also, limited literature provides a model that strikes a balance between theory and practice. Research has not

shown any study conducted on enablers and / or constrainers of pre-service teacher education programs guided by social realism, let alone Zimbabwe's 3-3-3 model for Post 'O' Level Science. It is therefore against this observation that this study interrogated, through critical and social realists' lens, both the successes and failures of the 3-3-3 secondary teacher education model for Post 'O' Level Science in a bid to acknowledge the enablers and tailor intervention strategies on constrainers.

## 1.5 Research Questions

### 1.5.1.1 Main research question

What are the enabling and / or constraining factors in Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science?

### 1.5.1.2 Sub research questions

- What structural factors facilitate and / or hinder the 3-3-3 secondary teacher preparation model for Post 'O' Level Science?
- What cultural discourses offer causal explanations for the enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science?
- What agential influences promote and / or impede the 3-3-3 secondary teacher education model for Post 'O' Level Science program in Zimbabwe?

## 1.6 Purpose of the Study

The purpose of this study was to establish structural, cultural and agential factors that facilitate and / or impede the 3-3-3 secondary teacher education model for Post 'O' Level Science. The study also sought to acknowledge the enablers and suggest intervention strategies on constrainers of teacher education programs in general and the 3 year Post 'O' Level Science program in particular.

## 1.7 Objectives of the Study

The main objective of this study was to critically examine enabling and / or constraining factors in the 3-3-3 secondary teacher education model for Post 'O' Level Science. The study had to further establish structural, cultural and agential factors that facilitate and / or hinder the 3 year Post 'O' Level Science program. The findings of the study acknowledged the enablers of the model and informed on intervention strategies about the constrainers of the model, that is, whether to modify or adjust the model.

## 1.8 Significance of the Study

This study intended to bring to the fore issues behind pre-service teacher education programs which are claimed to be inadequate. In this case, then, the study is an eye opener to the MHTESTD and teacher education colleges regarding enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science. If not, ignorance about these enablers and / or constrainers would make it difficult to intervene accordingly.

The findings of the study provide information for teacher education providers on the need to adjust or modify the 3 year Post 'O' Level Science program in order to improve teacher preparation. It is up to the MHTESTD as the responsible authority and associate of all colleges, and the studied college whether or not to use the results to review the 3-3-3 model for Post 'O' Level Science, since the results indicate the strengths and weaknesses in the 3 year pre-service program. The study recommended on intervention strategies on the weaknesses in order to improve teacher education programs.

The research, as it interrogated the Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science using social realism, which had limited literature, thus, expands the body of knowledge on issues confronting teacher education curriculum models. Finally, the research findings have expanded the database on the literature on

enablers and / or inhibitors of teacher education programs nationally, regionally and globally.

### 1.9 Delimitation of the Study

The study is a (single) case study of one Secondary Teacher Education College in Zimbabwe. It focused on enabling and / or constraining factors in Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science. Structural, cultural and agential factors were explored as facilitators and / or hindrances of teacher education programs. The sample included 1 DTE official, the Principal, the Vice Principal, 2 Heads of Departments (HOD) at the studied college, 8 Heads of Subjects (H.O.S), 3 Heads of Science Department in secondary schools (SHODs), 3 mentors (M) and 5 groups of 10 and 11 third and final year student teachers (FGD) at the studied college.

### 1.10 Definition of Terms

Terms may vary in sense depending on the context being used. While many other terms are explained in the text, the following key terms that guide the research are used as defined below.

**Teacher Education** is defined by the National Council of Teacher Education (1998) as a program of education, research and training of persons to teach from pre-primary to higher education.

**Teacher education curriculum** is an instructional and learning programme that is geared towards the development of skills and acquisition of knowledge and values by student teachers in preparation for teaching (Mamvuto, Kangai, Chivore and Zindi, 2012).

**A model** is a pattern serving as a guideline to action which can be found for every form of educational activity such as models of instruction, evaluation, supervision and administration (Oliva, 1992).

**The 3-3-3 model** is a three year teacher education program where students spend their whole first year of three terms on campus, their second year attached to schools where they do their teaching practice under the mentorship of experienced teachers and the last year is spent on campus (The DTE Handbook, 2012).

**A teacher- educator (lecturer)** is the person who is responsible for facilitating teacher education programs. She/ He is the one who prepares or trains teachers (Mamvuto, Kangai, Chivore and Zindi, 2012).

### 1.11 Organization of Chapters

There are seven chapters in this study. *Chapter 1* gives the background information, statement of the problem, research questions, the purpose, objectives and significance of the study, delimitation and defines key terms. *Chapter 2* focuses on the theoretical framework while *Chapter 3* reviews related literature. *Chapter 4* presents the research methodology. *Chapter 5* presents and analyzes the collected data that is discussed in *Chapter 6*. *Chapter 7* summarizes the results, draws conclusions from them and gives recommendations about the phenomenon that is being studied.

# CHAPTER TWO

## LITERATURE REVIEW PART 1: THEORETICAL FRAMEWORK

### 2.1 Introduction

A review of literature is necessary in any study so as to have a deeper understanding of the topic. This chapter gives a brief overview of what literature review is, and the role it plays, and then unpacks the theoretical framework that underpins the study. Within this context, Roy Bhaskar and Margaret Archer's philosophical approaches to the understanding of the social world, that is, critical and social realism are explored. Critical and social realism are underpinned by depth ontology. They are based on the assumption that there are real generative mechanisms underlying the events of the world and people's experiences of it (Pereira, 2012). Critical and social realists, therefore, base their explanations of how people experience a phenomenon on mechanisms that operate at deeper levels of reality. Brown (2009) notes that critical realism makes us aware that teaching and learning environment are open system in the sense of responding to both internal and external forces. Archer's (1995) and Archer's (1996) understanding of the social world as consisting of three analytically separate dimensions, namely, the structural, cultural and agential, provide a deeper understanding of the influence of mechanisms on events and experiences (Pereira, 2012). As such, they are employed in this study with the hope that they will provide analytical tools for arriving at a more in-depth understanding of enabling and constraining factors in Zimbabwe's teacher education curriculum models in general and the 3-3-3 secondary teacher education model for Post 'O' Level Science in particular.

## 2.2 What is a literature review?

A literature review is an account of what has been published on a topic by accredited scholars and researchers (Taylor and Procter, 2001). It is a critical summary and an assessment of the current state of knowledge or current state of the art in a particular field (ibid). Simply put, a review of literature is a summary of related information that other people have written about the topic one is researching.

A literature review plays a key role in defining and shaping the direction of the research. The information acquired helps refine and re-define the problem so as to gain a better understanding of it (Makore-Rukuni, 2001). It is the literature review that sheds light on a variety of issues concerning the research problem (ibid). It conveys what knowledge and ideas have been established on a topic, and what their strengths and weaknesses are (Taylor and Procter, 2001). In a way, it summarizes, synthesizes and analyzes the arguments of other scholars. It also describes and analyzes the knowledge that exists and what gaps occur in research related to the topic. This clarifies the relationship between the research being conducted and the work that has previously been done.

Literature review must be organized around, and related to the thesis or research question. It should reveal similarities and differences, consistencies, inconsistencies and controversies in previous research (Knopf, 2006). As such, it identifies related research and sets the current research within a conceptual and theoretical framework as there is no topic that is so new or unique that it cannot be located within some relevant and related field (Ridley, 2010). Blaxter *et al*, cited in Ridley (2010) assert that the purpose of the literature review is to locate the research project, to form its context or background, and to provide insights into previous work. Ridley (2010:5) writes, “----- *your research is a small jigsaw puzzle: it does not stand alone. It is dependent on what others have done before and you will contribute to an ongoing story or debate.*” Thus, the literature serves a major role in contextualizing the topic under study and describing the bigger picture that provides the background to the research.

## 2.3 Theoretical framework

This study employs Archer's(1995) socialist realist theoretical framework, to explain enabling and / or constraining factors in teacher education models that are used in training and developing teachers in Zimbabwe's teacher education colleges. Archer's social realist theory is underpinned by Bhaskar's (1978) critical realist philosophy. Critical realists believe that there is a reality independent of our thinking of it that science can study (Trochim, 2006). Wright (2008) observes that critical theorists critically analyze social practices with the aim of promoting positive social change and transformation. Critical and social realists focus on identifying hidden causal mechanisms, how they work, whether they are active or not, and the conditions under which they become active (Sayer, 2000). In critical realism, a causal explanation for a given phenomenon is inferred by explicitly identifying the means by which structural entities and contextual conditions interact to generate a given set of events (Wynn and Clay, 2012).

### 2.3.1 Critical realism

#### 2.3.1.1 The concept of critical realism

Critical realism is a meta-theory rooted in philosophy (Kahn, Qualter and Young, 2012). As a meta-theory, it is not a homogenous social science, but includes a variety of perspectives that relate to social science research practices (Danermark, Ekstrom, Jakobsen and Karlsson, 2002).Wright (2008) also observes that critical realism draws on all traditional paradigms, but also rejects each at a fairly fundamental level. Nonetheless, Danermark *et al* (2002) advocate a 'both-and' rather than an 'either-or' approach, as critical realist approach can draw on knowledge and insights from other positions while offering an alternative perspective.

Critical realism observes that there is a reality which exists independent of human conception (Trochim, 2006). The realism aspect of the theory focuses on the existence of real mechanisms which shape events while the critical aspect requires a deep

understanding of any social situation, going beyond the observable and investigating the mechanisms behind any event (Bhaskar, 1978). Mechanisms according to Bhaskar are those things that make other things to happen. Danemark *etal* (2002:5) say, “----to switch from events to mechanisms means switching the attention to what produces the events—not just to the events themselves.”

In critical realism the assumption is that there is an external world that exists independently of our experiences. What that world is, and what it is like, is not affected by our experiences, feelings, perceptions, beliefs and desires (*ibid*). This external world does not only exist independently of our knowledge of it, but it also quite often resists our attempts to understand and change it (Pereira, 2012). This is in contrast with subjectivists who hold that there is no external reality; everyone is involved in making it up.

Critical realism recognizes that all observation is fallible and has error and that all theory is revisable. It is critical of humans' ability to know reality with certainty (Trochim, 2006). The goal of critical realism is to hold steadfastly to the goal of getting it right about reality, even though we can never achieve that goal, since all measurement is fallible (*ibid*). Critical realism also holds that all observations are theory-laden, and that scientists and everyone else are inherently biased by their cultural experiences and worldviews (Bhaskar, 1978). Our knowledge of reality is subject to all kinds of historical and other influences. The different experiences and world views are however commensurable, thus people can live and understand one another.

Critical realism adopts constructivists' ideas that all humans construct their view of the world based on their perceptions of it. Because perception and observation is fallible, human constructions are imperfect (*ibid*). Therefore, no individual can see the world perfectly as it really is. As such, there is no objective reality, since all humans are biased and their observations are affected. Although objective reality can never be perfectly achieved, it can be approached through criticizing each other's work. As each work is criticized, knowledge is created.

In critical realism, the surface appearance of things is potentially misleading as to their true character. At times we may not even experience or observe some of the things that exist but that does not mean the things do not exist (Benton and Craib, 2001). Quite often we also perceive and experience the same phenomena differently. Our knowledge of reality is therefore unstable and unreliable, thus fallible and subject to change. This is what Bhaskar (1978) refers to as “epistemic fallacy”.

Critical realism tries to understand and explain the world behind the misleading appearances (ibid). Central to critical realism is the explanation of the complex social events and ruling out any other potential explanations. This can be done through the understanding of natural and social reality as an open stratified system of objects with causal powers (Bhaskar, 1978). Social reality is constituted at a range of levels or strata (ibid). Structures and mechanisms that bring about the events that shape our experiences are incorporated in these strata (ibid).

#### 2.3.1.2 A differentiated and stratified reality

The concept of a differentiated and stratified or layered reality was influenced by Karl Marx, (Pereira, 2012) who observed that the major role played by science is to give a clear distinction between essence, the inherent characteristics of a phenomenon, and appearance, an outward form as perceived visually. From Marx’s ideas, Bhaskar, (1978) developed the concept of stratification that ensures that causal mechanisms of the world are not fused together with the events and experiences they generate. Stratification takes two forms (ibid): the first form relates to the belief that reality is differentiated, changing and layered into three levels, that is, the real, the actual and the empirical. The second form relates to the concept of emergence, that is, one layer is emergent from the one below it (Bhaskar, 1978).

The empirical is the layer of reality that is most accessible to us. It refers to our observations and experiences of the world (ibid). In a way, it is that which we can see and experience. According to Danermark *et al* (2002), the observable experiences contain our facts that are always mediated by our theoretical conceptions. Since theory

changes, the empirical world consists of unstable knowledge, thus fallible (Pereira, 2012). In the case of this study, empirical knowledge is derived from what the Ministry of Higher and Tertiary Education, Science and Technology Development (MHTESTD) describes in policy documents as teacher education curriculum offered through the 3-3-3 secondary teacher education model. It also consists of teacher educators' conceptions of their roles as teacher educators, their understanding of student teachers and of teacher education curriculum models in Zimbabwe.

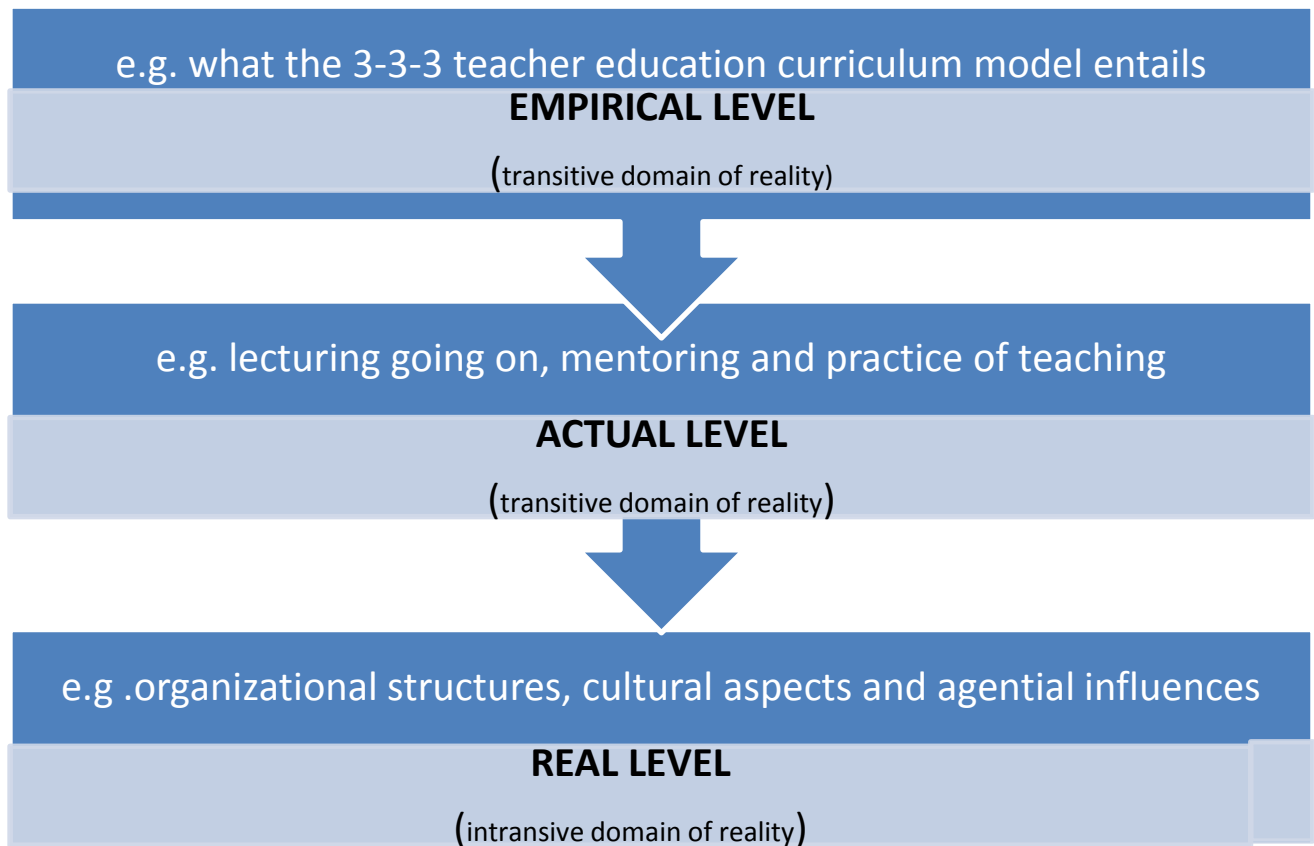
Critical realists believe that empirical knowledge can further be explored to uncover or unveil what is responsible for people's experiences and observations of the world (Pereira, 2012). Bhaskar (1978) observes that empirical knowledge fails to account for reality that exists independently of human knowledge. Hence, the exploration of the layers of reality below the empirical level; that is, the level of the actual and the level of the real. The actual domain is the layer of reality which refers to the events of the world whether experienced by people or not (Danermark *et al*, 2002). It consists of actual events which have been generated by certain mechanisms (Bhaskar, 1978). Because events depend on specific conditions, they cannot be reduced to what is observed at the empirical level (*ibid*). Examples of events from this study include the decision by the MHTESTD to adopt the 3-3-3 secondary teacher education model, the actual teaching and learning that goes on in the lecture rooms and the mentoring and practice of teaching that takes place in schools.

Danermark *et al* (2002) and Sayer (2000) assert that knowledge about the actual and the empirical worlds is accessed through our senses, and therefore context bound or dependent. Because of unstable and unreliable knowledge (transitive knowledge) provided by the empirical and the actual worlds (Bhaskar, 1978), critical realists turn to the deepest level of reality, that is, the level of the real (intransitive knowledge).

The level of the real refers to anything that exists, which has power to cause events at the level of the empirical and the actual (Sayer, 2000). Hence, this level is referred to as the causal level. It includes the mechanisms that have generated the actual events. These causal powers which exist at the level of the real exert influence when activated (Ndebele and Maphosa, 2014). This study focuses on exploring the generative

mechanisms that are responsible for the events and experiences in the 3-3-3 secondary teacher education model. It offers an explanation of how social structures, the cultural system and personal powers (agency) combine to enable and / or constrain teacher education curriculum models. The acute shortage of Science teachers is one of the mechanisms at the level of the real which influenced the decision by the MHTESTD to adopt the 3-3-3 secondary teacher education model for Post 'O' level Science.

Critical realist research therefore aims at arriving at knowledge of the content of the causal processes (Ekstrom, 1992) in order to understand what it is that generates particular events and experiences. Bhaskar (1978:13) illustrates the 3-layer conceptualization of reality as indicated in Figure2-1:



**Figure2-1: Bhaskar's concept of three layers of reality**

Adapted from Bhaskar (1978)

The implication of these 3 dimensions is that, while science strives to capture deeper levels of reality, some reality may never be known to humans nor reduced or changed by any external activity (Bhaskar, 1978). Pereira(2012) observes that scientific knowledge has to conform to the unchanging world that exists prior to it and that generates it.

### 2.3.1.3 Emergence

Emergence, the second form of stratification, indicates that the level of the real results from an act or action, and therefore social reality can be better explained in terms of the mechanisms that are at play (Pereira, 2012). Sayer (2000 :12) defines emergence as, *“situations in which the conjunction of two or more features or aspects give rise to new phenomena, which have properties which are irreducible to those of their constituents, even though the latter are necessary for their existence’*. In Carter and New’s (2004) view, emergence refers to the way in which particular combinations of things, processes and practices in social life frequently give rise to new emergent properties. Structures and mechanisms at the level of the real have powers to cause events and experiences at the level of the actual and the empirical. For example, funding, a structure at the level of the real, is at times inadequate to cater for teaching practice supervision.

This form of stratification therefore suggests that each of the two layers in the transitive domain emerges from the layer below it (ibid).This means that the empirical emerges from the actual, and the actual emerges from the real; therefore, both the actual and the empirical emerge from the real (Pereira,2012).

**Table 2-1: Bhaskar’s concept of emergence**

	Domain of the real	Domain of the actual	Domain of the empirical
<b>Mechanisms</b>	X		
<b>Events</b>	X	X	
<b>Experiences</b>	X	X	X

Adapted from Bhaskar, (1978)

According to the concept of emergence, the combination of things gives rise to new emergent properties; thus, reality at all three levels is not the same. Emergent properties require us to understand that mechanisms do not predict outcomes but produce tendencies (Houston, in Pereira, 2012). Critical realists argue against determinism (ibid); hence tendencies produced by mechanisms in teacher education curriculum models shall be studied.

Wikgren (2005) observes that Bhaskar's work provides the foundations for a realist Meta theory that is in principle, compatible with a variety of social theories. However, because of its stratified view of social reality, it is not compatible with upward, downward or central conflationism. That is to say, people cannot be reduced to society, or society to people, social structures, cultural systems and human agents. Each possesses their own emergent properties which have to be taken into account when analyzing social phenomena. Thus, Archer (1995), Archer(1996) and Archer (2003) have elaborated on this in her theory of social realism which underpins this study.

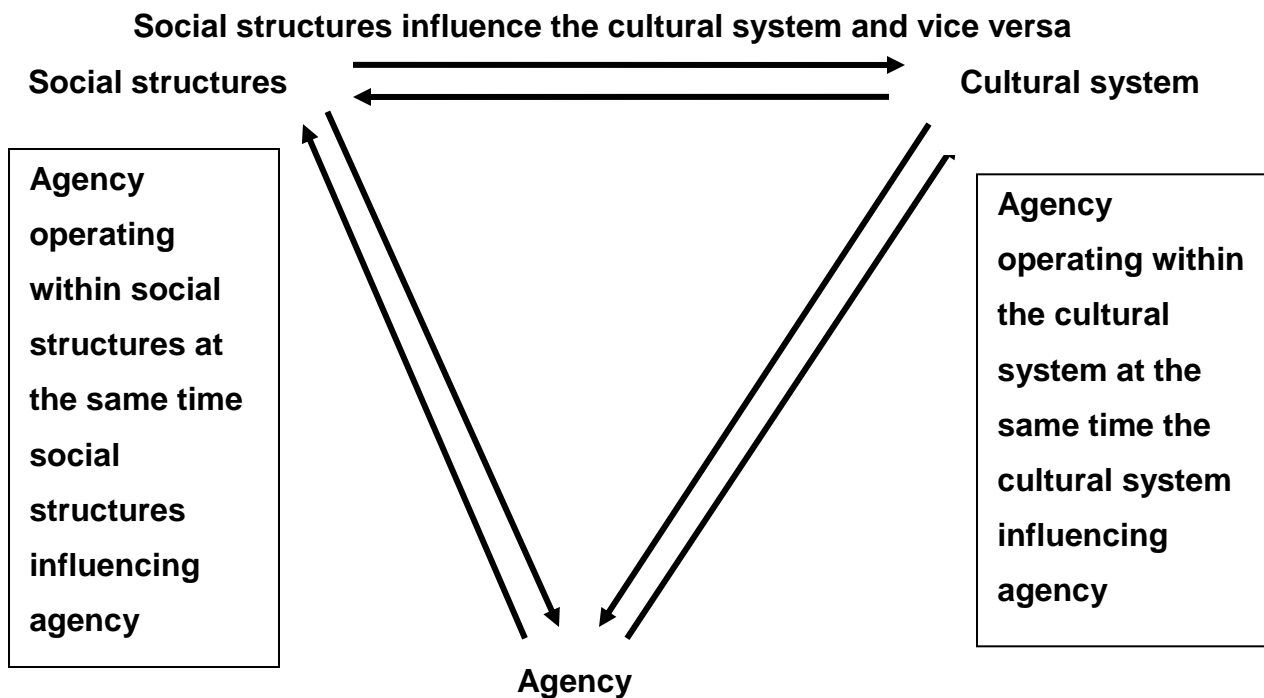
### 2.3.2 Social realism

As alluded to above, Archer(1995) and Archer (1996),working at the level of the real in Bhaskar's critical realist theory, developed a social realist analytical framework through which the underlying causal mechanisms at the level of the real can be analysed using the concepts of structure, culture and agency (Ndebele and Maphosa,2014). Archer's work is based on the argument against the tendency in sociological analyses to conflate structure, culture and agency, yet they are separate phenomena that have separate causal affect (Mudzielwana and Maphosa, 2013 citing Boughey and Niven, 2012).

#### 2.3.2.1 Archer's analytical dualism

Archer (1995) and Archer(1996) analyses the social world using the morphogenetic approach which she refers to as analytical dualism. Analytical dualism is explained as a method that recognizes that the entities of social life, that is, the 'parts' and 'people' are analytically separable. The parts refer to social structures or the cultural system,

whereas people are considered as agents, operating within a particular structural or cultural system (Archer, 1995 and Archer, 1996). Archer keeps the parts and the people separate in order to gain the ability to theorize about the extent (and subsequent results) of the influences of the parts on the people and the people on the parts. She stresses that the dualism is only analytical since the suggestion is not that the two are ontologically or philosophically separate (Vorster, 2010). Archer also separates structure and culture, unlike Giddens (1979) and Bourdieu (1977) who conflate them. She comes up with structure, culture and agency as the three social reality elements that can be studied separately, since they are different in form and possess unique properties and powers. Each one of them enables and / or constrains events in its own way, hence first discussed separately, then their relationship explained later, since there is always interplay among the three elements. The dualism aspect can simply be summarized in figure 2.2 below:



**Figure 2-2: Archer's concept of analytical dualism**

### 2.3.2.2 Structure

Archer (1995) and Archer(1996) views structure as a form of social organization, as well as the social relations that comprises it. It includes social institutions, social practices, roles, positions and so forth. Structures are seen as relations among social positions and are ontologically independent from the people operating within them. They are also irreducible to the people who brought them or operate within them (ibid). Giddens (1979) sees structure as what gives form and shape to social life, but it is not itself that form and shape. Mudzielwana and Maphosa (2013) assert that structure relates to material resources and to the recurring patterns of social behaviour or to the interrelationship between different elements of society around the distribution of these material resources and patterns of behavior. Thus, Archer (1995) observes that people are born into or enter into a pre-structured context which is a product of the 'doings' or activities of the 'long dead.' As such, current actors are not responsible for the way the social context is at the present time (ibid).This is true with the 3-3-3 secondary teacher education model that was inherited from the one that was operational from 1988 to 1992. The conditions under which the old one operated are different from the current one under study; hence structural conditions are thus contextual.

Archer (1995) and Archer(1996) identify three important characteristics that have to be considered when analyzing structure. These are autonomy, anterior and causal influence. First, structures have an autonomous existence, that is, they are different from culture and people (though they are entwined and influence each other) and therefore, when analyzed, they should not be conflated with culture and agency. For Archer, structures are real, but they require the activity of agents to be reproduced or changed (Vorster, 2010).Secondly, as indicated earlier on, structures pre-exist people in that people are born into them and their prior existence frequently constrain the meanings which can be imposed or made to stick (Archer, 1995 and Archer, 1996).Therefore, when analyzed, they are taken as given and analyzed independent of the responses to them. Finally, structures exert causal influence on people's actions. They condition people's actions and not determine what people do. Structures are not reified entities, they cannot act, but are dependent on people to either endure or

change, and they delimit the nature of the actions that are possible within a given structural context (Archer, 1995 and Archer, 1996). Pereira (2012) observes that these characteristics indicate that structures should not be confused with our sense knowledge of them.

Archer's theory of structure is based on four logical propositions. First, she argues that there are internal and necessary relations within and between structures. Universities, schools, families and Non Governmental organizations among other structures, for example, have relations with teacher education institutions. Secondly, various structural positions are defined by structural roles. Each of the structures given has a role to play in the training and development of teachers. Universities, for example, maintain the high standards in teacher education institutions, while families provide emotional and financial support to the students. Causal influences are exerted by the social structure on social interactions. The third proposition is that there are causal relationships between groups and individuals at the level of social interaction. Groups or individuals need each other; one cannot do without the other. For example, students need lecturers to teach, supervise and assess their work whilst lecturers also need the students for the survival of the institutions. Without the students, institutions are dysfunctional and are likely to collapse. The last proposition is that social interaction elaborates upon the composition of the social structure by modifying current internal and necessary structural relationships and introducing new ones in the process of morphogenesis. Where social structures are reproduced, internal and necessary relations between social structures are maintained (Vorster, citing Archer, 1995).

According to Archer (1995), when analyzing structure, one can either focus on positional levels, roles or institutional structures. Institutional structures focus on internal relations of various institutions that make up a social system. Institutions such as colleges, for example, have relationships with schools and universities. Positional levels on the other hand, entail the analysis of the way society is structured because of differences in the distribution of resources. People's circumstances are such that they are either advantaged or disadvantaged. An advantaged structural position gives people interest in maintaining their position, while a disadvantaged structural position

encourages people to find a way of improving their situation (Archer, 1995 and Archer,1996).The exodus of Science teachers to neighbouring countries, (Chronicle, 2007, 01, 09), for example, created a disadvantaged structural position that needed urgent attention, hence the re-introduction of the 3-3-3 model for Post 'O' Level Science in secondary teacher education colleges.

A role as a structural mechanism has constraining and enabling powers through role expectations (the dos and don'ts), and through penalties and promotions established to encourage compliance (Vorster, 2010).These are however not deterministic because people interpret roles differently. Roles, therefore do not necessarily program the behavior of their incumbents: People interpret these roles in different ways. Pereira (2012) observes that the role of teaching, for example, is performed differently by people who interpret teaching in a different way. As such, teachers do not all teach in the same way, hence there are different kinds of teachers. The distribution of resources such as finance, infrastructure and transport, roles played by teacher educators, mentors, the DTE officials and the principal; and relationships between schools and colleges, colleges and universities and various departments within the college were studied, in a bid to explain factors that facilitate and / or hinder the 3-3-3 secondary teacher education model at structural level.

#### 2.3.2.3 Culture

Archer (1996) sees culture as an extremely wide-ranging concept including all things capable of being grasped, deciphered, understood or known by someone or for someone to be identified with a particular society. As such the cultural context is made up of theories, ideologies, ideas, values, beliefs, attitudes, practices and so forth that exist through discourses used by particular people at a particular time (Quinn, 2012). It further entails how and what we think about those things. In teacher education and training, agents who include DTE officials, Principals and Vice Principals, lecturers, student teachers and mentors among others may hold certain theories, views, beliefs and attitudes that may compel them to act the way they do, thus bringing about cultures that will impact on teacher education programs. Archer (1996) argues that once an idea

has been lodged in the cultural register, even if it is not activated or used at a particular time, it remains there to be rediscovered and used by social actors.

Archer's theory of culture is based on four ontological propositions. First, she argues that there are logical relationships between components of the cultural system. People's ideas about something make them believe or value it. The second proposition is that there are causal influences exerted by the cultural system on the structural level. Certain beliefs or practices influence some changes on some structures. There are also causal relationships between groups and individuals at the structural-cultural level. Finally there is an elaboration of the cultural system as individuals and groups continue to interact and modify existing logical relations and introduce new ones (Archer, 1995 and Archer, 1996).

In fact, agents within a particular context have differential understanding and knowledge of prevailing ideas. For social analysis, only those ideas about which truth claims are possible (propositions) are used. These ideas can stand in a relationship to other ideas that are either complementary or contradictory. It is this logical relation of ideas that influence agents' actions (Archer, 1996). In social realist studies, the analysis of culture is of paramount importance as it helps in understanding what 'thought processes' (ideas, beliefs, theories, values, ideologies and attitudes) are contained in the society's propositional register (ibid). It is important therefore to understand that the cultural domain consists of propositions about the behavior of people for society to be the way it is proposed. That is, it consists of things held to be true or false in society at any given time or place. It does not necessarily mean that this is the way people actually behave in society (Archer, 1996).

Historically, the cultural system is man-made. It is the product of people's past practices. Culture is continuously transformed through people's actions. Because it emerges from the interaction that occurs between existing cultures (formed through previous practices of people) and the people who encounter these cultures in their daily lives, it has properties and powers of its own (ibid). The analysis of culture also helps in understanding the power that cultural properties have in conditioning people's actions. Cultural analysis entails specifying which systemic relationships condition action, how

they do so and the range of possible reactions to such constraints(Archer,1996).This level of analysis is thus concerned with the effects of holding theories or beliefs which can stand in particular logical relationships to other theories or beliefs. That is, whether these beliefs are contradictory or complementary will indicate the kind of influence the properties of the cultural system have on those who uphold ideas possessing them. According to Archer (1996:107):

*the cultural system contains constraints (like the things that can and cannot be said in a particular natural language), it embodies new possibilities (such as technical applications undreamed of in the pure theory on which they are based), and it introduces new problems through the relationship between the emergent entities themselves (the clash of theories), between these and the physical environment (mastery and ruin) between these and human actors.*

According to Archer, there are also relations such as consistency and contradiction or independence that have to be explored as they contribute towards cultural change and stability. The contradictory or complementary relations of the systemic properties of people's beliefs condition their actions; therefore it is important to understand what beliefs people hold and what behavior is possible when such beliefs are held, problems or possibilities that could result from such beliefs(Pereira,2012).

In an effort to explain enabling and constraining factors in Zimbabwe's 3-3-3 secondary teacher education model, discourses held about the teaching profession, what Science teachers should learn and how they should be taught were explored. Discourses which teacher educators, students and mentors subscribe to, that are evident in their day-to-day conversations were also explored. This helped to understand if the 3-3-3 secondary teacher education model for Post 'O' Level Science is enabled and / or constrained by culture.

#### 2.3.2.4 Agency

Agency is defined by Archer (1996) as the reflective, creative, innovative and purposeful actions of people. It refers to the choices that people make in their daily lives which either reinforce existing structures and cultures or transform them (ibid). It is what people do as individuals or groups with what they have collectively produced (culture). Giddens, cited in Ritzer (2008), argues that agents continuously monitor their own thoughts and activities as well as their physical and social contexts. They rationalize their world by developing routines that not only give actors a sense of security but enable them to deal efficiently with their social lives.

Pereira (2012) argues that people are not passive beings whose actions are automatically triggered by the forces of structure and culture. Similarly, Archer argues that even though structural and cultural systems impose constraints on the actions of people, it is important to understand that people are reflexive actors. Thus, she identifies four types of reflexivity; namely communicative, autonomous, meta-reflexivity and fractured reflexivity (Kahn, 2009). Communicative reflexives share their deliberations with others before deciding on a course of action while autonomous reflexives rely on solitary deliberations, that is, the individual decides on his or her own, without consulting anyone whether to act this way or otherwise. Meta-reflexives constitute a grouping of individuals who deliberate and come up with a solution on how best to deal with a particular situation. Fractured reflexives engage in deliberation that intensifies personal distress rather resulting in purposeful courses of action (ibid).

In this case, the 3-3-3 secondary teacher education model for post 'O' Level Science, communicative and meta-reflexivity were employed in a bid to alleviate the shortage of Science teachers in Zimbabwe. As reflexive actors, people choose what they like or dislike, what they agree with and disagree with, what they prefer and do not prefer, whether to be loyal or to be chauvinists (Archer, 1995 and Archer, 1996). The actions of people, therefore, can be significantly different from the socio-cultural system imposed upon them, not only because of discrepancies between imposed ideas and ideas held by individual actors but also because people think and make their own decisions about situations confronting them. Archer therefore, maintains that the actions of people do

not mirror the cultural system but can show significant degree of independent variation. Such deviations are crucial because they account for structural and cultural change or stability.

The way people behave in the present may either reinforce or transform existing cultures and structures in the future. These transformed structures and cultures exert a causal influence upon subsequent interaction (Archer, 1995 and Archer, 1996). She further explains that they do so by shaping the situations in which later generations of actors find themselves by endowing various agents with different vested interests according to the positions they occupy in the structures they inherit. People have their own emergent powers which cannot be reduced to those of structure and culture. Their agency has power to shape society, and it exists independently of our wishes for what society should be like (Pereira, 2012). Therefore, the success of the proposed 3-3-3secondary teacher education model (by the Principal) also depends on the agential power of teacher educators, among other factors. This is so because teacher educators as people, based on their beliefs, what they know, their attitudes or their circumstances can choose to adapt or find a way around some of the proposals.

Agency, therefore, is a necessary concept to interrogate in trying to understand enabling and / or constraining factors in Zimbabwe's 3-3-3secondary teacher education model for post 'O' Level Science.

### 2.3.3 The relationship between structure, culture and agency

Archer (1996) argues that structure, culture and agency operate in a dialectical relationship with one another. This is also advanced by (Porpora, 1993) when he says any particular social change will need to be explained by the particular structures, by the particular cultures and by the particular agents involved. As such, Archer sees culture as the element that links structure and agency. This is so because people's conceptions or ideas (culture) about social structures influence their disposition towards those structures (ibid). Social structures come about and are maintained through people's ideas (culture). People always act out structural and cultural circumstances, which their

very actions then proceed to modify or sustain. People also do not act apart from or outside of cultural and social structural contexts (Porpora, 1993). Ndebele and Maphosa (2014:174) also note that,

*Referring to the interplay between culture, structure and agency, Archer (1996) shows that social structures are the outcome of past social interaction between agents which condition the context in which current agents find themselves, and the way in which current agents respond to their context shapes the social structures in which future agents find themselves.*

An illustration of how agents can have causal influences through the effects of the social groups to which they belong is given by Quinn (2006: 52) when she writes:

*(---- the Educational Development Unit (EDU) staff as a group); actors (for example, the director of the EDU), on the other hand, have the capacity for causal impact through their individual properties and powers given the roles and positions they occupy and the ways in which they occupy them.*

Archer further argues that the effects of structural and cultural factors are mediated to the agency of the individual by a process that entails three main stages:

- (1) Structural and cultural properties objectively shape the situations which agents confront involuntarily, and possess generative powers of constraint and enablement in relation to*
- (2) Agents' own configuration of concerns, as subjectively defined in relation to the three orders of natural reality...nature, practice and society.*
- (3) Courses of action are produced through the reflective deliberations of agents who subjectively determine their practical projects in relation to their objective circumstances (Archer cited in Kahn, 2009:199).*

Therefore structure, culture and human agency are brought together as dialectically related, none exists without the other.

#### 2.3.4 Studies that have successfully used critical realism as a lens

Critical realism is a paradigm which is increasingly being used by a number of researchers in social sciences (Kahn, 2009). The justification of it being used is that it takes into consideration the fact that in any setting, an entity will have cultural or structural properties (Leibowitz, van Schalkwyk, Ruiters, Farmer and Adendorff, 2012) that play the role of enablements or constraints. It is how they interplay with the third domain—human agency, that leads to the variability of outcome in any situation.

Educational research, like other fields of research, has adopted critical realism as a theoretical basis for studying phenomena. Many researchers in education have shown interest in employing Roy Bhaskar's critical realism and Margaret Archer's social realist theory developed from Bhaskar's. They have used it to try and understand the effect of culture, structure and agency, and how individuals take advantage of the provision of support that exists.

Kahn(2009),Kahn, Quarter and Young(2012), Pereira(2012),Quinn (2006),Vorster(2010), Wright (2008), Mudzielwana and Maphosa(2013), Jawitz and Peres (2014) and Ndebele and Maphosa(2014)are some among many educational researchers that have employed critical realism as a theoretical framework in examining, analyzing, exploring and explaining educational issues. In all the studies, there were structural and cultural factors that interplayed with agency to either enable and / or constrain the phenomenon under study. Below are Kahn (2009) and Mudzielwana and Maphosa's (2013)studies which were chosen to show how individual concepts and the interplay among the three work.

##### 2.3.4.1 Kahn's (2009) study

Kahn (2009) studied the contexts for teaching and the exercise of agency in early-career academics. The study investigated the interplay between context and agency, for three early-career academics as they sought to develop their teaching. It considered ways in which early-career academics undertaking a Certificate in Professional Studies (CPS), a program of initial professional development for teaching, chose to adapt their

teaching in light of practices promoted in the program, seeking to identify factors that help to account for their choices.

Through the use of interviews, cultural and structural factors that shaped the context for the development of teaching were identified as follows: first, the program(CPS) itself was seen as a structural enabler that offered ideas that may be drawn on by the participants to shape their practice, since the program provided an introduction to specific teaching practices and developed a theoretical understanding about learners' experience, that it is about what they learn rather than what the teacher teaches. With these ideas in mind, early-career academics planned for their lectures and also came up with appropriate teaching methods. This clearly shows the interplay between structure, culture and agency in trying to improve on cultures that had been there. Therefore, the program itself was clearly only one factor (structural) among many, in shaping the way the interviewed early-career academics developed their practice.

Secondly, the department of Teaching and Learning in Higher education, set responsibilities for academics, thus identified as another crucial filter (structural enabler) on the formation of teaching practices, offering scope as it does for a range of collaborations and conflicts that affect the agency of academics (ibid).The module descriptors offered by the department clearly indicated time for lectures and tutorials, presentations. Early-career academics simply followed what was given in the module and these existing structures in the department developed their practice. This again shows the interplay between structure and agency in trying to improve the cultural practices of early-career academics. The discipline itself was identified as the third structural enabler that shaped early-career academics' practice. Perceptions of disciplinary relevance ruled out certain practices. Participants acknowledged (interplay between structure and agency) that they had learnt that each discipline had its own way of assessment. For example, Mathematics and Science need objective assessment that may not be relevant in History.

Workload was identified as the fourth factor that had an influence on early-career academics' capacity to adopt practices promoted on the CPS program. The three participants contended that the lecturer's work is quite demanding as lecturers have to

keep up to date with marking, researching and delivering lectures and conducting educational research. Workload is considered a cultural constraint on the exercise of agency in relation to adopting practices promoted on the program (Kahn, 2009).

Similar studies were carried out by Ndebele and Maphosa (2014) and Jawitz and Peres (2014) on professional development courses in higher education institutions (Universities) in South Africa because of concerns that students in South African universities were not performing well; hence the need for university academics to undertake professional development courses. Similar findings also established that workload was one of the major constraining cultural factors that contribute to the failure of most academics to attend professional development courses. Other factors such as time consumption, attitudes towards teaching and learning centres and privileging of research over teaching, ('publish or perish') were also identified as cultural constrainters that impede on professional development courses in universities. Qualified development practitioners and the Vice Chancellor, with higher education background, were identified as some of the agential factors that enabled professional development courses in higher institutions of learning. Structural enablers singled out were that most universities had established teaching and learning centres, offered teaching awards, sent members to attend international education conferences, and there was an induction program for new members of staff.

Pereira (2012) and Ndebele (2013) showed how existing cultures impact on new curricula. New curriculum faces tissue rejection because of the practices and beliefs about the curricula that had been there. In Ndebele's (2013) study, Education with Production (EWP), a curriculum that aimed at equipping youths with both academic and vocational skills after independence in Zimbabwe, died a natural death because it was mistaken for the F2 vocational curriculum that was offered to the Blacks before independence. The interviewed teachers did not see the difference between the two curricula as they felt that it was only names that were changed, but the philosophy behind the new curriculum was the same. Of course, there were other factors that led to the failure of the innovation. Similarly, in Pereira's (2012) study, Swaziland teachers could not see the difference between the International General Certificate of Secondary

Education(IGCSE) and the new Swaziland General Certificate of Secondary Education(SGCSE) as they continued to use the same methods of teaching that they were using in the old curriculum. They also believed that the new curriculum was just a change of the name from the old one. This clearly shows how structures and cultures influence agency to act in a particular way.

#### 2.3.4.2 Mudzielwana and Maphosa's (2014) study

Mudzielwana and Maphosa (2014) studied the influence of context on the South African Higher Education system pre-and post democratic eras. They examined the influence of context in the pre-democratic era to show how culture in terms of racial discrimination in society then, influenced structure in terms of policies and institutions which served to propagate a differential higher education system on racial lines. They established that during the colonial era there were huge discrepancies in terms of race and class in Higher Education (HE).The Council for Higher Education (2004) statistics cited in Mudzielwana and Maphosa indicate that there were 9%Blacks, 13% Coloureds, 40%Indians and 70%Whites. This clearly shows that the apartheid ideology (cultural) advantaged Whites over Blacks. Race and class, as structural factors, influenced cultural beliefs that Whites were superior to Blacks(thus the interplay between structure and culture influenced by context).

While Whites enjoyed access to good funding and well resourced institutions, Blacks were grossly underfunded and attended poorly resourced institutions in remote areas, as a result, very few Blacks entered university. This seemed not to be peculiar to South Africa alone, but also to the United States of America where Sunderman(2010) noted differences between Black urban students and their White counterparts' education experiences that were seen to derive from the unequal resources available to students in urban schools, which contributed to high dropout rates, low achievement and unemployment among Black students.

During apartheid in South Africa, English and Afrikaans were the only official languages in HE, the case even up to the present day. The apartheid ideology had provided a

culture of racial segregation and discrimination in the way HE was planned and implemented. Mudzielwana and Maphosa (2014) also found that the apartheid did not only propagate racial discrimination but ethnic divisions as well. There were universities for different African populations such as Zulu, Tswana, Sotho, Xhosa, Coloureds and Indians. Infrastructure, funding and the curriculum in the different universities was different. This resulted in advantaged and disadvantaged universities. All this was a way of showing White supremacy over Blacks. HE institution structures adopted discriminatory cultures that mirrored the social and political order.

The study established that the post-democratic (1994) period aimed at transforming colonial structures and cultures. Policies to redress racial and ethnic segregation and discrimination were put in place. New policies stressed equity and equality as opposed to discrimination. The new laws enacted enforced a new cultural shift and belief system in order to destroy the culture and belief of White supremacy. Universities were merged with the aim of creating a single coordinated system of HE without racial and ethnic inequalities. The Council for Higher Education (CHE), The Department of Higher Education and Training (DHET), and the National Students Financial Aid Scheme(NSFAS) were some of the structures among many that were put in place to ensure equal opportunity in HE for all South Africans regardless of Whites or Blacks.

The study established that social, political and economic environments in both eras resulted in policies(structures) and regulations that shaped the conceptualization, organization and implementation of HE. Social and political realities provided the cultural environment, in which HE operated, and in turn the cultural environment resulted in structural context by way of policies and regulations governing institutions of higher learning. The type of agents in the form of driving forces behind HE also played a pivotal role in the way HE system was operationalised.

The study clearly shows the interplay between structure, culture and agency in examining the influence of context on the South African Higher Education system.

### 2.3.5 A critique of critical realism theories

Critical realism theories have been criticized for one reason or another.

#### 2.3.5.1 The conflation of structure and culture

Archer (1995), Archer(1996) and Wikgren (2005) among other social theorists argue on the tendency of sociological analyses that conflate parts with people. They believe that parts (structure and culture) have their own causal powers that are different from those of people. To conflate them with people makes it difficult for anyone analysing a certain phenomenon to see which aspect of the social world exerts influence on a context at a particular point in time. Archer (1995) proposes an analytic framework that separates the three, with the understanding that each has its own way of influencing phenomena but is also criticized.

#### 2.3.5.2 Archer's morphogenetic approach

Akram (2012) observes that Archer has made a significant contribution to the development of social realism. He is, however, not satisfied about the way Archer approaches the structure and agency debate in developing the morphogenetic approach. Archer's concept of agency in her later work poses significant problems.

In the morphogenetic approach, both structure and agency have autonomy in interaction, but Archer's later work on agency privileges reflexivity and therefore undermines the autonomy of structure and agency as independent entities (ibid).For Archer, people are increasingly reflexive about their personal lives, and this increases morphogenesis rather than morphostasis, however, she over emphasizes it. This is also asserted by Stones in Akram (2012) when he says Archer's over-reliance on reflexivity in agency leads to a situation where structural influence appears in an overly transparent and insufficiently mediated manner. Akram (2012) further criticizes Archer's account of the interaction between structure and agency that fails to satisfy the requirements for a dialectical relationship, as personal identity is clearly given too much

autonomy from the effects of social influence, thereby undermining the effect of social structure in the structure and agency dialectic.

Because Archer's concept of agency overly relies on reflexivity, the unconscious as espoused by Giddens (1979), and habit advanced by Bourdieu (1977) is neglected, yet they play an important role in the structure and agency debate. Deep structures of the mind, that is, unconscious structures lead people to think and act the way they do (Ritzer, 2008). This thinking, acting and moving in and through the social environment is what is referred to as 'habitus' (Sweetman in Akram, 2012). In his critique, Giddens argues that whilst agents can be said to be reflective in their day-to-day life, reflexivity operates only partly on a discursive level of consciousness. Giddens also recognizes that agents are not totally aware of the structural contexts within which they are located and that these structural contexts can still influence their actions (Giddens in Akram, 2012). Stones, cited in Akram (2012), also observe that much of what agents do is seen but not noticed, even by the actors themselves.

When Archer examines how structure influences agency and vice versa, she explains the mediatory process, outlining the specific characteristics of agency which enable the dialectic to take shape. However, Archer's description fails to do justice to the properties necessary for the mediation process to be fully dialectical because she highlights agential reflexivity as the unique property of agency or the medium which structural influence occurs on agency (Akram, 2012). This is a flaw, and negates the possibility of the indefinite forms of structural influence which exist and must be allowed to influence agency, outside of, as well as within, agential reflexivity (ibid).

Archer (2003) argues that structure and agency constitute two distinctive and irreducible properties and powers and those human reflective deliberations play a crucial role in mediating between them. She describes personal reflexivity as the missing link in mediation, and argues that an account of how structures influence agency is entirely dependent upon the proposition that people's human powers of reflexivity have causal efficacy towards them, their society and relations between them. Archer also talks of the internal conversation, that is, the process of mediation through which agents intentionally and differently respond to social forms. Akram (2012) argues that Archer's

forms of structural influence in the mediation process though explicit, would be better conceptualized as having influence outside of agential consciousness through habit or in the unconscious. Thus, suggests that Archer could improve on her structure-agency relationship by adopting Giddens' (1979) notion of duality of structure and Stones in Ritzer's (2008) notion of duality of agency. In this way structure can affect agency both inside and outside of reflexivity and crucially through the unconscious and habit (ibid).

Sayer (2009) concurs with Archer's investigations into the everyday reflexivity of individuals and applauds her work on the internal conversation. However, he queries Archer's claim that social structures do not act on individuals without some conscious mediation by them (Sayer in Akram, 2012). By so doing, Archer is attempting to avoid a situation where agents are passively molded by social structures, and so institutes reflexivity as the core medium through which agents negotiate social structure (ibid). Akram, however, sees this as an over-simplification of agential social interaction, as agents have various means of interaction with social structures, such as being able to actively negotiate with them, to absorb through habit or through unconscious internalization.

Though criticized, Archer's morphogenetic approach clearly distinguishes structure from agency, thereby making it easier to analyze their relationship, hence offering a fruitful avenue to understand how social and educational dynamics of change, power, causality and agency operate at all levels (Leibowitz *et al*, 2012).

## 2.4 Summary

In this chapter, the theories that were used in helping achieve the objectives of the study have been discussed. Bhaskar's (1978) critical realism provides a stratified reality from which Archer's (1995) social realist approach is developed. Archer's analytical framework of structure, culture and agency underpins this study. Some examples of how the theory applies to the case study have been given. The interplay between structure, culture and agency has been discussed. Examples of some studies that have used critical and social realism have also been given. The chapter ends by giving a

critique of the theory. In the next chapter, the second part of literature review, teacher education is conceptualized through discussing philosophies that guide teacher education curriculum, teacher education curriculum models, teacher education curriculum content and methodologies or pedagogy, the theory-practice dilemma and challenges facing teacher education. These are assumed to be either enablers and / or constrainers of teacher education curriculum models. What a conceptual framework is, lays the foundation of the second part of the literature.

# CHAPTER THREE

## LITERATURE REVIEW PART 2: CONCEPTUALIZING TEACHER EDUCATION

### 3.1 Introduction

This chapter is part two of the literature review. This part conceptualizes teacher education by reviewing related literature on various aspects such as philosophies underpinning teacher education curriculum, models of teacher education, curriculum content in teacher education, methodology, dilemma in teacher education and challenges or problems facing teacher education. What a conceptual framework is, and the purpose it serves is explored first. Due to the paucity of literature that clearly distinguishes cultural, structural and agential factors that enable and / or constrain teacher education models, the various aspects are assumed to be embraced in Margaret Archer's three concepts of structure, culture and agency; hence considered to be enabling the 3-3-3 secondary teacher education model. The last aspect on challenges / problems facing teacher education is considered to be hindering teacher education programs, hence, consequently constraining the model under studying one way or the other.

### 3.2 Conceptual Framework

Gephart (1999) defines a conceptual framework as a network, or "a plane" of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena. In Cohen and Manion's (1994) view, a conceptual framework is a visual or written product that explains either graphically or in narrative form, the main things to be studied, the key factors, concepts or variables, and the presumed relationships among them. The concepts that constitute a conceptual framework support one another, articulate their respective phenomena, and establish a framework-specific philosophy

(Gephart, 1999). He further explains that conceptual frameworks possess ontological, epistemological, and methodological assumptions, and each concept within a conceptual framework plays an ontological or epistemological role. The ontological assumptions relate to knowledge of the “way things are”, “the nature of reality”, “real existence” and “real action”. According to Gephart (1999), the epistemological assumptions relate to “how things really are,” and “how things really work” in an assumed reality. The methodological assumptions relate to the process of building the conceptual framework and assessing what it can tell us about the “real” world (ibid). The purpose of a conceptual framework, therefore, is to highlight what is out there in the world that has to be studied, what is going on with those things or phenomena, and why (Cohen and Manion, 1994 and Gephart, 1999). The relationship between concepts is critically examined.

### 3.3 Philosophies Underpinning Teacher Education Curriculum

Everything that is done by educators is a reflection of a certain philosophy. Their practice, priorities, policies and procedures are linked to a particular philosophy or philosophies.

#### 3.3.1 What is a philosophy?

Pecorino (2000) defines a philosophy as a form of thinking that guides action or prescribes a way of life. It is an activity or quest after wisdom since the term is etymologically derived from two Greek words, ‘philos,’ which means love, and ‘sophia,’ which means wisdom or knowledge (Makuvaza in Peresuh and Nhundu, 1999). To philosophize, therefore, is to reflect or think critically on issues and on concrete human existential situations which may be problematic, with a view to providing answers for them (ibid).

Philosophy is a critical and comprehensive thought that requires analytic and synthetic, practical and theoretical, logical and empirical modes of operation (Pecorino, 2000).

Being critical, it attempts to criticize assumptions, meanings, word usages, beliefs and theories. It also attempts to develop clear definitions and formulations of propositions and to retain maximum precision in expression (ibid).Philosophic thought is practical in the sense that the method of inquiry can be used in solving problems. Thomas (2014) observes that the most practical thing to have is a theory. Theories help to analyze, explain and assist in planning. They also provide a basis for practically questioning assumptions, beliefs, ideas and the efficacy of current practices (ibid).As such, all that people know is critically and comprehensively brought together in order to obtain what humans value.

Philosophy reflects on different aspects of reality and human existence. The different aspects can be placed in four broad categories which are normally referred to as branches of philosophy. These are metaphysics, epistemology, axiology and logic. Metaphysics studies the nature of reality, while epistemology concerns itself with what constitutes knowledge. Axiology is the theory about values, and logic is the method of reasoning based on the principle that a concept is correct if it does not contradict reality (Peresuh and Nhundu, 1999).

Cohen (1999) asserts that metaphysics literally means 'beyond the physical', thus mainly attempting to find unity across the domains of experience and thought. At the metaphysical level, there are four broad philosophical schools of thought that apply to education today. They are idealism, realism, pragmatism / experimentalism and existentialism (ibid). These schools of thought provide the base from which the educational philosophies of perennialism, essentialism, progressivism and reconstructionism are derived. Gwele (2004) categorizes these educational philosophies as conservatives, progressives and radicals. They mainly focus on the nature of knowledge, and how people come to know, and are currently used in classrooms and lecture rooms all over the world. The main emphasis is on what should be taught and how, that is, the curriculum. There is some relationship between philosophy and education.

### 3.3.2 The relationship between philosophy and education

Ogworu, Kuria, Nyamwaka and Nyakan (2013) contend that philosophy is the foundation of knowledge, and it is the theory about education. Education is practical in nature, and philosophy is theory. Because of this relationship, philosophy is foundational in all aspects of education. In order for one to comprehend various issues in education, one has to embrace philosophy, for it is the foundation of knowledge (ibid). Philosophy also underpins education as it is its critical and theoretical component, all the problems and dimensions of education can only be understood properly through philosophy and they are of philosophical nature (ibid). Philosophy and education are interdependent in the sense that philosophy is the reflective component, and education is the active component (Ogworu, Kuria, Nyamwaka and Nyakan, 2013). Philosophy critically and rationally examines the reasons behind the most fundamental beliefs, circumstances and conditions of people while education provides practical solutions, methods and skills of solving problems (Makuvaza in Peresuh and Nhundu, 1999). Ideally, philosophy guides education. It clarifies and sets goals, trains the mind to think and to be critical. Philosophy provides the purpose, and education makes it practical (ibid). Philosophy, therefore, is one of the most distinctive of all human activities; as such, it has been, and may continue to be of importance to human life the world over (ibid). A brief description of each educational philosophy is necessary so as to establish the one(s) that underpin or inform teacher education curriculum in Zimbabwe.

Gwele (2004) observes that most of what has been written in educational philosophy has been directed to formative education, that is, primary and secondary education. For some reason; it seems that educational philosophies have preferred to stay clear of tertiary education, especially professional education. On the other hand, educators in the professions have been drawn to the philosophical debates underlying their practice (ibid). Although there is limited literature on educational philosophies that are directly linked to professional education, the familiar ones will be discussed as they bear some significance to teacher education curriculum.

### 3.3.2.1 Perennialism

Perennialism is a conservative educational philosophy that emphasizes on the values and knowledge that has stood the test of time (McGraw-Hill Higher Education, 2005). It is rooted in idealism and realism. Gwele (2004) argues that the basic premise underpinning the conservatives is that there are certain enduring worthwhile truths that should be taught and learned. For perennialists, the purpose of education is to transmit worthwhile bodies of information to learners so that that which is worthwhile is conserved. They teach ideas that are everlasting, constant and not changing (Gwele, 2004 and Cohen, 1999). These ideas have the potential for solving problems in any era, since the natural and human worlds at their most essential level do not change (ibid). Teaching these unchanging principles is critical as humans are rational beings, and their minds need to be developed. Thus, education should concern itself with the cultivation of the intellect and not learner needs and interests (ibid). Perennialists contend that there is an organized body of knowledge that children need to know so that society might cohere around a common identity (Gaudelli in Gwele, 2004). The teacher is the source of knowledge, hence learners are passive recipients, taking whatever is taught without questioning. Teacher centered methods are the order of the day.

Although Gwele (2004) argues that perennialists' views on education have limited relevance to professional education because of their focus on the basics of reading, writing and arithmetic, there are some aspects that seem to have informed teacher education curriculum. These will be highlighted later.

### 3.3.2.2 Essentialism

Like perennialism, essentialism is a conservative educational philosophy that is rooted in idealism and realism. Essentialists contend that both body and mind are important in education, and as such, core knowledge and skills are essential to a successful society, because those requisite abilities allow the individual to be an economically productive member of society (Gaudelli in Gwele, 2004). They focus on teaching the essential elements of academic and moral knowledge (McGraw-Hill Higher Education,

2005). Essentialists believe that knowledge is what is real, and reality exists outside the individual and is subject to observation (Gwele, 2004). There are certain subjects that are capable of cultivating the intellect. These include the fundamental academic disciplines of English (grammar, literature and composition), Mathematics, Science, History and Modern Languages (ibid). They need to be transmitted to students in a systematic and disciplined way (Cohen, 1999). Sharon (2008) says William Barley, the founding philosopher of essentialism argued that students should learn 'something' in addition to the process of thinking. Schooling should be practical, preparing students to become valuable members of society. It should focus on facts, that is, the objective reality out there (Cohen, 1999). The emphasis in this conservative perspective is on intellectual and moral standards that schools should teach. The core of the curriculum is essential knowledge and skills and academic rigor (ibid).

Although this educational philosophy is similar in some ways to perennialism, essentialists accept the idea that core knowledge and skills might change over time, depending on what is considered essential to know at a particular time. Students should be taught hard work, respect for authority, and discipline (ibid). Teachers have the authority to choose the curriculum, organize the school day and construct classroom activities. In this case the teacher is the sole source of knowledge and students are viewed as empty vessels waiting to be filled (McGraw-Hill Higher Education, 2005).

The purpose of education is to preserve, through transmission to generations of learners, that which is essential to learn (ibid). Education must instill in learners the academic and moral knowledge which constitute those essential things that have to be known by a mature adult in order to be a productive member of society (Hearne and Cowles in Gwele, 2004). Teaching and learning is no more than the acquisition of knowledge and skills. Lectures, drill, recitation and demonstration are mainly used in teaching. Mastery of concepts has to be demonstrated through performance in various forms of assessment (Cohen, 1999 and Gwele, 2004). Because of developing the intellect in learners, essentialism plays an important role in informing teacher education curriculum.

### 3.3.2.3 Progressivism

Progressivism is an educational philosophy that developed from scientific discoveries that proved that everything in the universe is not fixed; it is in a constant state of change or progress (Taylor, 2014). It puts more emphasis on experiential learning, where students learn by doing (Education.com, 2013). Progressivists believe that education should focus on the whole child, rather than on the content or the teacher. They stress that students should test ideas by active experimentation (Cohen, 1999 and Education.com, 2013) since children's understanding can only expand from those things that they have direct experience of. Hence, art-rooms, science laboratories and kitchens are features of progressive schools (Education.com, 2013). John Dewey, who is known to be the father of progressivism, argued that learning is rooted in the questions of learners that arise through experiencing the world. He also held that if knowledge is not a matter of passive reception, but of active engagement, so should learning also be (ibid). In his view, the teaching and learning of Science ought to be focused on the acquisition of skills of scientific method of experiment and hypothesis-testing more than on the memorization of scientific laws or facts (ibid). Taylor (2014) observes that in progressivism, the learner is a problem solver and thinker who make meaning through his or her individual experience in the physical and cultural context. The role of the teacher, therefore, is to provide experiences so that students can learn by doing. Spencer, a progressivist, argued that because children are naturally inquiring, constructing and active beings, teachers must constantly conform to the natural process of mental evolution (ibid).

Cohen (1999), Taylor (2014) and Education.com (2013) contend that the scientific method is used by progressivist educators so that students can study matter and events systematically and first hand. Students should find the experience of learning pleasurable. The emphasis is on process, that is, how one comes to know, as opposed to product, what one knows. Thus curriculum content is derived from student interests and questions. Shared decision making, planning of teachers with students, student-selected topics are all aspects of the curriculum (ibid). Unlike conservative philosophies

that use books as authorities, progressive philosophies use books as tools that facilitate learning rather than authority.

One of the key tenets of progressive education is that the school should improve the way of life of the citizens through experiencing freedom and democracy in schools (Taylor, 2014). This can be achieved through the use of learner-centered methods that promote freedom. Progressive education is more applicable in developed countries like America where it started. Developing countries that are strained by resources may borrow principles like teaching from simple to complex, lessons that start from concrete to abstract, instruction which proceeds from empirical to rational and encouragement of self-development. Otherwise a curriculum based on children's interests is utopian for them.

#### 3.3.2.4 Reconstructionism

Social Reconstructionism is a philosophy of radical thinkers, who reject all past human experience and propose to make a fresh start through a revolutionary change (Lewy, 1991). Social Reconstructionists believe that education must play a major role in changing or reforming societies. This is asserted by Stanley (1992) when he says education can and should be employed to help solve social problems and reconstruct the sociocultural order to create a more ideal society. Zvobgo (1986) has it that society undergoes change with time, and educational curriculum needs to change as well, to be in line with new developments. To achieve this, Reconstructionist educators must focus on a curriculum that highlights social reform as the aim of education (Cohen, 1999).

Reconstructionists advocate for schools that would adopt a curriculum that criticizes the old social order and support the one that combines critical socio-political inquiry, with the life experiences of the learner (ibid). Subjects taught should include Social Sciences for understanding society, Natural Sciences which deal with the nature of things, Language for communication, History for recording man's social life and Arts, Literature and Music that develop the child's creativity (Lewy, 1991). Learners should be exposed

to controversial issues so that they can explore them and come up with alternative solutions, thus learning involves problem solving. Teaching and learning is a process of inquiry in which the child invents and re-invents the world. It must not be seen as banking (Freire, 1973) in which the educator deposits information into students' heads. The process of schooling, therefore, should be linked to social progress. Schools must play an active role in determining societal order and reshaping society since they are a microcosm of society. They should create a vision of a new world, foster a broader social responsibility and work for the common good of the society (Lewy, 1991). The role of the teacher in Reconstructionism is to develop among learners, those values, attitudes, knowledge and skills consistent with the new way of life (ibid).

Reconstructionism is not easy to achieve. It is utopian in the sense that man are naturally restless beings, who are always dissatisfied with the state things have been and are, thus they engage themselves in a continuous process of development. Though utopian, there are some aspects that inform teacher education curriculum.

### 3.3.3 Philosophies that inform the 3-3-3secondary teacher education model for Post 'O' Level Science

In Zimbabwe, the 3-3-3secondary teacher education model for Post 'O' Level Science, seems to have borrowed certain aspects from all the philosophies of education. The content taught, that is, Social Sciences, Natural Sciences, Languages and History is gleaned from Reconstructionists. Perennialists and Essentialists contend with Reconstructionists when they suggest that the curriculum should offer long standing essential elements of academic and moral knowledge. Information and Communication Technology and Health and Life Skills are also part of the curriculum as they are considered essential knowledge that is consistent with the new way of life. Progressivists' content, though not specific, also applies to a certain extent, as most learners in this era of technology enjoy surfing information from the internet and playing computer games. This is also in line with pragmatists, the basis of progressivism, that knowledge is nothing but practical experience. All philosophies view education as

playing a vital role in developing among learners, skills, knowledge, values and attitudes to function effectively in their society.

Perennialists and Essentialists, as conservative philosophers adopt traditional methods of teaching such as the lecture method. The teacher transmits knowledge to the learners who receive it without questioning. On the contrary, Progressivists and Reconstructionists, as progressives and radicals respectively, advocate for child centered methods such as group work and excursions where learners discover knowledge on their own. Learners are expected to inquire, construct, experiment and draw conclusions as individuals or groups. The teacher's role is only to facilitate the learning process.

Because of the nature of the Zimbabwean teacher education curriculum which is exam oriented, teacher centered methods are used. Teacher educators dictate the pace of the students as they have to write the exam at a specified given time. Besides, the "Education for All" policy adopted at independence, increased enrolments at all levels of education and at the same time constrained financial, material and human resources. Because of limited textbooks, the lecturer is left with no option but to research and present lectures to students. The 'chalk and talk' method gleaned from Perennialists and Essentialists is still being widely used. Experiential, inquiry and constructive learning as advocated by Progressivists and Reconstructionists are used in Sciences where students do a lot of experiments, explain processes, discuss their findings and draw conclusions as individuals, pairs or groups. The Action Research Project that students do, demands them to identify learning difficulties among pupils and come up with intervention strategies to assist them. As such, they become active inquirers and critical thinkers who are eager to solve problems in the teaching and learning environment. Relevant hands-on is applied as recommended by progressivists.

As indicated earlier, that not all aspects of these educational philosophies are applicable, the 3-3-3secondary teacher education model for Post 'O' Level Science is neither derived from the experiences and interests of the learners, nor rejects all past human experience and proposes a fresh start. Instead, it is eclectic in its approach. It

borrowing what is relevant from each, triangulates it to come up with a well informed comprehensive teacher preparation model.

### 3.4 Models of Teacher Education

The requirement by The National Council for Accreditation of Teachers (1990) that all teacher education programs be grounded in a model, that is, a guideline to action prevalent in all educational activities such as instruction, evaluation, supervision and administration (Oliva, 1992), has resulted in a number of teacher education models. Villegas-Reimers (2003) defines models as specific processes and opportunities that are planned to provide professional development to teachers from the beginning of their preparation. Below is a description of the Competency Based Teacher Education model, the Zimbabwe Integrated Teacher Education Course (ZINTEC), Zimbabwe's 2-5-2 model and the partnership models. These seem to provide the basis for the 3-3-3 teacher education curriculum model as there are some aspects that have been gleaned from them.

#### 3.4.1.1 Competency Based Teacher Education model (CBTE)

The competency based model of teacher education has its roots in behavioral psychology and social learning theories (Ismail, Al-Zoubi, Rahman and Al-shabatat, 2009). In Britain, it was introduced in reaction to the concern that students were not taught the skills they require in life after school (Hill, 2013). CBTE generally refers to a type of training that focuses on acquisition of those specific competencies that are expected of prospective teachers. It emphasizes on the development of specific competencies, that is, knowledge, skills, values and attitudes of teaching which are assumed to be related to student learning (Carl, 2008 and Hill, 2013).

Ismail, Al-Zoubi, Rahman and Al-shabatat, (2009) citing Clark (2000) identify and categorize competencies into five. First and foremost are cognitive competencies that relate to knowledge and intellectual skills and abilities that are expected of learners. There are also performance competencies wherein the learner demonstrates that he or

she can do something. When learners bring change to others, they will have acquired consequence competencies. Affective competencies are expected attitudes and values that tend to resist the specificity and are more difficult to assess than the first three competencies. Finally, there are exploratory competencies which include activities that provide opportunities for teachers to learn about teaching. In addition to these, Lerner (2003) in Ismail, Al-Zoubi, Rahman and Al-shabatat (2009) proposes that teachers must also have competencies in human relationship abilities such as cooperation, which requires them to be helpful, deferential, empathetic and open. These competencies are important as they describe the students' ability to apply basic and other skills in situations that are commonly encountered in everyday life (Anderson, 2013). As such, teachers are expected to have an array of these important competencies.

Burke (1989) asserts that by specifying the competencies sought independently of the learning process, access to learning through any mode becomes possible. The statement of competence should incorporate specific standards such as the ability to perform a range of work related activities. The skills, knowledge and understanding required should be specified. There must be recognized standards of competence relevant to employment (ibid). Competency Based Education (CBE) is based on the broader concept of Outcomes Based Education (OBE), one that forms the basis of many current instructional design methods (Hill, 2013). OBE works backwards within a course, starting with the desired outcomes, often defined through learning objectives, and relevant assessment procedures, and then moving to learning experiences that should lead students to the outcomes (ibid). As a subset of OBE, CBE is closely tied to job skills or employment needs that are usually specified in advance as a set of objectives (Fraser, 2001 in Ismail, Al-Zoubi, Rahman and Al-shabatat, 2009 and Hill, 2013). It is based on a set of outcomes that are derived from an analysis of tasks typically required of students in life situations (Anderson, 2013).

Ismail, Al-Zoubi, Rahman and Al-shabatat (2009) contend that all CBE programs have four characteristics in common. These are: organization of what is to be learned into independent components, the precise specification of what is to be learned, the provision of feedback during the learning sequence and the insertion of models of the

performance to be learned in the learning sequence (in programs applying what has been learned about modeling and imitative behavior). This process of operant conditioning, that is, behaviorist psychology, aims at mastering the desired competencies.

The social cognitive learning theories are divided into observational learning, which emphasizes learning by watching others and cognitive behavior modification (CBM), which utilizes both modeling and self-instructional verbalization (Ismail, Al-Zoubi, and Rahman and Al-shabatat 2009 citing Seng *et al*, 2003). CBM can emphasize both social learning and self-regulation. Modeling behavior may be described as one person's observation of another's behavior and acquiring of that behavior (ibid). Bandura (1997) in Ismail, Al-Zoubi, Rahman and Al-shabatat (2009), suggests four sub-processes in the social learning theory view of observational learning. These component processes are attention, retention, motor reproduction, reinforcement and motivation.

In his view, Hill (2013) suggests that CBE programs should have six critical components: first, explicit learning outcomes with respect to the required skills and concomitant proficiency (standards for assessment) have to be specified. A flexible time to master these skills is then set and a variety of instructional activities to facilitate learning are put in place. The fourth component is testing, wherein criterion-referenced testing of the required outcomes is employed. After testing, the successful students are certificated basing on demonstrated learning outcomes. Finally, programs are adapted to ensure optimum learner guidance.

In this model, students are passive recipients of professional knowledge and have very little say in determining the direction of their preparation program. This is one of the most often used models in teacher education programs as much emphasis is on specific, measurable, achievable, results-oriented and time framed (SMART) objectives. Changes in behavior must be observable in order to tell that one is competent in a particular skill. Although the model equips the trainee teachers with the skills necessary for teaching, it is weakened by the fact that it fails to account for other competencies that a teacher might have that may not be specified under the initially stipulated skills.

### 3.4.1.2 The Zimbabwe Integrated National Teacher Education Course (ZINTEC)

The Zimbabwe Integrated National Teacher Education Course (ZINTEC) was an in-service or apprenticeship course adopted in Zimbabwe, in which students learnt the teaching skills on the job. The ZINTEC program was launched by the Ministry of Education in January 1981, in an effort to alleviate the acute shortage of teachers caused by the government's democratization of education which made primary education free and compulsory for all children of school-going age (Zvobgo, 1986). The ZINTEC model was founded on the principle of integrating theory with practice in which student teachers spent as much of their course period actually engaged in practical teaching in a real classroom situation as they did in learning the theories of the teaching practice (Tshuma, 2009). The ZINTEC program was a political program that was implemented for political dispensation through the political administrative machinery (ibid).

The ZINTEC program was a complete departure from the traditional approach which had students spending the first and last terms (16 weeks) resident at college on full time contact tuition which sandwiched 10 terms (160 weeks) of teaching practice and was hence referred to as 1-10-1 model. Chivore and Masango (1982) cited in Tshuma (2009), raised criticism over the brevity of the time students spent at college in the ZINTEC program. This resulted in an increase in the initial and final residential periods students spent at college from one term to two terms (2-8-2). This meant that students spent the first and last two terms (32 weeks) at college on full time contact tuition sandwiched by 8 terms (128 weeks) of teaching practice (ibid).

During the first residential course at college, students were introduced to a condensed program of study covering the theory of education and applied education. Towards the end of the residential course, the college provided an intensive teaching program which enabled the students to acquire the basic survival skills of the teaching profession (Tshuma, 2009). According to Zvobgo (1986), the micro-teaching program concentrated on the basic interpretation of the syllabi of the subjects taught in primary schools, skills of scheming, lesson planning, marking and content selection and on various techniques of lesson presentation, class management and control. Tshuma (2009) posits that at the

end of the residential course, the student teachers were handed over to the Teaching Practice Department of the college for their professional development in schools over the longest period of the course.

The student teachers in the ZINTEC program were tasked with the full responsibility of handling classes as full time teachers and were not attached to experienced teachers during their terms of teaching practice. The 'trial and error' approach to teacher education encouraged student teachers to depend either on chance, experience or on merely copying behaviors that they had observed from others in the school, whether they were bad or good(Zvobgo,1986). This approach did not yield positive results on learner academic achievement, and as such, efforts were made to improve on it. This led to the introduction of 2-5-2 model.

#### 3.4.1.3 Zimbabwe's 2-5-2 teacher education model

According to Tshuma(2009),in 1999,the two ZINTEC colleges that trained teachers in a 4year program parallel to the 3 year program offered by conventional colleges proposed to the Ministry of Higher Education to have the length of their course reduced from 4 to 3 years to align them with the conventional colleges. The teaching practice period was then reduced from 8 to 5 terms sandwiched between the initial and the final residential terms, and this led to the introduction of the 2-5-2 model in 2000(ibid).

In the 2-5-2 model, student teachers are attached to experienced classroom practitioners to ensure monitoring, assistance and supervision for quality teaching practice. In January 2002, the Ministry of Higher Education and Technology directed that all conventional primary teacher education institutions adopt the 2-5-2 model (ibid).

As advanced by Tshuma, the 2-5-2 teacher education model meant that pre-service teachers spent the initial 2 terms (8 months) at college learning the theory of education, applied education and research methods, 5 terms (20 months) in teaching practice attached to teacher-mentors and the final 2 terms (8 months) back at college for revision and examinations, hence the term 2-5-2.

Under the 2-5-2 teacher education model, pre-service teachers spend most of their course time as (55%) in teaching practice in schools, attached to experienced classroom practitioners, with emphasis on, on-the-job training as in other countries such as Hungary, Finland, Britain, Canada, United States of America, Australia and New Zealand where pre-service teachers spend more than 66% of their course duration in schools (Tshuma, 2009 citing Forlin and Gibson, 1997). Student teachers are expected to benefit from the daily contact, guidance, close monitoring and supervision on practical teaching practice issues by the experienced classroom teachers. During the 5 terms of teaching practice, the daily assistance, guidance, support and supervision provided by teacher mentors help to ensure continuous professional and instructional development of pre-service teachers (ibid).

The 2-5-2 teacher education model adopted the collegial partnership between schools and teacher education institutions as reflected in the partnership and ZINTEC models. Tshuma (2009) posits that Mandu and Mashava's (2001) studies in Zimbabwe's teaching practice reflected characteristics of the integrative model in the 2-5-2 teaching practice where lecturers dominated the post lesson discussions as they sought to direct students' teaching without much contribution from the students themselves. This practice of attaching pre-service teachers to school-based mentors improves the quality of teaching practice as practicing students learn a lot from experienced teachers. Formative supervision is done by both college lecturers and school-based mentors using a supervision instrument designed by the college. Various competencies such as subject mastery, classroom management and class control and documentation are assessed.

During their last term of teaching practice, the pre-service teachers in the 2-5-2 system are subjected to an external quality assessment exercise in teaching practice which is supervised by the Department of Teacher Education (DTE) of the University of Zimbabwe as mandated by the Teacher Education Scheme of Association, (DTE Handbook, 2012). This is a form of summative assessment where external assessors confirm those pre-service teachers who would have successfully completed teaching practice and at the same time make recommendations for those who seem to have not

acquired the expected competencies. Some are required to repeat teaching practice whilst dismal failures are asked to quit the teaching profession.

#### 3.4.2 The partnership model

The partnership model assumes a strong relationship among all stakeholders that are actively engaged and working together to enhance teaching and learning (Sorenson, 2004 in Tshuma, 2009). Villegas-Reimers (2003) observes that in countries like Britain, United States of America and Canada, the partnership between schools and teacher education institutions has been emphasized where pre-service teachers spend a minimum of two thirds of their course duration in schools on teaching practice.

Under this model, schools and teacher education institutions are accorded equal rights in the supervision of student teachers. This has strengthened and improved teacher education programs as student teachers and experienced teachers continue to engage in co-teaching and learning activities, with experienced teachers guiding student teachers 'development. Students are supervised and monitored on the integration of theory of education with real practical teaching. Darling-Hammond(2010) advances that, the partnership model ensures a strong clinical practice, and the injection of the reality of professionalism in teacher development. Thus, most countries globally, have adopted the model. In most countries where teacher education is offered in universities, it is a dual partnership between universities and schools, whereas in some countries where teacher education is offered in colleges of education, it is adopted on a tripartite system that involves universities, colleges and schools.

#### 3.4.3 Models underpinning the 3-3-3 secondary teacher education model for Post 'O' Level Science

The 3-3-3secondary teacher education model for Post 'O' Level Science is underpinned by the above discussed models, as all of them advocate for some theory and practice in their programs. What varies is only the amount of time given to the theory aspect and

the practicum. In the ZINTEC and 2-5-2 models, for example, the 3-3-3 model adopts that teacher education should be done in school terms, that is, following the school calendar. From the 2-5-2 model, the 3-3-3 model also borrows that the teacher education course should be done in 9 school terms. The CBTE model equips students with all the competencies required, though falling short on how that can be done. The ZINTEC and the 2-5-2 models come in handy to fill the gap by emphasizing on IN-OUT and IN; thus the 3 terms practicum are sandwiched between the first 3 starting terms and the last 3 ending terms. In most countries globally, universities and colleges of education partner with schools where student teachers do their teaching practice, thus adopting the partnership model. The 3-3-3 model has aspects of CBTE, ZINTEC, 2-5-2 and partnership models, and thus eclectic, encompassing all the models as no one model is superior to the other.

### 3.5 Curriculum Content in Teacher Education

The best practices of teacher education have been an ongoing area of research, as evidenced by studies appearing in the literature. Cochran- Smith, Fieman-Nemser, McIntyre and Demers (2008) argue that studies on teacher education should focus on teacher knowledge, skills and dispositions. Teachers should not only keep pace with the changes in society but to lead the change. Their knowledge has to become deeper and more flexible. For them to acquire such knowledge, relevant skills and dispositions that foster positive attitudes, they must be exposed to teacher education programs that equip them with such attributes.

Darling-Hammond (2006) observes that research has identified attributes that should be possessed by teacher education programs. These are: close integration of courses that create coherent experience throughout the programme, well defined standards of practices and performance, a core curriculum with emphasis on student learning, assessment and content pedagogy and use of problem-based teaching methods. Villegas-Reimers (2003) observes that different countries emphasize different curriculum or the amount of time devoted to each one. But, in general, most include courses and experiences that address subject matter, the foundation of education

courses, professional studies (such as pedagogy and method courses), child development and practicum.

The National Board for Professional Teaching Standards (NBPTS) (2002) established guidelines entitled, 'what teachers should know and be able to do.' The following five core propositions were outlined:

- *Teachers were to be committed to their students and their learning.*
- *Teachers knew the subjects they taught and how to teach those subjects.*
- *Teachers were responsible for managing and monitoring student learning.*
- *Teachers thought systematically about their practice and learned from experience.*
- *Teachers were members of learning communities*

In order to equip teachers with such knowledge, skills, attitudes and competencies, the content of the curriculum should consist of four main areas as espoused by Darling-Hammond (2006), Mamvuto, Kangai, Chivore and Zindi (2012), Lynd (2005) and Cochran-Smith, Fieman-Nemser, McIntyre and Demers (2008). These areas are:

- *Content knowledge (CK) / academic studies / subject matter*
- *Pedagogical knowledge (PK) / professional preparation*
- *Educational foundations*
- *School practice / practicum / clinical practice.*

#### 3.5.1.1 Content knowledge (CK)

According to Koehler (2011) content knowledge is knowledge about the actual subject matter that is to be learned or taught. The content to be covered in high school social studies or algebra is very different from the content to be covered in a graduate course on computer science or art history. Clearly, teachers must know and understand the subjects they teach, including: knowledge of central facts, concepts, theories and procedures within a given field; knowledge of explanatory frameworks that organize and connect ideas; and knowledge of the rules of evidence and proof (Shulman, 1986).

Teachers must also understand the nature of knowledge and inquiry in different fields. For example, how is a proof in mathematics different from a historical explanation or a literary interpretation? Teachers who do not have these understandings can misrepresent those subjects to their students (Koehler, 2011).

### 3.5.1.2 Pedagogical content knowledge (PCK)

Shulman (1986) also introduced the idea of pedagogical content knowledge. He claimed that the emphasis on teachers' subject knowledge and pedagogy were being treated as mutually exclusive domains in research concerned with these domains. The practical consequence of such exclusion was production of teacher education programs in which a focus on either subject matter or pedagogy dominated. To address this dichotomy, Shulman proposed to consider the necessary relationship between the two by introducing the notion of pedagogical content knowledge (PCK).

According to Cochran (1997), pedagogical content knowledge is a type of knowledge that is unique to teachers, and is based on the manner in which teachers relate their pedagogical knowledge (what they know about teaching) to their subject matter knowledge (what they know about what they teach). It is the integration or the synthesis of teachers' pedagogical knowledge and their subject matter knowledge that comprises pedagogical content knowledge. Shulman (1986) sees pedagogical content knowledge as embodying the aspects of content most germane to its teachability. Within the category of pedagogical content knowledge, Shulman includes, for the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations, the ways of representing and formulating the subject that make it comprehensible to others. It also includes an understanding of what makes the learning of specific concepts easy or difficult: the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning (ibid).

Cochran (1997), citing Gudmundsdottir (1987) says pedagogical content knowledge is a form of knowledge that makes science teachers, teachers rather than scientists.

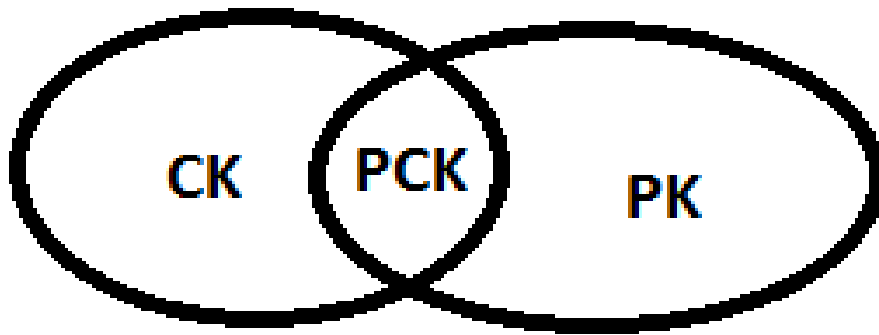
Teachers differ from scientists, not necessarily in the quality or quantity of their subject matter knowledge, but in how that knowledge is organized and used. In other words, an experienced science teacher's knowledge of science is organized from a teaching perspective and is used as a basis for helping students to understand specific concepts. A scientist's knowledge, on the other hand, is organized from a research perspective and is used as a basis for comparison of the organization of subject matter knowledge among groups of experienced science teachers, experienced research scientists, novice science teachers, subject area science majors, and pre-service science teachers (ibid).

Koehler (2011) understands that PCK includes knowing what teaching approaches fit the content, and likewise, knowing how elements of the content can be arranged for better teaching. This knowledge is different from the knowledge of a disciplinary expert and also from the general pedagogical knowledge shared by teachers across disciplines. PCK is concerned with the representation and formulation of concepts, pedagogical techniques, and knowledge of what makes concepts difficult or easy to learn, knowledge of students' prior knowledge and theories of epistemology. It also involves knowledge of teaching strategies that incorporate appropriate conceptual representations, to address learner difficulties and misconceptions and foster meaningful understanding (Cochran, 1997). It also includes knowledge of what the students bring to the learning situation, knowledge that might be either facilitative or dysfunctional for the particular learning task at hand. This knowledge of students includes their strategies, prior conceptions (both "naïve" and instructionally produced); misconceptions students are likely to have about a particular domain and potential misapplications of prior knowledge (ibid).

Cochran (1997) and Koehler (2011) contend that PCK exists at the intersection of content and pedagogy. Thus, it does not refer to a simple consideration of content and pedagogy together but in isolation; but rather to an amalgam of content and pedagogy, thus enabling transformation of content into pedagogically powerful forms. PCK represents the blending of content and pedagogy into an understanding of how particular aspects of subject matter are organized, adapted, and represented for

instruction (ibid). Shulman (1986) argued that having knowledge of subject matter and general pedagogical strategies, though necessary, were not sufficient for capturing the knowledge of good teachers. To characterize the complex ways in which teachers think about how particular content should be taught, he argued for pedagogical content knowledge as the content knowledge that deals with the teaching process, including the ways of representing and formulating the subject that make it comprehensible to others. If teachers were to be successful, they would have to confront both issues (of content and pedagogy) simultaneously, by embodying “*the aspects of content most germane to its teachability*” (Shulman, 1986: 9). At the heart of PCK is the manner in which subject matter is transformed for teaching. This occurs when the teacher interprets the subject matter, finding different ways to represent it and make it accessible to learners (ibid).

The notion of PCK is based on Shulman’s acknowledgement that pedagogical content knowledge is of special interest because it identifies the distinctive bodies of knowledge for teaching. It represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction. Since its introduction in 1987, PCK has become a widely useful and used notion in the area of science education. Professional organizations such as the National Science Teachers Association (NSTA, 1990) and the National Council for the Accreditation of Teacher Education (NCATE, 2010) have all emphasized the value of PCK for teacher preparation and teacher professional development (Cochran, 1997). The notion of PCK has permeated the scholarship that deals with teacher education in general and the subject matter education in particular. It is valued as an epistemological concept that usefully blends together the traditionally separated knowledge bases of content and pedagogy. Shulman’s contribution to the scholarship of teacher knowledge can be represented in a diagram by connecting the two circles, so that their intersection represents pedagogical content knowledge as the interplay between pedagogy and content. Figure 3-1 explains the interplay between pedagogical content and content knowledge.



**Figure 3-1: The interplay between pedagogical knowledge and content knowledge**

In Shulman's words, this intersection contains within it,

*the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations, that is, the ways of representing and formulating the subject that make it comprehensible to others (Shulman, 1986: 9).*

### 3.5.1.3 Educational foundations

Chaube (2002), Villegas-Reimers (2003), Darling-Hammond (2006), Bhoikhutso (2010), and Lynch and Yeigh (2013) contend that in educational foundations, the delivery of pedagogical courses such as Psychology of learning, Curriculum and Instruction, Information Technology, Health and Life Skills, Special Education, Sociology of Education and Philosophy of Education provide the base for the initial preparation of teachers.

Psychology is relevant in teaching and learning as it studies everyday problems of education, from which one derives principles, models, theories, teaching procedures and practical methods of instruction and evaluation, as well as research methods, statistical analyses and measurement and assessment procedures appropriate for studying the thinking and affective processes of learners and the socially and culturally

complex processes of schools (Mkandla in Peresuh and Nhundu, 1999). Psychological foundations generate theories of teaching and learning.

According to Chaube (2002) philosophy acquaints us with values in life and education tells us how these values can be realized. That is why so much emphasis is placed on value in life while considering the nature of the school curriculum, the method of school discipline, and techniques of instruction and school organization. These values are nothing but a philosophy of education which, in the ultimate analysis, is a philosophy of life. Philosophy gives meaning to all what is done in an educational process (ibid). Philosophy is the main guide to what constitutes worthwhile knowledge as discussed earlier, on philosophies that underpin teacher education programs.

Sociology concentrates its study upon the group life of human beings and the product of their group living (Gwarinda, 2001). Gwarinda (2001) goes on to explain that sociology does not typically examine individuals but groups: how groups interact, how institutions arise and operate, how groups change and develop. The emergence of customs, traditions and values is of great interest to a sociologist. The justification for studying sociology of education as a distinct discipline is generally that we need to isolate certain social or societal factors that affect education so that we are in a position to grapple with educational problems or situations successfully (ibid).

The three major sub-disciplines of Psychology, Philosophy and Sociology constitute the core of any course that purports to produce teachers. As societies continue to change and develop, the sub-disciplines of education keep on expanding.

#### 3.5.1.4 School practice / practicum

School practice or practicum is the period when pre-service student teachers are placed within a school setting (Grootenboer, 2006 and Lynch and Yeigh, 2013). It is normally referred to as teaching practice. The teaching practice component aims at developing pre-service teachers who are responsible, reflective, and respectful and who not only do

what they “have” to do, but also what they “ought” to do in the best interests of their learners(Mkandla, 2004).

Teaching practice is unanimously seen as an instructional program to enable the student to marry theory with practice (Mkandla, 2004, Villegas-Reimers, 2003, Darling-Hammond, 2006 and Zeichner, 2010). Mkandla (2004) observes that teacher education curricula are derived from, and therefore directly represent and relate to the classroom. A certain period of classroom exposure is necessary to enlighten the pre-service student teacher on the intersection of theory with practice, and how the former accurately represents reality leading to him or her becoming a distinctive doer or knower. Darling-Hammond (2006) asserts that practicum is considered to be the most highly valued component of teacher education program that aims to prepare teachers who are thoughtful, reflective and inquiring. Pre-service teachers are offered the opportunity to gain knowledge and experience in the field. Cochran-Smith and Lytle (1999) say teachers learn the tricks of the trade during school practicum.

Mkandla (2004) asserts that teaching practice is structured. It is logically oriented, subject-centered and follows well laid out procedures and norms. There are two dimensions to structural teaching practice, that is, quantitative and qualitative practice. Quantitative practice and supervision are dominated by subject content or documentation, that is, content is schemed, planned and evaluated (Teaching practice Circular, 2013). Supervisors look for such characteristics as subject mastery, sequencing of content, proper scheme and plan layouts, statement of objectives, lesson development, closures and evaluations, adherence to the syllabus and timetable, and relationship to authority(Tshuma, 2009 and Mnkandla,2004).The pre-service teacher follows well laid out procedures and strategies as indicated in the teaching practice circular. Evaluations of the documents after a certain period help to check the breadth and depth of teaching. Proper documentation is therefore crucial as documents serve as a means of control. Poor documentation or absence of them is tantamount to failure. Grootenboer (2006) posits that unless structures are in place to promote reflection and evaluation, the practicum can become an experience of uncritical practice that can work against quality teacher education.

Mkandla (2004) advances that qualitative practice aims at improving the general performance of the pre-service teacher especially the quality of the lessons he or she prepares and delivers. The Teaching Practice circular (2013) indicates that supervisors evaluate some lessons and offer the necessary advice and comments. They comment and advise on student mastery of base-line skills like chalkboard use, questioning techniques, language use, handling of learner's responses, explanation and general classroom interaction, management and discipline. In follow-up discussions, the supervisors point out strengths, weaknesses, distortions and offer suggestions while the pre-service teacher undertakes the necessary readjustments.

There is an array of teaching practice supervision instruments that are used. Teaching practice departments, in liaison with the teaching staff draft the supervision instrument and discuss it with the pre-service teachers so that they are aware of what is expected of them. Rating scales or checklists are normally used. Although scored numerically, the scales are non-symbolic models and highlight traits like distinctive, passing or failing performances. These qualities are assessed in terms of student teacher's schemes which must display logical arrangement, resourcefulness, objectives, clear methodology and valid comments (Teaching practice circular,2013).Lesson preparation and planning must display specific, measurable, achievable, results oriented, time framed (SMART) objectives, relevant induction set, proper sequencing of content, logical activities, methods or strategies and a diagnostic conclusion. Teaching procedures must encompass motivation techniques, clarity in explanation, demonstrations, use of aids, for example, chalkboard, proper language usage and sensitivity to feedback, classroom management, quality of written work and quality of marking (Mkandla, 2004).Pre-service teachers are also expected to keep a record of learners' progress (mark list), remedial and extension record books and the teaching practice file where all lesson plans, syllabiand schemes of work are kept. The student teacher's general deportment, dress, attitude and commitment to the profession are also assessed (Teaching practice circular, 2013).

Fullan and Hargreaves (1996) observe that practicum plays an important role in any teacher education program as it strengthens the development of specific teaching

competencies in student teachers. It provides opportunities for self reflection, for sharing experiences with a mentor, supervisor and peers, and for student teachers to establish themselves as generative and innovative teaching professionals through authentic participation in school and community activities. Practicum exposes student teachers to real pupils or learners and real situations that enable them to develop a repertoire of skills in dealing with different learning situations (Mkandla, 2004).

### 3.6 Teaching Methods Used in Teacher Education

Davis (1993), Sajjad (2011) and Al-Rawi (2013) identify various strategies of teaching that can be used by teacher educators in transacting knowledge, skills and values to students. Al-Rawi (2013) sees teaching and learning as two activities, where one reflects the other. He argues that since the outcome of teaching is learning, the term, “Teaching and Learning Methods” should be used instead of Teaching Methods only. A similar perspective is taken here, as teaching methods are discussed together with learning approaches.

#### 3.6.1.1 Training and coaching

Training and coaching, draw upon behavioral theories that emphasize on observable behavior change. It is most effective in teaching skills of using tools, experiments and training in giving speech (Al-Rawi, 2013). The teacher shows and performs the skills or experiments in front of the students in an optimal way, and he or she may repeat several times before he or she asks students to practice the skill or carry out the experiment under his or her supervision (ibid).The success of this method highly depends on the teacher and his personal skills, as there are some skills that cannot be learned without providing real demonstrations. The advantage of this method is that each and every student practices the skill or does the experiment, thus allowing active participation among all learners. Because of its learner-centeredness, it provides an enthusiastic and enjoyable learning environment for students.

There are of course some limitations in this method as it requires a highly skilled instructor to effectively demonstrate the skill. If every learner is to carry out an experiment, it becomes costly for the institution as perishables like chemicals have to be continuously purchased. Close supervision is required as students cannot be left alone carrying out experiments, hence demanding on the part of the teacher.

### 3.6.1.2 Lecturing and explaining

Sajjad (2011) defines a lecture as a talk or verbal presentation given by a lecturer, trainer or speaker to an audience. With all the advancement of education systems and information communication technology (ICT), the lecture method is still widely used in teaching and learning at higher level of education. According to Davis (1993), lecturing is not simply a matter of standing in front of a class and reciting what one knows, instead, it is a special form of communication in which voice, gesture, movement, facial expression and eye contact can either complement or detract from the content. This method is economical, as it can be used for a large number of students and large amounts of material can be structured and covered within a short period of time. The teacher has great control of time and material.

Al-Rawi (2013) finds the lecture method advantageous in that it presents factual material in direct, logical manner, contains experience which inspires, stimulates thinking to open discussion, and most useful for large groups. It also creates new ideas and develops creativity among students. The teacher is assumed to be experienced and has a good mastery on the subject taught, hence, clearly explains all key concepts to the learners with ease and can answer almost all questions raised by students. With proper planning and effective presentation techniques, the lecture can be a highly effective method for transferring knowledge to students as it develops among learners listening skills, attention and active learning.

Lecturing and explaining draws upon cognitive learning theories that put more emphasis on understanding concepts. It also draws from Freire's (1978) banking approach to education where the teacher has valuable knowledge that he or she imparts to the

learner. The teacher is the source of knowledge. It is however criticized for assuming that learners are empty vessels waiting to be filled. Since learning is for the learner, teachers should minimize teaching and allow learners to learn.

#### 3.6.1.3 Inquiry and discovery

This strategy grows out of the work of the pragmatist John Dewey who believed that learning is nothing but experience (Taylor, 2014). For any learning to take place, learners should be involved in problem solving and critical thinking skills to arrive at a conclusion. Learners should be directly involved in work, service, fieldwork or other concrete operations. Learning is by doing (ibid). In the process of enquiry, learners construct knowledge, skills and values from direct experience. It is extremely learner centered and learner directed, and can be modified for learners at any level, reaching them where they are (Sajjad, 2011). Inquiry based learning takes a lot of time, energy and planning, but it is often very effective (ibid), as it emphasizes on higher order thinking skills. These include problem solving, synthesis and analysis, discovery and creative activities, both in the classroom and the community. In enquiry learning, students are responsible for processing the data and drawing up conclusions from them (Davis, 1993 citing, Smith, Batchelor, O'Steen and Angelo, 2011). Artkinson (1999) posits that in inquiry and experiential learning, the role of education becomes largely a matter of enabling learners to acquire problem solving skills, since human life consists of a series of problems, each with a special character of its own.

#### 3.6.1.4 Groups and teams/Co-operative learning

Groups and teams grow out of communication theory that centers on using groups to facilitate learning with the understanding that learners learn best from one another (Davis, 1993). Heterogeneous grouping yields better results as compared to homogeneous grouping because the academically gifted assist those who have learning deficiencies. Learners exchange ideas, and there is active participation that develops creativity among them and evokes thinking. Co-operative learning builds confidence and

trust among learners. They become responsible as they are encouraged to complete their assigned tasks and report back to their teacher and colleagues.

#### 3.6.1.5 Individual presentation

In Sajjad's (2011) view, a presentation involves motivating listeners to accept the ideas presented, alter an existing opinion, or act on a given premise. There is need for the presenter to thoroughly research on a given topic and compile notes on the data to be presented. Thorough preparation also involves sharing ideas with other learners and asking for assistance on how best one can present the assigned topic. Individual presentation creates confidence to the presenter, hence mostly benefitting the presenter.

#### 3.6.1.6 Assignments

Written assignments help in organization of content, assimilation of facts and better preparation for examinations (Sajjad, 2011). The assignment method emphasizes individual performance. The parameters of the topic assignment are clearly defined and the requirements fully explained so that students know how to approach it. Davis (1993) suggests that teachers should give assignments and exams that recognize students' diverse backgrounds and special interests.

#### 3.6.1.7 Online Teaching Method

As information communication technology (ICT) changes human lives, it brings changes in teaching and learning in education institutions. Al-Rawi (2013) posits that online teaching method refers to the teaching and learning that occurs outside a traditional classroom using internet. Since the teacher interacts with his or her learners through the internet, there is need for him or her to be highly computer literate. This method has merits in that students can participate in classes from anywhere in the world, provided they have computer and internet connection (UNESCO, 2008). Students also have an open access to resources and materials that may be located anywhere in the world,

since resources and ideas are shared (Enochson and Rizza, 2009). Al-Rawi (2013) and UNESCO (2008) share the same opinion that online learning is efficient; unlike face-to-face classes, there is time for students to think, discuss, respond, and solve given tasks. Within an online discussion, students actively participate by answering discussion questions made by their classmates, building on what they have said and become actively engaged in what they are studying and what they need. As part of the learning experience, students discover the collaborative effort involved in the learning process (ibid). Online learning allows a dynamic interaction between tutor and students and among themselves (Chang, Chien, Chng and Lin, 2012). Self-direction and critical thinking is a result of the online interactive learning environments; the tutor or facilitator and students' collaboration create dynamic learning environments (ibid).

There are of course some limitations in using online teaching method as the method is only applicable to students who are able to access the computer and internet. Students and teachers must have the knowledge of using the computer and how to navigate the cyber space. Al-Rawi (2013) forwards that since technology is intended to be the tool used in the learning process; this tool should be trusted, available and maintained all the time. More so, not every subject can be taught online because the current electronic medium does not permit the best method of instruction. Curriculum of an online program must be carefully developed by qualified professionals. Curricula that are successful in traditional education will not always be successful in online program where learning and instruction paradigms are quite different (ibid).

The type of method chosen largely depends on the subject matter. While content subjects like History and Literature may require lecture method, Science and Mathematics may require hands-on experiential learning. Some subjects may require an eclectic approach to these teaching strategies for effective teaching and learning to occur, as relying on one strategy may not yield positive results.

## 3.7 Dilemma in Teacher Education

### 3.7.1.1.1 The theory-practice dilemma

The theory–practice dilemma in teacher education has long been a topic of debate and concern. The theory and practice base lies in the relationship between philosophy and education as discussed earlier, that philosophy is theory and education is practice. Concerns raised are on how much theory and how much practice student teachers should receive during their course of training. It is also not clear what should come first between theory and practice (Tshuma, 2009). Cobb in Villegas-Reimers (2003) observes that it is a widely-accepted fact that teacher education courses cover all necessary theoretical knowledge; but, do not provide enough opportunities to put the theory into practice. Literature reveals that the length of the teacher education course varies with individual countries. India, for example, offers a 1 year teacher education course that does not adequately prepare teachers for classroom responsibilities (NCTE, 1998). In Latin America, it is reported that short teacher education programs put too much emphasis on theory and little or none on practice (OECD, 2005). In Japan, the practicum is 4 weeks, and in New Zealand, Belgium, France and Germany, the practicum is 1 year (Villegas-Reimers, 2003). Such disparities clearly indicate that the theory and practice in the initial preparation of teachers is a cause for concern.

Cochran-Smith and Lytle (1999:250) distinguish between “knowledge–for–practice” and “knowledge–of–practice” where knowledge for practice is the formal knowledge and theory that teachers are taught to use to inform their practice, whereas knowledge of practice is constructed in the context of use, intimately connected to the knower and also inevitably a process of theorizing.

Gwele (2004) observes that all good practice presupposes theory. The knowledge of theory influences practice and helps students to question and analyze, thus providing them with strategies of handling their classes. Theory, though it never exactly matches what one does in the classroom, is a catalyst to make one think about what is going on. In Gwele’s (2004) view, the relationship between theory and practice is equated to the

oscillation of a pendulum that swings forwards and backwards. The idea has to be taken and looked at in practice. In light of the practice, the theory is reviewed to establish if it still stands or has to be refined or re-defined.

Theory and practice should not be conceptualized as separate entities, that is, theory here and practice there, since there is always interweaving between the two. Some authors express – often implicitly – the belief that there should be no gap between theory and practice in an appropriate teacher training program (Gwele, 2004). Leinhardt and Smith (1985) describe a component of a teacher education program based on the principles of reflective practice and inquiry, where the theory and practice of teaching and learning to teach are inseparable. Theory, in this context, is presented as a kind of pseudo-scientific justification for practitioner action, the implication being that, by using it to generate hypothetical solutions to problems; it could be ‘applied in practice’. Gwele (2004) goes on to suggest that in the first and second year, teacher education programs should emphasize on practical work, with the theory going into practice. In the third and fourth year, practice should be going into theory, thus there will always be a pendulum that swings backwards and forwards.

According to Gwele (2004) teacher education courses should be 4 year programs where the first 2 years are mainly spent on teaching practice and the last 2 years emphasize more on theory. Student teachers should be given the opportunity to construct their own theories from their own practice, and to thoughtfully generate authentic episodes of practice from their own theories. They should also be able to help learners to integrate and transform their knowledge by theorizing practice and particularizing theory. In such a learning environment, theory can fulfill the desired function of laying an orientation base for reflection on practice. The dilemma on theory and practice in the initial preparation of teachers can therefore be demystified by understanding practice as the application of theory. In this way, it would not be necessary to quantify or qualify theory or practice as they are intertwined.

### 3.8 Challenges or Problems Facing Teacher Education

Teacher education and development in most nations presents one of the greatest challenges to both Governments and teacher education institutions (The African Virtual University). Studies by various researchers indicate that teacher education is faced with the problem or challenge of providing well prepared and effective teachers and teacher educators (Cochran-Smith, 2004, Batra, 2014 and Sahin, 2014). Hawes (1979) claims that this is aggravated by the fact that teacher education institutions and their curricula are not linked to the realities of schools. Within teacher education institutions, the actual curriculum and the actual practice are observed as being less relevant to the needs of the schools. Concurring with Hawes, Batra gives an example of philosophy and sociology that have since ceased to be valid engagements for the preparation of teachers as they are argued to have no direct bearing on the nature of teaching or nature of knowledge considered valid in a globalizing world. They are considered as of doubtful value to the teacher in the classroom. Classroom problems and realities are ignored by teacher education (Hawes, 1979). Similar sentiments were raised by Makombe and Madziyire (1999) citing Sarason, Davidson and Platt, (1986) that in North America, serious and unanswered questions have been asked on the relationship between the preparation of teachers in teacher education institutions and the demands on these teachers from the schools. Because there is a mismatch between the expectations of the society about teacher education and the teacher education curriculum content, there will always be an outcry that teacher education programs are inadequate.

In Greece, Tsafos (2010) notes that numerous factors prevent the creation of a reflexive environment in which appropriate and effective teacher pre- or in-service teacher education can take place. Citing Hopf and Xwhellis (2003), Tsafos (2010) identifies problems of lack of systematic, psycho-pedagogical training and a general gap between pedagogical theory and educational practice. To minimize such problems, suggestions are that pre-service teacher education programs should be organized in a way that connects theory to practice, utilizing partnerships between higher education institutions and secondary education schools. This is what is practiced in countries such as

Zimbabwe, Kenya, Tanzania and Malawi. Faculties of education in Universities are mandated to control standards (DTE Handbook, 2012), while at the same time student teachers are deployed to schools to do their teaching practice under the supervision of mentors with the aim of connecting theory to practice.

According to Hawes (1979), teacher education programs have a tendency to undervalue professional content essential for teaching and the failure to develop effective study skills necessary to a teacher in a dynamic and changing world. Instead, they concentrate on subject matter or academic content, which is unnecessarily too wide. This is however, contrary to Zimbabwe's teacher education programs that consist of core subjects such as Theory of Education which is sub-divided into Philosophy of Education, Sociology of Education, and Psychology of Education. There is also Professional Studies, National Strategic Studies, Health and Life Skills and Information and Communication Technology (ICT) and Teaching Practice. All students are expected to do all the core subjects together with their subjects of specialization. Such a curriculum, though wide, tries to develop among student teachers, knowledge and skills expected of a teacher. Fullan and Spiegelbauer (1991) in Makombe and Madziyire (1999), however, notes the absence of clear evidence that supports the effect of Theory of Education on the student teachers, since the impact of the course has not been studied in depth.

Chivore (1990) observed that in Zimbabwe, teacher education is faced with the problem of not having a Teacher Education Curriculum plan that serves as a guideline on what teacher education colleges are expected to do. Teachers' colleges enjoy autonomy in deciding on their curricula. Each college designs its own syllabi using guidelines provided by The Department of Teacher Education, University of Zimbabwe with which they are affiliated. Most of these colleges, Chivore asserts, fail to respond to the new demands from schools and the nation after independence. Minor changes were made to the syllabi that some colleges used before independence, that is, 1980. These syllabi have continued to be used in the era of change. This is a problem in the sense that what is taught and how it is taught is likely to be irrelevant, 35 years later.

Methods of teaching also continue to be a challenge as inappropriate methods of teaching that promote passive reception of knowledge and rote learning in student teachers continue to be predominantly used (ibid). Interactive methods, the use of modern educational media, the use of distance education modes of teaching and other appropriate approaches have not been tried out (Chivore, 1990). Research has shown that Zimbabwe has limited financial resources to adequately fund education programs; whereas Ahmed (2012) advances that the financial status of any country could be very influential in shaping the quality of the education system provided. Its education system is exam oriented, hence the tendency of adopting traditional methods of teaching in which the teacher is the source of information with the aim of covering the syllabus before examinations commence. The examinations that are written encourage learners to memorize facts then just regurgitate them later when asked in the examination.

Research studies also identify ICT as challenging in teacher education. Harmon and Chitiyo (2009) citing Naidoo and Schutte (1999) note that developing countries have problems in technology integration in teacher education as they mainly focus on acquiring basic utilities such as telecommunication infrastructure, hardware, software and networks. Technology integration activities are constrained by infrastructural facilities which are a result of lack of funds and expertise, and in some cases political instability. Nwake (2003) and Machacha (2004) in Harmon and Chitiyo (2009) assert that while Zimbabwe has grown steadily in ICT, it has yet to build the basic infrastructure needed to take advantage of the information age. They further explain that cost and financing ICT is the main constraint, and this is reflected in the slow speed of the internet, intermittent power supply, foreign currency, denominated licensing fees and huge telephone costs. Despite the challenges, ICT is indispensable in teacher education curriculum in the 21<sup>st</sup> century. The little that the institutions are doing, go a long way in equipping the student teachers with 21<sup>st</sup> century skills.

Research studies also indicate that teacher education rarely attracts motivated and high quality teacher trainees as extrinsic factors such as swift employment after graduation, long summer vacations, desperation, the possibility for having extra time for family and kids, job security, and that a teaching degree is easier to obtain compared to some

other fields, influence teacher education applicants (Sahin, 2014). More so, teacher education is feminized, that is, it is prioritized by women. All these stereotypical beliefs cause problems in teacher education, as teacher educators deal with less motivated people who are not intrinsically motivated to learn and practice what they have learnt.

Unless and until these problems facing teacher education are addressed, pre-service teacher education will continue to be blamed for teacher inefficiency in schools. Through continuous research on problems facing teacher education and development, solutions to the problems may probably be found.

### 3.9 Summary

This chapter reviewed philosophies that inform teacher education curriculum and teacher education curriculum models that are used in implementing teacher education programs. Perennialism, Essentialism, Progressivism and Reconstructionism provide a basis for what should be taught, how and why it should be taught. Competence Based Teacher Education, ZINTEC, the 2-5-2 and partnership models of teacher education curriculum have some aspects that the 3-3-3 model seems to have borrowed; thus they were explored. The content, teaching methods and the theory-practice dilemma were also reviewed. Philosophical, sociological and psychological foundations, subject matter, pedagogical knowledge and practicum constitute the content of teacher education curriculum, while lecturing, tutoring and group discussions, individual presentations, assignments and online teaching, are methods used in operationalizing the teacher education curriculum. In teacher education, theory is put into practice, but there is no consensus on how much theory and practice pre-service teachers should receive during their course of training; hence the discussion on the theory-practice dilemma. Challenges facing teacher education were also explored. As indicated earlier on, all these aspects are assumed to be either enablers / and or constrainers of teacher education curriculum models in general and the 3-3-3 Post 'O' Level Science in particular.

The following chapter discusses how the research was conducted, that is, methodology.

# CHAPTER FOUR

## RESEARCH METHODOLOGY

### 4.1 Introduction

A methodology in research refers to the strategy or plan of action that links methods to outcomes and governs the choice and use of methods (Creswell, 2003). Nyawaranda (2004) simply defines a methodology as how one conducts research. It is a planned sequence of the entire process in conducting research, focusing on the specific ways or methods that can be used to try and understand phenomena. Ultimately the research methodology seeks to address the broad strategy or philosophical base of the research process and design, working strategic plans for obtaining the required information (Babbie, 1992). It defines what the activities of the research were and how the study was conducted. As a broad strategy, the research methodology gives an overview of the overall research process. It is therefore considered as the most crucial stage in the research process since whatever results are obtained; by and large depend on the methodology. Meke (2011) argues that good research is research that uses a methodology which fits the situation and the goals being pursued. A qualitative research methodology was adopted in this study. Methodological aspects such as the research paradigm, the research approach, research design, population, sample and sampling techniques, and data collection instruments, issues of trustworthiness or credibility, data analysis and ethical considerations are discussed in this chapter.

### 4.2 Research Paradigm

Tshuma (2009), citing Gibbons and Sanderson (2002:5) posits that the starting point for any researcher should be for him / her to take time to reflect on the world that he / she knows and ask, 'Of all the things that I believe, why do I see them as such and what is the philosophical framework that makes it so?'. Paradigms are considered to be

philosophical frameworks that guide researchers. According to Creswell (2007) and Maree (2007), paradigms are sets of assumptions, values or beliefs about fundamental aspects of reality which give rise to a particular world view, and serve as the lens or organizing principles through which researchers perceive and interpret reality, hence representing what we think about the world. Johnson and Christensen (2012:31) say, '*A research paradigm is a perspective about research held by a community of researchers that is based on a set of shared assumptions, concepts, values and practices.*' Our actions in the world, including the actions we take as researchers cannot occur without reference to those paradigms.

Guba (1990) emphasizes that research paradigms are all encompassing systems of interrelated practice and thinking that define for investigators, the nature of their inquiry along the three dimensions of ontology, epistemology and methodology. Ontology specifies the nature or essence or reality being investigated, hence pure reality cannot be known as it can only be interpreted through our senses and experiences resulting in differing perspectives of reality. According to Cohen and Manion (1994), this leads to questions of whether social reality is external to the individual, that is, imposing itself on his or her consciousness from without, or whether it is the product of the individual's consciousness. Such questions arise, is reality of an objective nature, or the result of individual cognition? Is it given 'out there' in the world, or is it created by one's mind? As a result, everyone has his or her own interpretation of reality that emerges from one's epistemology.

Epistemological assumptions concern the very bases of knowledge, its nature and its forms, how it can be acquired and how it is communicated to other human beings (ibid). Epistemology as viewed by Guba (1990) specifies the nature of the relationship between the knower (inquirer) and the known (or knowable) thus showing the inquirer's philosophical orientation. Cohen and Manion (1994) explore whether it is possible to identify and communicate the nature of knowledge as being hard, real and capable of being transmitted in tangible form or whether 'knowledge' is of a softer, more subjective, and spiritual or even transcendental kind, based on experience and insight of a unique

and essentially personal nature. The epistemological assumption in these instances determine extreme positions on whether knowledge is something that has to be acquired on one hand, or is something that has to be personally experienced on the other (ibid). Our epistemological orientation enables us either to see knowledge as absolute and separate from the inquirer or researcher, and linked to a knowable external reality, or to see it as part of the researcher and relative to the individual's experiences that are associated with his or her environment (Tshuma, 2009). It is how researchers align themselves in this particular debate that affects how they go about uncovering knowledge of social behavior in their research studies (ibid). This has given rise to three major research paradigms namely positivism, interpretivism and post-positivism.

The methodology, that is, how the inquirer or researcher goes about finding out about knowledge and the nature of reality, largely depends on how the researcher views the two, that is, ontology and epistemology. Researchers that view reality as socially constructed and knowledge as individual and group experiences are likely to adopt an interpretive paradigm that informs qualitative approaches as discussed below.

#### 4.2.1.1 The interpretive paradigm

Interpretivism emphasizes that social reality is viewed and interpreted by the individual according to the ideological positions the individual possesses (Tshuma, 2009). Therefore, knowledge is personally experienced rather than acquired from or imposed from outside (Dash, 2005). The interpretivists believe that reality is multi-layered and complex (Cohen, Manion and Morrison, 2000), and a single phenomenon has multiple interpretations. They emphasize that the verification of a phenomenon is adopted when the level of understanding of a phenomenon is such that the concern is to probe into the various unexplored dimensions of the phenomenon rather than establishing specific relationship among the components, as it happens in the case of positivism. Gephart (1999) argues that interpretivists assume that knowledge and meaning are acts of interpretation. The premise of interpretive researchers is that access to reality (whether given or socially constructed) is only through social constructions such as language,

consciousness and shared meanings (ibid). Dash, (2005) adds that interpretive researchers have often preferred meaning (versus measurement) oriented methods. They assume that knowledge and meaning are acts of interpretation; hence, there is no objective knowledge which is independent of thinking or human reasoning. Further, Krauss (2005) adds that interpretivism asserts that reality, as well as our knowledge thereof, are social products and are, hence, incapable of being understood independently of the social actors (including the researchers) that construct and make sense of that reality.

While positivism stands for objectivity, measurability, predictability, controllability and constructs laws and rules of human behavior, interpretivism essentially emphasizes understanding and interpretation of phenomena and making meaning out of this process (Meke, 2011). According to Dash (2005), interpretivism, which stresses the subjectivist approach to studying social phenomena, attaches importance to a range of research techniques focusing on qualitative analysis. These include personal interviews, participant observations, accounts of individuals and personal constructs and analysis of documents. In the same vein, Gephart (1999) observes that in the interpretivist approach, data collection and representation have been accomplished with informant interviewing, ethnography, or the thick description of cultures based on intimate knowledge and participation. Sometimes the approach uses ethnographically-linked textual analyses which use transcripts or verbal protocols of meetings as data. According to Gephart (1999), such verbal or conversational data are collected to represent interactions in important, naturally occurring social settings.

In the interpretive approach, the researcher does not stand above or outside, but is a participant observer who engages in the activities and discerns the meanings of actions as they are expressed within specific social contexts. Interpretive researchers do not predefine dependent and independent meanings that lie behind social action, but focus on the full complexity of human sense making as the situation emerges (ibid). Phenomena are understood through the meanings that people assign to them. Analysis is put into context.

In terms of assessment, interpretive research differs from positivist theory assessment. Positivists seek rigor using statistical criteria and conceptions of reliability and validity to evaluate the quality of quantitative findings (Gephart, 1999). Sample size, common methods bias and sampling error are common concerns. In contrast, meaning focused research in the interpretive tradition is assessed in terms of trustworthiness criteria including credibility, transferability, dependability and confirmability and authenticity criteria including fairness and ontological, catalytic and tactical authenticity (ibid).

Interpretivism has its greatest strength in the richness and depth of explorations and descriptions it yields through its qualitative approach to research. It is therefore suitable in this study since the researcher is actively involved in the preparation of teachers, a practice that has continued to raise questions on how teachers ought to be initially prepared. There are relatively few studies on the inadequacies of pre-service teacher preparation programs; hence the need to delve in such issues, perhaps some meaningful information might be established and added to the little that is available.

However, interpretivism is criticized for its subjectivity and the failure of the approach to generalize its findings beyond the situation studied (Maree, 2007). Although criticized, the interpretive paradigm is utilized in this qualitative case study so as to understand in depth what enables and / or constrains pre-service teacher education curriculum programs.

### **4.3 Research Approach**

Positivist, interpretive and post-positivist paradigms inform quantitative, qualitative and mixed methods approaches respectively. Approaches can simply be understood as ways of thinking about and doing research. The type of approach used depends on answers sought by the researcher to the three following questions as suggested by Creswell, (2003:5):

*What knowledge claims are being made by the researcher (including theoretical perspectives)?*

*What strategies of inquiry will inform the procedures?*

### *What methods of data collection and analysis will be used?*

The knowledge claims are based on different paradigms while strategies of inquiry or methodologies provide specific direction for procedures in a research study. The strategies can be experiments, quasi-experiments or surveys in the case of quantitative studies; or they can be ethnographies, case studies or phenomenological research if it is a qualitative study (ibid). A mixed method approach includes strategies from both qualitative and quantitative approaches. The methods of data collection imply the instruments used in the data collection process and may include interviews, questionnaires, observations, focus group interviews, document analysis among others, depending on whether the study is qualitative, quantitative or a mixed method study. Below is a discussion of qualitative research approach as it is the one that guided this study.

#### 4.3.1.1 Qualitative approach

Qualitative research is based on a relativist, constructivist ontology which argues that there is no objective reality; rather, there are multiple realities constructed by human beings who experience a phenomenon of interest (Krauss, 2005). It is broadly defined as any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification (Strauss and Corbin, 1990) but instead, the kind of research that produces findings arrived at from real-world settings where the phenomenon of interest unfolds naturally (Patton, 2001). It is naturalistic in nature, attempting to study phenomena in their natural settings. It attempts to make sense of, or to interpret, phenomena in terms of the meaning people bring to them (Denzin and Lincoln, 2005). Qualitative research aims at exploring and discovering issues about a problem of which very little is known about the problem. In this study, not much is known about the enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science, hence qualitative approaches are applicable.

According to Hoepfl (1997), qualitative researchers seek illumination, understanding and extrapolation to similar situations, unlike quantitative researchers who seek causal determination, prediction and generalization of findings. Berg (2009) observes that qualitative research is designed to help researchers understand phenomena in depth as rich data are collected, classified, ordered, synthesized, evaluated and interpreted from the respondent's point of view. People impose order on the world as they perceive it in an effort to construct meaning. Meaning lies in cognition not in elements external to us. Information impinging on our cognitive systems is screened, translated, altered and perhaps rejected by the knowledge that already exists in that system. The resulting knowledge is purposefully constructed (Meke, 2011).

In qualitative research, different knowledge claims, enquiry strategies, and data collection methods and analysis are employed (Creswell, 2003). Qualitative data sources include observation, interviews, documents and texts and the researcher's impressions and reactions (Berg, 2009). Data is derived from direct observation of behaviors, interviews, written opinions, or from public documents (ibid). The researcher is considered the primary instrument of data collection and analysis. She or he engages the situation, makes sense of the multiple interpretations, as multiple realities exist in any given context as both the researcher and the participants construct their own realities. The researcher strives to collect data in a non-interfering manner, thus attempting to study real-world situations as they unfold naturally without predetermined constraints or conditions that control the study or its outcomes (ibid). According to Merriam (2001), the researcher engages often without an observation schedule, and plays a dynamic role in constructing an understanding of the research environment through self interpretation of what happens, thus qualitative research produces a result which is an interpretation by the researcher of others' views filtered through his or her own.

Qualitative research is primarily subjective in approach as it seeks to understand human behavior and the reasons that govern such behavior. Researchers have the tendency to

become subjectively immersed in the subject matter. Meke (2011) quoting Ryan (2006:21) characterizes qualitative research as follows:

*It seeks to provide an in-depth picture; it generally deals with smaller numbers than quantitative research. It tries to interpret historically or culturally significant phenomena; it can be used to flesh out quantitative data; it tries to isolate and define categories during the process of research; it is appropriate when the questions posed by the researcher are difficult for a respondent to answer precisely; it tries to illuminate aspects of people's everyday lives; it values participants' perspectives on their worlds and it often relies on people's words as its primary data.*

According to Creswell (2003), qualitative research uses strategies of inquiry such as narratives, phenomenologies, ethnographies, grounded theory studies or case studies. In this type of research, the researcher collects open-ended emerging data with the primary intent of developing themes from the data. However, findings from a qualitative research are often not generalizable because of the small numbers and narrow range of participants used in the data collection process.

#### 4.4 Research Design

According to Mouton (2001), a research design is a plan or blueprint of how you intend conducting the research. The design looks at the type of study you want to engage in and the research instruments you intend to employ. Maree (2007) conceives a research design as a plan or strategy which moves from the underlying philosophical assumptions to specifying the selection of participants, the data gathering techniques to be used and the data analysis to be done. Similarly, Trochim (2006) views a research design as the structure of research, that is, the “glue” that holds all of the elements in a research project together. Research designs are constructed plans and strategies that are developed to seek and discover answers to research questions (Tshuma, 2009 citing Taylor). A research design can therefore be seen as a systematic arrangement of procedures and methods of research in which the entire process of sampling, data collection and analysis and interpretation of the results is encompassed to avoid ahaphazard approach. In a way, the research design makes the research problem researchable by setting up the structure in a way that will produce specific answers to

specific questions. Berg (2009), citing Leedy and Ormrod observes that a poorly designed study will fail to provide accurate answers to the questions under investigation, leave too many loopholes in the conclusions, permit little generalization and produce irrelevant information, thereby wasting materials and resources. Therefore, the research design must be carefully planned and structured such that the entire parts and phases of the study are held together. This study adopted a qualitative case study design.

#### 4.4.1.1 Case study design

The qualitative case study design is based on a naturalistic approach where the researcher develops a complex, holistic picture, analyses words, and reports detailed views of informants and conducts the study in its natural setting (Creswell, 2007 and Denzin and Lincoln, 1998). Patton (2001) argues that case studies seek to understand in depth phenomena in specific settings such as 'real world' setting where the researcher does not attempt to manipulate the phenomenon of interest. A case study is conceived by Creswell (2007) as a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence. It is a situated activity that locates the researcher in the world of study. It consists of a set of interpretive, material practices that make the world visible (Patton, 2001). These practices transform the world. Case studies may be single or multiple, focusing on specific entities such as organizations, groups, communities and events. Single cases often form the basis for research on typical or critical cases; whereas multiple cases can be limited to two or more cases that are researched, in order to facilitate an understanding of a phenomenon or a comparison of phenomena (Yin, 2009). Basically, case study is viewed as a triangulated research strategy, as multiple sources of evidence are used to validate the findings (Patton, 2001). Case studies have a considerable ability to help generate answers to the "why?" as well as "what?" and "how?" questions (Yin, 2009). They allow for an intensive investigation and a deeper understanding that leads to rich interpretations (ibid). Given that this study aims at establishing what enables and / or constrains the 3-

3-3 secondary teacher education model for Post 'O' Level Science, the selection of case study seemed appropriate.

The case study design assumes that each case is special and unique. This is asserted by Eisner (1991) when he says that a case study pays attention to the idiosyncratic as well as the pervasive; seeking the uniqueness of each case. From the prolonged engagement that may take weeks, months or years, the researcher gets to know a particular social setting and views things from the point of view of those in it. Most case studies are based on two or more methods of data collection. Because of the flexibility of case studies in allowing the use of various data collection methods such as interviews, observation and text or document analysis, rich data are collected.

Drew, Hardman and Hosp (2008) observe that reports from case study researchers get rich descriptions, colourful details and unusual characters, instead of a formal neutral tone with statistical descriptions. The single case study design was chosen for this study. Because the researcher was interested in understanding and explaining enabling and / or constraining factors in Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science, selecting a particular setting where the model is being used was most appropriate. Zimbabwe has only three secondary teacher education colleges that are geographically located in distanced cities. The researcher, for convenient purposes, studied one case as she could not afford travelling expenses of 443 and 579 kilometer distances. Studying that one case also allowed for rich data to be collected due to the researcher's prolonged engagement and immersion in the selected setting. It also allowed the researcher to collect in-depth data through interviews and focus groups for an in-depth understanding of the enablers and / or constrainers. These were repeatedly and successfully done, since the researcher interacted with the participants on a daily basis. Sessions could be adjourned and continued on another day convenient to the participant. There was also easy access to syllabuses used, academic and teaching practice examining reports, admission records, pass lists and policy documents among other relevant documents.

Interviews were conducted with one official from the Department of Teacher Education at the University of Zimbabwe, to which teacher education colleges are affiliated, the Principal and Vice Principal of the college, heads of departments and heads of subjects, who are directly involved in the implementation of the 3-3-3 secondary teacher education model for Post 'O' Level Science and mentors in secondary schools. Their involvement in the implementation of teacher education programs made them key informants in the study. Focus group interviews were conducted with all the 55 final year student teachers undertaking the 3-3-3 Post 'O' Level Science program. These were also considered as key informants as they were the recipients of the program and had experienced both in-course programs at college and teaching practice in secondary schools. Through these interviews, the researcher was able to obtain information on the participants' views, feelings, attitudes, voices, opinions, perceptions and experiences about enabling and / or constraining factors in Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science.

Due to the geographical spread of host schools in which student teachers are deployed and the travelling costs involved, convenience sampling of schools was used to identify the closest host schools from which mentors were sampled. The researcher visited each of the conveniently sampled host secondary schools to carry out in-depth interviews with Heads of Science department and mentors. The researcher visited the Heads of Science department and mentors at their institutions so that she could also analyze the context in which they are operating in addition to their responses. This is in line with Yin's (2009) view that the case study allows investigators to retain the holistic and meaningful characteristics of real life events since case studies allow for rigorous investigation of a specific phenomenon in its natural setting.

Document analysis was also engaged to validate the findings obtained from the in-depth interviews. Vision and mission statements of the Ministry of Higher and Tertiary Education Science and Technology Development, the Department of Teacher Education at the University of Zimbabwe and the college under study, the Department of Teacher Education handbook, the 3-3-3 Post 'O' Level Science syllabuses, academic

and teaching practice reports, policy documents, admission records, mark profiles, pass lists and any other relevant documents were analyzed to solicit data that have some relevance to enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science. Document data complemented interview data.

The case study involved recording what people said and analyzing the aforesaid documents. The interview data were collected through tape recording and note taking then transcribed together with text data for further analysis and interpretation, based on the values and meanings that participants perceive in their world. Reporting the results involved describing what was discussed with the participants. The population, sample, sampling techniques and the instruments used to collect data are discussed in depth below.

## 4.5 Population, Sample and Sampling

### 4.5.1.1 Population

Yin (2009) understands a target population as the entire group of individuals or objects which researchers are interested in, in generating their conclusions. A population can refer to a group of people that share one or more characteristics from which data can be gathered and analyzed. It is therefore the total quantity of things or cases that are studied. Meke (2011) asserts that in defining a population for a study, the population must be specific enough to be clearly understood by the readers. In Zimbabwe, there are only three secondary teacher education colleges, therefore all the three principals, vice principals, all lecturers in the three colleges, all Department of Teacher Education officials at the University of Zimbabwe, all student teachers in the 3-3-3 secondary teacher education model for Post 'O' Level Science and secondary school Heads of Science department and mentors comprise the population.

#### 4.5.1.2 Sample and sampling procedures

The college under study is one of the secondary teacher education colleges that offer teacher education through the 3-3-3 secondary teacher education model. The college has been preferred because that is where the researcher is employed, therefore being convenient for her in terms of money and time to conduct the study. Convenience sampling in this case was used to select the area of study.

The target population was too large to be studied, hence there was need to establish key informants for the study. A sample was therefore selected. A sample is simply defined as a subset of the population. The choice of participants for any study is crucial as poor choices could lead to false or misleading outcomes. Hoepfl (1997) notes that information regarding the inclusion and exclusion criteria for participants needs to be explicit and justifiable for qualitative researchers. Purposive sampling was used in selecting participants. Patton (2001) asserts that purposive sampling involves selecting subjects because of some characteristic they possess. Purposive sampling targets information rich cases that can be studied in depth. The researcher exercises his or her judgment about who will provide the best perspective on the phenomenon of interest, and then intentionally invites those perspectives into the study (Johnson and Christensen, 2012). Purposive sampling uses a small sub-population of accessible cases. In all cases, efforts should be made to establish situations that promote the greatest opportunity to gather the most relevant data about the phenomenon under investigation. Information rich cases are those participants one could learn a great deal about issues of central importance to the purpose of the study (Tshuma, 2009).

The Department of Teacher Education at the University of Zimbabwe is mandated to monitor and evaluate teacher education programs for the purposes of standards control. Each college has a coordinator from DTE who is tasked with the responsibility of ensuring that teacher education programs are implemented as prescribed in the DTE handbook. The coordinator therefore becomes the first key informant as he or she has all the background knowledge concerning teacher education programs, the 3-3-3

secondary teacher education model in particular. The principal and the vice principal of the studied college were also selected to participate in the study. As administrators in the institution, they have a responsibility of ensuring that the institution's goals of producing competent teachers are achieved. Two Heads of Departments at the college, one for the Science subjects and the other for Educational foundations were included in the sample. HODs supervise the teaching of various subjects, thus were purposely selected. Eight Heads of Subjects (HOS) were selected to participate as they were directly involved in the 3-3-3 secondary teacher education model for Post 'O' Level Science. All the 55 final year student teachers in the 3-3-3 model participated in focus group interviews. There were 5 groups of 10 and 11 third and final year student teachers. The researcher found it necessary to hear their views about the model as they are the recipients of the 3-3-3 Post 'O' Level Science program. Lastly, there was a selection of three Heads of Science Department in secondary schools and three mentors from easily accessible secondary schools. These were regarded as key informants as they participated in the implementation of the 3-3-3 model through mentoring student teachers during their one year of teaching practice in schools.

Convenience and purposive sampling were adopted in this study as they were seen to be appropriate. The coordinator, the principal and the vice principal, 2 HODs, 8 HOSs, 3 SHODs, 55 student teachers and 3 school mentors comprised the sample.

#### 4.6 Data Collection Instruments

In qualitative research, interviews, observations, focus groups and document analysis are the most common methods of data collection. These strategies emphasize the need and importance of looking at cases in the natural setting in which they were found. In choosing the appropriate instruments, the researcher was guided by the nature of the research problem and the type of questions to be addressed. In addition, the research paradigm, approach and the research design also guided the researcher in adopting the instruments that were considered suitable to collect data that would address the key issues of the study. In this study, interviews, focus group discussions and document

analysis were used to collect data from the selected participants and documents. Multiple sources of information were sought, since no single source of information could be trusted to provide a comprehensive perspective. Different data sources were used to validate and cross check the findings.

#### 4.6.1.1 Interviews

The interviews involved the collection of data through direct contact between the researcher and the participants. Maree (2007) conceives an interview as a two-way conversation in which the interviewer asks the participant questions to collect data and to learn about the ideas, beliefs, views, opinions and behaviors of the participants. Interviews basically aim at collecting rich descriptive data that helps the researcher to understand the participant's construction of knowledge and social reality. Denzin and Lincoln (1998) observe that meaning in an interview is not merely elicited by apt questioning nor simply transported through participant replies; instead, it is actively and communicatively assembled in the interview encounter with prolonged engagements. Maree (2007) categorizes interviews into three groups, namely, open-ended interview, semi-structured interview and structured interview. In open-ended interviews, the focus is on the participant's perceptions of an event or phenomenon being studied. To minimize bias in the data collected, it is advisable to conduct the interviews with more than just one informant. In semi-structured interviews, the participant is required to answer a set of pre-determined questions that define the line of inquiry. Probing and clarification of answers are allowed. In this type of interview the researcher needs to be very attentive to the responses given by the interviewee so as to identify new emerging themes that are directly related to the phenomenon being studied. In structured interviews, the questions are detailed and developed in advance (Maree, 2007). There is not much probing in structured interviews since the questions are overly structured. Large samples use this type of interview to ensure consistency.

This study used open-ended interviews to solicit rich descriptive data from informants. Rich informants provided a deeper understanding of enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science. The interviews were conducted with the key informants involved in the implementation of the model. These were one of the DTE officials (coordinator), the principal, the vice principal, HODs, HOSs, SHODs, final year student teachers in the 3-3-3 secondary teacher education model for Post 'O' Level Science, and mentors in secondary schools. Open-ended interviews were preferred to other forms of interviews in this study because they offer a platform for conversation where respondents freely express themselves (Borg and Gall, 1996). The researcher's intention was to explore with the participant his or her views, ideas, beliefs and attitudes concerning the enablers and / or constrainers of the model. In so doing, the researcher saw the world, that is, the enablers and / or the constrainers through the eyes of the participants (Maree, 2007).

Open-ended interviews' flexibility, adaptability and human interaction permitted the researcher the freedom to probe the interviewees, follow-up leads, elaborate on the original responses, obtain additional and more detailed data and clarify answers (Borg and Gall 1996 and Creswell, 2007). A systematic collection of data was maintained.

While face to face methods of collecting data could be the primary and most effective strategy for collecting empirical data, it is time consuming and is prone to subjectivity and bias. Participants may want to please the interviewer by seeking out answers that support his or her pre-conceived notions. These weaknesses may be minimized by staying focused and allowing freedom of expression. Interviews also lack the anonymity that is provided by the questionnaire. This limitation may leave the participant feeling threatened especially if the topic or some of the questions are sensitive. Emphasis should be put on confidentiality to reduce the effects of this weakness. Despite the weaknesses, the interview remains the most reliable and effective method of collecting empirical data.

#### 4.6.1.2 Focus group discussions (FGDs)

A focus group is conceived as a small gathering of individuals who have a common interest or characteristic, assembled by a moderator who uses the group and its interactions as a way to gain in-depth information about a particular topic (Kark and Williams, 2002 in Tshuma, 2009 ). Krueger and Casey (2009) view a focus group as a carefully focused discussion that is designed to obtain perceptions, attitudes, feelings and experiences in a defined area of interest in a permissive non-threatening atmosphere of disclosure from a predetermined and limited number of people. It is a 'focus' group because the moderator keeps the individuals in the group focused on the topic being discussed. What is important here is the involvement of people where their disclosures are encouraged in a nurturing environment (Tshuma, 2009). Attitudes and perceptions are developed through interaction with other people. Focus group discussions are very useful in those topics that are better discussed by a small group of people who know each other.

The focus group interview strategy is based on the assumption that group interaction will be productive in widening the range of responses, activating forgotten details of experience and releasing inhibitions that may otherwise discourage participants from disclosing information (Maree, 2007). Krueger and Casey (2009) in Meke (2011:89) observe that focus group interviewing is about:

*Paying attention to what people have to say and being non-judgmental, it is about creating a comfortable environment for people to share. It is about being careful and systematic with the things people tell you and people go away feeling good about having been heard.*

This implies that focus group discussions must be carefully planned and designed such that they obtain as much information as possible in a relaxed atmosphere.

The focus group strategy in this study produced detailed rich data. This was necessitated by group dynamics that enabled the participants to build on each other's ideas, experiences and comments to produce data that are rich in detail and not attainable from individual interviews(Maree, 2007). Unexpected comments and new

perspectives could be explored easily within the focus group and added value to the study. The focus group discussions enabled participants in this study to interact more with each other rather than with the interviewer. This allowed the participants' views to easily emerge and be captured as rich data.

The researcher utilized Maree's (2007) advice that focus group interviews should begin with a broad and less structured set of questions to ease participants into a process where they actively debate issues. This encouraged full participation and interaction among members. The moderator continued to probe the group members as they discussed in order to clarify issues.

Final year students in the 3-3-3 Post 'O' Level Science program at the studied college are only 55. The researcher thought it wise to involve all of them in the study, since they were deployed to different schools while they were on teaching practice. The varied school environments were hoped to generate rich data. Anderson (1993) asserts that focus groups generally range from 6 to 12 participants. He observes that any group that is more than 12 tends to break apart into various factions while groups less than 6 generally are not enough to provide the synergy required. Anderson (1993) also advised that a study would need more than one focus group with the first two groups giving considerable new information, and there after the new insights rapidly diminish. Five groups of 10 and 11 were used in this study. Grouping was carefully done such that groups comprised of members who did teaching practice in different schools. Each group then selected its moderator who facilitated the discussions. A good rapport between the moderator and the group members encouraged active participation and free expression of feelings, ideas, views, experiences, perceptions and attitudes about enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science.

#### 4.6.1.3 Document analysis

In document analysis as a data gathering instrument, the researcher focuses on all types of written communication that may shed light on the phenomenon that the researcher is investigating (Maree, 2007). This includes published and unpublished documents, memoranda, agendas, administrative documents, letters, reports, newspaper articles, minutes of meetings or any other document that is connected to the investigation (ibid). However, the researcher has to be cautious of the authenticity and accuracy of records before using them.

Borg and Gall (1996) indicate that document analysis is unobtrusive and non-reactive and can yield a lot of data about the values and beliefs of participants in their natural settings. The sources of documentary analysis can be primary or secondary. Primary sources of data refer to unpublished sources from which the researcher gathers information directly from the participants who actually witnessed events which they describe. Examples of such sources are minutes of meetings, reports and correspondence. Secondary sources are materials that are based on previously published works such as text books and research reports (ibid).

In this study, the analysis of published and unpublished documents such as the Department of Teacher Education (DTE) handbook, vision, mission statements and core values of The Ministry of Higher and Tertiary Education Science and Technology Development (MHTESTD), DTE and the studied college, syllabuses, teaching practice reports, policy documents, external examining reports, academic board minutes, mark profiles, admission records and pass lists among other relevant documents, complemented individual and group interviews in the data collection process. Analyzing documents, in addition to interviews, helped in filling up gaps that were not captured by the interviews and the focus groups. Document analysis also assisted in the verification of interview and focus group data.

Document analysis has however been criticized due to its social context and identity.

Creswell (2003) notes that, authors of documents decide to record or leave out information informed by social, political and economic environments, of which they are part. In this case, incomplete data would be gathered. The researcher might also render a selective and biased understanding of a document and may even deliberately choose and select particular documents. Because of these criticisms, researchers should be alert when using document analysis in order to avoid being unreflective and uncritical.

#### 4.7 Trustworthiness

Bell (2010) advises that whatever procedure for collecting data is selected, it should always be critically examined to assess the extent that it is likely to be reliable and valid. Reliability refers to the extent to which the selected procedures can produce a similar picture when applied at a different time (Pereira, 2012) and validity refers to the extent to which a measuring instrument measures what it is supposed to measure and is used to determine whether the findings are accurate from the standpoint of the researcher, the participants or the readers of an account (Creswell, 2007 and Maree, 2007). In qualitative studies, reliability and validity are conceptualized as trustworthiness, rigour and quality (Pereira, 2012 citing Muhammad and Muhammad, 2008). It is also sometimes referred to as credibility. Trustworthiness in this study was ensured through triangulation, low-inference descriptors, member checking and reflexivity.

Triangulation is a method of controlling bias through the adoption of multiple data sources, multiple data collection methods and multiple theories (Johnson and Christensen, 2012). Two types of triangulation were used in this study. These were methodological triangulation and multiple data sources triangulation. Interviews, focus group discussions and document analysis (methodological triangulation) were employed to try and establish enabling and / or constraining factors in Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science. The DTE official, the Principal, the Vice Principal, HODs, HOSs, SHODs, final year student teachers in the 3-3-3 secondary teacher education program and mentors, were the sources of data in the study.

It was important for the researcher to capture data that would enable her to answer her research questions. Tape recording and note taking during interviews ensured that responses given were captured accurately to avoid misrepresenting the participants.

The use of multiple sources and methods of data collection enhanced credibility of the study as conclusions suggested by different data sources and methods are far stronger than those suggested by one, alone. Maree (2007) argues that seeing things from two different perspectives provides researchers with different kinds of knowledge about it, helps answer different questions, provides the opportunity to corroborate findings, enhances the credibility of the data and helps build some confidence that the meaning of the data has some consistency across methods and sources.

Low-inference descriptors, that is, the use of description phrased very similar to the participants' accounts and field notes (Johnson and Christensen, 2012) were adopted. These help the researcher to hear how the participants think and feel about issues and experiences. Verbatim provide the actual words said by the participants and this ensured that correct information has been recorded.

Member checking in this study occurred in the form of participant review (McMillan and Schumacher, 2006 in Meke, 2011) and peer review (Johnson and Christensen, 2012). Participant review was used to ensure that data collected were a true reflection of what was said during the interviews in order to avoid coming up with conclusions that were based on incorrect information. Notes taken down during the interview were read and revised with the participants so that they verified and clarified issues if there was need to. Interpretations were also discussed with colleagues who were not involved in the study (peer review) in order to find out if what was presented was meaningful. All these strategies were employed in an effort to maximize the credibility of the study.

## 4.8 Data Analysis

Johnson and Christensen (2012) observe that in qualitative research, data collection and analysis usually proceed simultaneously. Bogdan and Biklen (2002) view data analysis as the systematic process of searching and arranging data from interviews, questionnaires and other instruments to enable one to increase one's understanding of the phenomena under study and present to others what one has discovered in a clear and logical way. Data analysis involves organizing and transforming data into manageable units, synthesizing items, searching for patterns and deducing what is valuable and what is to be learnt (Bogdan and Biklen, 2002 and Creswell, 2007). Data analysis can therefore be understood as the process of bringing order, structure and interpretation to the collected data which results in the generation of patterns, themes, constructs and inferences.

In this study, individual and group interview data were organized on the basis of themes, categories, general ideas, concepts or similar features that related to the main research questions. In analyzing the data, the researcher sought to summarize what had been seen and heard in terms of common words, phrases, themes or patterns that would aid the understanding and interpretation of that which was emerging (Maree, 2007).

Because the researcher adopted critical realism as a framework, there was need to analyze the data in relation to the interplay between structural, cultural and agential factors. Analytical dualism was employed to understand and explore the underlying causal mechanisms that have enabled and / or constrained the 3-3-3 secondary teacher education model since its inception in 2007. Data collected were classified under Archer's concepts of structure, culture and agency and effort was made to try and explain how each of the factors identified under the three concepts enabled and / or constrained the model. Meke (2011), citing Kothari (2004) defines classification as simply the process of arranging or placing in groups or classes on the basis of common

characteristics. Structural, cultural and agential information gathered from individual and group interviews was grouped separately.

In analyzing documents, content analysis was employed. Berg (2009) defines content analysis as a careful, detailed, systematic examination and interpretation of a particular body of material in an effort to identify patterns, themes, biases and meanings. Content analysis is simple a coding operation and data interpreting process. Similar content from the DTE handbook, vision, mission statements and core values of the MHTESTD, DTE and the college under study, syllabuses, academic board minutes, external examining reports, teaching practice reports and policy documents among other documents were clustered into themes. Coherent themes were grouped together into one category.

Since document analysis was aimed at complementing interview and focus group discussion data, the researcher was mindful of checking on consistency among the data gathered using the three methods. She sought to find out if there was converging evidence to support an explanation of enabling and / or constraining factors from the gathered data. However, there was analytic challenge in reducing data, identifying categories and connections, developing themes and offering well-reasoned, reflective conclusions as observed by Johnson and Christensen (2012).

#### 4.9 Ethical Considerations

All human behavior is subject to ethical principles, rules and conventions which distinguish socially acceptable behavior from that which is socially unacceptable, thus research is no exception. Researchers therefore are advised to give a great deal of attention to measures of ethical consideration. In this study, the researcher abided by ethical considerations as contained in the Faculty of Education Handbook of Post Graduate Qualification Policies and Procedures so as to ensure that individual rights were not infringed upon and to promote fairness in the interpretation of data. Principles such as obtaining informed consent, respecting the right to privacy and participation,

anonymity, confidentiality and other principles as highlighted by Cohen *etal* (2000), were adhered to during the data collecting, data analysis and interpretation.

Diener and Crandall, in Cohen *etal* (2000) view informed consent as the procedure in which individuals choose whether to participate in an investigation after being informed of the purpose of research. Cohen *etal* (2000), advise that there is need to obtain the consent and cooperation of subjects who are to assist in investigations, and of significant others in the institutions or organizations providing the research facilities. Creswell (2003) also advises that researchers need to respect research sites so that the sites are left undisturbed after the study. In this study, the researcher sought permission from the responsible authorities, that is, the Ministry of Higher and Tertiary Education Science and Technology Development and the Ministry of Primary and Secondary to access the research sites. The Principal of the studied college and the Provincial Education Director for Bulawayo Metropolitan Province allowed the researcher to identify the participants and carry out her study as there was no sensitive information that needed to be guarded jealously. After securing permission, the researcher then made appointments with the sampled participants for the interviews.

The researcher furnished the participants with full information on the aims and objectives of the study, the duration of involvement, methods and procedures that would be followed. All the participants of the individual and focus group interviews were provided with informed consent forms that clearly stated the purpose of the study, that their participation was voluntary, that they could discontinue their participation at will and that their responses would be held in the strictest confidence they deserve. The researcher respected the participants' right to know that their involvement was voluntary all the time and that they had the right to refuse to take part or to withdraw once the research had begun, hence informed consent implied informed refusal (Creswell, 2003 and Cohen *etal*, 2000).The participants were well informed before they were involved.

#### 4.9.1.1 Right to confidentiality and anonymity

In research, the right to confidentiality and the right to anonymity put the participants at ease to give information which might otherwise be regarded as sensitive (Meke, 2011). It is therefore, crucial that participants be assured of the researcher's adherence to issues of confidentiality and anonymity. Cohen *et al* (2000) conceptualize confidentiality as the ability to protect the privacy of participants by keeping the data sources as confidential and private as possible, while anonymity refers to disguising the identity of the participants. Instead of using real names of the participants, fictitious or pseudo names are used. In this study, the researcher ensured that the individual remained anonymous and that anyone reading the research would not be able to deduce the identity of individuals since fictitious names were used. Information may be quoted and used, but the identity of the individual remained protected.

#### 4.9.1.2 Dual role of the researcher

The researcher was always conscious of her dual role as a researcher and employee and this gave the researcher the opportunity to exercise reflexivity and look at her own perspective with a critical eye. Reflexivity involves critically examining one's own perspective and interpretations of phenomena (Denzin and Lincoln, 2005). The critical interpretation of findings enabled the researcher to remain as objective as possible, and avoid the bias and subjectivity that is caused by an employee in the system under review. As an employee at the institution under study, the researcher made known her interest before the start of the research and kept an awareness of her values, beliefs and attitudes in order to minimize bias. As such, the research findings were objectively understood.

#### 4.10 Summary

This chapter discussed the methodological aspects that guided the study. The interpretive paradigm, the qualitative approach and the case study design were outlined.

A detailed discussion of the population, the sample and sampling procedures was given. The discussion also focused on data collection instruments that include interviews, focus group discussions and document analysis. Issues of trustworthiness, data analysis and ethical considerations were also dealt with. The following chapter (Chapter five) presents and analyses data (Data Presentation and Analysis).

# CHAPTER FIVE

## DATA PRESENTATION AND ANALYSIS

### 5.1 Introduction

This chapter presents and analyzes data that were collected for this study on the enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science in Zimbabwe. Qualitative data were collected through individual and focus group interviews as well as document analysis. This is consistent with Charmaz's (2006) principles of triangulation and in line with basic requirements for qualitative content analysis. Interviews were conducted with one DTE official, the Principal, the Vice Principal, two Heads of Departments, ten Heads of Subjects, three Heads of Science department in secondary schools and three mentors. Focus group discussions were conducted with 5 groups of 10 and 11 third and final year student teachers. Internal and external academic examining reports, teaching practice reports, mark profiles, pass lists, admission records, syllabuses, vision and mission statements and core values of the Ministry of Higher and Tertiary Education Science and Technology Development (MHTESTD), the Department of Teacher Education at the University of Zimbabwe (DTE) and the college under study and other relevant documents were reviewed to complement interview data. Issues arising from the interviews and the document reviews were then put together as the findings of the study.

The data are presented and analyzed in line with the main objective of the study which was to establish enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science in Zimbabwe. This was guided by the specific objectives of the study which were to:

- Establish structural factors that facilitate and / or hinder the 3-3-3 secondary teacher preparation model for Post 'O' Level Science.

- Find out cultural discourses that offer causal explanation for enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science.
- Establish agential influences that promote and / or impede the 3-3-3 secondary teacher education model for Post 'O' Level Science program in Zimbabwe.

In addition to the objectives of the study, the presentation and analysis of data were facilitated by the research questions of the study. The major research question was:

**What are the enabling and / or constraining factors in Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science?**

The sub research questions were:

- What structural factors facilitate and / or hinder the 3-3-3 secondary teacher preparation model for Post 'O' Level Science?
- What cultural discourses offer causal explanations for the enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science?
- What agential influences promote and / or impede the 3-3-3 secondary teacher education model for Post 'O' Level Science program in Zimbabwe?

With the objectives and research questions in mind, the chapter has been divided into five sections. The first section examines the biographic information of the participants. This section was considered necessary as some enablers and / or constrainers of the 3-3-3 Science program can better be explained through reference to the biographic information of the participants. The second section presents and analyzes data on the rationale behind the re-introduction of the 3-3-3 Post 'O' Level Science program in secondary teacher education colleges. The number of students taking up the program and graduating each year, and their academic qualifications bears some significance to the study. The third section presents and analyzes data on structural factors that facilitate and / or hinder the 3-3-3 secondary teacher education model for Post 'O' Level Science. A wide range of factors considered structural, such as the bureaucratic structure, the in-out-in structure, institutional structures such as the university, the college, secondary schools and the family; infrastructural facilities, material and financial

resources and utilities such as water, electricity and the internet are presented. Data on cultural discourses that offer causal explanation for enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science are presented and analyzed in section four. Discourses held about the teaching profession, the vision and mission statements and core values of the MHTESTD, DTE and the studied college, beliefs about what Science teachers should learn, how they should be taught and the skills they should acquire are presented. The fifth section presents and analyzes data on agential influences that promote and / or impede the 3-3-3 secondary teacher education model for Post 'O' Level Science. Decisions made by the DTE officials, the Principal, lecturers, student teachers, school Heads and Heads of Science department in secondary schools, among other key players in the 3-3-3 model, in trying to reinforce or transform existing cultures and structures, are explored.

## 5.2 Biographic Information of Participants

The biographic data examined variables pertaining to the participants such as the gender of the participants, the age, the years of teaching or lecturing experience, their highest academic and professional qualifications.

### 5.2.1.1 Number of participants

As noted earlier, Zimbabwe has only three secondary teacher education colleges and the study was conducted in one of the colleges. In total, the researcher conducted one interview with a DTE official, two interviews with the Principal and Vice principal, ten interviews with the Heads of Departments and Heads of Subjects at the college, six interviews with Science Heads of department in secondary schools and mentors. Five focus group discussions were made with 55 final year Post 'O' Level Science student teachers. Figure 5-1 displays the codes of the participants.

**Figure 5-1: Codes of participants**

Data collection instrument	Participants	Codes
Interviews	Department of Teacher Education official	DTE
	Principal and Vice principal	P and VP
	Heads of Departments and Heads of Subjects	HOD1 and HOD2 HOS1---HOS8
	Science Heads of Department in secondary schools and mentors	SHOD1—SHOD3 (where SHOD1 = interview with Science Head of Department from School number 1)  M1—M3(where M1=interview with mentor from school number 1)
Focus group discussions	Final year Post 'O' Level Science student teachers	FGD1—FGD5

#### 5.2.1.2 Gender of respondents

Gender has a bearing on how events are interpreted. Turner (1996) argues that people's attitudes, beliefs and values are also influenced by their gender. There is gender stereotyping in the teaching profession as it is feminized in many societies. More women than men are said to be choosing teaching as their career (Sahin, 2014), but few females take up Sciences. Involvement of both male and female in this study

ensured that different opinions across gender are represented. Of the 19 participants interviewed, 13 were male and 6 were female. The focus group discussions with student teachers also considered gender representation. Of the 55 student teachers who participated in the focus group discussions, 24 were male while 31 were female.

### 5.2.1.3 Age of participants

Teaching as a profession requires mature minds to comprehend and discern what is involved in the teaching and learning process. Age is one such indicator of readiness for the teaching profession. The Zimbabwean education system demands that entry age for primary schooling is 6 years. This is followed by 7 years of primary schooling, then 4 years of lower and middle secondary education and 2 years of upper secondary education. On successful completion of primary and secondary education one can then enroll in any tertiary institution. Accordingly, the minimum age at which a person can enroll as a teacher is 19 years. Table 5-1 illustrates the age categories of the participants who participated in focus group discussions.

Table 5-1: Age of focus group participants (N=55)

Age category	Number of participants
Between 20 and 29 years	30
Between 30 and 39 years	23
Between 40 and 49 years	2

As can be seen from Table 5-1, the age range of participants to this study was from 20 years to 49 years. The distribution of the participants by age range indicates that there were 2, 23 and 30 in the 40 to 49 years, 30 to 39 years and 20 to 29 years age bracket respectively. This shows that all the participants were mature for the teaching profession, and indeed mature enough to identify enablers and / or constrainers of

teacher education programs in general and the 3 year Post 'O' Level Science program in particular.

#### 5.2.1.4 Years of experience

Experience is the best teacher. Generally, people assume that the more years of experience one has, the more one becomes a better teacher. Lecturers in teacher education colleges are appointed from primary and secondary school teachers on the basis of their qualifications and experience. Among the DTE official, the Principal, the Vice Principal, Heads of Departments, Heads of Subjects and mentors, it was noted that 2 had less than 5 years experience, 3 had between 5 and 10 years experience, 5 had between 11 and 15 years and 6 had between 16 and 20 years and 3 had more than 20 years in the service. Table 5-2 below shows participants' years of experience.

Table 5-2: Years of experience (N=19)

<b>Years of experience</b>	<b>Number of participants</b>
Less than 5 years	2
Between 5 and 10 years	3
Between 11 and 15 years	5
Between 16 and 20 years	6
Over 20 years	3

From the data in Table 5-2, the majority of the participants had vast experience such that they were able to identify enablers and / or constrainers of teacher education programs. They were able to give thick descriptions of what goes on in the teaching and learning of Science. For one to give such detailed descriptions, experience plays a very important role (Seale, 2004).

### 5.2.1.5 Academic and professional qualifications

Academic and professional qualifications were considered important in this study. The understanding and interpretation of teacher education programs requires some level of academic and professional experience. The policy on teacher education demands that the minimum entry professional qualification for college lecturers is a first degree in one's area of specialization. A Masters degree is an added advantage. Data from the 10 participant lecturers indicated that eight are holders of Masters Degrees and only two have Bachelor of Science Honours' degrees; an indication that highly qualified staff is involved in the preparation of Science teachers. Table 5-3 shows the academic and professional qualifications of participants.

Table 5-3: Academic and professional qualifications of participant college lecturers (N=10)

Qualification	Number of participants
CE, Bed, PG Diploma, Msc Ed	1
CE, Bed, Msc Ed	3
Bsc (Hons)	2
CE, Bed, Med	2
CE, Bed, Med Mgnt	2

From Table 5-3, all participant lecturers have the necessary qualifications. Science lecturers in particular, are specialists in the three pure Science subjects; as such, they should enable the facilitation of the 3-3-3 model due to their high and relevant qualifications.

#### 5.2.1.6 Academic qualifications of focus group participants

Academic qualifications of student teachers were seen to be important in this study as they have significance in enabling and / or constraining the 3-3-3 model for Post 'O' Level Science. According to the DTE handbook (2012), entry requirements into this Science program are 5 Ordinary level passes including Mathematics, English, Physical Sciences and or Pure Sciences. However, data from the participants indicated that only 3 students had Physical Science, 2 had Pure Sciences and the majority had Integrated Science and Biology or Human and Social Biology. Table 5-4 indicates students' academic qualifications.

Table 5-4: Academic qualifications of student teachers (N=55)

Qualification	Number of student teachers
5 'O' Levels including Mathematics, English and Pure Sciences and Integrated Science	2
5 'O' Levels including Mathematics, English and Physical Science and Integrated Science	3
5 'O' Levels including Mathematics, English, Integrated Science and Biology	9
5 'O' Levels including Mathematics, English and Integrated Science	28
5 'O' Levels including Mathematics, English, Integrated Science and Human and Social Biology	11
5 'O' Levels including Mathematics, English and Combined Science	2

From Table 5-4, the majority of the student teachers do not have the necessary recommended qualifications. This then means that both lecturers and students have to work extra hard in order for students to do well in the program.

### 5.3 The Rationale behind the Re-Introduction of the 3-3-3 Secondary Teacher Education Model for Post 'O'level Science

This section presents and analyzes data on how the 3-3-3 secondary teacher education model for Post 'O' Level Science was re-introduced in 2007. In response to the question on what necessitated the re-introduction of the 3-3-3 secondary teacher education models for Post 'O' Level Science, the DTE official, the Principal and the Vice Principal gave two major reasons. First, due to the dwindling numbers of Post 'A' Level graduates that were taking up Sciences, secondary teacher education colleges had to recruit Post 'O' Level graduates in case Science subjects became extinct in colleges.

Table 5-5 shows enrolment figures for the Sciences from the period 1997 to 2007.

Table 5-5: Enrolment figures for Post 'A' Level Science student teachers from 1997 to 2007

Year	Number of students enrolled	Number of students who failed or withdrew	Number of students who graduated
1997-1998	35	3	32
1998-1999	34	2	32
1999-2000	39	8	31
2000-2001	29	2	27
2001-2002	24	2	22
2002-2003	23	3	20
2003-2004	14	3	11
2004-2005	11	3	8
2005-2006	7	2	5
2006-2007	3	2(withdrew)	1

(Source-Pass Lists)

As can be seen from Table 5-5 that from the period 1997, the Post 'A' Level Science student teachers' enrolment figures were reasonable considering the fact that there were not many secondary schools that were offering Sciences up to 'A Level at that time. From 2001, the numbers started dropping. Explaining the drop rate, the DTE official, the Principal, the Vice Principal and HOS1 indicated that the expansion of

universities and the introduction of institutes of technology led to the absorption of many Post 'A' Level Science graduates. As a result most Post 'A' Level Science students preferred taking up science courses with universities and institutes of technology than attending teacher education colleges. HSO1 went on to say universities would offer them degrees, and institutes of technology, though offering them diplomas, are more valuable than teacher education diplomas in this era of technology. Because of this stiff competition for Post 'A' Level Science graduates, teacher education colleges lost out.

Secondly, the acute shortage of science teachers in secondary schools led to the re-introduction of the 3-3-3 secondary teacher education model for Post 'O' Level Science. The brain drain that led to the near collapse of the Zimbabwean economy from 2004 to 2008 left many secondary schools without teachers and Science and Mathematics teachers in particular. The most affected were the rural secondary schools where many teachers left the country to seek for greener pastures in neighbouring countries such as South Africa, Botswana, Namibia, and Australia among other countries (Chronicle, 2002/02/09).

Table 5-6 shows the number of pupils and qualified science teachers in ten purposively selected secondary schools from 2004 to 2014.

Table 5-6: School Enrolment (SE) and staff establishment for qualified Science Teachers (QT) from 2004 to 2014

School	Enrolment	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>A</b>	SE	1040	1035	1028	993	757	809	1025	1030	1036	1038	1040
	QT	6	6	6	2	1	1	1	1	2	5	7
<b>B</b>	SE	1738	1795	1783	1671	1667	1674	1706	1723	1733	1743	1755
	QT	10	10	8	4	3	7	8	8	8	10	9
<b>C</b>	SE	1253	2232	2323	2174	1991	1787	1832	1669	1667	1785	1776
	QT	5	5	5	3	2	3	4	5	4	4	4
<b>D</b>	SE	2413	2411	2415	2402	2391	1813	1817	1613	1624	1821	1553
	QT	9	9	9	4	3	3	4	6	7	9	9
<b>E</b>	SE	1280	1282	1278	1265	1256	1275	1280	1280	1280	1320	1320
	QT	8	8	8	4	3	6	8	8	8	9	10
<b>F</b>	SE	1782	1780	1772	1678	1665	1672	1778	1788	1785	1788	1786
	QT	9	9	7	3	2	4	6	6	8	8	9
<b>G</b>	SE	1248	1275	1271	1244	1239	1236	1247	1278	1283	1281	1285
	QT	5	5	5	2	2	3	4	4	5	5	5
<b>H</b>	SE	1788	1792	1790	1775	1769	1766	1774	1782	1785	1787	1794
	QT	8	8	6	4	3	5	5	6	8	8	8
<b>I</b>	SE	1785	1788	1778	1748	1756	1765	1772	1778	1784	1786	1788
	QT	8	8	6	3	2	3	5	5	6	6	8
<b>J</b>	SE	1778	1782	1776	1749	1762	1770	1778	1780	1782	1785	1786
	QT	7	7	6	2	2	3	5	6	6	8	8

(Source-Staff lists, subjects taught & school enrolment files)

From Table 5-6, secondary schools were hardly hit by the acute shortage of qualified science teachers in the years 2007 and 2008. All the schools had either 1, 2, 3 or 4 qualified Science teachers attending to more than a thousand learners. The situation really needed urgent and swift attention. Although the situation has improved, there are still some schools especially in the rural areas that lack qualified Science teachers, thus the 3-3-3 model will continue to be offered in order to alleviate Science teacher shortage.

Taking into consideration that the 3-3-3 secondary teacher education model for Post ‘O’ Level Science was re-introduced as a scapegoat measure, chances of the model being faced with challenges are high. Although there are possible constraints facing the model, there are also notable enablers as evidenced by the number of students taking up the program and graduating since its re- inception in 2007 to date. Table 5-7 shows the number of students who enrolled and graduated in the 3-3-3 Post ‘O’ Level Science program since 2007.

Table 5-7: Enrollment figures for Post ‘O’ Level Science student teachers

Year	Number of students enrolled	Number of students who either failed, withdrew or deferred	Number of students who graduated
2007---2009	23	6	17
2008---2010	28	5	23
2009--2011	31	17	11
2010--2012	39	3	36
2011--2013	52	13	39
2012--2014	55	5	50
2013--2015	78	N/A	N/A
2014--2016	123	N/A	N/A

From Table 5.7 the number of students taking up the 3-3-3 Post ‘O’ Level Science program increases every year. This helps facilitate the model as it continues to attract more and more student teachers. Data also indicates that very few students, except for

the 2009 to 2011 intake, do not fare well in the program. Explaining the high failure rate in this intake, HOD1 indicated that the majority of the student teachers, in this intake had no Mathematics at 'O' Level and had done Integrated Science. A similar explanation was captured in the 2011 external examiner's report as indicated below:

*There was 100% pass rate in coursework for all the four components, that is, Physics, Chemistry, Biology and Methodology. Examinations were badly done. Reasons for poor performance could be multifaceted and complex, however it was noted that the majority of the candidates had no Mathematics at 'O' Level and a good number did not have the acceptable scientific aptitude since they had passed Integrated Science only at 'O' Level, which is a terminal subject.*

Explaining the deferral and withdrawal cases HOD1 said:

*In the majority of cases, female students are deferred when they develop complications or ill health after giving birth. At times it is the newly born baby that causes the student to defer her studies as it needs close monitoring by the mother. Male students rarely defer their studies and if they do, it will be due to ill health as well.*

*Withdrawal cases are usually voluntary. Some students will have sent applications to various places and when they are successful they just leave and go to their preferred jobs. However, an insignificant number of students withdraw from the Science program.*

Poor performance in examinations due to lack of basics in Pure Sciences, complications by female students at delivery, ill health and voluntary withdrawal negatively affect the 3-3-3 model which aims at producing as many secondary school Science teachers as possible in order to close the gap that was created during the collapse of the economy.

#### 5.4 Structural Factors Facilitating and / or Hindering the 3-3-3 Secondary Teacher Education Model for Post 'O' Level Science

This section presents and analyzes data on structural factors that enable and / or constrain the 3-3-3 secondary teacher education model for Post 'O' Level Science. Various aspects considered structural include bureaucratic structures, the in-out-in structure, institutional structures such as the university, the college, secondary schools and families, infrastructural facilities, material and financial resources, transport and

utilities such as water, electricity and the internet. These are presented as facilitating and / or hindering the model under study.

#### 5.4.1.1.1 The organizational structure of teacher education in Zimbabwe

In response to the question on how teacher education is organized in Zimbabwe, the DTE official, the Principal and Vice Principal concurred that:

*Teacher education adopts a bureaucratic structure where colleges are under the MHTESTD and are affiliated to the University of Zimbabwe. The government, through the MHTESTD provides student teachers' cadetship while they are studying. The university maintains the standards whilst the colleges ensure that the nation's teachers are produced. On the other hand, schools provide teaching practice centers during the course of training.*

The diagram below shows the organizational structure of teacher education in Zimbabwe.

Ministry of Higher and Tertiary Education Science and Technology Development

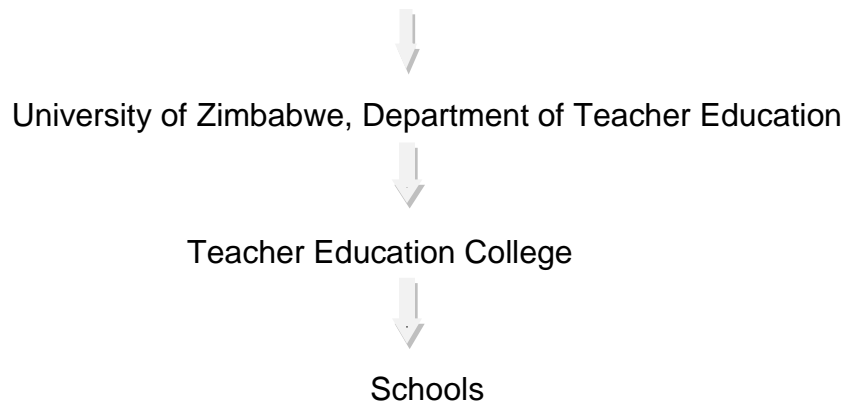


Figure5-2: The organizational structure of teacher education in Zimbabwe

As indicated in the diagram above, teacher education in Zimbabwe adopts a bureaucratic structure, that is, a rational arrangement of offices providing certain means for administration and control of the office holders' actions (Gwarinda, 2001).

#### 5.4.1.2 The organizational structure within the teacher education college

Teacher education colleges also adopt the hierarchical structure within the organization for administration purposes. The diagram below shows the organizational structure within the teacher education college.

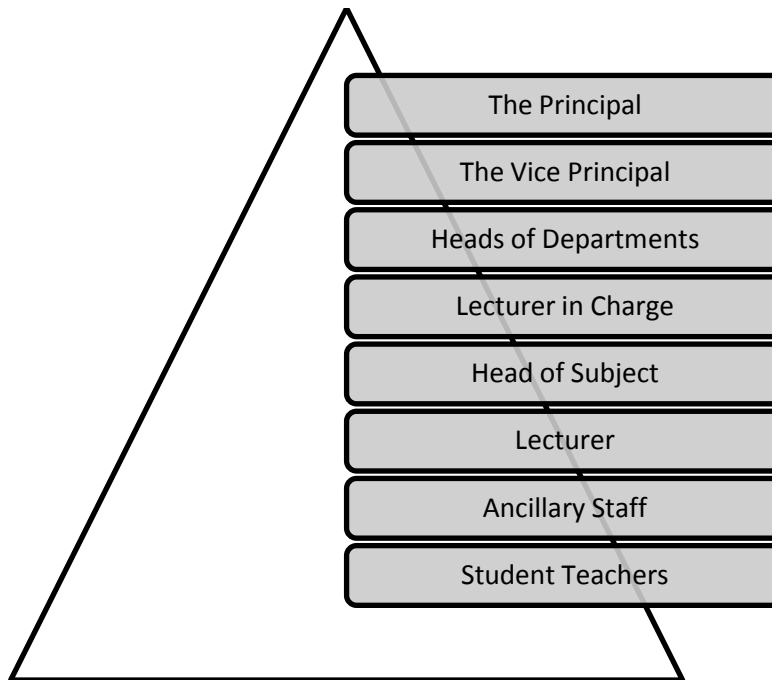


Figure 5-3: The organizational structure within the college

The bureaucratic structure as indicated by the Principal, the VP, HODs and HOSs helps in the efficient day to day running of the college as each individual is allocated his or her tasks which he or she has to accomplish at a specific given time.

The Principal as the administrator of the college indicated that:

*I ensure that everyone in the institution executes his or her duties accordingly. This, I do with the assistance of the VP, HODs and LICs. HODs ensure that LICs of various subject areas see to it that the subjects are taught as scheduled in the college calendar. HOSs also ensure that syllabuses in their subjects are covered before examinations begin. The ancillary staff, which includes the nurse, the clerical, grounds, the drivers, kitchen staff and cleaners, ensures that the welfare of the students is not compromised.*

The Vice Principal, Heads of Departments and Lectures in Charge, as assistant administrators concurred with the Principal that:

*The bureaucratic structure adopted in the college necessitates the efficient day to day running of the college. Because roles are clearly defined and specified in such a structure, each and every member at the college is aware of what is expected of him or her. Supervision in such a structure is not cumbersome, as it is merely a matter of checking whether or not things are done timeously.*

The Heads of Subjects were also in agreement that:

*The hierarchical structure is one of the best to adopt when it comes to delegation and demarcation or streamlining of duties. As subject specialists, we make sure that the various subjects we are leading and teaching are taught as per the college calendar. Lecturers do what they are expected to do at a specified given time. Because of the structure, that provides clear specification of duties for individual lecturers, the efficient day to day supervision of the teaching of the subjects is enhanced.*

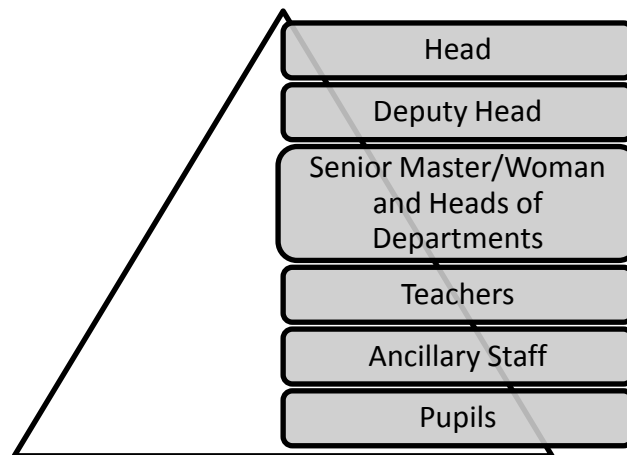
Student teachers also felt that:

*The bureaucratic structure promotes the efficient day to day running of the activities in the college. Without such a structure adopted in an education institution like a college, there would be chaos and anarchy that may lead to very minimum teaching and learning. It is good that the structure provides order for teaching and learning to occur. Each person knows his or her place in the hierarchy and takes up his or her duties as specified.*

Because the hierarchical structure provides a clear channel of communication, unity of purpose is usually achieved.

#### 5.4.1.3 The organizational structure of the secondary school

Secondary schools where student teachers do their teaching practice also adopt a bureaucratic structure as shown in the following figure:



**Figure 5-4: The organizational structure within the secondary school**

Responding to the question on how the bureaucratic structure in secondary schools promote teacher education programs, SHODs, mentors and student teachers indicated that the structure provides a clear channel of communication.

Secondary school Heads of Science Department pointed out that:

*Secondary schools as organizations cannot avoid bureaucratic structures as they provide the efficient running of the schools. All programs are well coordinated due to such structures. As SHODs, monitoring and supervising the teaching of Science in schools is promoted by the structure since duties are streamlined, no one crosses anyone's paths as each member in the department is aware of what he or she is expected and supposed to do. Delegation of duties in the department is also not a problem as all members are aware that they have a role to play as Science teachers in the school.*

Mentors in secondary schools concurred with SHODs that:

*Without the adoption of bureaucratic structures in secondary schools, it was not going to be easy to operate. It is the bureaucratic structure that provides order in schools. Each and every member in the institution is aware of what is expected of him or her. Duties, tasks and roles are clearly spelt out, hence all members feel obliged to fulfill their roles as mentors and teachers.*

In agreement with SHODs and mentors, students in FGD1 indicated that:

*Without the hierarchical structure, it was going to be difficult, if not impossible for schools to properly function and achieve the expected goals.*

They went further to explain what they considered the function of each structure in the hierarchy:

*The Head, as the overall supervisor ensures that teaching and learning is taking place at the school. This, he or she does with the assistance of the Deputy Head who also seeks help from the Senior Master/Woman and Heads of Departments. It is the responsibility of Heads of Departments to see to it that teachers in their departments conduct lessons according to the school timetable. The senior master and woman maintain order and discipline in the school. Such structures provide a conducive teaching and learning environment.*

The bureaucratic structure in secondary schools promotes teaching and learning in the sense that student teachers are supervised accordingly and they teach learners whose behavior is monitored, thus giving them confidence as they practice teaching.

#### 5.4.1.4 The hierarchical structure as constraining teacher education programs

Commenting on how bureaucratic structures constrain the implementation of teacher education programs in colleges and schools, student teachers, HOSs and mentors indicated that:

*Bureaucratic structures, though providing clear channels of communication, allowing tasks to be accomplished and the achievement of goals, are criticized for their top-down, autocratic approaches where members at the bottom of the hierarchy rarely have a say in the day to day running of the institution. This stifles creativity and innovation as those who occupy top positions in the hierarchy hardly ever consider ideas raised by their subordinates. The structure gives too much autonomy on the person at the top.*

HOS1 pointed out:

*While bureaucratic structures are recommended for effective implementation of programs as they ensure the attainment of organizational goals, they however have their own flaws. There was once a time when one member in the team of teaching practice external assessors from the University, failed more than five student teachers in just one visit. That was not amusing at all and quite disturbing as the student teachers were formatively supervised by college lecturers twice and three times by the school mentors passing. Because DTE officials are at the top of the hierarchy, they will make final decisions which no one can contest.*

HOS2, giving disadvantages of bureaucratic structures, raised concerns on procedures followed when requesting laboratory equipment and chemicals. He indicated that:

*The committees that sit to approve laboratory equipment, chemicals and other purchases may not see the necessity of the chemicals and purchase what they feel is urgent to them. We place the chemical requisition orders with the HOD who takes the order to the procurement committee. The procurement committee takes the requisition to the finance committee that either adopts or drops some of the orders citing lack of financial resources. The red tape that has to be followed when requesting for laboratory chemicals is laborious such that we end up not placing any orders at all and teach without experimenting.*

Student teachers raised similar complaints at school level. They indicated that Science kits which were donated by UNICEF were not easily accessible. They failed to do some of the experiments with learners because SHODs had to first approve their requisitions. FGD4 pointed out:

*The teaching of Science in schools could have greatly improved due to the UNICEF kits that were donated but it has not. The reason being that procedures are followed to access the equipment are prohibiting. One has to apply to his or her mentor, who will take the application to the Head of Department for approval. Knowing the laxity of experienced teachers, the SHOD may ask the mentor to drop it on his desk for approval later. One ends up forgetting about the requested equipment and chemicals and teaches the topic without experimenting. This compromises the teaching and learning of Science which is based on experiments.*

Students were putting blame on Heads of Science Departments, who also happen to be victims of the bureaucratic structure. One of the SHODs indicated that the UNICEF kits were donated with strings attached. SHOD2 indicated:

*We are expecting better results, now that UNICEF donated Science kits. The problem is that we are supposed to account for every chemical and equipment that we use. I end up restricting the teachers to one experiment per week per teacher. If I do not do that, I will end up using my money to purchase some of the chemicals because the Head strictly warned me to handle the UNICEF Kit with much care.*

The bureaucratic structure adopted by educational institutions as organizations promotes teaching and learning and at the same time hampers the achievement of certain goals as presented by some of the participants.

5.4.2 The 3-3-3 structure, that is, In-out-In as facilitating the Post 'O' Level Science secondary teacher education program

Commenting on the triple three structure, that is, In –Out –In, the DTE official, Heads of Departments, Heads of Subjects and student teachers concurred that the first year of 3 terms at college, followed by another year of 3 terms of teaching practice in schools, then the final year of 3 terms back at college is quite in order. The DTE official indicated that:

*The 3-3-3 structure has its foundational base in the ZINTEC and 2-5-2 models of teacher education in Zimbabwe. The difference is just but the time or period in residence, the period out of residence and last period in final residence, otherwise it is not divorced from other structures adopted in Zimbabwe's teacher education programs. The sandwich model also provides a balance between face to face interaction between lecturers and student teachers during years one and three, enabling feedback from teaching practice in the third and final year. Students would also have more teaching practice time in between two years of theory. The mixture of interface and distance education makes this model powerful except that the absence of modules impedes on students' work.*

He went on to say:

*Student teachers disengage with lecturers for a long time, therefore all subject areas should produce modules which students will continue to read and interact with while they are on one year teaching practice. Since the In-Out-In structure adopted by the triple three model seem to be having its foundational base in the ZINTEC and 2-5-2 models that have modules, the 3-3-3 model should be seen to be touring the line, that is, having modules.*

Lecturers indicated that:

*The In-Out-In structure adopts what most teacher education programs emphasize on, that is, theory and practice. Theoretical and practical aspects equip student teachers with the requisite knowledge, skills, values and attitudes of the teaching profession in general and Science teaching in particular.*

Student teachers indicated that they were comfortable with the structure as it gives them ample time to do their studies. FGD4 commented:

*The whole first year allows us to familiarize with the demands of the teaching course as we learn the Science content knowledge and pedagogical knowledge. The second full year on teaching practice is adequate for one to grasp the ethics of the teaching profession. The fact that in this one year of teaching practice we*

*are attached to school mentors benefits us a lot as we observe our mentors teaching then emulate them interacting with learners on a daily basis.*

Another student in FGD3 summed up saying:

*The third and final year back at college reconciles and consolidates theory with practice. In our first year at college we will be exposed to theory, then in the second year we go for teaching practice where we are expected to apply the theory we learnt into practice. In the third year, therefore, we reconcile the two, theory and practice, identifying what works and that which does not work, and mapping a way forward on what seems not to work.*

This is in line with The National Science Teachers Association (NSTA) (1990) that observes that the success of professional development of student teachers depends on the balance between theoretical and practical teaching applications offered in teacher education programs. How much theory and how much practice can be considered as balancing remains a dilemma in teacher education (Tshuma, 2009).

#### 5.4.3 Institutional structures as facilitating and or hindering the 3-3-3 secondary teacher education model for Post 'O' Level Science

Teacher education programs are supported by various institutions such as universities, colleges, schools, families, churches and Non-Governmental Organizations.

##### 5.4.3.1 The family as enabling and / or constraining the 3-3-3model

Responding to the question on the role played by the family in teacher education, all the participants indicated that:

*The family as an institution plays an important role in teacher education as it supplies teacher education colleges with students. It is the family that provides emotional and financial support to student teachers. Without the family's support, many students would be failing to complete the course, as the course requires payment of fees and purchase of learning materials. Members of the family also encourage student teachers to work hard in order to succeed.*

Students in FGD4 commented that:

*There are however, some families that struggle to raise bus fares for student teachers who at times end up missing some lectures. Students from such families do not do well though they may pass the course.*

#### 5.4.3.2 The secondary school as enabling and / or constraining the 3-3-3 model

In response to the question on how secondary schools facilitate the 3-3-3 model, all the participants concurred that:

*Secondary schools play a dual role in facilitating teacher education. First, students who take up teaching as a career learn from these schools, and secondly schools provide teaching practice centers for the student teachers. Experienced teachers mentor the student teachers, equipping them with knowledge, skills, attitudes and values of the teaching profession.*

While secondary schools are envisaged to be playing a crucial role in churning out teacher trainees and providing teaching practice centers for student teachers, all the ten secondary schools consulted had only one Form four class that did pure Sciences, the other 7,8,9 or 10 classes did Integrated Science.

SHOD1 indicated that:

*In 2013 there was verbal communication that all secondary schools should offer pure Sciences to all learners since UNICEF had donated Science kits. We tried to effect that, but most of the pupils in weak streams could not cope and preferred to continue doing Integrated Science concurrently with pure Sciences. The majority finally dropped the pure sciences and only wrote Integrated Science in their final examinations, complaining that they were challenged by pure Sciences. Secondary schools therefore are faced with a challenge of producing learners who would qualify to train as Science teachers.*

SHOD2 also commented:

*Secondary schools are faced with a host of challenges with regards to the teaching and learning of Science. Some do not have laboratories where experiments should be conducted. Others do not have laboratory assistants and those that have, are unqualified. Yes the UNICEF Science kits are available but pupils are learning Science lessons from classrooms. Most of the secondary schools have Science graduate teachers who have served for a long period but without teaching qualifications. Because of their long service, they are assigned student teachers to mentor. Secondary schools still have a shortage of qualified Science teachers. As it is, at this school we are only 2, that is, the deputy head,*

*and I, the rest are Science graduates without teaching qualifications. The deputy head spends most of the time engaged in administrative duties.*

#### 5.4.3.3 The University of Zimbabwe, Department of Teacher Education as facilitating and / or hampering the 3-3-3 model

The University of Zimbabwe as an affiliate of all teacher education colleges plays a significant role in facilitating teacher education programs. Responding to the question on how the University facilitates the 3-3-3 model, the DTE official rightly pointed out:

*The University is mandated by the MHTESTD to ensure knowledge, diligence and integrity in teacher education colleges. It ensures that colleges have an academic board in place which is responsible for monitoring and implementing associate policies, process college syllabuses, process examinations, initiate and evaluate programmes, set and implement admission criteria, identify and recommend external examiners to DTE and undertake any other academic and professional matters. That is why when this college initiated on the triple three Science program, the University permitted it to do what it sees fit to remedy the scarcity of Post 'A' Level graduates taking up Sciences.*

The DTE official went on to identify the members of the college academic board (CAB) as given in the DTE Handbook (2012). These are:

*The Principal (Chairperson), the Vice Principal, Heads of Departments (HODs), Lecturers-In-Charge (LICs), and a Student Representative Council member (SRC), The College Academic Board (CAB) is an academic authority that should ensure high standards of academic work.*

The DTE official also explained:

*It is also the responsibility of the University of Zimbabwe to award the diploma to student teachers on completion of the course. That is why you see us every year in August coming down here to present the diplomas to the grandaunts during graduation ceremonies.*

The University of Zimbabwe puts in place such structures governing colleges as a way of fulfilling its mandate.

#### 5.4.3.4 The secondary teacher education college as enabling and / or constraining the 3-3-3model

The college under study is one of the institutions that train and develop secondary school teachers. Responding to the question on how the college promotes the model, the Principal indicated that:

*The college, as an education service provider internally relates with the society at large, the secondary schools and the University to come up with a social system that trains and educates teachers. It is the college that realized the need to re-introduce the triple three models for Sciences as there were few Post 'A' Level Science graduates as shown in Table5-5.*

The Vice Principal alluded to that:

*Every year the college advertises the programs it offers in the press (print media), receives applications, conducts interviews and enrolls shortlisted students for the program. It is the responsibility of the college to draft syllabuses and have them approved by DTE, teach students, supervise students on teaching practice, supervise students' research projects, set examinations, execute and mark them. Passing, failing, repeating and deferred students are determined by the college as prescribed in the DTE Handbook (2012).*

The Principal and the Vice Principal concurred that:

*The entire process from advertising programs, the recruitment of students and training and developing them, up to the time they graduate lies entirely in the hands of the college.*

Whilst the college has been seen to be providing a worthwhile service to the nation, some participants like the DTE official, Heads of Subjects, Heads of Science Department in secondary schools, mentors and student teachers had some reservations on how the service is delivered. The DTE official indicated that:

*The college, having adopted the ZINTEC and 2-5-2 approaches to the training and development of teachers must be seen to be touring the line of these models that have distance modules for use by students while on teaching practice. The college fails to provide student teachers with distance modules for use while they are on one year teaching practice, a long period of disengagement with lecturers and library facilities. This compromises the quality of work produced by student teachers.*

Heads of almost all the Subjects lamented the understaffing in their subject areas.

HSO4, 5, 6 and 7 concurred that:

*The college fails to recruit adequate academic staff. We have been to other secondary teacher education colleges where lecturers in the Educational Foundations, normally referred to as mass subjects, and the number of lecturers ranged from 10 to 12. At this college you find 6, 7, 4, and 2 lecturers handling more than a thousand student teachers. This is grossly unfair for both the students and us, especially in terms of assignment marking. We spend sleepless nights trying to mark students' assignments. It also compromises on quality as some assignments are hurriedly marked to try and meet deadlines.*

HOS1, 2 and 3 were also in agreement that:

*Failure by the college to recruit a Chemistry lecturer so that at least they are two, qualified laboratory assistants, laboratory technician and computer technician, negatively impacts on the teaching and learning of Science*

*The college is also not doing justice to student teachers who enroll with Integrated Science and perform badly in all first year end term tests but go for teaching practice at the end of the first year. The students may pass teaching practice but they are usually the ones that fail final examinations in the third year. It is better for the college to ask those who are weak to repeat first year in order that they acquire adequate content before they go for teaching practice.*

Heads of Science Department in secondary schools were not happy with the student teachers they receive from college. All the three concurred:

*The student teachers we receive from college lack the knowledge and skills required for a Science teacher. They can hardly set the apparatus and conduct some of the simplest Form 1 and 2 experiments and we wonder how they learn Science at college. When they came, we thought they were able to do experiments on their own, but we learnt that some of them just cannot.*

Mentors, like SHODs indicated that:

*Science student teachers are not doing well in terms of carrying out experiments and teaching. They are weak. We wonder how they learn the Sciences at college. We make sure that we assist them in every bit of the experiment they do as they confess that some of the chemicals they will be seeing them for the first time. As mentors, we feel we are more of teaching the students rather than mentoring them.*

Students in FGDI indicated that:

*The library does not have enough books to at least cater for half of the Science students. It must be well stocked with current books so that we can borrow and read problem areas. We are also worried about the internet. Some of us managed to buy laptops while we were on teaching practice but internet connectivity is letting us down as it is very poor. We thought the internet would make up for the few books that are in the library.*

FGD3 said:

*The shortage of lecturers, especially in Chemistry where we only have one lecturer is a serious problem that has to be urgently looked into. Chemistry is really giving us problems. Unqualified laboratory assistants do not help us much as they lack the requisite knowledge and skills. We also feel that the timetable should give more time to Science.*

5.4.3.5 Other stakeholders including Non-Governmental Organizations as enabling and / or constraining the 3-3-3 model

Responding to the question on the contribution made by other stakeholders in facilitating the 3-3-3 model, lecturers, Heads of Science Department in secondary schools, mentors and student teachers indicated that:

*The training and development of Science teachers is well supported by various stakeholders though there are challenges here and there. The United Nations Children's Fund (UNICEF), a non-governmental organization donated Science kits to secondary schools with the aim of achieving the 21<sup>st</sup> century goals of advancement in Science and Technology. If the Science aptitude is developed among learners at an early stage, learners are likely to do well in Sciences as they go higher and higher in Science education.*

HOD1 also explained that:

*The donation that was meant for schools was also extended to the college after the college had requested for the kit citing reasons that it will not be in order for Science students to fail to be exposed to the kit while they are at college, only to see the kit for the first time in schools.*

SHOD1 indicated that:

*The business community also supports the education and training of teachers as it supplies the college and schools with the necessary equipment and chemicals*

*needed in the teaching and learning environment. Book suppliers, suppliers of furniture, computers and computer software, suppliers of utilities such as electricity, water, and internet connections all go a long way in promoting the education and training of Science teachers. At this school, parents, through the School Development Committee buy gadgets for e-learning and some donate cash to pay for the internet facility. All these efforts by various stakeholders enhance the training and development of teachers.*

#### 5.4.3.6 Infrastructural facilities as enablers and / or constrainers of the model

The availability or unavailability and the adequacy or inadequacy of infrastructural facilities bears some significance to teaching and learning. Commenting on the college main teaching and learning infrastructure, lecturers and student teachers indicated that:

*Classrooms, laboratories, lecture rooms and the library are available. The lecture rooms are adequate, well ventilated, adequately furnished and well maintained. The library, though available has become too small for the large numbers of students. If there could be a way of extending it, which would give more space to accommodate the large numbers of students that have since ballooned would be a welcome decision. Students crowd and scramble for the few furniture, books and computers that are there.*

HSO3 describing the laboratories they are currently using said:

*We are currently using make shift laboratories that are not up to standard. The standard laboratories are being re-furbished and hope that after completion, proper teaching and learning of Science will take place. There is also need for a computer laboratory in the Science department so that student teachers are exposed to computer based methods of teaching while they are still at college, as there are some secondary schools that have already adopted e-learning strategies. The available student computer laboratory accommodates all students from various subject areas and is only operational during ICT lectures. When there are no lectures going on, the laboratory is kept under lock and key.*

*I feel the student computer laboratory is underutilized and suggest that the authorities responsible for running college academic affairs should re-consider utilizing the student computer laboratory for research purposes since students are only allowed 30 minutes research time in the few computers that are in the library. One wonders how much information will have been gathered within thirty minutes.*

Heads of Science Department in secondary schools, mentors and student teachers indicated that:

*In some secondary schools, standard laboratories are there especially those schools that offer Sciences at Advanced level. They have separate laboratories for juniors, that is, forms one and two and senior laboratories for forms three to six. Some secondary schools have sub-standard laboratories whilst others do not have any laboratories at all, Science is taught from ordinary classrooms. The ordinary classrooms are adequate and fairly furnished.*

*The same applies to the library facility. Very few schools have the facility and are poorly stocked with limited Science textbooks and teacher education texts. We normally use the city council or municipality libraries in the western suburbs whilst others use the Public Library situated in the city centre. Some secondary schools have computer laboratories with all the necessary hard and software and have adopted e-learning strategies.*

The availability and adequacy of infrastructural facilities such as classrooms, laboratories, lecture rooms and libraries facilitate teaching and learning. In instances where such facilities are unavailable or inadequate, teaching and learning is likely to be hampered.

#### 5.4.3.7 Material resources as promoting and / or hindering the model

Teaching and learning material resources come in various forms, such as laboratory equipment and chemicals, computers, laptops, projectors, printers, photocopiers, desks, chairs, benches, textbooks and stationery.

#### 5.4.3.8 Laboratory equipment and chemicals

Commenting on Science laboratory equipment and chemicals, SHOD2 indicated:

*UNICEF has come to our rescue as regards to Science laboratory equipment. The little that we had has been boosted by the donation, and we are very grateful. We of course have to purchase the consumable chemicals now and then, but we can afford since all learners are charged Science levy for that purpose.*

The college situation on Science laboratory and equipment was similar to the school situation, though the college had just sourced the UNICEF kits through the sister Ministry. HOD1 explained:

*UNICEF kits are meant for secondary schools, but we had to plead with the responsible authorities in the Ministry of Primary and Secondary Education to extend the donation to colleges since the student teachers at the colleges are going out into the schools. It will not be proper for them to see the kits for the first time in schools. Student teachers have to familiarize themselves with the kits while they are still at college. Perishable chemicals are purchased by the college though the process of acquiring the chemicals is laborious as there are one or two committees that have to sit before purchases are done. Had it been that urgent orders like chemicals are made directly to the Vice Principal; speedy purchases that were going to benefit the students were going to be made.*

In trying to establish the situation at college and in schools before the UNICEF donation, HOSs, SHODs, and mentors indicated that:

*It was not easy to teach a practical subject theoretically throughout. The old and few equipment was difficult to use. Learners in schools approximately shared the equipment in the ratio 1:15 and some learners would not even have the chance to do the experiments let alone to touch the apparatus. The situation was just the same with student teachers at college, there were more theory lessons than practical ones.*

One of the students in FGD2 appealed:

*Science is a practical subject; therefore we expect more practical lessons than theory lectures. We understand that there is shortage of equipment but lecturers should try their best to develop in us the zeal to discover things on our own and be able to improvise where possible. The Science curriculum has to be pragmatic.*

The teaching fraternity and Science teachers in particular owe great gratitude to UNICEF for affording the Zimbabwean nation the opportunity to realize its dream of advancement in Science and Technology.

#### 5.4.3.9 Availability, adequacy and accessibility of computers, laptops, projectors, printers and photocopiers as enabling and / or constraining the model

Responding to the question on the availability, accessibility and adequacy of computers at college, student teachers and lecturers indicated that the college has tried to secure a reasonable number of desktop computers to be used by students and lecturers. All HOSs indicated that:

*Each subject area has a desktop computer, a printer and a laptop. There is also a staff computer laboratory with ten desktop computers. Projectors, printers and photocopiers are accessible to anyone since all subject areas and departments have the facilities. The library also has ten desktop computers that are accessible to both students and lecturers for research purposes only. It is only the time frame for the student that has to be revised as 30 minutes for research is just but too little. The majority of lecturers also have personal laptops and sophisticated cell phones that connect the college Wi-Fi.*

Students also indicated that:

*We have our own computer laboratory that has about sixty functional desktop computers. The student computer laboratory is only meant for ICT lessons, when there are no lessons going on, the laboratory is always locked. We feel this has to be revised as the laboratory is grossly underutilized. We also have problems when it comes to the printing of assignments as there is no facility meant for students at college. We feel that if a similar stance of paying for photocopying in the library, was taken for printing, we were not going to be facing challenges we are currently facing. A printer should be available for us and we print at affordable rates or charges. We are also thankful to the Ministry of Primary and Secondary for paying us while we were on teaching practice as some of us managed to buy ourselves laptops from the one year teaching practice earnings. A handful of us without laptops have sophisticated cellphones that access the internet. We are very happy that we have minimal problems in researching and typing our assignments. We are let down by poor internet connectivity at college. At least our problems are half solved.*

All secondary schools visited had computers, printers and photocopiers.

SHOD1 and 2 and M1 and 2 indicated that:

*The few computers that our schools have are used by a few individuals like the Head, the Deputy Head, the senior master/woman, HODs of various subject areas and the clerk. Learners do not have access to computers.*

Other schools that had benefitted from His Excellency, the President Robert Mugabe's donation of computers, had computer laboratories that were accessible to all learners.

SHOD3 and M3 indicated that:

*Our school is one of those that benefitted from His Excellency; the President Robert Mugabe's donation of computers sometime in 2003. An expert in computers is engaged and paid by the parents. All learners are taught the basic computer skills and those that do well are encouraged to do short computer courses and are given certificates of participation in those courses.*

There were a few teachers and learners who owned laptops. Mentors indicated that some teachers and learners have sophisticated cellphones that access the internet.

Because of the availability and accessibility of computers, printers and photocopiers in schools and at college, teaching and learning in this 21<sup>st</sup> century is enhanced.

5.4.3.9.1 Computer perishables such as ink and cartridges as facilitating and / or hindering the model

All lecturers interviewed indicated that:

*Consumables such as cartridges and ink are requested through the IT Department and purchased by the college. There are rare instances when we fail to print our documents due to shortage of ink. We are happy that all what we require for teaching and learning is readily available.*

The same situation prevailed in the secondary schools. SHODs and mentors mentioned that:

*We do not face any challenges when it comes to computer consumables as there are levies paid by learners that are dedicated to the purchase of computer consumables.*

5.4.3.10 Furniture as promoting and / or hindering the model

Responding to the question on the state of the furniture at college, lecturers and student teachers indicated that:

*Furniture at college is adequate. Each specialist room has its own furniture, thus there is no movement of furniture from one room to the other. Lecturers have comfortable office tables and chairs, though in shared offices. This facilitates teaching and learning as there is no time wasted while looking for chairs.*

The situation in secondary schools was not bad either as all learners had chairs or benches to sit on. However SHODs and mentors from double session schools lamented:

*Although we have enough chairs for all our learners we are faced with the challenge of high rate of furniture breakages. This is caused by the movement of furniture from one class to the other as the number of learners in the two sessions does not always balance.*

Mentors indicated that some of the schools offering Woodwork and Metal work repaired their furniture but those without the subjects incurred expenses of continuous repairs.

The teachers also had enough chairs and desks in the staff room. Student teachers indicated that there was a challenge in double session schools. They commented:

*As student teachers, we are expected to be at the school from the time the school starts up to the time it finishes (Teaching Practice circular 2013). Most double session schools start as early as 7.00am and end as late as 5.00pm. Since they are double session schools, there are two schools in one. What it means is that when the morning session learners give room to afternoon session learners, teachers should do likewise. There is no way one can remain in the staff room marking because the chair and the desk will be for the next teacher. As student teachers we are left with no option but to squeeze ourselves at the corners of the staff room or crowd in one of the Science offices. This is strenuous and makes us feel very uncomfortable. We feel there is no need for us to be at school when the learners we were teaching will have left. Meaningful and constructive work can still be done at home.*

One of the students in FGD1 also remarked:

*It is not anyone's fault that there are no adequate schools for the nation's children. Double sectioning is the best solution to our inadequate infrastructural facilities and all structures just have to adapt and adjust to what the situation demands.*

Of late, the availability and adequacy of furniture at college and in secondary schools provides opportunities for effective teaching and learning.

#### 5.4.3.11 Textbooks and stationery as hampering and / or facilitating the model

Textbooks are important in the teaching and learning of any subject. Responding to the question on the availability of textbooks in the college library, students and lecturers were disappointed by the state of the library. Students indicated that:

*We scramble for the limited old books that are in the library. The long and short of it is that the college library is poorly stocked and urgent attention needs to be taken. Responsible authorities should try and map a way forward since the library is the backbone of the core-business of the college, that is teaching and learning.*

Similar comments were given in some external examiners' reports that were reviewed that there is shortage of the latest textbooks for research by both lecturers and students.

One of the student teachers in FGD5 lamented:

*The library situation is pathetic, the few books that are there are old but surprisingly we are encouraged to cite current sources in our assignments. If the college has challenges in addressing the text book shortage in the library, it should at least try to upgrade its internet connectivity so that those who have laptops can easily access the internet.*

One of the former students of the college who is now lecturing there said:

*I am disappointed by the state of the library. When I trained here soon after independence in the 1980s, the library was well stocked. There were even libraries for each department that complemented the main library. What happened to these departmental libraries? I suggest they be revived because they are easily accessible to students in various subject areas and usually have the latest copies.*

The textbook situation in secondary schools is not very bad since they got a donation from UNICEF sometime in 2010. The textbook ratio in most schools that were visited was 1: 3. Science HODs indicated that:

*The textbook situation is not all that bad though we do not have a ratio of 1:1or 1:2. The donation that we got from UNICEF sometime in 2010 really helped us beef up the old ones that we had. The problem we have is that pupils lose the text books and when you ask parents to replace them, they rarely comply.*

Shortage of text books especially current ones has a bearing on the teaching and learning of Science.

Lecturers, students, Science HODs and mentors concurred that stationery is now affordable. They said:

*All learners do not have problems with exercise books, pens, rulers and pencils as they are now cheap and affordable. It is also good that all written work given to learners is now written on time as no learner waits to borrow a pen from a friend.*

Student teachers also indicated that:

*Because of very low prices that are charged on stationery we can afford purchasing manila for making our teaching aids.*

Lecturers were happy that:

*All the stationery that we require, we are given by the college.*

The affordability of stationery is seen to be enhancing teaching and learning since it is affordable to almost every learner, teacher, student teacher and lecturer.

#### 5.4.3.12 Financial resources as facilitating and/ or hindering the model

Finance is fundamental to teaching and learning. Responding to the question on how finance facilitates and / or hinders teaching and learning programs, the Principal and the Vice Principal indicated that:

*All activities at the college are based on finance. Laboratory equipment, laboratory chemicals, computers, textbooks, furniture and stationery require finance. All these are inadequate due to financial constraints.*

The Principal went on to explain that:

*Due to the fact that education was declared a human right, it has to be afforded by the majority that is why schools and colleges charge affordable fees so that all learners and students have access to education. Tuition fees that are collected from students and cadetship funds that are received from the MHTESTD facilitate the purchase of teaching and learning materials. The day to day running of the institution is as a result of finance.*

Concurring with the principal HSO8 indicated that:

*For lecturers to effectively supervise students on teaching practice, they are given an allowance for their breakfast and lunch. This motivates them to do their work earnestly.*

Similarly, in secondary schools, SHODs and mentors indicated that:

*The tuition fees and levies that are paid by learners ensure the purchase of teaching and learning materials. Textbooks, furniture and stationery are bought from tuition fees and levies. The day to day running of the schools is due to finance. We are grateful to the parents who heeded to the request by the former Minister of Education to pay teachers incentives since teachers' salaries are below the poverty datum line. Incentives motivate teachers to work very hard. Without finance, very little if not nil, teaching and learning can take place; therefore efforts made by all key players in education are commendable.*

#### 5.4.3.13 Transport facilities as enabling and / or constraining the model

Transport is very crucial in the day to day running of any organization, thus schools and colleges are no exception. Responding to the question on the state of transport at the studied college all lecturers indicated that:

*We are very happy with the fleet of cars that the college has managed to secure. As lecturers we are happy to be ferried by bus daily to and from work. We are not frustrated by saving bus fares from the meagre salaries that we are getting.*

HSO8 also remarked:

*Teaching practice supervision of late is no longer a problem because enough cars have been acquired for teaching practice. Because of the availability of transport, student teachers are supervised 5 times by college lecturers. This helps them to continuously get advice from lecturers throughout their teaching practice period.*

Adequate teaching practice supervision was also captured by external examiners in their report DTE/BS/19:2.4 that, *“in the majority of cases, students were adequately supervised.”*

Student teachers also indicated that:

*We are grateful to the college for securing as many vehicles as it can to facilitate teaching practice. Lecturers were able to supervise us 5 times due to the availability of transport. Even in the schools where we were, there was either a minibus or a kombi which ferried us for free to and from work.*

#### 5.4.4 Utilities such as water, electricity, and the internet as facilitating and / or hindering the model

Utilities such as water, electricity and the internet facilitate teaching and learning programs. Lecturers, students, SHODs and mentors commented much on electricity and the internet.

Lecturers and students felt that something is not right at college. HSO1 argued:

*Electricity load shedding is a national problem. The college went a long way to source generators to back up power cuts. The college prioritized the administration block, the library and the IT office block. Because of the size of the generator, there was need to connect all key places such as lecture rooms and Science laboratories. The Science laboratories are not connected to the generator, so when there are power cuts, any lesson that was conducted with the use of electricity ceases to be taught until maybe the next day.*

Students also had the same opinion that:

*The size of the generator in the administration block is quite big that it can lift the whole college including students' hostels. We feel it is under utilized as it can connect the laboratories and the lecture rooms with much ease. We keep our fingers crossed that one day the core business of the college will be taken into much consideration and teaching and learning facilities given first priority.*

Commenting on the water situation students said:

*We are happy that water is not much of a problem as we have learnt survival skills of storing it in containers ever since the city council started water rationing. We are also lucky that the college has reserve tanks and borehole water.*

HSO2 was not impressed about the internet facility at college as he identified it as another cause for concern among others. He said:

*I wonder why such a big institution like this college does not have technicians. The Science department does not have a qualified laboratory technician and there is also no computer technician. In secondary schools parents hire computer experts to teach their children and go on to pay those people but college fails to engage experts for critical facilities like the internet. College internet connectivity is very poor, if there was a qualified computer technician reasons for poor connectivity were going to be identified and sorted out. There is need to upgrade the internet facility as the Wi-Fi is not accessible in some places. One needs to go to certain points to continuously access wireless connection. I feel the college*

*is lagging behind in 21<sup>st</sup> century knowledge and skills. There is need to be adventurous and try out things like other sister colleges.*

Students were frank to say:

*The situation in some of the secondary schools where we were was far much better than at college. Schools had small generators to back up power cuts and were connected to the administration block and computer laboratories. Learners continued working in the computer laboratories despite the power cuts. The internet facility was also accessible at all times. Parents, through SDC ensured that it was always paid up. The person in-charge of the computers ensured that the internet was only meant for research purposes thus all the computers were commanded for research. Downloading of big files was prohibited. There were rules and regulations with regards to computer laboratories and this necessitated the easy management of the computers.*

*Like at college, water was stored in containers and tanks. Water rationing did not affect teaching and learning as it is storable. Major utilities such as water, electricity and the internet were prioritized as they are crucial to teaching and learning.*

Considering the fact that people's actions are conditioned by structures, such structures as bureaucratic, in-out-in, institutional, infrastructural, material and financial resources, utilities such as water, electricity and the internet are discussed as enabling and / or constraining teacher education programs. They are some of these structures which Bhaskar (1978) observes that,

*We will only be able to understand-and so change-the social world if we identify the structures at work that generate those events and discourses.*

#### 5.5 Cultural Discourses Offering Causal Explanation for Enablers and /or Constrainers of the 3-3-3 Secondary Teacher Education Model for Post 'O' Level Science

This section presents and analyzes data on cultural discourses that offer causal explanation for enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science. Archer (1995) views culture as an extremely wide ranging concept including all those things that are capable of being grasped, deciphered, understood or known by someone so that someone can be identified with a

particular society. In analyzing cultural aspects as enablements or constraints, Archer is mainly concerned with the discourses, theories, ideas, values, opinions, arguments, practices and beliefs (Archer, 1996) held by people that condition their actions. A similar stance is taken here where data on discourses, theories, practices, beliefs, ideas and opinions held by key players in the training and development of Post 'O'Level Science teachers are presented. Among the data, discourses held about the teaching profession, what science student teachers should learn how they should be taught and the skills, attitudes and values they should acquire are analyzed and presented among other relevant aspects.

#### 5.5.1.1 Discourses held about the teaching profession

Responding to the question on why people choose teaching as a career, various reasons were brought forward by the DTE official, the Principal and the Vice Principal, Heads of Departments and Heads of Subjects, mentors and student teachers.

#### 5.5.1.2 The discourse of the teaching profession as a secure job

All the participants concurred that:

*Teaching is a secure job. We chose the teaching profession for security reasons as we were assured of remaining in the profession as long as we live up to retirement. There is a permanent contract in the teaching profession.*

#### 5.5.1.3 The discourse of the teaching profession as an assurance of getting employment soon after completing the course

Students in FGD1 indicated that:

*We chose to be teachers because we knew that we were going to get employment soon after completion unlike in other professions where you have to start looking for the job after completing the course. Teaching provides readily available employment soon after graduating. In other professions at times you may not even find the job when they want certain years of experience in the job. We are also at an advantage because there is a shortage of Science teachers in secondary schools. Some of us who are lucky will even be deployed in town. We will not get to the remotest schools because we specialized in Science which falls*

*under critical skills. Some of us who are still young and energetic are also assured of employment in our neighbouring countries.*

HOD1 indicated that:

*When I completed teacher training 25 years back I was deployed to a boarding school where I had all the privileges that you can think of. I stayed there for 10 years and left to join this college. Science teachers had always been in demand especially lady teachers as you can see I am the only one among 5 gentlemen.*

#### 5.5.1.4 The discourse of the teaching profession as a prestigious job

Students in FGD3 indicated that:

*When we grew up we envied teachers very much. The way they dressed, the type of food they ate and the way they stood in front of us teaching. Everything about them was just good to us and felt one day we would join them as teachers. Yes they may be lowly paid, but the status of the teacher is respected. Teaching gives all the prestige as teachers are considered knowledgeable. They open up the minds of people hence we are proud to be teachers. Young children may disobey their parents, but they will always respect and make every reference to their teachers.*

M1commented:

*I grew up in rural areas. We were not exposed to any other jobs besides teaching, hence when we were asked what we wanted to be when we grow up, we were quick to say we wanted to be teachers. Teachers were very much respected in the community and they used to stand out as the most educated people. Even now teachers are still respected, both in rural areas, towns and in many societies. I am not regretting that I am one, as my self esteem is boosted when I stand in front of learners to impart knowledge to them. I may be lowly paid yes, but I find satisfaction in that I have opened up the mind of the learner. Remuneration comes secondary to me. I am proud to be a teacher, I even volunteered to be a mentor.*

HOD1said:

*I developed the interest in the teaching profession while I was still at school. I enjoyed explaining Biology concepts to other learners who had difficulties with the subject. When I realized my potential as a teacher, I took up teaching as a career and I enjoy imparting knowledge to the students. I also like it because it is one such profession that is good at molding one's character. As teachers, we are expected to be good role models for our learners thus preferred it so as to assist our young brothers and sisters to grow up to be responsible citizens.*

#### 5.5.1.5 The discourse of the teaching profession as a stepping stone

The DTE official mentioned that:

*Teaching is one such profession that provides opportunities for academic development. Once one joins the teaching profession, one becomes aware that in order for one to successfully teach, one should continue learning. As one continues to learn and acquire higher qualifications, better job opportunities open up. Different levels of educational institutions require different qualifications. For example, secondary and primary schools only require a diploma, teacher education colleges require a first degree and universities require a Masters degree. It is through teaching that one can acquire one academic qualification after another.*

He gave reference to himself:

*I began as an ordinary primary school teacher, then advanced with my studies and left for teacher education colleges and now I am at the highest institution of learning, that is, a university. I am not only lecturing but coordinating teacher education programs. I owe all this upward mobility to the teaching profession that instilled in me the zeal to learn and learn until I learn no more.*

The Vice Principal also used herself as an example:

*When I completed secondary education, I was employed as a temporary teacher. I did temporary teaching for 2 years then left to train as a Science secondary school teacher. When I had served for about 5 years I decided to advance with my studies. I did my first degree that gave me the opportunity to join teacher education. When I was here, I furthered my studies to attain a Masters' degree. As I speak now, I have already secured employment with one of the Science universities and will be leaving shortly. I believe it is through teaching that one feels like going higher and higher in education.*

#### 5.5.1.6 The discourse of the teaching profession as a last resort

One of the students in FGD5 indicated that:

*Honestly speaking, teaching never inspired me. Of course my father was a teacher but I was never inspired to be one. What I did not like about teaching is that my father would always carry pupils' exercise books to mark at home. I said to myself, I need a job which I will live at the work place and be free when I am at home. I also felt pity for him when he would spend the whole week indoors scheming when schools are towards opening. I concluded that although there are school holidays, marking and scheming would give me problems as a person who likes playing sport and watching television, where will I get extra time to do*

*all that donkey work? I applied for nursing but there was no response. I tried to be a police officer but could not finish the distance we were assigned to run in the specified given time. It was the same with air force; it needed physically fit athletes who would finish the 10 kilometers within 45 minutes. I could not make it. After all the trials and failures; I resolved to take up teaching as a career instead of wasting time looking for jobs that I was failing to get. I had no choice but to take what was on offer since all other avenues seemed to be closed, thus I had to join my father in the teaching field.*

Another student in FGD2 indicated that:

*After completing my 'O' Level, I got a place to train as a nurse that was the job I dreamt of and was happy when I applied, attended the interviews and was shortlisted. I am an outgoing person whom you can rarely find at home. During my first year my performance was not all that good. I had scored average marks in all the examinations; hence I proceeded to the second year. Nursing was not as easy as I thought it was. There were a lot of things to master. With my outgoing character, I could not sit down and take time to revise all what we were taught. I also went through the second year with gentleman's marks. Unfortunately, I could not make it in the final year. When I had failed, it was recommended that I go to one of the hospitals in the rural areas. Having been born and bred in an urban setup, I could not imagine myself in a rural hospital. That is how I dropped from nursing. Because I was desperate for a career, I had to apply for this three year program of teaching. It is interesting to note that I enjoyed teaching learners while I was on teaching practice. I now view teaching as a fascinating job.*

#### 5.5.1.7 The discourse of the teaching profession as a family job

M2 indicated that:

*I personally joined teaching because everyone in the family is a teacher. My father, mother, brother and two sisters are teachers. Teaching is the only job that I was socialized into while I was still young; therefore I had to take after my parents' career as I realized that our family was a happy one. During school holidays we would visit resort areas such as Victoria Falls and Matopo Hills. In teaching, I like the one full month school holiday, which allows families to spend time together unlike other professions.*

#### 5.5.1.8 The discourse of the teaching profession as an easy woman's job

Another student in FGD3 indicated that:

*I was influenced by my mother to do teaching. She told me that teaching was one of the easiest courses that any normal person cannot fail. My mother did teaching whilst she was already married but did not face any challenges even if she had to be taking care of the kids and at the same time doing assignments. Because I was an average person at school, I thought my mother's advice was good rather than thinking of taking challenging jobs that would give me a hassle.*

From the career choice perspective, the teaching profession is among the most vulnerable to extrinsic and material factors (Sahin, 2014) as evidenced in the various responses given by different participants. This, however, facilitates the training and development of nations' teachers through various models and the 3-3-3 model in particular.

#### 5.5.2 The discourse of the vision, mission statements and core values of the MHTESTD, DTE and the studied college as guiding the training and development of teachers

The MHTESTD's vision of guaranteeing Zimbabwe as a leader in the creation and use of new and existing knowledge, skills, attitudes and resources for quality higher and tertiary education guides the training and development of teachers. To understand how the Ministry fulfills its vision, and mission statement, the Principal clearly explained that:

*The Ministry, in trying to fulfil its vision, ensures that colleges recruit, train and develop teachers that are required by the nation. Policies are set on the recruitment criteria of student teachers. For example, all student teachers should possess 5 Ordinary levels including Maths and English. This ensures the quality of the teacher produced, who is able to fit in the global village. All student teachers are taught NASS so that they develop attitudes of patriotism. ICT is also compulsory to all students so as to equip student teachers with 21<sup>st</sup> century knowledge and skills. The Ministry also pays cadetship for students to ensure that the nation's teachers are produced.*

The Vice Principal indicated that:

*Because the Ministry's mission statement is to provide an effective system for the production of highly competent human capital, the Ministry's policy on the training and development of Post 'A' Level and Post 'O' Level certificate holders is clear. Post 'O' Level holders take a longer period of 3 years in training than Post 'A' Level holders (2 years). The longer period taken by Post 'O' Level holders aims at ensuring that on completion of the course, they are equally competent as Post 'A' Level certificate holders. Because the Post 'O' Levels will*

*not have done 'A' level, they definitely have to cover 'A' level content first, then go on to do college content. This is why they take longer than their 'A' level counterparts.*

The DTE's vision of being the leading teacher education institution for scientific based accreditation, research and teaching nationally, regionally and internationally also guide the training and development of teachers. In explaining the DTE's vision and mission statement, the DTE official indicated that:

*The Department of Teacher Education at the University of Zimbabwe aims at providing a scientific based teacher education accreditation system that supports colleges to excel in the provision of quality teacher education programs. This it does by monitoring and maintaining high standards in teacher education colleges. It continuously keeps in touch with the colleges through paying interim visits every beginning of the year. In these interim visits, evaluations for the previous year are made, identifying major successes and failures. How the successes were achieved is taken note of and reasons that could have led to the failures are stated. Such an evaluation serves as an eye opener to the colleges on how best they start and work on a new year. Each year's mistakes and problems are noted so that, if possible they may not be repeated. A way forward for the New Year is mapped out.*

*We also keep in touch with colleges during teaching practice and academic external examining. This is the time when University and college lecturers interact and learn from each other. As University lecturers we assess student's work that will have been supervised by the lecturers. College lecturers learn from University lecturers how to supervise students' academic work. As University lecturers, we give suggestions on how best students can be assisted.*

The following are some of the suggestions that were given by DTE officials on how best student teachers can be produced:

*It is high time you develop among your student teachers 21<sup>st</sup> century skills of ICT. Ensure that all students use the internet as well as authored texts in their assignments. When marking students' work, make sure that there are running comments that assist the student.*

*Research projects should be taken seriously and ensure that all students have mastered the research process by the time they leave college. Students must be able to identify areas that much research has not been done and endeavour to research on those areas since nations develop through research.*

*Science is a practical subject; therefore student teachers must be seen to be doing more practical than theoretical work. In fact, experiments must be conducted for the majority of the lessons that need experimentation.*

The studied college's vision, derived from the vision and mission statements of the MHTESTD and the DTE, of being a leader in the development of competitive secondary education teachers in the region and the world at Diploma level also guide the training and development of teachers. In response to the question on how the college develops competitive secondary school Science teachers, the Principal, the Vice Principal, HODs and HOSs unanimously agreed that:

*The college tries its level best to provide quality services to the student teachers. This is evidenced by the hard work displayed by the lecturers. Lecturers thoroughly research for their lectures, present them using PowerPoint, assign students work to do, set and mark examinations, supervise students on teaching practice and supervise students' projects. All this they do with the aim of producing high quality teachers who are eager to learn and develop themselves. Most lecturers are good role models to their students as they lead by example. They even work extra time during weekends and school holidays marking and supervising their projects.*

The core values of DTE and the studied college also guide the training and development of teachers. Professionalism, diligence, patriotism, integrity, creativity, moral uprightness (ubuntu/unhu) and pride in the teaching profession are some of the core values that provide a strong foundation in the preparation of teachers. How the core values were enforced was explained by the Vice Principal that:

*As a college, we try by all means to instill among our students the values of professionalism, diligence, integrity, creativity, moral uprightness and pride in the teaching profession. This we do through conducting assemblies with students and addressing them on issues pertaining to their conduct as teachers. There are also laid down rules and regulations that are clearly spelt out to each student on admission. Each student is given a copy that he or she reads and signs to indicate that he or she has understood the rules. Any student found to be violating the rules and regulations governing the running of the college is dealt with accordingly. Most of them are warned and counseled. In the majority of the cases most of them reform and tour the line. We even try to model expected behaviours as administrators and lecturers.*

The vision, mission statements and core values of the MHTESTD, DTE and the studied college guide the training and development of teachers. Ideas, beliefs, practices, values etcetera that are held can be understood as cultural enablements and / or constraints.

#### 5.5.2.1 The discourse of the college motto as guiding the training and development of teachers

In response to the question on how the motto, “we learn in order to teach” guides the activities of the college, lecturers and students contended that the college motto kept everyone at the college focused. All the participant lecturers indicated that:

*The college motto is sharp and to the point. We do not have any other business with students except to teach them how to teach. We continuously refer to this motto when some students decide not to take their work seriously. We ask them what they are going to teach their learners if they are failing the subjects they are learning to go and teach. The motto helps us to direct and re-direct our students.*

Students in FGD1said:

*The college motto is simple and straight forward that any student who enters the college will exit it as a teacher. This motto keeps us focused as to why we have come to college. Lecturers continue to refer to it when they see some kind of wayward behavior. They encourage us to learn what has to be learnt by a teacher then go on to cascade or impart what we have learnt to learners out there in the schools.*

The college motto acts as a tour guide to the students.

#### 5.5.2.2 Beliefs about what Science student teachers should learn

In response to the question on what people believe to be learnt by Science student teachers, the DTE official, the Principal and the Vice Principal, the HODs and HOSs, mentors and student teachers themselves, believed that:

*The three pure sciences, that is, Physics, Chemistry and Biology are key to pre-service Science teacher preparation. In addition to the three Sciences, Theory of Education, Professional Studies, Information and Communication Technology, Teaching Practice, National Strategic studies, Communication skills and Health and Life Skills are also important in the training and development of teachers.*

This is consistent with the content of teacher education curriculum as espoused by Darling-Hammond, (2006), Mamvuto, Kangai, Chivore and Zindi (2012) and Lynd, (2005). They all express what is valued for one reason or another in teacher education.

### **5.5.2.3 The discourse of offering the three pure Sciences (Biology, Chemistry and Physics) in training and developing secondary school Science teachers as the base or foundation for Science teacher education**

As discussed earlier, the 3-3-3 secondary teacher education model for Post 'O' Level Science was re-introduced in 2007 to alleviate the acute shortage of secondary school Science teachers that was caused by the brain drain as shown in

Table 5-6. Reviewed documents reveal that the Ministry of Higher and Tertiary Education changed its name in 2013 to the Ministry of Higher and Tertiary Education Science and Technology Development. This clearly indicates that there was a gap that was not addressed in the previous name. Science has ever been and will always be valued as it is through Science that new knowledge and discoveries are made. In his speech at the 2014 graduation ceremony at the studied college, the Deputy Minister of Higher and Tertiary Education Science and Technology Development said:

*Because we are now living in the 21<sup>st</sup> century where Science and Technology are the order of the day, more emphasis should be put on Science subjects and Information and Communication Technology. Teaching in tertiary institutions should adopt scientific methods of experimentation and discovery learning. Lecturers should desist from the traditional lecture methods and encourage students to be as resourceful as they possibly can.*

The Deputy Minister's advice is also in line with the 3-3-3 Post 'O' Level Science syllabus aims 2.2 and 2.4 which state that:

*The course aims to produce teachers with a sound understanding of new applications and advances in Science and Technology and develop teachers who will be able to improvise apparatus, assess pupils through assignments, practical and tests.*

The main objectives of the course are that student teachers should be able to:

- 3.1 relate acquired scientific knowledge to everyday life experiences*
  - 3.2 apply the problem solving approach in daily interaction with the environment*
  - 3.3 handle scientific equipment and implement appropriate laboratory management skills confidently*
  - 3.4 supervise practical lessons and mount demonstrations in the teaching of Science*
  - 3.5 use varied participatory methods applicable to Science teaching*
  - 3.6 demonstrate independent study techniques*
  - 3.7 link Science and Technology to human development and daily life in society*
  - 3.8 demonstrate innovation and improvisation of basic apparatus*
  - 3.9 use materials from the local environment in a sustainable manner and*
  - 3.10 present well researched assignments, practical, write ups and tests*
- (Source: DTE/UZ/HILL/SCIENCE/Post 'O'/12/2012)*

In response to the question on the extent to which the objectives are attained, different views were given by different participants. Heads of Science Department and mentors in secondary schools were not happy about the performance of student teachers when they receive them for teaching practice. They indicated that:

*Most of the student teachers lack Science content and fail to carry out the simplest experiments. We wonder if they were exposed to practical at college. We have a feeling that these student teachers are released prematurely to schools before having grasped adequate content to deliver to the pupils. They are very different from the Post 'A' level students you used to send us. Since they have not done 'A' level, we feel you need more time with them so that they can master the content.*

One of the SHODs went on to say:

*I suggest that instead of the first 3 residential terms before going for teaching practice, 6 terms would suffice. Considering the fact that the majority of the student teachers have no basics of pure Sciences, they should be given more time to study subject content. What this means is that the model should be re-structured from 3-3-3 to 6-2-1. This structure will give student teachers adequate time to learn as much pure Science content as they can before going out to schools for teaching practice. Two terms for teaching practice are sufficient for anyone who has adequate content knowledge of the subject and the one last term is also adequate for examinations.*

SHOD2 indicated that:

*Because of their weak performance, I am now reluctant to give them academically gifted pupils who do pure Sciences and allocate them weak classes that do Integrated Science only.*

Students indicated that:

*Science is a practical subject but most of the lessons we have at college are dominated by theory. Heads of Science Department in secondary schools are telling the truth that during our teaching practice we had problems in carrying out some of the experiments since we had not done any similar ones at college. We find that what we did in Integrated Science is shallow as compared to the pure sciences. We are of course working hard to improve on our performance. Group discussions with the few that did pure sciences benefit us a lot as we learn from them.*

Responding to the question on how they understand the content knowledge of Science, student teachers genuinely indicated that:

*Science is not an easy subject. We really struggle to understand the content that is being taught. We believe that if we had done pure sciences, we were not going to be facing the challenges we are currently facing. The course is really meant for those with pure sciences because they easily understand what is taught. The majority of us with Integrated Science are struggling to understand. Biology is not giving us many problems as most of the concepts just need time and patience to understand. With continuous revision, Biology concepts are easily mastered. Physics is also better to understand than Chemistry. The understanding of Chemistry is really challenging.*

This is consistent with Salome's (2013) observation that:

*The Chemistry curriculum content, teaching periods, methods of teaching Chemistry and lack of laboratory experiments might be some of the reasons that contribute to the negative attitudes towards Chemistry.*

Considering the fact that most of the students only did Integrated Science, students felt that:

*Our failure to understand Chemistry may be caused by lecturer student ratio which is very high (1:179, which is 55third years plus 123first years). There is only one lecturer in the department. This means that he teaches first and third years alone. We feel the lecturer is overwhelmed with work such that he has no adequate time to research and break down the content such that it is easily understood by students.*

HOSs for the three pure Sciences concurred with student teachers that:

*Most of the students in the three year program are under performing because of their Integrated Science qualifications that they hold. They did not do pure Sciences at 'O' Level. We have a mammoth task of teaching people who do not have the basic knowledge of the three Sciences. In brief, though harsh, we can say they are scientifically illiterate. Recruitment of under qualified student teachers compromises the quality of the Science teacher produced. We advocate for the recruitment of student teachers with the right qualifications if the training and development of Science teachers is to be fair and just.*

Commenting on performance in Biology, HOS1 indicated that:

*Almost all student teachers find Biology easy to handle. This is evidenced by the 100% pass rate every year. In addition to the fact that Biology is not all that challenging, the subject area has three lecturers. This is an advantage in the sense that the three lecturers have adequate time to research, prepare experiments and consult each other on how best to teach various topics.*

Student teachers were also happy about the way Biology lessons were conducted. They indicated that:

*In Biology we do experiments, that is, practicals in almost every lesson. We believe that these practicals are the ones that aid our understanding of the subject. Records indicate that every year we all pass Biology.*

Responding to the question on how student teachers perform in Physics, HOS2 indicated that:

*Most of the students are not doing well in Physics due to the fact that they are studying it for the first time. As lecturers, we are overworked as we are to first teach students Physics content, and then go on to teach them how to teach that content to the learners. We encourage students to work extra hard in order to at least get passing marks at the end of the year. Although we encourage students to read extra hard, they go out for teaching practice with inadequate content. I realized that they lack confidence when teaching. To build confidence among students there is need to give them more content. I feel this can be achieved through increasing the first residential period from 3 terms to 4.*

This suggests that the model be re-structured to be a 4-2-3 model. Like SHOD1, HOS 2 felt two terms teaching practice was adequate.

Student teachers commended their two Physics lecturers:

*The two lecturers we are having in Physics motivate and encourage us to work hard despite the fact that we did not do pure sciences. Because of their encouragement, we work tirelessly to pass. We really appreciate the effort they put to make sure that we master the Physics concepts with fewer difficulties. The majority of us pass Physics*

*though with weak passes. As such there are fewer students who fail Physics as compared to Chemistry.*

HSO2 commented:

*I am a curriculum specialist, for any curriculum to remain relevant, it must adapt to the demands of the situation. The situation on the ground is that Post 'O' Level Pure Sciences and Physical Science graduates proceed to do 'A' Level Science then enroll in Universities and Institutes of Technology. Colleges are then left with no option but to recruit the few Post 'A' Level graduates and those with Integrated Science in order for the institutions to survive. Colleges therefore, should re-structure the program as suggested, now that the recipients of the program are no longer the ones the program was targeting or intended for.*

Beliefs held by people are that pre-service Science teachers have to be well versed with all the three Science subjects, in order that they may be able to teach learners in schools. However, there is evidence that the majority of the student teachers in the three year program lack the science aptitude but efforts are made by both students and lecturers to acquire the basic knowledge and skills required of a Science teacher.

#### **5.5.2.4 The discourse of offering Theory of Education and Professional Studies as laying the foundation for the teacher education course**

When asked to justify the inclusion of each subject in the teacher education curriculum, Dick's (in FGD5) response was:

*Subjects like TOE and PS have greatly helped me to be someone who is equipped and knowledgeable about how certain theories can be applied into day to day lives of the education sector and the society at large. This alone has contributed enormously to my pride as a student who is able to distinctively apply concepts of philosophical, psychological and sociological theories of education than any other graduate teacher who has not undergone teacher training.*

HOD2 indicated that:

*TOE and PS aim at educating the hand, the head and the heart. The two subjects are the backbone of the teacher education course as they provide key aspects in the education and training of teachers. In TOE, Philosophy looks at what constitutes worthwhile knowledge, Psychology deals with theories of learning and development whilst Sociology looks at how the society and education relate. In PS, the ethics of the teaching profession*

*are dealt with. TOE and PS therefore equips student teachers with knowledge, skills, values and attitudes required in the teaching profession. The content knowledge (CK) of these subjects at the college is well taught by highly qualified specialists who know and understand the central facts, concepts and theories underpinning the subjects.*

This is compatible with the aims and objectives 2.1, 2.4 and 3.1 of the TOE syllabus:

*2.1 TOE aims at producing teachers who are committed to the teaching profession and can demonstrate an academic understanding of the principles of pedagogy.*

*2.4 The subject also aims at inculcating in student teachers values and attitudes consistent with the teaching profession.*

*3.1 The main objective of TOE is to enable student teachers to apply the theories and principles in Psychology, Philosophy and Sociology of education in the classroom situation.*

*(Source: DTE/UZ/HILL/TOE/Post'O'/12/2012)*

HOS4 went on to argue that:

*A teacher can hardly be mistaken for a police officer or nurse because of TOE and PS. The way teachers dress, talk and carry out themselves distinguishes them from any other professionals.*

This is in harmony with the main aims and objectives 2.1, 3.1 and 3.6 of the PS syllabus which indicate that:

*2.1 PS aims at producing a dynamic, competent and reflective teacher who practices the values and ethics of teaching.*

*3.1 To enable students to apply a variety of innovative teaching and learning approaches.*

*3.6 To manage the classroom and school environments in ways that reflects professionalism.*

*(Source: DTE/UZ/HILL/PS/Post'O'/12/201)*

Discourses held about TOE and PS are that they are the ones that make a teacher different from any other person as they provide the ethics of the teaching profession hence should be offered to student teachers.

#### **5.5.2.5 Opinions held about the offering of National Strategic Studies in teacher education programs**

In response to the question on how NASS benefits student teachers, HOS5 indicated that:

*NASS is a very important subject in a developing country like Zimbabwe where the economy is not stable. If it is not taught, I see a situation where we will be training teachers for countries with stable economies. NASS instills in students the sense of belonging. It teaches students to be patriotic citizens who love and serve their country despite the challenges the country is currently facing. Student teachers become aware that they belong to Zimbabwe, Africa and the world at large, as such they should be proud of their country, region and world and work very hard to develop their country and region as they are the leaders of tomorrow.*

He continued to say:

*A student teacher who goes into the schools and communities having been taught to appreciate national achievements and limitations is unlikely to be problematic when there are no teaching and learning materials in schools. She or he will be comfortable and willing to work with the head, other teachers, parents and learners to acquire the basic requirements so that pupils learn and pass.*

Students in FGD5 indicated that:

*NASS is as good as other subjects we are taught at college. It helps us to develop various competencies expected of a student such as listening, researching widely and be able to answer questions given. In addition to that we see NASS as sort of indoctrinating us to love and like our country despite the challenges it is facing. It instills a sense of hatred to the British who colonized us and make us see absolutely nothing good about them. We are not to be critical in any way as to acknowledge that this type of education we are trying to acquire was brought by them. They colonized us yes, but where were we heading to with our traditional education? We are trying to imagine our situation in this 21<sup>st</sup> century. NASS is good for us teachers who are expected to be apolitical and quietly teach learners in schools.*

According to the syllabus, NASS aims to:

- 1.1 equip student teachers with requisite intellectual, practical and attitudinal competencies at the service of the community, nation and wider world*
- 1.3 promote a student teacher who appreciates national achievements and limitations*
- 1.4 develop a student teacher who cherishes national dignity and hard work.*

Student teachers should be able to:

- 2.1 demonstrate qualities of ubuntu/uhnu, self respect and hard work.*
- 2.2 participate positively in community and national affairs.*
- 2.3 promote strategies that are compatible with the sustainable use of resources and the environment.*
- 2.4 observe human rights and balance them with responsibilities to the larger community and the nation.*

*2.7 develop home-grown strategies and solutions that benefit local communities and the nation.*

*2.8 appreciate local culture in its diversity*

(Source: DTE/UZ/HILL/NASS/Post 'O'/12/2012)

National Strategic Studies encourages student teachers to work very hard with what they have in order that their country, region and the world may continue to survive.

#### **5.5.2.6 Beliefs held about the teaching of Health and Life Skills as enabling teacher preparation**

In response to the question on their views or opinions about the importance of Health and Life Skills in teacher education programs, student teachers in FGD4 indicated that:

*HLS helped us very much during our first days at college. We were assisted by peer educators on how best to settle in a new environment. Health awareness on the pandemic HIV/AIDS and sexually transmitted infections were discussed in-depth such that we learnt of the expected moral behaviors of teachers as soon as we started the teacher education course. Issues on how to handle vulnerable children such as orphans and the abused fully equipped us with the school environment. Counseling as a component of HLS armed us with the techniques of assisting peers and learners with social problems.*

HOS7 indicated that:

*HLS molds student teachers' behavior such that they become good role models for their pupils. Without HLS, I strongly feel that student teachers were going to face serious problems when they were faced with challenging situations. HLS equips them with social and self survival skills.*

These responses are in line with the aims 2.1, 2.2, 2.3, 2.4 and objectives 3.1, 3.2 and 3.5 of the HLS syllabus that are to:

*2.1 provide accurate, comprehensive and up-to-date information on health and contemporary issues.*

*2.2 promote awareness of children's rights and welfare as enshrined in the United Nations and African Union Charter.*

*2.3 promote responsible social behavior*

*2.4 develop positive attitudes towards the infected and the affected with HIV/AIDS.*

*Student teachers should be able to:*

*3.1 develop an understanding of causes and effects of health issues and vulnerability.*

*3.2 identify and assist vulnerable children in schools.*

*3.5 apply community based care and counseling skills.*

*(Source: DTE/UZ/HILL/HLS/Post 'O'/12/2012)*

The aims and objectives of HLS indicate that student teachers need to be responsible for their health and that of their learners. This satisfies the saying that a healthy mind in a healthy body. When both the teacher and the learner are healthy, teaching and learning take place as expected.

#### **5.5.2.7 Discourses held about the offering of Language and Communication Skills in teacher education programs**

Responding to the question on their opinions about how Language and Communication Skills helps in training and development of teachers, students in FGD4 indicated that:

*Language and Communication is a very useful course for student teachers as it equips us with both verbal and written communication skills. Without the course, we would be ineffective teachers. As teachers, we are to be good communicators, both in spoken and written and as such we gain a lot in terms of how to present assignments in a scholarly manner. Since the course spells out the different purposes of reading, writing and speaking, we are well equipped and well informed in terms of language and communication.*

Responses were in agreement with the aim 2.1 and objectives 3.1, 3.2 and 3.3 of the syllabus that were to:

*2.1 equip student teachers with personal skills of communication and communicable language as teachers.*

Student teachers should be able to:

*3.1 speak effectively with accuracy, using appropriate register.*

- 3.2 inculcate a life-long reading culture.
  - 3.3 develop academic writing skills.
- (DRAFT SYLLABUS 2012)

From what the students believe to be important in the Language and Communication Skills course, teacher preparation is enhanced.

#### **5.5.2.8 The discourse of Information and Communication Technology (ICT) as the basis of the 21<sup>st</sup> century skills in teacher education**

The 21<sup>st</sup> century is a period of Information and Communication Technology and education institutions are expected to be adopting 21<sup>st</sup> century teaching and learning methodologies.

Responding to the question on the extent to which the college and secondary schools are adopting 21<sup>st</sup> century methodologies of ICT, student teachers in FGD2 indicated that:

*We are very happy that the ICT department introduced us to the computer skills course but we feel, the course took long to be introduced to us. We thought it was going to be introduced in our first year and as soon as we started lectures just like any other subjects. We feel that computer skills should be prioritized in this era of technology. We went through the whole first year without learning computers, only to be offered a one week intensive course in our third year. This we feel is really not in order and has to be revised. The one-week intensive program that came after teaching practice did not benefit us much as we were to master all the modules in that one week. When we got to schools some of the teachers were already using ICT methodologies in teaching thus we felt the college was lagging behind in equipping student teachers with the requisite skills and knowledge.*

However students in FGD3 indicated that:

*Although we had to spend one whole week doing computers, the two lecturers helped us a lot in acquiring the basic skills that are relevant to teaching. Pair work helped us assist one another as there are some who already had acquired the skills before they came to college. Lecturers were quick to identify those and asked them to demonstrate some of the skills to the class. Because we were taken through the course in groups, all of us had the chance to practice the required skills. Even during practical examinations, the lecturers ensured that we worked as individuals in order to find out if we had mastered all the skills in the syllabus or not.*

Commenting on how ICT is offered at college HOS3 said:

*ICT at college is far below the expected standard but there are a reasonable number of computers for both students and lecturers. ICT skills seem not to be prioritized as the course is offered to students while they are from teaching practice. Lessons are not well organized as they are only for one week. Students get into the computer laboratory from morning up to the time they dismiss without attending any other lesson besides ICT. The skills developed in that one week could be spread throughout their residential period at college so that they use each and every skill that they learn. Of course we understand that there are only two full time members to teach all the students, but sanity has to prevail in the manner computers are offered to students.*

*Internet connectivity is very poor, time allocated to students for research in the library is very little (30minutes), and the students' computer laboratory is only meant for lectures, when there are no lectures going on, the computer laboratory is always locked. I feel this is grossly underutilization of the computers. To make matters worse, the library only has about 10 computers but the students' computer laboratory has 60 desk top computers that are only used during computer lessons. If the computer laboratory could even be used for research purposes, it would go a long way in improving students' computer skills.*

Students in FGD4 suggested:

*There should be supervision and monitoring mechanisms that are put in place on how student teachers can effectively utilize computers that are always locked in the laboratory, only to be used during few lessons. Facilities should be used if they are available. Students need to research for their assignments, type and print them; therefore they should not be denied that opportunity.*

HSO6 was happy that:

*As lecturers, the ICT department tries hard to make sure all of us acquire the basic skills we need for teaching and learning. The short courses that they offer to us almost every term benefit us a lot as we are able to research for lectures, compile our notes, put our lectures on PowerPoint and present them. I am also pleased that the two lecturers are always readily available for assistance whenever one has a problem. The college is also doing well by using attachés from Universities to boost the number of lecturers in ICT, but it is high time the college increases its staff establishment as all departments seem to be understaffed. Two lecturers for all students and lecturers in ICT is really unmanageable. The two lecturers are really overwhelmed with work.*

HOS3 seemed to be having many issues concerning ICT as he went on to say:

*I wonder why such a big institution fails to hire a computer technician who will continuously upgrade the standards of ICT at college. As it is, other colleges now talk of granaries; the library system is computerized. The system of using pockets is overtaken*

*by events but we continue using outdated systems. All these facilities are possible with a computer technician. The college should move with the times. The 21<sup>st</sup> century is the time for ICT; therefore ICT methodologies should be adopted.*

Reporting on ICT in 2014's external examining meeting, the external examiner was not impressed about the way ICT lessons are conducted. She indicated that:

*According to the college timetable, ICT has only 2 teaching slots whereas PS, NASS and HLS, which have the same weighting in examinations, have 7 or 8 slots. ICT at this college is not accorded the status it deserves. Another issue you should consider as a college is to train ICT teachers as there are secondary schools that now offer computers up to 'O' level. ZIMSEC, our examining body is now examining learners on computers.*

Giving his comments on the extent to which the college is adopting ICT methodologies in teaching and learning, HOS 8 complained:

*The staffing situation in ICT is very bad. To have only two members teaching all the three groups of student teachers, that is, first, second and third years is not good at all. ICT is a practical subject, so we have serious problems when it comes to assisting each and every student. The lecturer-student ratio is unbelievable too high. If it were not for the University student attachés that we now receive almost every year, the quality of the lectures in ICT would be compromised. At least an addition of 5 or 6 more members in the department would be appreciated.*

The basic skills that students and lecturers acquire in computer studies go a long way in assisting them to research for assignments and lectures make PowerPoint presentations, type and print their work. Challenges are seen here and there as discussed, but ICT is functional at the college.

### **5.5.3 The discourse of coursework assignments, tests and examinations as determinants of students' success in the teacher education course**

Zimbabwe, like most developing countries uses the examination system to determine the success of learners. The education system is examination oriented, thus student teachers sit for an examination in the third term of their final year at college.

Responding to the question on examination procedures, the Principal and the Vice Principal indicated that:

*Examinations that students sit for are set by the University of Zimbabwe. Subject specialists at the college generate a pool of questions that cover a period of 3 years in their subject areas. These questions are then used by the University to set the examinations. Candidates are examined in 4 areas (DTE/BS/37/99) viz, Teaching Practice, Theory of Education, Main Subject and Professional Studies. Examinations constitute 70% whilst coursework amounts to 30%.*

They went on to explain that:

*The number and type of coursework assignments is determined by individual subject areas and approved by the College Academic Board (CAB). Students are expected to pass coursework before sitting for the examination. Students who fail assignments or practical work are given a second chance to rewrite the assignment or re-do the practical and a maximum of 50% is recorded. Failing assignments are moderated to satisfy that students submitted sub-standard work.*

Commenting on the examinations, students in FGD2 said:

*The 30% coursework and 70% examination seem not to be fair on us. We feel coursework and examinations at tertiary level should be balanced. After all, information that we master and use to teach learners is mainly acquired through coursework rather than the examination. The examination encourages us to just cram even without understanding as long as we will be able to recall the facts during the examination, present them as they are and pass.*

#### **5.5.4 The discourse of Action Research as promoting reflective practice in student teachers and laying the foundation of research skills**

In response to the question on how useful or beneficial The Action Research Project was to the students, students in FGD3 indicated that:

*The project is very beneficial to us as classroom practitioners. First and foremost we understand that as we go higher and higher with education to attain degrees, we will be expected to carry out research in areas that we are interested in. The Action Research Project therefore lays the foundation to the research skills that we should be having. This type of research encourages us to be very alert so as to identify problems faced by learners then come up with intervention strategies to minimize the problems. The research process of problem identification and articulation, stating the indicators of the problem and sub-problems, providing the statement of the problem, stating the*

*objectives of the study, and intervention strategies used to minimize the problem introduces us to research.*

*The guidelines we were given by PS to follow are straight forward. The PS department did us a favour by compiling and giving us the handout to continuously refer to as we write our mini-projects. What we do not understand is further explained; otherwise the handout is very clear. Most of us were able to identify problems faced by learners, articulated them very well and intervened the whole year we were on teaching practice to try and minimize the problems. It is easy to give recommendations to anyone who is likely to face the same problem as we have gone through the intervening process in different cycles.*

HOD2, concurring with the students remarked:

*Students are taught how to write projects in PS. The different types of research are covered but students, as classroom practitioners are encouraged to do Action Research. Action Research benefits both the student and the learners as students are expected to identify teaching and learning problems in their classes, observe how the problems manifest themselves, then come up with intervention strategies to minimize the problems. This helps students to be reflective practitioners who are able to identify learners' problems, their weak areas and work towards improving them.*

HSO3 seemed to be critical in most of the things. Commenting on the Action Research Project he said:

*Yes, the Action Research Projects that are done by students equip them with the research skills of gathering data to explain a phenomenon but we are tired of receiving the same problems from different students every year. Of course classroom problems are similar but I feel our students lack creativity. As lecturers we should try to probe them when they bring topics that we have supervised before. I feel they should identify something different from the common problems so that there is diversity. Honestly; I am tired of supervising the same topics every year.*

The mini project that students do provides a good foundation for research among Science student teachers as it equips them with skills of investigating and inquiry into everything around them. This is what is expected of a scientist, to be always skeptical about things and not just accept what has been proven by other scientists.

### 5.5.5 Opinions on how secondary school Science student teachers should be taught and the skills, attitudes and values they should acquire

There are different methods of teaching Science student teachers that lead to the acquisition of various skills, attitudes and values.

HOS2 indicated that:

*The ideal methods of teaching Science student teachers are child centered methodologies which include discovery method, research and presentations, experimental, group work, discussions, tutorials, demonstrations, excursions, problem solving, project method among others where students find out or unearth things on their own. These methods are suitable because Science is a practical subject, as such students must be actively involved as they learn the subject. The teacher acts as a guide in such methods.*

*Because of the large numbers of student teachers and the shortage of resources, at times the traditional teacher centered methods such as the lecture, question and answer, drill, explanation are adopted among other teacher centered methods. Although the apparatus and equipment in the laboratories is not commensurate with the large numbers of student teachers, we try by all means to minimize the lecture method as much as we can, considering the fact that Science is a practical subject. We have also tried to utilize and serve the little that we can by mainly using group work rather than individual work. Experiments are always carried out in groups. This reduces the amount of chemicals used.*

SHOD3 indicated that:

*Science student teachers should be exposed to challenging tasks in order to develop critical thinking skills. All efforts should be made to acquire the basic equipment or apparatus and chemicals to be used in teaching the three Sciences. Where students can improvise, they should be encouraged to do so. This makes them to be resourceful as Science teachers.*

*Demonstrations, experimentation, research and presentations, theory and practical tests, peer teaching should characterize Science lessons. Practice makes perfect, therefore student teachers should be exposed to peer teaching at an early stage so that they improve on their language as they explain concepts to their peers.*

Students in FGD4 also emphasized that:

*The teaching and learning of Science must adopt child centered methods where every student will be seen to be actively participating. Teacher centered methods should be*

*minimized at all costs as they encourage students to be passive recipients of knowledge. Lecturers should encourage students to improvise some of the apparatus where possible. The teaching and learning of Science should be interesting to the students due to the methods used so that we will be able to apply the methods we learnt at college in the schools. Every student must be actively involved.*

Responding to the question on requisite knowledge, skills, attitudes and values that Science student teachers should acquire during their course of training, all the participants concurred that:

*Science student teachers should have content knowledge of pure Sciences as it is key to Science teachers. It is this content knowledge that will distinguish and define the student as a Science teacher. Failure to possess such content knowledge results in ill talks about the student teacher that he or she is not good in Science. Learners may end up lacking confidence in such a student teacher. Some learners drop pure sciences due to lack of content by the student. Failure to possess such knowledge has also resulted in some students failing the course.*

SHOD2 indicated that:

*A Science student teacher should distinguish among the science of motion (Physics), a science of life processes (Biology) and that of behavior of matter (Chemistry). All the concepts related to these subjects as prescribed in the Physics, Biology and Chemistry syllabi should be internalized by Science student teachers. A wide scientific knowledge base is expected from Science student teachers. A student teacher who fails to acquaint himself or herself with such knowledge cannot be considered a good Science teacher who can be allocated a pure Science class to teach. That is why some students who lack this knowledge are asked to teach Integrated Science classes.*

A variety of skills must be acquired by Science student teachers. HOSs in the Science subject area and SHODs in secondary schools contended that:

*A science student teacher must possess manipulative, practical, questioning, drawing, listening, reading, communication, decision making, motivation, classroom management, counseling, research and computer skills. They should develop the skill of handling apparatus and also be able to identify learners with Science aptitude at an early stage. Failure to develop these skills is also tantamount to poor performance by the student teacher. Learners lack confidence in student teachers who fail to display these skills. Their lessons are dull and uninteresting. That is why some student teachers are allocated to weak classes because of lack of some of these skills. Some student teachers fail teaching practice due to lack of some of these skills.*

Science student teachers' attitudes and values should be positive. Mentors indicated that:

*Science student teachers should be curious, adventurous, inquisitive, analytic, persistent and investigative. Such attitudes will motivate them to discover things on their own. They should always be skeptical about things and not just take things as true. Student teachers who fail to possess such attitudes and values, lack creativity and diversity in their practice of teaching. They do not grow professionally thus they are not motivated to improve on their teaching techniques. Some students are allocated weak classes who do Integrated Science due to lack of these skills.*

HOS3 felt that:

*Student teachers should value hard work. A lazy Science student teacher can hardly do well since Science is a practical subject that requires one to be as industrious as a beaver. Learners lack confidence in lazy student teachers. Some student teachers have failed teaching practice because of laziness. Others have been denied the chance of teaching good classes with the belief that they will make them fail.*

SHOD3 indicated that:

*Science student teachers should appreciate Science and be able to apply it outside the classroom. Student teachers should be able to vary teaching methods so as to make the subject as interesting as possible. Through their teaching methods, pupils should like the subject and enjoy themselves studying it. Students who lack such attributes cause the learners to dislike the subject and view it as difficult. That is why some student teachers are asked to teach only Integrated Science.*

Opinions about the different methods to be adopted in the teaching of Science teachers enhances teacher education and training as the students will be equipped with the requisite methods they would be expected to use in the schools. The different methods would equip them with the requisite skills, attitudes and values expected of student teachers. Students who fail to acquire the requisite knowledge, skills, attitudes and values cause school HODs and learners to lack confidence in them. Some have even gone to the extent of failing teaching practice due to the lack of some of the skills required of a Science student teacher.

### 5.5.6 Beliefs about teaching practice as equipping student teachers with requisite skills for classroom practice

Responding to the question on how teaching practice enhances teacher training and development, student teachers in FGDI indicated that:

*Teacher education programs consist of theory and practice; hence any teacher preparation course without the teaching practice component will be incomplete. As distinct from the other professional graduates who are now flooding the teaching profession, our teaching practice experience has equipped us with wealthy experience of contemporary and innovative teaching methods which are participatory methodologies.*

Responding to the same question HOS6 posited that:

*The exposure of student teachers to the 3 terms (school calendar) of teaching practice gives them a realistic feel of the work place. The one year teaching practice is adequate for one to realize that at times educational theories and the actual practice are two different things altogether. It requires experience for one to actually produce the required practical aspect of an educational theory. This gives enough time for student teachers to try different approaches in one year.*

HOS4 indicated that:

*The teaching practice department works very hard to ensure that all student teachers go through teaching practice with less difficulty. Students are guided on how to prepare a teaching practice file where they file schemes of work, lesson plans, mark lists, syllabi, registers remedial and extension records and supervision crit forms. They are also shown how to scheme, plan, deliver and evaluate their lessons. They are encouraged to constructively mark pupils' work. Students are provided with a teaching practice circular that specifies what is expected of them while they are out on teaching practice. The codes of dress and conduct are spelt out in the circular. The circular acts as reference source or guide for the student teacher. The concluding remarks in the circular that: 'To teach is to touch a life forever' fully arm the student teachers as they go out on teaching practice knowing very well that they should make meaningful contributions to the lives of the pupils they are going to teach.*

Giving his comments on teaching practice, the DTE official indicated that:

*As DTE, we are more of assessors than supervisors. Our experience as assessors is that colleges do not spread supervision of student teachers evenly throughout the year. Colleges have the tendency of leaving supervision towards the final term of teaching practice which does not help the learner teachers much. More supervision should be done by subject specialists for the benefit of the student teachers.*

The comment on more supervision to be done by subject specialists was also raised by HOS3:

*Non-specialist lecturers observing subjects they are not well versed in defeat the whole purpose of teaching practice supervision. Observing a Science lesson requires expert knowledge. In addition to non-specialist lecturers observing subjects they are not specialized in, the quality of teaching practice supervision is also compromised by the number of student teachers supervised by each lecturer a day. Supervising more than two students during peri-urban teaching practice supervision compromises the quality of teaching practice supervision as it is done hurriedly with the intention of getting to the next school before lessons finish. Not much meaningful post-lesson discussion is done.*

Commenting on their teaching load while on teaching practice, student teachers in FGD2 indicated that:

*The 12-15 periods per week that we were allocated were favorable as they allowed for adequate time for scheming, planning, evaluation and marking pupils' work thoroughly identifying those who needed remediation or extension work. We also felt that teaching practice was well organized since we were attached to mentors who helped us grow professionally. They showed us how to draw schemes of work, plan for lessons and evaluate lessons after teaching. Mentors also assisted us in identifying good books for teaching particular topics and demonstrated some of the experiments to us. The whole orientation and induction to the teaching of Science and laboratory management skills was done by mentors.*

On the contrary, student teachers in FGD4 indicated that:

*There was very minimal assistance we got from our mentors. Some of the mentors were holders of non-teaching degrees and as such had no knowledge of what was expected of student teachers. They were assigned to be mentors due to the fact that they had served in the service for a long period of time. Such mentors never supervised us, they only produced crit forms when we requested for them.*

Another student in FGD5 had an interesting experience with her mentor. She indicated that:

*After the induction and orientation exercise, my mentor informed me that she was going to observe one of my lessons the following day. Because I had been informed of the supervision, I took my time with the laboratory assistant carrying out the experiment and writing down all the processes and conclusions. I did all the necessary preparations. The following day the mentor came and positioned herself at the side of the laboratory and observed me teaching. I introduced the lesson, developed it and concluded it very well. Learners took part in lesson development through carrying out experiments in groups, writing down the processes and what they observed. Before the learners left the laboratory, I ensured that all laboratory rules were observed. There was a post-lesson review where the mentor asked me to reflect on my lesson first before she commented*

*about it. I identified what I felt were my strengths and weaknesses then the mentor gave her comments and recommendations for future practice.*

From the way the mentoring was done, it was quite evident that the mentor had attended the mentorship workshop that was organized by the college. Teacher training and development is enhanced and / or hampered by teaching practice.

#### 5.5.6.1 Comments given about the teaching practice supervision Instrument used in measuring students' performance

Responding to the question on the importance of the teaching practice supervision instrument and the extent to which it assesses knowledge, skills, attitudes and values expected from a student teacher, HOS8 indicated that:

*The teaching practice instrument as a standard measure minimizes subjectivity and bias and tries to capture what lecturers feel is crucial to be developed and mastered by student teachers. The instrument assesses teaching skills of documentation and planning (25marks), lesson presentation (30marks), pupil learning (35marks) and professionalism (10marks). For that to be easily supervised the broad aspects are further sub-divided.*

Under documentation and planning, it is necessary to assess:

- 1.1TPfile: adequacy and quality of preparation (5marks).*
- 1.2 Lesson objectives: clearly stated and attainable (3marks).*
- 1.3 Introductions: relevancy, appropriateness and variety (3marks).*
- 1.4 Content: sequencing and quality (3marks).*
- 1.5 Planning for the use of chalkboard and teaching aids (3marks).*
- 1.6 Assessment: frequency and quality of written work, marking and record of marks (5marks).*
- 1.7Evaluation, remedial and extension work (3marks).*

In lesson presentation, it is important to look at the:

- 2.1Effective use of the introduction (3marks).*
- 2.2 Use of motivation techniques (3marks).*
- 2.3 Voice projection, clarity of explanation (3marks).*
- 2.4Questioning ability: type, frequency, relevance, distribution, handling of pupils' responses (3marks).*
- 2.5 Subject mastery, structuring of content (3marks).*

- 2.6 Interaction: teacher-pupil, pupil-pupil (3marks).
- 2.7 Variety of teaching strategies (3marks).
- 2.8 Use of time or pacing the lesson (3marks).
- 2.9 Management or control of the class (3marks).
- 2.10 Conclusion (3marks).

Under pupil learning, focus should be on:

- 3.1 Pupil participation (5marks).
- 3.2 Checking pupil understanding of content (5marks).
- 3.3 Learning through discussion (5marks).
- 3.4 Appropriateness of pupil tasks (5marks).
- 3.5 Catering for pupils' intellectual and emotional needs (5marks).
- 3.6 Pupil involvement in individual/pair/group activities (5marks).
- 3.7 Achievement of objectives (5marks).

On professionalism:

4.1 Attire, dress and

4.2 Attitude / conduct / mannerisms are assessed.

(Source: Teaching Practice Supervision Form)

HSO8 also commented that:

*For each and every skill assessed, a mark and comments are given by the supervisor or assessor. Overall comments and advice regarding what has been observed are written by whoever is supervising the student teacher. These comments assist the student teacher to improve on his or her weaknesses and further strengthen his or her strengths. Overall comments also guide the next supervisor who has to establish whether or not the student teacher improved on weak areas that had been highlighted.*

The supervision instrument finally grades the student teacher into nine grades as follows:

A+	90-100
A	80-89
B+	70-79
B	60-69
C+	55-59
C	50-54
D	45-49
E	40-44
F	0-39

(Source: Teaching Practice Supervision Form)

HSO8 also indicated that:

*For every student teacher to be supervised, he or she must be at the school, have a TP file and daily lesson plans. Any student found without a TP file or lesson plan(s) is awarded a mark not more than 39% as indicated in the teaching practice circular. The supervision instrument facilitates teaching practice supervision as it helps in establishing whether or not the student teacher has acquired the requisite teaching skills. There are however criticisms by other lecturers that the instrument is too objective yet there is more of subjectivity in the art of teaching. Although criticized, I find the instrument user friendly and trying to level the ground for everyone and minimize bias that might disadvantage student teachers. It brings about fair treatment to all students.*

Student teachers in FGD5 were also comfortable with the teaching practice supervision as they indicated that:

*The teaching practice instrument accommodates almost all the requisite skills that must be developed while we are on teaching practice. We feel it is good to have a standard measure that we are all measured against. It is also good that the instrument is exposed to us as early as third term while we will be doing our peer teaching. This is really a welcome decision; our lecturers really want us to pass teaching practice with distinctions. From the instrument, we come to know what exactly is required from us. The allocation of marks per aspect helps us see which aspects should thoroughly be worked on. Anyone failing teaching practice will not be serious at all about his or her career. The fact that we also become aware of public service dress code and awarded marks for appropriate dress really teaches us the ethics of the profession while we are still undergoing training. We feel the instrument brings about fairness to all of us as we are measured against the same standards. No one is advantaged or disadvantaged.*

It can be argued therefore that the teaching practice supervision instrument facilitates teaching practice as it helps in the development of various teaching skills envisaged to be acquired by student teachers during their course of training.

#### 5.5.6.2 The discourse of teaching practice supervision as carried out by non-specialists in the subject area

Secondary teacher education is structured differently from Primary teacher education. Primary school teachers are trained to teach all the subjects while secondary school teachers specialize in one or two subjects. A secondary school teacher becomes an expert in that subject.

Secondary teacher education colleges adopt a similar stance where lecturers teach subjects they specialized in. Physics specialists teach Physics, Chemistry experts teach Chemistry and Biology gurus teach Biology. The same applies to pedagogical knowledge; Psychology specialists handle Psychology, so do Philosophy, Sociology, Curriculum Studies and Professional Studies experts. The college under study offers other subjects through the 2-2-2 program. These are Geography, Mathematics, IsiNdebele, English, Chi Shona, French, Portuguese, Art and Design, Music and Physical Education and Sport. Likewise these subjects are taught by specialists.

The problem arises when it comes to teaching practice where any lecturer can supervise any subject except for the indigenous languages, that is, Chi Shona and IsiNdebele and foreign languages, French and Portuguese. There is a feeling by subject specialists that non-specialists cannot objectively supervise subjects they have no knowledge of. On the other hand, HOS8, the lecturer in charge of teaching practice has always argued that one needs not be a specialist in order to supervise a student. A good lesson can be detected. HSO3 argued:

*What is the purpose of teaching practice supervision? Is it not for assisting the student teacher to improve on her or his teaching skills in his or her area of specialization? If that is the case then, the way teaching practice is done here is not proper. IsiNdebele, Chi Shona, English, French and Portuguese lecturers are language specialists and might have last done Physics, Chemistry and Biology a couple of years ago at 'O'level. Honestly, to ask these lecturers to supervise these subjects and give meaningful comments to the student is doing injustice to the student, the learner and the entire teacher education system. I strongly feel there must be a way of going about this gross anomaly if we are to provide an efficient and effective Science teacher training and development program.*

He continued:

*This does not only affect lecturers at college level. I am also aware of lecturers at the University of Zimbabwe who are not Science specialists but come to externally examine Science students. To me that is not in order. The DTE is controlling standards in teacher education colleges; therefore it must assign subject specialists to assess our Science students. If the department of teacher education at the university does not have such specialists, it would rather use Science lecturers from other colleges who are aware of what it takes to be a Science teacher. Secondary teacher education assumes that every subject has its own peculiarities that distinguish it from the other subjects and that it what must be enforced. That can only be perfectly done by subject specialists. The assumption that any lecturer can supervise any subject is unlikely to yield positive results as there are few non-Science specialists who can objectively give constructive assistance to our Science students on teaching practice.*

Concurring with HSO3, HSO2 said:

*The fact that our students are assigned to Heads of Science Departments in secondary schools and Science mentors automatically signals the message that it is the Science teacher who can meaningfully assist the Science student grow professionally.*

In trying to establish the views of the students on non-specialist lecturers supervising them on teaching practice, students in FGD1 indicated that:

*As students we believe that all lecturers have the knowledge and skills of identifying what takes to be a good teacher. We have observed that non-specialist lecturers concentrate on methodology and do not check on whether the content we are teaching is wrong or correct. Wrong content is usually picked by our Science lecturers, otherwise all lecturers are familiar with the ethics of teaching and they usually give us constructive comments.*

The DTE official recommended that:

*For any meaningful supervision to take place, in the majority of cases, subject specialists should supervise student teachers on teaching practice.*

There is dissatisfaction on who supervises and assesses students on teaching practice. Science specialists strongly feel the way it is currently done seem to be compromising on quality.

### 5.5.6.3 The discourse of mentorship workshops as enhancing teaching practice supervision

As seen earlier, some of the mentors in secondary schools do a sterling job in mentoring student teachers while they are on teaching practice. Students confirmed that those who attended the workshop knew what was expected of them as mentors. Responding to the

question on how informative the mentorship workshop conducted by the college was, M1, M2 and M3 indicated that:

*We learnt a lot from the workshop that was organized for us as our duties as mentors were clearly spelt out. It really helped us in terms of how to effectively execute our duties. Through participatory methodologies, we were taken through the whole process of mentoring. The circular that we were given also reinforced what we had learnt. We will continuously refer to it when we are not sure of something for effective mentorship in schools. Because the circular indicates the contents of the teaching practice file that all student teachers should have, we will make sure that students' files have all the required documents. We hope the suggestions given on how best we can supervise rather than assess student teachers will really guide us. Going through and discussing the supervision instrument also equipped us with the skills of student supervision. The allocation of marks for specific areas is unlikely to give us problems since we discussed that in depth. It is good that you gave us the two documents, that is, the Teaching Practice Supervision Circular and the Teaching Practice Supervision Instrument attached together.*

HOS8 indicated that the three-day workshop's objectives were to:

- 1. Bridge the gap between mentors and lecturers on the quality of assessment.*
- 2. Explore solutions to challenges faced by students, lecturers and mentors.*
- 3. Create good rapport between lecturers and mentors in order to produce a quality teacher.*
- 4. Solidify a symbiotic relationship between students, lecturers and mentors.*
- 5. Improve the efficiency and effectiveness of mentorship.*

Giving comments on how mentorship workshops could be improved, the two mentors indicated that:

*There was no use inviting heads of schools since they rarely supervise student teachers. The ideal situation was to invite mentors and HODs so that they will go back and in-service other members in their departments. We also feel that we deserve a token of appreciation from the colleges since we are now partners in the training and development of the nation's teachers. We hear that you get some form of remuneration in cash or kind when you go for teaching practice supervision. A certain percentage paid by student teachers for teaching practice supervision should go to schools for onward transmission to the mentors.*

Similar sentiments were raised by the DTE official that:

*Now that colleges officially ask schools to mentor their students, which was not the case before, arrangements should be made to motivate mentors to execute their duties in good faith; otherwise school crit forms are not genuine at all, mentors may just be producing them without even observing lessons with the frustration that they cannot be*

*providing free service to the college. The workshops should be held regularly, maybe once in a year to discuss different challenges that arise from different groups of student teachers.*

The mentorship workshops bridge the gap between the college and the school. The student teachers become aware that what the college expects from them is what the school also requires.

#### 5.5.6.4 Opinions held about final teaching practice external assessment

Responding to the question on how lecturers, mentors and student teachers view final teaching practice external examination, all participants except the DTE official were not comfortable with the way it is done; HSO3 commented:

*As lecturers we are mainly concerned with the criteria used by teaching practice external examiners that is not known to us. We see no reason why the instrument used for final teaching practice assessment is not availed to us. We avail our teaching practice instrument to our students, mentors and DTE officials so that all of us speak with the same voice. What is prohibiting the external assessors to avail the assessment instrument to the lecturers if ever it is there, so that all key players are aware of what external examiners expect from the students, mentors and lecturers? Formative supervision of student teachers by both lecturers and mentors would be done taking into consideration almost all the aspects that are vital to the training and development of student teachers. As lecturers we feel summative evaluation of student teachers also takes us on board. If the student fails, the lecturers who would have supervised that student should know where both of them could have missed it, so that next time the lecturer emphasises on that weak spot among students.*

He continued:

*I raise this issue as a follow up on the comments given on the teaching practice examining report DTE/BS/19 which indicated that student teachers should be advised to keep remedial and extension records. Lecturers felt these records were more relevant in Primary Teacher Education Colleges than Secondary teacher Education Colleges that is why they did not emphasize on them. Had it been that the final teaching practice assessment instrument was availed to lecturers, the issue was going to be debated and both parties have a common understanding on the importance of the missing records.*

M3 also had the same opinion when he said:

*All the years we have been asking ourselves what exactly the external examiners look for among students. The college held mentorship workshops with us, gave us a circular to continuously refer to and the supervision instrument to use when supervising student teachers. We of course understand that the examination loses to be an examination when learners happen to get hold of it but it is different in skills development. We feel that the instrument should be availed to us so that students acquire the best skills that are required of a teacher. When we get feedback that students whom we were supervising failed teaching practice, we at times wonder how the student will have failed. It is our hope that in the near future external examiners will avail the instrument to us as mentors since we are working together in the training and development of our nation's teachers.*

Student teachers in FGD4 indicated that:

*Final teaching practice external examining is a 'do or die' encounter. We are always in the dark of what exactly external examiners expect from us students. They come in with their note books and we only see them writing. We always remain panicking, wondering what exactly they were writing. We see no reason why they do not avail their assessment instrument to the college so that it complements the teaching practice supervision instrument used by college lecturers. We believe that if their instrument is availed to the lecturers, mentors and students, our teaching skills will be very much improved. As university lecturers, we believe their standards are far ahead of college lecturers' thus the lecturers will be willing to tap those and enforce them on us.*

Failure to avail the final teaching practice assessment instrument impedes teaching practice in the sense that some students fail teaching practice because of some aspects that may not be emphasized by lecturers and mentors but considered important by external examiners.

#### 5.5.6.5 Opinions held about extra-curricular activities in secondary teacher education and training

Commenting on the importance of extra-curricular activities in teacher education programs, student teachers in FGD5 indicated that:

*There is a saying that too much work makes Jack a dull boy, hence various sporting activities, different types of clubs such as drama, music, dance, scripture union, public speaking and debate gives us the opportunity to relax and socialize outside the lecture room environment. Leisure time is good for a healthy body and a healthy mind.*

*The Ministry of Primary and Secondary Education's curriculum has extra-curricular activities as one of its components; therefore we should be exposed to them while we are at college so that when we get to schools we will be able to take up duties as patrons and coaches of various sporting disciplines*

Lecturers interviewed on the importance of extra-curricular activities also indicated that:

*Sport is good for students as they refresh their minds. There is no way we can take away sport from the students. After all, there are some people who earn their living through sport; therefore the various talents that the student teachers have should continue to be nurtured. However, extra-curricular activities need someone who is able to balance work with leisure since some students miss out lessons when they are attending competitions. They should be able to make up for the lost time.*

Extra-curricular activities help student teachers to break away from books to refresh their minds, which is good for their physical and mental health.

Considering the fact that historically, the cultural system is man-made, and is the product of people's past experiences (Archer, 1996), consisting of things held to be true or false by people, beliefs held by people about the teaching profession, what Science student teachers should learn and opinions on how they should be taught are taken to be cultural factors that enable and / or constrain the training and development of Science teachers. What people believed to be important in training and developing teachers long back, is still valued and practiced.

## **5.6 Agential Influences Promoting and / or Impeding the 3-3-3 Secondary Teacher Education Model for Post "O" level Science**

This section presents and analyzes data on agential influences that enable and / or constrain the 3-3-3 secondary teacher education model for Post 'O' Level Science. With the understanding that agency refers to the reflective, creative, innovative and purposeful actions of people (Archer, 1996) that compel them to make choices which either reinforce existing structures and cultures or transform them, actions taken and choices made by the DTE officials, the Principal, the Vice Principal, lecturers, School Heads, SHODs, mentors and students are presented. Analysis on how all those involved in the implementation of the model have dealt

with structural and cultural factors to facilitate and / or hinder the model under study is made. Their actions and choices in trying to reinforce or transform existing cultures and structures are analysed.

#### 5.6.1 The decision by the Principal, the Vice Principal, Science lecturers and the College Academic Board (CAB) to re-introduce the 3-3-3 secondary teacher education model for Post 'O' Level Science

As indicated earlier that people's actions are conditioned by structures (Archer, 1996), the disadvantaged structural position of the exodus of Science teachers due to the meltdown of the Zimbabwean economy and the brain drain (National Report on the Development of Education in Zimbabwe, 2004) needed urgent attention by the Principal, the Vice Principal, Science lecturers, the Department of Teacher Education and the entire college community. They were to decide on what to do in order for the institution and Science education to survive. This is in accordance with DTE regulations that associate institutions have the autonomy to develop, review and seek approval for new curricula and courses of study. Such reviews must follow procedures starting from recommendation to approval (DTE Handbook, 2012).

Responding to the question on how the Principal redressed the anomaly, the Principal remarked:

*When an alarm was raised by only three students who registered in 2006, (see Table 5-5), I sat down with the Vice Principal, Science lecturers and the Academic Board to deliberate on what can be done with the unpleasant situation. We resolved that we revert back to the three-year Post 'O' Level program. The requirements are 5 'O' Level passes including Mathematics, English and any of the following 'O' Level Science subjects (listed in order of priority) Physics or Chemistry and Biology, Physical Science, Extended Science, Combined Science. As we all know, passing symbols at 'O' Level are A, B and C. We then forwarded the application to DTE which was approved without delay thus we had our first intake in 2007.*

On the same note the Head of Department for Sciences (HOD1) indicated that:

*From 2004 when we realized as the Science Department that numbers were dwindling, we sought for ideas from colleagues and students on how best the college can attract*

*more Science students. Lecturers indicated that due to the expansion of universities and opening up of Institutes of Technology, there are slim chances of getting more Post 'A' Level Science graduates.*

Students indicated that:

*The economic collapse that has seen teachers getting meager salaries is contributing to less and less high school graduates willing to train as teachers.*

Both lecturers and students suggested that the college consider enrolling Post 'O' Level Science graduates so that schools at least have qualified Science teachers. The decision to enroll Post 'O' Level Science graduates aimed at ameliorating the unpleasant situation of failing to get Post 'A' Level Science graduates. The suggestion was taken up and implemented in 2007.

#### 5.6.2 The decision by students to enroll for Post 'O' Level Science secondary teacher education program

Data reviewed on the academic qualifications of student teachers who enrolled for Post 'O' Level Science between 2007 and 2009 revealed that students had the required qualifications. Explaining the recruitment trends in Sciences, the Head of Department for Sciences (HOD1) said:

*Most of the students we enrolled from 2007-2009 had done Physical Science at 'O' Level and got a "C". At that time, the few 'A' Level schools did not enroll learners with C grades, that is why they would enroll in teacher education colleges and polytechnics since their weak passes could not take them to 'A' Level even if funds permitted. In a way, 'C' was a passing terminal grade. As time went on, trends changed as more schools were accorded 'A' Level status, and learners with 'C' grade at 'O' Level proceeded to do their 'A' Level. While 'A' Level schools expanded, Universities likewise expanded and Institutes of Technology opened up. Post 'A' Level graduates could easily enroll with any University and Institute of Technology of their choice. This then led to few students with the required Sciences; hence most of the current crop has Integrated Science, a terminal Science subject.*

She continued to say:

*History repeats itself. The scarcity of students who qualify to train as a Science teacher has re-surfaced, and there is no way we can sit and watch the system collapsing, we have to act as we did in 2007. Lessons have been learnt that when the best is not available, make do with the rest, hence we will continue with a mixed bag of Science*

*students, since some with Integrated Science work hard and pass though with weak passes.*

The students interviewed on why they decided to enroll for Post 'O' Level Science, gave the following reasons. One of the students in FGD1 said:

*As for me, the reason why I decided to do Science is that I did not do 'A' Level because I went to school long back in the 90s when 'A' Level was not prioritized. I had been employed as a till operator for more than ten years but realized the importance of having job security. Because of age, I could not go back to school and do 'A' Level. Through interaction with various people, I got to know about this program and applied and was admitted.*

Another student in FGD2 frankly said:

*As for me, frankly speaking, I was forced by the economic situation to join the teaching profession as all avenues are closed. I wanted to be a nurse but I have failed to secure a place. Even though I did not initially want to be a teacher, I now enjoy interacting with a wide range of peers, lecturers and learners. I now feel that I made the right decision.*

The third student in FGD3 indicated:

*I did 'A' Level Arts, but decided not to take the 2-2-2 Post 'A' Level program because I realized that the 21<sup>st</sup> century requires more of scientific knowledge than Arts. I intend to advance with Science, now that there are many Universities offering Sciences. The course, though challenging since I left school long back, gives me a wide range of experience in Science as we tackle Chemistry, the most challenging, Physics, the average and Biology, the least difficult of them all.*

Students had their uncomfortable structural positions that needed to be acted upon and they decided to take up the course for varied and welcome reasons.

#### 5.6.2.1 Recruitment of under qualified student teachers

Science lecturers are not impressed about the continuous recruitment of students without the proper qualifications for the course. Complaining about the recruitment HSO1 argued:

*For the past four years I have been here, we have been receiving students who have no basics of Pure Sciences. These students struggle to get passing marks. According to the syllabus, the content that we teach should be equivalent to first year degree level work upon completion of the program, but we are left with no option but to water down some of the content to at least have a reasonable number passing. The solution to this*

*problem is not complicated, let us enroll the right candidates for this course or have a 4 year program for Integrated Science graduates.*

Commenting on complaints from Science lecturers about the recruitment of under qualified student teachers, HOD1 said:

*As I mentioned earlier on that history repeats itself and its events have to be recorded so that lessons can be learnt, college recorded what happened in 2006 and learnt that when students with the right qualifications are not forthcoming, it should not wait until the system collapses but should make do with what is there. It is unfortunate that all the current Science lecturers were not here in 2006 when the Science department nearly collapsed, if they were here they would not be complaining; instead they would be happy that at least they have Science students to teach.*

*Of course I understand their plight; it is really demotivating to teach a group of fifty or more students, only to get one or two passing the subject. I am appealing to them that we all do the best that we can and those who fail to go an extra mile in their spare time is not anyone's fault that they fail the course. I ask them to encourage students to read widely and consult whenever they are challenged. The worse situation we have is that most students did not do the basics of Chemistry and Physics and we only have one Chemistry lecturer, at least in Physics it is better since they are two. Efforts are being made to recruit more lecturers especially in Chemistry.*

*I have heard enough of these complaints and I am glad that this problem will soon be coming to an end in 2015. All the shortlisted candidates have either Pure Sciences or Physical Science. There is no one with Integrated Science. I am also happy that college has managed to employ one more Chemistry lecturer who will be joining the Science department next year, 2015. I am also keeping my fingers crossed that my career guidance workshops I have been carrying out in secondary schools encouraging learners to utilize the UNICEF donation will yield positive results. More girls should be seen to be trying out the pure sciences, though some still feel it is a male domain.*

*I feel it is up to us lecturers in teacher education institutions to go out into the schools marketing our programs because if we do not, the teacher education system will collapse in our hands. Teachers in schools cultivate the intellect, whilst we lecturers in tertiary institutions work on the diligence.*

HSO2 had this to say:

*I believe that the continuous intake of students without the requisite qualifications is not purposively done by the college; instead there are few students with the right qualifications. But the system has to continue functioning, therefore the solution is just but one, to take what is available. As a Biology lecturer, I have discovered that the students are not very bad in this component. I have advised them that the trick to pass*

*Biology is to continuously revise the notes I give them and try to master the basic concepts. During experiments, I ensure that each and every student has something to do and draw conclusions from that. I have also encouraged them to download and read as much Biology information as they can from the internet. Group discussions and presentations should be done even during weekends; they should find time to work with Biology content each and every day. With much effort put, most of the students normally pass the tests I give them.*

Students undertaking the Science program as discussed earlier are mature. Commenting on their failure to possess the right qualifications, students inFGD4 said:

*We are quite aware that we do not have the appropriate qualifications for this program but we could not ignore the offer when we were given. When we applied we were trying our luck since the qualifications were clear and specific. Luckily we were considered. We study as a group and in this group we have resolved that every day we carry out presentations on the topics that we will have covered with the lecturer to find out if we understood what was being taught. Each one of us presents and asks questions from the presentation. This has helped us a lot especially in Biology and Physics. So far no one in the group has failed the two components. We are still trying to come up with solutions to Chemistry. It is really giving us problems. We are hoping that the college will get another lecturer to assist the only one that we have. We feel that he is overwhelmed with work, thus he does not get enough time to structure his content simple enough to be understood by the students.*

Both Science lecturers and student teachers are aware that the majority of the students lack the requisite pure Science knowledge hence work extra hard to achieve the best that they can. A variety of teaching methods are adopted for better understanding of Science concepts.

### **5.6.3 The Decision to Use Various Methods of Teaching and Learning as Facilitating and / or Hampering the Model**

Lecturers and student teachers interviewed indicated that teaching is an art that requires a lot of creativity and innovativeness on the part of the teacher. Science, as a practical subject demands a wide variety of experiments, thorough preparation and time.

### 5.6.3.1 The decision to adopt demonstration and experiments in groups

HSO1 indicated that:

*I usually divide the students into groups of fours, demonstrate the experiment then ask them to take turns in groups to carry out the experiments, observing and writing the results. At times, I would want students to discover on their own if the experiment works. I would ask any volunteer student to try the experiment following the given steps. I also encourage the students to be persistent and curious to discover behavior of matter and explain any processes.*

Students in FGD 4 indicated that:

*When we were out on teaching practice we adopted our lecturer's methods of teaching. We also demonstrated to our learners then grouped them to work on the experiment in groups observing and explaining each and every step. Our Physics lecturer is a good role model of a Science teacher.*

As students and lecturers demonstrate and experiment, Science concepts are better understood.

### 5.6.3.2 The choice to use Inquiry and discovery methods

Science is a practical subject, and it is one such subject where students should discover things on their own. HOD1, a Biology lecturer, indicated that:

*I have done a lot of inquiries and discoveries with my students though most of them were done with plants due to ethical considerations that some experiments cannot be done with human beings. All students were actively involved where they would choose the plants they would want to study and work with until they complete the study. After that they would write their reports on their studies.*

Interestingly one of the students in FGD3 indicated that:

*I am yet to see new discoveries from the new scientists because I am convinced that what lecturers call discoveries to me are not discoveries at all. We are simply trying to prove and confirm what was discovered by other scientists long back.*

He emphasized:

*The Science curriculum must be designed in such a way that students who study Science must be in a position to discover what has not been discovered, unless if we are saying*

*everything under the sun has been discovered, yes there would be nothing else to discover. That is my understanding of the word, 'discover.'*

HOD1 responding to the student's comment indicated that:

*There is a difference between Science lecturers in colleges and teachers in secondary schools and scientists in universities. At this level, when we talk of discovering we mean that students and pupils should not be told by the lecturer or teacher that photosynthesis for example, does not take place when there is no sunlight but should carry out an experiment on that to prove that what has been discovered by specialist scientists is true. The student should just follow the experiment as given and produce the exact results that the scientist discovered since he is only a secondary school Science teacher but not a scientist at a Science university laboratory.*

Inquiry and discovery methods are suitable for Sciences. Decisions taken by Science lecturers to adopt such methods in the teaching and learning of Science keeps students well informed about the behavior of animals and plants.

#### 5.6.3.3 The decision to use individual presentations

Individual presentations have been utilized by lecturers and students during peer teaching and revision. HOS1 commented:

*When we are preparing students for teaching practice, that is, peer teaching, we normally use individual presentations. We ask each student to prepare a lesson plan on a topic of his or her own choice following guidelines on how to draw up a Science lesson plan. He or she must follow all laid down procedures as if preparing for learners in the classroom. The student then conducts his or her lesson with peers acting as learners. There is a post-lesson discussion after each and every student's presentation, his or her peers commenting on the lesson that was delivered. I come in at the end to give a complete evaluation. These presentations have helped students identify their weaknesses and strengths before going out for teaching practice. I always encourage the students to improve on the weaknesses before they leave for teaching practice.*

HSO2 indicated that:

*I normally use individual presentations during peer teaching and when revising for examinations. When we revise for Biology examinations, I task each and every student with a question that he or she individually answers and presents the answer to the rest of the class. As the student presents, the whole class will be taking down notes for that question and making additions where necessary. This helps students acquire answering techniques.*

HOS6 also indicated that:

*In Health and Life Skills we identify peer educators whom we train as facilitators. These peer educators are assigned tasks to research and present to the other peer educators. The peer educators are then assigned groups to teach. Each peer educator assigns different tasks to members of his or her group to research and present to the whole group. At the end, all students will have had a chance to present something to his or her peers.*

Student teachers preferred individual presentations to any other method of teaching and learning. Students in FGD5 said:

*Individual presentation is the best method of teaching and learning at this level. We say so because it really prepares us for the actual classroom environment where we will be faced with learners to demonstrate the experiments and explain concepts to them. This is the method we should be exposed to while we are at college. Lecturers are doing very well to encourage us to individually present different topics. Our confidence is built as we continuously present in various subject areas. There are of course a few instances where individual presentations have not successfully worked. Some students may decide just not to research for the assigned task and report that they are not ready to present. Because student teachers are adults, there are minimal forms of punishment that can be used to deter the behavior. Those who decide not to work on the task are counseled and asked to be responsible next time.*

#### 5.6.3.4 The decision to use lecturing and explaining

Science is a practical subject; as such there are few instances where the traditional lecture method is used. HOD1 indicated that:

*The traditional lecture method that is normally used with the mass subjects like Theory of Education, Professional Studies and National and Strategic Studies is at times used with practical subjects like Science. There is no way we can avoid lecturing to students about laboratory rules. Not all topics need experiments and in such cases, we will lecture and explain concepts whilst students take down notes. There are also instances where we run short of apparatus and chemicals. We cannot live the topic undone; instead we lecture and explain to the students. What is more important is that we lecture and explain in such a way that students master the concepts.*

HOS4, a lecturer in Theory of Education indicated that lecturing and explaining, which are done by all lecturers in TOE, PS, NASS and HLS, are the most applicable. She explained:

*Because of shortage of textbooks in the library and the nature of the subjects, lecturing and explaining are most appropriate in these subjects. The student teachers might be having the syllabus that indicates the content to be covered but may have problems in interpreting what exactly has to be mastered, and as such, we prefer to research, prepare notes and deliver the lectures while students take down notes. We of course encourage students to do their own research, as per the taught topic and write their personal notes to enhance the understanding of the topic. At the end of the year when they are presented before external examiners for final assessment, both lecture and personal notes are assessed.*

Students were also comfortable with lecturing and explaining both in Science and mass subjects. Students in FGD2 explained:

*When we did methods of teaching in Professional Studies, the lecturer who conducted the lecture was very clear on the choice of methods used when teaching. He indicated that the method should be suitable and justifiable. Science laboratory rules for example, are just clearly spelt out to the students without any need to experiment. How does one teach Science where there are no laboratories, chemicals, apparatus and textbooks? The lecture method comes in handy in such instances. How does a TOE lecturer involve 600 students in 1 hour 30 minutes participatory activities? Lecturing, though criticized for assuming that students are empty vessels that need to be filled and developing a culture of laziness among students, is unavoidable in such instances.*

There are many Philosophical, Psychological and Sociological theories that are applied in teacher education; hence the lecture method is most appropriate for covering the syllabus at a given specific time.

#### 5.6.3.5 The preference to use coursework assignments

Lecturers prefer using assignments for coursework to find out if students can widely research and be able to present their academic work in a scholarly manner. Science lecturers also give practical assignments where students work on an experiment and make a writeup for the findings in groups. HSO2 indicated that:

*In all the four aspects, that is Biology, Chemistry, Physics and Methodology we prefer giving students practical and written assignments. For the practicals, we usually group them in order to use fewer chemicals. We of course supervise them to ensure that all of them take part in the group assignment. Written assignments are usually given three to four weeks of research and writing. Students are encouraged to meet deadlines. In*

*instances where a student fails a major assignment, we assist the student by discussing the weak areas and ask the student to re-write the assignment. A re-written assignment records a score of 50%. The majority of the students does not fail coursework assignments as we encourage collaborative and team work.*

Students were happy with the way coursework assignments are handled at college. Students in FGD5 indicated that:

*In all subject areas, be it mass subjects, Sciences or ICT, lecturers do their best to ensure that we pass coursework. We are also happy about the system of re-writes, where the lecturer identifies your weak areas, discusses them with you before you are given the second chance to write. This really makes us grow in academic work. You find that most of us re-write the first assignment only because it would be our first time to be asked to write an assignment at tertiary level. We also welcome the 50% awarded for the re-write since we will have been shown how to tackle it, there should be a difference with those who would have got it right for the first time. We are also given enough time to research and present our work and we usually meet deadlines.*

Coursework assignments seem to be welcome by all students and they seem not to be having any challenges with them.

#### 5.6.3.6 The decision to adopt online teaching method as enabling and / or constraining the model

The college under study had just received a Computer Studies University student on internship. The student managed to create what he called e-classes. As a way of trying to adopt e-learning strategies that are encouraged by DTE, lecturers were encouraged to post their lectures to the e-classes for students to access. HOD2 commented:

*Now that all members in the department have acquired the minimum computer skills, all of us can utilize the e-classes that have just been introduced. I have so far seen four lectures, 2 from 2 lecturers in TOE and the other 2 from 2 lecturers in PS. If all of us can post as many lectures as we can, that will be commendable. Anyone who is challenged can seek assistance from those who have mastered the technique.*

One of the lecturers responded:

*Online teaching is very much appreciated in this era of technology. We are also all aware that DTE is emphasizing on e-learning. We are very grateful to the young man for*

*introducing e-classes to us but there are many mitigating factors to this. The lecturers might have posted the lectures but the intended beneficiaries might not have had chance to access them due to an array of factors. In the library there are only 10 computers to cater for a thousand or more students. Only a significant number of students have laptops. Only a few again have sophisticated cell phones that can access the internet. Internet connectivity is poor. The computer laboratory for students is not meant for research but for computer lessons only. In such a scenario, one wonders how miraculously the student teachers can access the information posted to e-classes. In this regard, online teaching needs a lot of ground work to be put in place before it can be fully adopted at this college. In the meantime lecturers can do both, that is, continue to attend the traditional lectures with students then go on to post what was taught to e-classes. This would go a long way in benefitting those who can access the internet and might have missed lectures with valid reasons.*

Commenting on online teaching methods, one of the students in FGD3 indicated that:

*Online teaching methods are a welcome move in this 21<sup>st</sup> century. We are grateful to the college and ICT department for exposing us to computer skills as we are now able to make PowerPoint presentations. It is unfortunate that we learnt these skills while we were back from teaching practice. Had we been equipped with the skills before we went out into the schools, we were going to apply them for the benefit of learners.*

Another student in FGD5 said:

*In the school where I was, some of the teachers were already using computers for teaching. All their lessons were taught from laptops and projectors such that learners had the advantage of copying correct spellings and punctuation. Because of lack of computers in most schools, our secondary schools are still lagging behind in ICT and you find that traditional methods of teaching are still being used by the majority of the teachers. As technology continues to advance, I hope our schools and learners will one day benefit.*

Due to scarcity of financial resources to purchase computers, most secondary schools are not utilizing ICT in teaching and learning. At college level, the situation has improved as most lecturers present their lectures on PowerPoint.

#### 5.6.4 The decision by the Science Head of Department (HOD1) to seek Science laboratory equipment from UNICEF

HOD1, dialoging with Heads of Schools established that UNICEF has laboratory kits that it is donating to secondary schools. Getting assistance from the responsible authorities in the Ministry of Primary and Secondary Education, HOD1 managed to source the donation for the college. She remarked:

*I saw it improper for student teachers to get to schools that have equipment that they are not familiar with, thus I decided to take it upon my shoulders to make sure that we also get something. At least the students will familiarize with the equipment while they are still at college and this will give them confidence.*

Bhaskar (1978) argued: *ask not what is different but what is absent*. HOD1 observed that if equipment that is in schools is not at college, students may have problems meeting it for the first time when they go to schools, then acted upon the missing structure and sourced the equipment.

#### 5.6.5 The decision to hold staff development workshops for lecturers as enhancing and /or hindering the model

Lecturers should always be up-to-date with what happens in the training and development of teachers. In order to keep abreast with teacher education curricula, the college set up a staff development committee to facilitate staff development programs. HOS7, the chairperson for the staff development committee indicated that:

*As a committee, we carry out a needs analysis exercise where we identify what lecturers need to be staff developed on. Critical areas identified are ICT, Teaching practice and research. Lecturers feel these should be periodically held as they are likely to improve the standards of training and developing teachers. Through these areas, lecturers continue to acquire requisite knowledge and skills to be used on their day to day interaction with student teachers.*

A lecturer in TOE commented:

*When I joined the college in 2008 I had no knowledge of the computer, but due to the short courses I undertook every term, my computer skills improved and they continue to improve as I research for lectures, type marking guides and course outlines.*

*I owe gratitude to the IT department which makes efforts to equip all lecturers with the knowledge and skills that are relevant to their duties as lecturers. Typing, copying and pasting, creating folders, inserting tables, using PowerPoint, and posting lectures to e-classes are some of the relevant skills needed by lecturers. All these must be known by lecturers in order to effectively execute their duties.*

Because lecturers supervise different student teachers every year, observations for each group of students are discussed in a workshop, lecturers presenting what they came across in the schools. One lecturer once asked:

*What do I do when I observe a lesson where a student teaches wrong information to the learners? Do I stop him or her, or I let her or him continue up to the end of the lesson?*

First response:

*The student should be stopped, taken out of the classroom and be told that he/she is misleading pupils.*

Second response:

*The lecturer should not disrupt the lesson, let the student teach up to the end of the lesson and bring it to his/her attention during post-lesson discussion that he /she was teaching wrong information to the learners.*

HOS7 commented:

*As you can see, we are faced with such dilemmas when supervising students on teaching practice, hence conducting workshops now and then helps us come up with suitable strategies on how best we can supervise student son teaching practice. We continue to learn from different individual experiences.*

Lecturers also supervise students' projects. One of the junior lecturers who was supervising research for the first time indicated that:

*When I did my degree at the University, I was exposed to a research project that had 5 chapters but here I was given a guideline or handout on Action research with 4 sections. Honestly speaking, I am in the dark on what I should expect from the student. I greatly need assistance so that I become of good use to the students.*

In response HOS7 indicated that:

*Action research at diploma level is one of the easiest to supervise. The student should identify a learning problem in his or her class. He or she should be able to explain how the problem manifests itself in the background of the study. The objectives of the study are not different from the traditional research you are used to. The student should then come up with intervention strategies on how to minimize the problem among his or her learners. These intervention strategies are given in cycles. With these few explanations, I hope you will be able to follow the guideline or handout. I can also advise you to laisse with one of the members in your department to assist you and if possible give you a sample copy of an Action research project. I am sure that you will soon understand it.*

Staff development on ICT, teaching practice supervision and supervising research projects enhances teacher training and development.

#### 5.6.6 The decision to adopt and conduct mentorship workshops for mentors and heads of secondary schools

The decision by DTE that colleges operate on a tripartite system which includes the University, the college and the schools promotes effective supervision of student teachers in schools.

HOS8 indicated that:

*The workshops that were held in the three provinces in 2013 went a long way in addressing pertinent issues affecting student teachers on teaching practice. Heads of schools were concerned with the unprofessional behavior of student teachers. Absenteeism, drunkenness, dressing, refusal to supervise extra-curricular activities, were some of the issues raised by school Heads. I explained that students should abide by all regulations binding qualified teachers, and they should not be exempted from any school activities.*

Mentors in schools indicated that:

*Mentorship workshops were long overdue. We started supervising your students long back but it was just a 'hit or miss' because we did not know what exactly you expected from us as mentors. We were facing challenges with students who would refuse to take allocated classes and ask mentors to give them classes of their own choice. Now that we*

*are aware of our roles, we are going to be strict with the students since they were taking advantage of our ignorance on how exactly we should handle them.*

The Lecturer in charge of teaching practice (HOS8) appealing to the mentors said:

*We appeal to you to be genuine and as objective as you possibly can when allocating marks. If a student is under performing, that should be seen by the mentor first before the lecturer comes. We also ask you to provide detailed comments on the performance and conduct of the student so that the student is best assisted to acquire the requisite knowledge, skills, attitudes and values expected of a student teacher.*

Mentors were open to air their views:

*Now that we are assisting you lecturers in the training and development of teachers, we hope we won't be wrong to expect a token of appreciation from college. There is a lot that is expected from us, hence we request you to motivate us with anything that you feel is worthy thanking someone who has provided you a service. We will take anything on offer.*

Mentorship workshops provide a strong relationship between lecturers and mentors, as they promote the speaking in one voice to the student teacher. The decision to hold such workshops empowered mentors who are now having a task of participating in the training and development of teachers.

#### 5.6.6.1 The decision to consider external examiners' yearly recommendations regarding the library

The library, as the backbone and source of knowledge, is the focal point of the college. Year in and year out, external examiners have recommended that the state of the library be improved. Complaints have been raised on the shortage of books. The few books that are there are old and outdated. In 2014 the reports shifted as it was indicated that efforts are being made to purchase current books. Psychology, Philosophy, Sociology, Physics, Chemistry and Biology had a stock of new books though few for the numbers.

The efforts made by the college to source recent books will enhance teaching and learning since students will get the chance to reference current information. Science continues to come

up with new discoveries, therefore lecturers and students should keep abreast of the new knowledge.

#### 5.6.6.2 Failure to connect the generator in the administration block to the science block

Zimbabwe Electricity Supply Authority (ZESA) load shedding has taught people to seek alternative means of power. The college took a good stance and purchased a huge generator that, according to reliable sources, can lift the whole college. The administration block, the library and IT office block are connected to the generator.

HSO2 commented:

*The College fails to recognize that it is through Science that generators were designed. We are failing to conduct lessons whenever there are power cuts but there is an underutilized generator that can be connected to the Science block. If this problem is not solved we will continue to produce half baked Science teachers who can hardly carry out experiments. Science laboratories should always have electricity and water, without these utilities, Science teaching is not productively conducted.*

Because of failure to connect the generator to the Science block, the teaching and learning of Science is hampered.

#### 5.6.6.3 Failure to increase staff establishment

Reviewed documents indicate that all the departments at the studied college are understaffed. External examiners' reports dating back to 2008 report on the same issue of inadequate staff. The Principal's response to that is the freezing of government posts. The Principal indicated that:

*Until the government lifts the freeze, the college will continue to experience the academic staff shortages. The situation is gross in Chemistry, where only one lecturer teaches all the three groups of students that is first, second and third years. He also has to give all these students assignments and mark them. During examinations, he marks all the scripts. The Chemistry lecturer is overwhelmed with work; no doubt students do not fare well in the subject. The subject might be challenging as students claim, but it is*

*worsened by the fact that they are taught by one person; there is need for variety and change.*

With the shortage of subject specialists, the teaching and learning of the subjects is compromised. It is not easy for one person to do a job that has to be done by three or four people.

#### 5.6.6.4 Failure to engage qualified laboratory assistants

One of the student teachers inFGD5 commented about failure to engage qualified laboratory assistants both at college and in schools.

*FGD5: The failure by the college and schools to employ qualified laboratory assistants compromises the quality of the teaching and learning of Science. At times I left some topics untaught because I was afraid to carry out experiments that we had not even done at college. My mentor would be too busy to help me prepare the equipment and chemicals for the experiment. As a teacher who teaches examination classes, she is either marking pupils' work or teaching, she has a tight schedule. Schools should consider engaging qualified laboratory assistants if Science is to be effectively taught.*

HOS3 commenting on failure to engage qualified laboratory assistants said:

*We understand that the government has frozen its posts, but the college should try and make efforts to make up for the freeze. There are students from polytechnic colleges who may want to come and do their attachment here; it is up to the college to advertise that we need laboratory assistants. It is better to work with attachees than to completely have nothing at all. We cannot sit and wait for unfreeze, which we do not know when it will be effected. This negatively impacts on the teaching of Science.*

The problem of lack of qualified laboratory assistants both at college and in schools leaves a lot to be desired. The question arises as to why both Ministries do not consider them as necessary and desirable. If they are not desirable, the unqualified ones in schools and at college should not be seen to be there either.

#### 5.6.6.5 The decision by some school heads not to take student teachers for teaching practice

Some of the school heads no longer take students for teaching practice. In one of the graduation ceremonies HSO8 said:

*I wonder why you continue inviting this head to our graduation ceremonies yet he has stopped taking our students for teaching practice.*

The member of the graduation invitations committee asked:

*Why is he no longer taking them?*

HSO8:

*There was a case of this Science male student who was alleged to be robbing pupils of their pocket money. The student, of course had problems and a fail and repeat was recommended. What I do not like is to paint all the students with the same brush. What Dick did is not guaranteed that Sam will also do. If I were in the Invitations committee, I would not be inviting him.*

Member of invitations committee:

*As Invitations committee, we would not be aware of some of these issues. Next year we will not invite him, we have no reason to, after all what will he be celebrating without any student he assisted?*

The dialogue between the lecturer in charge of teaching practice and one of the members in the Invitations Graduation Committee at a graduation ceremony reveals that there are some heads of schools that have all the autonomy to do as they please in public institutions. Such negative decisions hamper the training and development of teachers as the school in question is one of the peri-urban schools with standard Science laboratories that can be utilized for training and developing Science teachers.

5.6.7 The decision by some school Science HODs to allocate student teachers weak classes that only do integrated science

One of the Science Heads of Department in secondary schools (SHOD1) indicated that:

*Student teachers in the 3-3-3 Science program lack content, so I do not make a mistake of allocating them good classes that do pure Sciences; instead I give them weak streams that do Integrated Science. They perform better there.*

Responding to what some SHODs are doing HOD1said:

*The decision by some school Science Heads of Departments to allocate student teachers to teach Integrated Science is contrary to what the college expects from schools. The college expects schools to expose student teachers to the three pure Sciences while they are on teaching practice. What some SHODs are doing defeats the whole purpose of teaching practice as students should practice teaching the three pure Sciences. This will further impact negatively even after completion because they would not have confidence to teach the three Sciences. Practice makes perfect, everyone involved in one way or the other in the training and development of teachers should allow them to practice as much as they possibly can.*

Taking into consideration that naturally people act on cultures and structures that confront them, actions and choices made by the DTE officials, the Principal, the Vice Principal, lecturers, heads of schools, heads of the Science department, mentors and student teachers are explored as agential influences enabling and / or constraining the 3-3-3 model for Post 'O' Level Science.

## 5.7 Summary

This chapter has analyzed and presented data on the rationale behind the re-introduction of the 3-3-3 secondary teacher education model for Post 'O' Level Science. Structural, cultural and agential influences enabling and / or constraining teacher education programs have been presented. Bureaucratic structures, institutional structures, infrastructural and transport facilities, material and financial resources, utilities such as water, electricity and the internet have been analyzed and presented as structural factors enabling and / or constraining the model. Discourses held about the teaching profession, beliefs about what Science student teachers should learn; knowledge, skills, attitudes and values they should acquire during their course of training and the methods that should be used for training and developing student teachers were analyzed and presented as cultural factors. People act on structures and cultures which confront them. Those actions either reinforce or transform the structures and cultures. Actions and decisions made by DTE officials, the Principal, lecturers, Heads of schools, Heads of Science departments, mentors and student teachers among other people are analyzed and presented as agential influences that enable and / or constrain the 3-3-3 model. The next chapter discusses the findings of the study.



# CHAPTER SIX

## DISCUSSION OF THE FINDINGS

### 6.1 Introduction

This is a theory driven study, therefore, the discussion in this chapter is conducted in light of Archer (1995) and Archer's(1996) socialist realist analytical framework which suggests that underlying causal mechanisms at the level of the real, can best be analysed using the concepts of structure, culture and agency. These have to be analysed separately as they are separate phenomena that have separate causal affect. However, in her morphogenetic approach to reality, Archer points out that in real life, these concepts are not separable. They are intertwined, simultaneously influencing each other. Events are being shaped and re-shaped by the interplay between these three.

A clear understanding of enabling and / or constraining factors in pre-service teacher education models, therefore, requires an interrogation of the interplay between structure, culture and agency in order to establish what enables and / or constrains the models and how the models are enabled and / or constrained.

The discussion presents the three major themes, that is, structural facilitators and / or hindrances, cultural enablers and / or constrainers and agential promoters and / or impediments separately as presented in the findings of the theory based research questions. Because the reality is that structures, cultures and agency intermingle (Archer, 1995) and Archer,(1996), an attempt is made to show that interplay, as seen from Mudzielwana and Maphosa's (2014) study. But in situations where the interplay is somewhat not clear, a separate discussion of each concept is done (as presented in Kahn's, 2009 study), with the aim of

capturing the unique and autonomous properties and powers that each concept has, in enabling and / or constraining the 3-3-3 model.

## **6.2 Structural Factors Facilitating and / or Hindering the 3-3-3 Secondary Teacher Education Model for Post 'O' Level Science**

This section discusses structural factors that were found to be facilitating and / or hindering the 3-3-3 model for Post 'O' Level Science. The disadvantaged structural positions of the shortage of Science teachers in secondary schools and the dwindling numbers of Post 'A' Level graduates in secondary teacher education colleges were identified as some of the major factors that led to the re-introduction of the 3-year Post 'O' Level program that was terminated in secondary teacher education colleges long back in 1992. The bureaucratic and In-Out-In structures, institutional structures such as the family, the Department of Teacher Education at the University of Zimbabwe, the college under study, secondary schools, infrastructural facilities, material and financial resources, transport facilities and utilities such as water, electricity and the internet were discussed as some of the structural facilitators and / or hindrances of the 3-3-3 model. These structures conditioned people's actions thus they acted in ways that enabled and / or constrained the model. Below is a discussion on each one of them.

### **6.2.1 The disadvantaged structural positions as promoting the re-introduction of the 3-3-3 model**

#### **6.2.1.1 The acute shortage of Science teachers in secondary schools**

In the study, the researcher noted that the acute shortage of Science teachers which resulted from the brain drain as most teachers left for greener pastures in neighbouring countries such as South Africa, Botswana, Namibia and Australia (Chronicle, 02, 09) among other countries, disadvantaged many learners. A disadvantaged structural position was created in secondary schools due to belief systems that other countries offer better remuneration. Because learners were left with two or three qualified Science teachers (Table 5-6), few managed to do Sciences

up to 'A' Level. Despite the fact that Zimbabwe was facing economic challenges that forced teachers to leave the country, studies indicate that Science teacher shortage is a global issue, affecting United States, United Kingdom, Canada and Australia(Ososki, White, Morago and Sickle,2006).This shows that globally, the teacher-pupil ratio in Sciences is high, hence teaching and learning is negatively impacted. This could probably be one factor among many that contributes to fewer learners taking up Sciences up to higher levels.

The study also revealed that the few learners who studied Sciences up to 'A' Level preferred taking up courses in Universities that would award them degrees as compared to colleges that would offer them diplomas. This again corroborates with Clewell and Forcier(2000) cited in Ososki, White, Morago and Sickle's (2006) observation that few students who take up Sciences up to higher level rarely choose teaching as their career. They view teaching as having poor social status with limited opportunities for advancement. They also observe that teaching salaries are comparatively low as compared to those of other Science professions.

The acute shortage of Science teachers, therefore, resulted in few learners taking Science sat Advanced level; hence, necessitating the re-introduction of the 3-3-3 model for Post 'O' Level Science in secondary teacher education colleges.

#### **6.2.1.2 The dwindling numbers of Post 'A' level Science graduates**

The study also established that the dwindling numbers (Table5-5) of Post 'A' Level Science graduates doing the teacher education course was most probably caused by the expansion in universities and the opening up of Institutes of Technology. When there were many students taking up the teacher education course, universities were few and did not have many Science programs; hence had pitched their entry points high. As universities expanded, with more Science programs and Institutes of Technology opening up, more Post 'A' Level graduates took up courses with universities and Institutes of Technology. The belief system, as discussed earlier on, that Science courses pay better than the teaching profession existed. As more Post 'A' Level

Science graduates enrolled in universities and Institutes of Technology, only a few were left to take up the teacher education course in colleges.

In light of the researcher's observation discussed above, there were few Post 'A' Level Science graduates registering for the teacher education course, hence, a disadvantaged structural position was again created in teacher education colleges. Urgent measures were to be taken (by agency) before Sciences became extinct in colleges. Although the structural positions were disadvantageous, they paved way for the Post 'O' Level Science program, hence acted as enablers. This is in line with The National Report on the Development of Education in Zimbabwe (2004) that programs are constantly reviewed and revamped to cater for new demands and emerging issues. It had emerged that secondary teacher education colleges could no longer attract Post 'A' Level Science graduates, therefore urgent measures, in the form of considering Post 'O' Level Science graduates were to be taken to address the issue .

This situation also corroborates with a study conducted by Mudzielwana and Maphosa (2014) that established that context has an influence on structures that are put and cultures that are there at a particular point in time. The colonial period in apartheid South Africa had put up structures that advantaged Whites and disadvantaged Blacks. Whites attended well-resourced universities whilst Blacks' universities were poorly resourced. The culture of racial segregation prevailed. At attaining independence structures put were different. Equality of opportunity in education was the culture of the day. This allowed more Blacks to attend university education. Similarly, the acute shortage of Science teachers in secondary schools and the dwindling numbers of Post 'A' level Science graduates in secondary teacher education colleges, created the context in which the Post 'O' Level Science program was introduced. As Woods (1994) in Villegas-Reimers (2003) puts it, *"Professional development has to be considered within a framework of social, economic and political trends and events."* Social, economic and political trends created disadvantaged structural positions that were later acted upon (by agency) by re-introducing the Post 'O' Level Science program in secondary teacher education colleges which

was phased out in 1992; hence, enabling the 3-3-3 model. The interplay between structure, culture and agency is very clear.

#### **6.2.1.3 Bureaucratic structures**

Most organizations are bureaucratic, that is, they have a rational arrangement of offices that provide certain means for administration and control of the office holder's actions (Gwarinda, 2001). Universities, colleges and schools as educational organizations are no exception. The study established that the bureaucratic structure adopted by teacher education colleges and schools has a number of advantages that facilitate the 3-3-3 model.

#### **6.2.1.4 Bureaucratic structures as facilitating the 3-3-3 model**

The study found that in a hierarchical or bureaucratic structure, who does what, is well known. There is division of labour. As each member in the hierarchy is aware of his or her duties, management and attainment of set goals is easily achieved. This concurs with Tenuto's (2014) observation that bureaucracy serves as a system for efficiently organizing large numbers of people to achieve the same goal. The Ministry of Higher and Tertiary Education Science and Technology Development (MHTESTD), at the top of the hierarchy in teacher education pays student cadetship while they are studying. This system where the government commits itself to fund students' education also emerged in Mudzielwana and Maphosa's (2014) study that the South African government, through the National Students Financial Aid Scheme (NSFAS) provides loans and bursaries to eligible students. Such commitment by governments is a way of ensuring access to Higher and Tertiary education for the general populace. Because the government funds teacher education, it then assigns the Department of Teacher Education (DTE) at the University of Zimbabwe to be responsible for approving and accrediting programs in teacher education colleges. Similarly in South Africa, the Department of Higher Education and Training (DHET) is tasked to coordinate education and training sub-systems of post-school education including universities. As the second organ in the hierarchy, DTE closely monitors the programs and makes sure colleges offer the best programs as it is mandated to control standards

(Mamvuto, Kangai, Chivore and Zindi2012).Teacher education colleges ensure the production of the nation's teachers. The colleges laise with schools to receive, induct and mentor student teachers accordingly. The Ministry of Primary and Secondary (MPS)pays student teachers while they are doing their teaching practice in schools. This is a welcome move as students will be providing a service to the schools. In turn, schools at the bottom of the hierarchy provide induction and mentorship services to student teachers. All the ethics of the teaching profession are learnt and practiced in schools thus schools are teaching practice centers.

Each office in the hierarchy sets structures for it to effectively function.DTE for example; selects individual members among university lecturers to coordinate activities in different colleges. Colleges also put in place the College Academic Board (CAB) to look into the academic affairs of the college (DTE Handbook, 2012). In schools, the Senior Management Team (SMT) is also put in place for effective and efficient supervision. All these structures set by the bureaucratic structure are a way of bringing about a clear channel of communication that provides unity of purpose and coherence. The study revealed that without bureaucratic structures in educational institutions; minimum teaching and learning would take place as supervision would be difficult to carry out. This partnership system of operation between the University, the college and secondary schools allows for effective training and development of student teachers as espoused by Tshuma (2009).

In the college hierarchy, the Principal, the Vice Principal, Heads of Departments, Lecturers In Charge, Heads of Subjects, lecturers, the ancillary staff and student teachers do what they are expected to do in order for teaching and learning to take place. Again, it was observed that supervision is easily and effectively done, resulting in the achievement of set goals, as each member in the hierarchy is aware of his or her position and responsibilities.

Similarly, in schools, it was established that teaching and learning took place as expected due to the rational arrangement of offices, that is, the hierarchical structure. The Head, the Deputy

Head, the Senior Master or Woman and Heads of Departments, the ancillary staff and pupils 'activities were well coordinated through the hierarchical structure.

The interplay between structure, culture and agency is clearly picked again here. Cultures or beliefs that go with different positions in the hierarchy allow agency to act the way they do or accordingly. In schools and colleges for example, the culture that prevails that pupils and students greet staff may be interpreted as aligned to the fact that they are at the bottom of the hierarchy, therefore they should be seen to be observing those that are above them. Similarly, cultures or beliefs that are attached to the Principal and the Head's positions allow them to call out meetings, chair them and have the final say in all the affairs in the college and school. That is why it was the Principal who finally resolved that suggestions to re-introduce the 3-3-3 Post 'O' Level program for Science be taken up to DTE for approval. What the Principal and the Head resolves, no one disputes. This is in tandem with Jawitz and Peres's (2014) study that established that professional development courses for academic staff in one of South Africa's universities were positively received and yielded positive results because the Vice Chancellor at that university had higher education background. As change was driven and enforced at the top, all members at the bottom had to comply.

The bureaucratic structure as discussed, clearly shows that it interplays with culture and in the process, all members involved (agency) act the way they should do hence enhancing the 3-3-3 model.

#### **6.2.1.5 Bureaucratic structures as hindering the 3-3-3 model**

However, it also emerged from the study that although bureaucratic structures help in the achievement of set goals, the hierarchical structure gives too much autonomy to those people at the top and at the same time undermining those at the bottom of the ladder. Being at the bottom does not necessarily mean that one has nothing to offer, and being at the top does not mean that one has all the ideas either. A good example was given where one member of the DTE officials failed more than five students on teaching practice in one day. Surprisingly, all the

students had been supervised twice by the lecturers and thrice by the mentors passing. This was therefore attributed to the hierarchical structure that as a DTE official, with high authority over the lecturers and mentors, the official has the final say which is unchallenged.

Bureaucratic structures have also been criticized for stifling creativity and innovation in institutions. This is confirmed by Sunderman (2010) who asserts that in the United States of America, during Reagan's administration, low morale, bureaucratization and centralization of the public school system and politicization of educational issues were identified as major causes of educational deficiencies. Because bureaucratic structures are rigid and not flexible, the organization may obstruct the attainment of goals and lose sight of its overall objectives. In the study, it emerged that lecturers who did not belong to the College Academic Board and students had wise ideas on how the implementation of the 3-3-3 program can be improved. But because they were at the bottom of the structure, their voices were not heard. Examples of such ideas are the engagement of student attaches in place of unqualified laboratory assistants, utilizing the student computer laboratory for research purposes, connecting the huge generator to all teaching and learning venues and engaging a computer technician among other constructive ideas. Unfortunately all these ideas were brought up by people at the bottom of the ladder. One can then imagine how the situation would be like if these people were the ones at the top of the hierarchy. The 3-3-3 model would no doubt be very much enabled with few complaints that its products are underperforming.

These criticisms leveled against bureaucratic structures consequently constrain the 3-3-3 model for Post 'O' Level Science.

#### 6.2.1.6 The In-Out-In structure

Besides the bureaucratic structure enabling and at the same time constraining the 3-3-3 model, the study found that the three year period of the first year in residence, the second year out on teaching practice and the final year in residence was found to be the normal practice for teacher education courses globally and regionally, hence also enabling the model. Literature

reveals that most countries adopt the In-Out-In structure in pre-service training and developing of their teachers(Villegas-Reimers,2003), the only difference is the time taken by individual countries and the length of teaching practice. Some of the countries in the Asian-Pacific Economic Cooperative organization(APEC),for example Japan, NewZealand ,Singapore, Korea and Asia among others, offer two weeks, four weeks or one year teaching practice depending on the level of learners that will be taught after completion of the course(ibid).

The study also revealed that the 3-3-3 model borrows its structure from the ZINTEC and the 2-5-2 models. The model is similar to the 2-5-2 model used for training and developing primary school teachers in Zimbabwe in the sense that it also trains teachers within a period of 9 terms. A slight difference only lies in the practicum period where the 2-5-2model has a longer period than the 3-3-3 model. The researcher therefore concludes that since most countries offer subject content and practicum for teacher training and development courses, the 3-3-3 model is in line with international trends in teacher education thus, enabled by the In –Out-In structure.

In this case there is interplay between structure and culture. There are beliefs and practices that most if not all teacher education programs consist of theory and practice that can be offered using the In-Out-In structure. This can be well linked to Archer’s (1995) analytical dualism of parts and people. Here the parts (structure and culture) are seen to be enabling the 3-3-3 model.

#### 6.2.1.7 Institutional structures

The study established that there are various institutions that enable and / or constrain the 3-3-3 model. Within those institutions there are also structures that are seen to be promoting and / or hindering the model. The family, universities, colleges and secondary schools among others are some of the institutions of which without them, the model would be defunct.

### **6.2.1.8 The family as enabling and / or constraining the model**

The study found that the family is one such institution that plays an important role in providing moral and financial support to the student teachers. It emerged from the study that it is the family that pays tuition fees, provides stationery and bus fares for non-resident students. There were instances where some families failed to raise bus fares and pocket money for some students and this disturbed the students as they missed out some of the lectures. This negatively impacted on their performance. This corroborates with Shava's, (2012) study that established that the more support and help the child is given at home, the better his or her chances of scholastic success, and the less family support the child gets, the slimmer are the chances of doing well at school. Although the study mainly concentrated in school children, the role of the family remains the same even with student teachers. A supportive family enables the 3-3-3 model while a family that fails, due to one reason or the other, to fulfill its obligations constrains the 3-3-3 model.

The family as a structure is believed to be supportive to students, who then attend lectures, work on their assignments and complete their teacher education course. This clearly shows the interplay between structure, culture and agency.

### **6.2.1.9 The Department of Teacher Education at the University of Zimbabwe**

The study established that the University of Zimbabwe as an institution plays a major role in facilitating teacher education programs. Although the discussion might sound repetitive of what was raised under bureaucratic structures, it was necessary to include the institution for consistency. There are also some points that were not raised under the bureaucratic structure, hence the need to capture them here.

The University of Zimbabwe's mandate is to maintain standards in teacher education colleges (DTE Handbook, 2012). The University, through the Department of Teacher Education, then set structures that ensure that standards are maintained. Colleges, though autonomous in their

curriculum and activities are bound by the structures set by the University. It is the University that approves the colleges' programs and syllabuses, sets examinations from pools supplied by the colleges, cross check the marking of coursework and examinations, engages international external examiners for academic examining, conducts external academic and teaching practice assessment meetings, recommends passing ,failing, repeating and deferred candidates and finally awards the diploma. This corroborates with studies by Darling-Hammond (2006); Villegas-Reimers (2003) and Tshuma (2009) that the university's major role is to ensure that standards are maintained in all the affiliate colleges. Tshuma's (2009) study, though specifically on quality assurance in teaching practice, bears some significance to this study as both studies show that the University assures quality in colleges. Structures that are put in place by the University; activities or practices done by whoever is supposed to do what enables the 3-3-3 model. The interplay between structure, culture and agency comes out clearly.

#### **6.2.1.10 The college as facilitating and / or hindering the model**

The study found that colleges play a crucial role in training and developing teachers. Like the University of Zimbabwe, the college's main function as an institution may sound repeated but in this case the researcher is emphasizing its key functions in training and developing teachers through the 3-3-3 model for Post 'O' Level Science. Under the hierarchical structure, the main emphasis was on it being the third in the hierarchy and simple taking orders from the structure above it.

##### **6.2.1.10.1 The college as a facilitator**

It emerged from the study that the college as an institution is the key player in educating and training teachers. It is the responsibility of the college to review its programs and find out if they still address the demands of the community and the society at large. That is why when there were few Post 'A' Level Science graduates registering for the teacher education course, the college, with its autonomous status though criticized by Chivore(1990), recruited Post 'O' Level Science graduates. The autonomous status in Zimbabwe's teacher education colleges is

contrary to what was established by Goodlad's(1990) in the United States of America where he found that teacher education programs and curricula are set by external agencies, thus not allowing any autonomy(Goodlad in Villegas-Reimers,2003).The college, through the public service, also employs academic and non-academic staff it requires. Advertisements for the programs that the college offers, interviews for prospective students and enrollment of students is all done by the college. It is also the responsibility of the college to teach, supervise students on teaching practice and decide whether individual students are passing, failing, repeating or are deferred. All this the college does by putting up institutional structures such as the College Academic Board (CAB), Subject departments, College Advisory Council, Disciplinary Committee, Graduation Committee and the Student Representative Council. All these structures work together towards the achievement of the main goal of the institution, that is, to produce teachers that service the nations' schools.

The college as an institution also ensures that the infrastructural facilities are properly looked after. Material and financial resources, transport facilities, utilities such as water, electricity and the internet are all harnessed by the college. This is line with Villegas-Reimers's (2003) observation that most countries offer teacher education courses in colleges of education thereby making sure that teaching and learning takes place as expected. The United States of America also has Professional Development Schools that train teachers in the field (Mary, 2010), like medicine that trains doctors in hospitals.

The college as a structure sets up other structures within the college. Those structures are believed to be responsible for performing certain tasks that work towards the achievement of the institutional goals that promote the 3-3-3 model. This is in accordance with the partnership model that advocates for active participation by all parties involved in order to achieve set goals. The interplay of structure, culture and agency is also clear here.

#### 6.2.1.10.2 The college as a hindrance

In this study, it however, also emerged that there are instances where the college has constrained the 3-3-3 model. Understaffing, employment of unqualified laboratory assistants, poor library facilities, failure to effectively use the huge generator, failure to utilize the student computer laboratory, failure to have a computer laboratory in the Science department, the use of non-specialists to supervise students during teaching practice and the recruitment of under qualified students are some of the hindrances that the study unveiled.

Understaffing negatively impacted on the performance of students especially in Chemistry where there was only one lecturer to teach and mark first and third year work. Students were performing badly in Chemistry. Poor performance in Chemistry might have also been aggravated by the shortage of textbooks in the library and equipment in the laboratories. The Commonwealth of Learning (1993) confirms that the shortage of human and material resources hampers progress in teacher education for Science. When students performed badly, they then developed negative attitudes towards the subject. This corroborates with Salome's (2013) Kenyan study that established that students 'achievement is influenced by favourable attitudes towards oneself as well as the subject.

Unqualified laboratory assistants can hardly set the correct apparatus and equipment to be used by lecturers and students, therefore, lecturers have to do both, that is, setting the apparatus and teaching and that is time consuming and strenuous. This again impacts negatively on preparation and lesson delivery. It was also found that the huge generator that was sourced to back up on electricity load shedding was not connected to the critical areas such as the lecture rooms and laboratories. That then defeated the whole purpose of it being purchased for back up in an institution where the co-business is teaching and learning.

Failure to have a computer laboratory in the Science department was strongly criticized as some of the secondary schools where student teachers were deployed had already adopted e-learning strategies. As Science majors, both lecturers and student teachers should be in the fore

front in using technology in teaching and learning. The Ministry in which colleges fall under: Ministry of Higher and Tertiary Education Science and Technology Development(MHTESTD),call for the integration of technology in this 21<sup>st</sup> century. Failing to heed to the call is really uncalled for.

It also emerged from the study that the college has a tendency of underutilizing some facilities that can benefit students. The student computer laboratory with a total of 60 computers was only used during the few computer lessons. If mechanisms can be put in place on how the student computer laboratory can be utilized for research purposes, it would go a long way in equipping almost all the student teachers with computer skills as the number is quite substantial. Failure to utilize the computers hinders the 3-3-3 model as there are some students without laptops. The library which could be assisting the students only has about 10 computers catering for over a thousand students. The 30minute-research time allowed each student is also not helpful to the students. How much information will one have got in 30minutes?If the student computer laboratory is utilized for research purposes, the 3-3-3 model would be very much enabled as it would ease pressure in the library. These were the major hindrances of the 3-3-3 model established by the study of which if they can be attended to, the implementation of the model would greatly improve. College structures and cultures negatively impact the 3-3-3model.

#### **6.2.1.11 Secondary schools as facilitating and / or hindering the model**

The study established that secondary schools, as institutions, facilitate and / or hinder the 3-3-3model. Although they were mentioned before in the bureaucratic structure, they were just identified as the bottom in the hierarchy, with not much detail on how they enhance or hamper the model. Detailed information is then discussed here.

#### **6.2.1.11.1 Secondary schools as facilitating the model**

The study found out that student teachers practice teaching in secondary schools. Though at the bottom of the hierarchy, secondary schools provide practice centers where students learn all the ethics of the teaching profession of which without them it was not going to be easy to come up with effective teacher education programs. It is in the secondary schools where student teachers practice delivering the content that they have learnt to the learners. The exposure to laboratories, apparatus and chemicals gave them the feel of being Science teachers. Student teachers also practice to apply the theories they learnt in Psychology, Sociology, Philosophy and Professional Studies among other educational foundation courses. With the assistance of mentors, students learn to scheme, plan and evaluate their work. This corroborates with Tshuma's (2009) study that established that mentors are the pillars of the teacher education programs as they equip student teachers with all the skills necessary for a student teacher.

Some secondary schools had already integrated e-learning methodologies in their teaching, hence equipped the student teachers with those skills. Those students who are active in sports and other co-curricular activities utilize their talents with learners. Secondary schools as institutional structures with certain practices enable the 3-3-3 model.

#### **6.2.1.11.2 Secondary schools as hindering the model**

It also emerged from the study that some secondary schools were not good practice centers for student teachers, as they did not have laboratories, enough textbooks and laboratory assistants. In such schools, students could not experience how it feels like to teach learners in a laboratory. Schools without laboratory assistants disadvantaged both learners and student teachers as some student teachers left some experiments undone as they were afraid to handle some apparatus and chemicals on their own. Other secondary schools attached student teachers to very experienced Science teachers who did not have teaching qualifications and as

such student teachers did not benefit much from such mentors. Because of such school structures and practices, the 3-3-3 model was hampered.

#### 6.2.1.12 Infrastructural facilities

The study established that infrastructural facilities are crucial for teaching and learning.

#### 6.2.1.13 Infrastructural facilities as facilitating the model

It emerged from the study that classrooms at college were adequate, well ventilated and always kept clean. Students were free to use any free classroom for their group discussions. Lecture rooms were also big enough to accommodate all the students, well ventilated and adequately equipped with chairs for all students. Science laboratories that were used at that time were makeshift ones while the standard ones were being re-furbished. Although makeshift, they were satisfactorily big enough to accommodate all Science students. Computer laboratories for both students and lecturers are also available with a substantial number of desktop computers to facilitate the teaching and learning of computers. Lecturers were also accommodated in well ventilated spacious offices though they shared in 2s or 3s, depending on the size of the office. The library facility is there.

In secondary schools, a similar situation prevailed where there were adequate classrooms for the usual double session schools. The staff room was big enough to accommodate all teachers for both sessions and was well ventilated. It also emerged that some schools had proper Science laboratories with all the equipment. Former group 'A' schools in particular, had separate laboratories for juniors (Form 1 and 2) and seniors (Form 3– 6). This facilitated the teaching of Science at different levels of secondary education. Some schools also had the computer laboratory that catered for all learners. Few schools had the library facility. Because of these infrastructural facilities available at college and in secondary schools; the 3-3-3 model was enabled.

#### **6.2.1.14 Infrastructural facilities as hindering the model**

The study found that, although the college library facility was there, it had become too small to accommodate more than a thousand students and seventy or so lecturers. The college does not have a Science computer laboratory to be utilized by lecturers and Science students during the time when there is too much talk of e-learning. There is need for Science lecturers and student teachers to integrate technology in their teaching. Traditional methods of teaching have no place in the 21<sup>st</sup> century.

The situation in some secondary schools was not good at all. There were no Science laboratories thus Science was taught from ordinary classrooms. This corroborates with Shava's (2012) study on challenges facing the provision of quality education in Zimbabwe that established that most secondary schools lack specialist rooms like laboratories where Science can effectively be taught. The Commonwealth of Learning (1993) confirms that inadequate facilities and teaching materials negatively impact the quality of teaching. This negative impact compromises the quality of Science lessons as some of the equipment has to be improvised. For example, instead of using water from the sink, learners have to bring in buckets of water and basins. Although teaching and learning goes on, proper Science teaching and learning is not done. The library facility in some schools is not there. Learners only depend on text books they share. It was established that some learners are members of city council libraries located in the high density suburbs or the Public library situated in the city center. This is how they are exposed to reading outside the classroom. Lack of teaching and learning infrastructure hampers the 3-3-3 model.

#### **6.2.1.15 Material and financial resources**

The study found that material and financial resources are important structures for teaching and learning.

#### **6.2.1.16 Material and financial resources as enhancing the model**

It emerged from the study that material resources such as furniture, laboratory equipment, chemicals, and stationery, cartridges, ink and other computer perishables both at college and secondary schools is not much of a problem. As such, Hallack (1990) points out that the availability; relevance and adequacy of educational resource items contribute to academic achievement. On the same note, Kelly and Finnigan (2003) observe that the availability of organizational resources enhance teaching and learning as they are critical predictors of student success. The college and schools have enough furniture for staff, students and pupils. The UNICEF donation alleviated the shortage of laboratory equipment and chemicals. Computers in students and lecturers' computer laboratories, though not adequate, are quite a substantial number for use during computer lessons. Tuition fees and levies paid by students and cadetship received from the government, though not sufficient, is reasonable enough to purchase whatever needs to be purchased. Similarly in schools, tuition fees and levies collected from learners are used to fund school programs. The availability of these enable the 3-3-3 model.

#### **6.2.1.17 Material and financial resources as constraining the model**

It was, however, established that the critical shortage of textbooks in the library, impacted negatively on the teaching and learning process. Textbooks are a major resource for meaningful teaching and learning to take place. Inadequate computers, again in the library, made it very difficult for students to carry out their research. In addition to the very few computers in the library, 30 minutes allocated for research is just too little for one to gather information that can meaningfully answer a question. The facility for students to print their assignments and Action research projects is absolutely not there. Most probably it is because there is no facility for them to type their assignments either. "One man for himself and God for us all", is the situation that prevails at college regarding the typing and printing of assignments. This is a problem where they have to go to town to have their assignments and projects typed and printed. They rarely apply the knowledge and skills they learn during the one week intensive computer

lessons. This corroborates with Harmon and Chitiyo's (2009) study on Zimbabwe's e-Readiness that established that while Zimbabwe has grown steadily to embrace Information and Communication Technologies (ICT), it has yet to build the basic infrastructure needed to take advantage of the information age. ICT resources are not sufficient. Projectors to use during lecture presentations are also not enough. Some departments completely do not have the projectors. Photocopiers to run syllabuses, question paper and handouts for students are also very few for a big institution that has more than a thousand students.

It emerged from the study that financial resources have never been enough both at college and in schools. Research has also shown that Zimbabwe has limited financial resources to adequately fund education programs whereas Ahmed (2012) advances that the financial status of any country could be very influential in shaping the quality of the education system provided. Administrators therefore, budget and make do with what they collect. That is why they prioritize those things that the institutions cannot do without. Inadequate funds and resources hinder the 3-3-3 model.

#### 6.2.1.18 Transport facilities

The study established that transport facilities are crucial in any organization. Without transport, it is not easy to move from point A to B or transport whatever items from one place to another. It emerged from the study that the college and secondary schools had made significant strides in acquiring vehicles for their institutions. At college, there were enough vehicles to transport lecturers to various schools for teaching practice supervision. The college also has a bus that transports lecturers to and from work, though it goes up to the city centre. In such a scenario there are rare instances where lecturers fail to attend lectures due to lack of transport. A similar situation prevails in secondary schools, where all schools have either a kombi or bus or mini bus that transports teachers to and from work. Students likewise had no transport challenges while they were out on teaching practice in schools. As far as transport facilities are concerned, the 3-3-3 model is enhanced.

#### 6.2.1.19 Utilities such as water, electricity and the internet

The study found that utilities such as water, electricity and the internet are crucial in any teaching and learning institution. Water is life and indispensable. The college and secondary schools had taken all the necessary measures to make sure that water is always available despite water rationing by the city council. Storage tanks were sourced and always filled up. The college also repaired the borehole. Students also stayed with filled up containers. In as far as water is concerned, there were minimum challenges. It also emerged that the college and schools had backup systems for electricity that is not storable. They had purchased generators that would work in place of electricity when there was load shedding by Zimbabwe Electricity Supply Authority (ZESA). The study established that although mechanisms were put in place to backup electricity supply at the college, institutional structures defeated the whole purpose as one of the biggest generators could not be connected to all study venues, classrooms and Science laboratories. With proper institutional structures put in place, utilities like water and electricity should not be hampering teaching and learning as there is a generator that can lift up the whole college.

The study also found that the internet facility both at college and secondary schools is there. Secondary schools were seen to be managing the facility far much better than the college as there were no complaints of poor internet connectivity by teachers and students. At college it emerged that internet connectivity was very poor as it was slow and the college Wi-Fi, was only accessible in certain spots. Unfortunately, no one was willing to explain the reasons for poor connectivity. However, the researcher got to understand the problems from Zinyeka's (2005) study cited in Harmon and Chitiyo (2009) that the impact of high costs and limited financing in ICT are reflected in the slow speed of the internet and huge telephone costs.

It emerged from the study that water, electricity and the internet facility did not have much negative impact on teaching and learning both in schools and college, hence cannot be blamed much for constraining the 3-3-3 model. Institutional structures and cultural practices compel

agency to act the way they do, thus enabling and / or constraining the 3-3-3 model for Post 'O' Level Science.

Disadvantaged structural positions of the acute shortage of Science secondary school teachers and the dwindling numbers of Post 'A' Level Science graduates in secondary teacher education colleges led to the re- introduction of Post 'O' Level Science program in secondary teacher education colleges. Bureaucratic structures, the In-Out-In structure, institutions such as the family, the University of Zimbabwe, the college under study and secondary schools, infrastructural facilities, material and financial resources, transport facilities and utilities such as water, electricity and the internet have been discussed as structural factors facilitating and / or hindering the 3-3-3 model for Post 'O' Level Science. In some instances these structures created cultures that compelled agency to act in one way or the other, since structures condition people's actions, thus enhancing and / or hindering the model.

### **6.3 Cultural Discourses Offering Causal Explanation for Enablers and / or Constrainers of the 3-3-3 Secondary Teacher Education Model for Post 'O' Level Science**

This section discusses cultural discourses that were found to be offering causal explanation for enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science. Discourses about the teaching profession, the vision and mission statements and core values of the Ministry of Higher and Tertiary Education Science and Technology Development (MHTESTD), the Department of Teacher Education at the University of Zimbabwe (DTE) and the studied college are discussed as enabling and / or constraining the model. Beliefs about what and how Science teachers should be taught, skills, attitudes and values they should acquire are also discussed as promoting and / or hampering the 3-3-3 model. Most of these cultures that determined people's actions emanated from structures that conditioned people's actions. Following is a discussion on how each one of them determined the actions of agency.

### **6.3.1 Discourses about the teaching professionals a secure job, an assurance of getting employment after completion, a prestigious job, a last resort, a stepping stone and an easy woman's job**

The study established that there are quite a number of discourses about the teaching profession that compel people to choose teaching as a career. This is consistent with Archer (1995) and Archer's (1996) observation that the beliefs that people hold have a great influence on what they will do in practice. People believe that teaching provides job security. Because of the belief that one is assured of employment soon after completion, teaching becomes people's choice. Some people would choose to be teachers because they view it as having a prestigious status. This is however contrasting with a study conducted by Clewell and Forcier (2000) cited in Ososki, White, Morago and Sickle (2006) that established that students who study Sciences up to higher levels rarely choose teaching as a career, because they believe that teaching has poor social status and offers low salaries. The implication here could be that participants in the current study could not go higher with their Sciences thus they believed that settling for the teaching profession would do them good. Had they gone higher, may be they were also unlikely to choose the teaching profession.

It was also established that people end up becoming teachers because of desperation. They then believe that half a loaf is better than nothing. This corroborates with research studies that indicate that teacher education rarely attracts motivated and high quality teacher trainees as extrinsic factors such as swift employment after graduation, long summer vacations, desperation, the possibility for having extra time for family and kids, job security and that a teaching degree is easier to obtain compared to some other fields, influence teacher education applicants (Sahin, 2014). The disadvantaged structural position of failing to get one's preferred job creates such beliefs that compel one to take what is on offer. The interplay between structure, culture and agency clearly comes out here.

There are some who also believe that teaching is a stepping stone, for one to go up the social ladder, one can start as a teacher. There are also stereotypical beliefs that teaching is an easy

woman's job. There are very few instances where one can fail the teacher education course. All these beliefs that people hold about the teaching profession promote the 3-3-3 model as there are always students who take up the Post 'O' Level Science program influenced by such beliefs.

### **6.3.2 The discourse of the vision, mission statements and core values of the MHTESTD, DTE and the studied college as guiding the training and development of teachers**

It emerged from the study that there are beliefs that any organization to achieve its goals, it must clearly state its vision, mission and core values which will continuously guide and give direction towards the expected goals. The vision, mission and core values as structures are believed to be determining what exactly is intended to be achieved by the organization. Without these three, chances of going the wrong direction are high. This corroborates with Lay, Wharton and Gorstein's (2011) views that mission statements shape practice and communicate core values in organizations. They commit the institutions, thus they feel obliged to fulfill their mandate. The MHTESTD, DTE and the studied college feel that the responsibility of training and developing secondary school teachers in Zimbabwe is solely theirs. The Zimbabwean populace is looking up to them to develop competitive teachers with the requisite knowledge, skills, attitudes and values desired by the nation. That is why when there were few Post 'A' Level graduates taking up the teacher education course, the three institutions, guided by their vision and mission statements opted for the Post 'O' Level graduates so that Science teachers are available in the schools. This is in line with Delone's (2007) view that such guiding statements bring in changes that may be as a result of crisis. Without such statements that act as constant reminders, institutions are likely to forget their mandates and responsibilities. The beliefs on the core values of professionalism, diligence, patriotism, integrity, creativity, moral uprightness and pride in the profession among others, help enforce discipline and appropriate conduct expected of teachers. That is why structures such as rules and regulations and orientation programs are put in place to try and build up the kind of teacher that is distinguishable from any other professional.

The beliefs held about the vision, mission and core values of the MHTESTD, DTE and the studied college are some of the cultural factors that enable the 3-3-3 model for Post 'O'Level Science.

#### **6.3.2.1 The discourse of the college motto as guiding the training and development of teachers**

The study established that in line with the beliefs about the vision, mission and core values, there is also the belief that the college motto cements what the vision, mission and core values emphasize. The college motto, “we learn in order to teach” is believed to beguiling students and lecturers on their core-business at the college. Both parties try to fulfill their responsibilities while at college. Lecturers are kept aware that whatever knowledge, skills, attitudes and values they impart to the students, the students will further transfer them to the learners in secondary schools. As such, acceptable and proper attitudes and values are likely to be imparted to the students. Similarly students are believed to be kept focused on the major goal of acquiring knowledge and skills appropriate to be further imparted to the learners. This is in line with Stemler, Bebell and Sonnabend’s (2011) observation that such guiding statements help in reflecting on the purpose of one doing a particular course. The reason for pursuing the course is always in mind. With such beliefs about the motto, any normal student would not want to leave college without having learnt something. This is well argued by the essentialist William Barley, the founding philosopher of essentialism, that students should learn ‘something ‘in addition to the process of thinking (Sharon, 2008).The college motto as a structure, creates a strong belief among students that whatever they learn, must be teachable to the learners and as such they will make effort to learn not only the content knowledge of their subjects but also appropriate behavior to model to their learners. As Dalone (2007) argues that guiding statements shape the attitudes and behavior of individuals in an organization, lecturers and students’ behaviors are believed to be shaped by the college motto.

### 6.3.2.2 Beliefs about what Science teachers should learn

The study found that people believe that Science teachers should learn Pure Sciences, Educational foundation courses, Professional studies, Research and Teaching Practice. This is consistent with studies conducted by Cobb (1999) in Villegas-Reimers, (2003) and Darling-Hammond, 2006) that established that different countries emphasize different components in teacher education curriculum or time taken to do the teacher education course. Generally, most countries offer courses and experiences that address subject matter, the foundation of education courses, pedagogy and method courses, child development and practicum. These courses as structures are believed to possess valuable content and experience to be tapped by teachers for use in the teaching and learning environment.

### 6.3.2.3 The discourse of learning subject matter or content knowledge (CK) (Pure Sciences: Physics, Chemistry and Biology) as key to Science teachers

The study established that people believe that subject matter or content knowledge for the three Pure Sciences, that is Physics (science of motion), Chemistry (behavior of matter) and Biology (life processes) as prescribed in the syllabus must be learnt by student teachers in the 3-3-3 Post 'O' Level Science program. These have stood the taste of times as argued by the conservative perennialists. Essentialists also find them essential components of a Science teacher education curriculum. This is also in line with Carl(2008) and Hill's (2013) view on Competency Based Teacher Education(CBTE) model that teachers should have cognitive competencies, that is, they should have the knowledge of the subjects they are to teach.

It emerged from the study that these subjects, as structures in the Science teacher education curriculum were offered by specialists in the subjects. Lecturers knew the content of the subjects as they were able to deliver it to the students. However, there were several beliefs held by lecturers, students, mentors and Heads of Science departments in secondary schools about the offering of the subjects. Lecturers believed that though they were teaching students, they were over strained since the majority of the students did not do pure Sciences at 'O' Level,

instead, they did Integrated Science. As such they were doing a double job, of first teaching the students the content, then go on to teach them how to teach that content to the learners. They found that most students were struggling to master the content. This corroborates with Ali's(2012) study that what an individual learns is a result of actively relating what is already known to what is being taught or experienced. Students with poor background knowledge of basic concepts learnt at lower levels, have challenges in mastering the concepts despite the efforts by the teacher to use a variety of explanations. This suggests that unless and until students bring a good understanding of basic concepts to the learning situation, they may not be able to cope with the advanced level of knowledge. As a result, lecturers felt it would be better to increase the first residential period from 3 terms to 4, so that students would have more time to master pure Science content before going out into the schools to do their teaching practice. One of the lecturers felt that the model should be changed to 4-2-3 and believed two terms teaching practice were adequate for someone with enough content. Both lecturers and students were working extra hard in order that students at least, get passing marks.

Lecturers also believed that the shortage of apparatus and chemicals for students to carryout individual experiments that would help in their understanding also gave them additional problems. They believed that if there were enough apparatus and chemicals, students would be carrying out experiments individually to enhance their understanding. Lecturers also felt that shortage of textbooks in the library and none at all in the department aggravated the situation. If there were enough textbooks for students to at least share in pairs, it was going to be better as they were going to encourage students to always read ahead since they had the syllabus. Lecturers also felt that the inaccessibility of the internet worsened the situation as they would be asking the few students with laptops to help their colleagues download information from the internet, then continuously revise in order to master the content that they are not familiar with.

It also emerged from the study that lack of a computer laboratory in the Science department also defeated the whole purpose of the Science department as spearheading-learning at college. Science is a practical subject, therefore, lecturers should be seen to be having more practical lessons than theory in their teaching, but the opposite was true. They had to do more theory lessons than practicals because there were few chemicals and apparatus and at times chemicals were not there when the red tape followed in sourcing them took long to process the orders.

The high student-lecturer ratio was also believed to be adding more problems faced by the Science department. It was believed that no matter how hard working one was, it was not easy for one lecturer to effectively teach first and third years alone. There was only one Chemistry lecturer. The single lecturer had no one to share ideas and this caused more problems as most students were not doing well in Chemistry. Even the genius would want to confirm one or two ideas from someone to make sure he or she has got it right. In addition to that, there was no qualified laboratory assistant who would at least prepare the apparatus and chemicals for the lecturer. It was established that students were performing better in Physics and well in Biology where there were two and three lecturers respectively. Despite the fact that there were more lecturers in these two subjects, students were given more practical work in these subjects as compared to Chemistry. Moreover there were more activities and encouragement from the lecturers. This corroborates with Bamiro's (2015) study that established that the use of guided discovery and think-pair-share strategies are capable of promoting learning through discovery, which eventually leads to the development of higher quality cognitive skills, which in effect enhances problem solving skills in students. The two methods are contrasted with the lecture method. This then proves that hands-on in practical subjects benefits the students.

It also emerged from the study that student had similar beliefs with the lecturers. They believed that their underperformance in Science was a result of not having done Pure Sciences at 'O'level. On the other hand, they felt that they were mature enough to work hard in order to make up for the gap. They believed that their underperformance was aggravated by the

shortage of books in the library, lack of practical lessons, lack of qualified laboratory assistant, high lecturer-student ratio and poor internet facility.

The study established that mentors and Heads of Science department in schools confirmed the underperformance of student teachers in the Post 'O'Level program and felt that they were released prematurely into the schools before having grasped the requisite knowledge, that is why one of the SHODs went on to suggest that the program be re-structured to be a 6-2-1 model. This he believed would give more time to students to grasp the necessary content to teach in schools. This suggestion tallies with what the lecturers raised that they have to teach students pure Science content first, then go on to teach them how to teach it to the learners. What it means is that the first year will solely be meant for teaching the pure science content, then the second year concentrates on what is normally taught to the normal group, then they go out for teaching practice for two terms just like in the 2-2-2 program. The last term is then set aside for revision and examinations.

It emerged from the study that mentors were worried about the failure by student teachers to carry out what they considered the simplest experiments. Because of their failure to carry out some of the experiments, some of the SHODs were left with no option but to allocate them classes that do Integrated Science since they lacked confidence in them. This again was believed to be defeating the whole purpose of teaching practice in the three Sciences consequently hindering the 3-3-3 model.

It was found that the Science department was believed to be having a host of problems, no wonder why sentiments are raised that most of the students in the 3-3-3 Post 'O'Level Science program are not doing well in secondary schools. The problems seem to be largely emanating from the Science department at college that 'half bakes' them. Most of the structures and cultures in the Science department condition and determine people's actions that constrain the 3-3-3 model.

#### **6.3.2.4 The discourse of learning pedagogical knowledge (PK) or educational foundation courses as a basis for understanding the theories underpinning teacher education**

The study established that people believe that the content knowledge of the three pure sciences alone cannot fully equip student teachers with the knowledge of managing the teaching and learning environment, hence the need to also learn pedagogical knowledge or educational foundation courses that include Theory of Education (TOE), Professional Studies (PS), National Strategic Studies (NASS), Health and Life Skills (HLS), Language and Communication Skills and Information and Communication Technology (ICT). These subjects are believed to help student teachers understand the theories that underpin teacher education and mold them to be the kind of teachers that are expected in the 21<sup>st</sup> century. This corroborates with Carl (2008), Hill (2013) and Anderson's (2013) assertion that student teachers must have performance and affective competencies that will help them execute their duties effectively. A variety of performances acquired by student teachers through learning different subjects equip them with the knowledge, skills, attitudes and values expected of a teacher.

It is believed that TOE, with its three sub-components, of Psychology of Education, Philosophy of Education and Sociology of Education provide the theories that guide the training and development of teachers. Psychology provides an understanding of child development and learning theories, among other theories that have a bearing on teaching and learning. Philosophy of education, as the foundation of what constitutes knowledge, provides the base for understanding theories about education. Sociology of Education lays the foundation that education as a social construct operates within and among societies, as such, must be understood as explaining social factors affecting education. These three components are assumed to be helping teachers understand their learners better in order to assist them in the best possible way to make them learn. This is consistent with Archer's (1996) interplay between structure, culture and agency that social structures are the outcome of past social interaction between agents which condition agents in the context in which current agents find themselves in. People have been conditioned that teacher education programs should be coupled with TOE, thus failure to offer it would sound in complete. However, Fullan and Spiegelbauer (1991)

in Makombe and Madziyire (1999), assert that there is no clear evidence that supports the effect of Theory of Education on student teachers; hence the impact of the course has not been studied in depth. Despite the assertion, TOE has continued to be part of the teacher education curriculum as teacher educators strongly believe that the subject provides theories that help in the management of the teaching and learning environment and it will continue to be offered until research proves that it has become irrelevant.

It also emerged from the study that people believe that Professional studies equip student teachers with the necessary skills, attitudes and values expected in the teaching profession. Teachers are expected to acquire lesson planning, lesson delivery, explanation, questioning, demonstration, lesson evaluation and class or classroom management skills, among other relevant skills. All these skills, people believe, are developed and perfected through the offering of Professional studies. Lecturers in the PS department, though inadequate, are making efforts to equip the student teachers with the requisite skills of the teaching profession.

The study also found that student teachers should be conscientised about their being Zimbabweans and not South Africans or Nigerians. As Zimbabweans, they should be aware that they have a responsibility of serving their country despite the challenges it is facing. It is believed that this can be well done through the offering of National Strategic Studies. Although the offering of NASS cannot stop people from leaving the country for greener pastures as discussed on how the 3-3-3 model for Post 'O' Level Science was re-introduced in secondary teacher education colleges, it is believed that the few that will be considerate of the nation's sustenance as opposed to individual gains, will remain providing service in the nation's schools. Even during the collapse of the Zimbabwean economy, two or three Science teachers remained, as indicated in Table 5-5, despite the call by neighbouring countries. It was established that the four lecturers in the subject area, though over strained with work, inculcate and model values for love of one's country.

The study established that with the high death rate nationally and regionally due to HIV/AIDS, there is a need for the teacher education curriculum to widen and incorporate health issues.

This was believed to be done through offering Health and Life Skills. Having the belief that teachers must be good role models, HLS, helps students to be particular about their health and moral behavior so as to model to their learners and also remain healthy as the saying that a healthy mind in a healthy body. HLS is also believed to be equipping student teachers with social skills as they are envisaged to be meeting people of all kinds out there in the field.

The study found that it is the people's belief that communication is crucial in any course of study. Both written and verbal communication is important to teachers as they have to explain concepts to the learners and at the same time write meaningful constructions. Language and Communication equips student teachers with skills of communication, and with constant practice builds confidence among students.

The study established that the practice of having coursework assignments, tests and examinations is believed to be the way student teachers are being evaluated, that is, whether they have passed the teacher education course or failed it. Passing students go on to join the rest of the teachers in secondary schools whilst failing students are asked to repeat the course until they pass it.

It also emerged from the study that Information and Communication Technology is indispensable in the 21<sup>st</sup> century. Research, lecture presentation, data capturing, typing and printing are now better handled through the use of ICT. Feelings were that the integration of ICT in teaching and learning was lagging behind and needed to be spruced up. This is in line with Oztark and Yigit's (2012) study that established that education is behind in the context of technology when compared with other areas like medicine, business, law, banking and engineering. This is due to lack of government support, training and motivation. It was appreciated that the college had secured a reasonable number of computers for both students and lecturers to use in acquiring computer skills. However, it was believed that the acquisition level of computer skills is gone past and now is the time for learning various programs that go with the computer age. That is where the college was lacking. This was aggravated by lack of a computer technician at the college. Lecturers believed that the two lecturers in the department were trying their level best to keep the lecturers informed about the new programs that can be

utilized in teaching and learning. The workshops that they continue to hold through college staff development programs go a long way in equipping lecturers with the requisite knowledge and skills. In addition to learning the techniques of using the computer as an information gathering tool, they had recently learnt how to post lectures to e-classes though the internet facility negatively impacted on e-classes.

It was established that student teachers believed that they were not benefiting much from the ICT program offered at college. This is because they learnt computers while they were coming from teaching practice. The way it was taught also disadvantaged them as they were kept in the computer laboratory for one whole week without attending other lectures. They felt if the syllabus was spread throughout their two years residential periods at college, they were going to benefit a lot from the program. As it stands now, they are simply learning to pass the examination with little application in their teaching and learning. This concurs with Oztark and Yigit's (2012) study in Turkey that established that there were a lot of debates about the inability of teacher preparation programs to fully prepare new teachers to use technology effectively. Teachers needed adequate training and more support in order to develop new attitudes and skills towards technology usage. It is also in line with Chitiyo and Harmon's (2009) study that established that technology integration into education is not just a matter of having the necessary infrastructure but students must be prepared to use technology effectively.

It was established that the internet facility, though believed to be facilitating the teaching and learning process, it was not benefitting students and lecturers much as there was poor connectivity. It was worse with the college Wi-Fi, which was only accessible at strategic points. Poor internet connectivity was discussed earlier that it was due to its high costs that it was not easy to efficiently sustain it. Despite the challenges experienced in ICT, it was believed that the ICT department is making frantic efforts to afford every lecturer and student the opportunity to acquire the requisite knowledge and skills to remain relevant rather than obsolete in the 21<sup>st</sup> century.

The belief is that offering of structural disciplines such as Theory of Education, Professional Studies, National Strategic Studies, Health and Life Skills, Language and Communication Skills

and Information and Communication Technology in the teacher education curriculum promotes certain cultures that enable and / or constrain the 3-3-3 model for Post 'O' Level Science.

#### **6.3.2.5 The discourse of learning Pedagogical Content Knowledge (PCK) as the basis for applying theory into practice (Teaching practice or Practicum)**

The study found that people believe that the academic teacher education curriculum of content knowledge (Physics, Chemistry and Biology) and foundation courses (TOE, PS, NASS, HLS and ICT) alone cannot fully develop knowledge, skills, values and attitudes required by student teachers in the teaching and learning environment hence the need for the teaching practice or practicum component in teacher preparation programs.

It was believed that teaching practice provides the opportunity for student teachers to put the theories that they learnt in Psychology of Education, Sociology of Education, Philosophy of Education and Professional Studies into practice, that is, marrying theory with practice as alluded to by Mkandla(2004) . Student teachers get an opportunity to develop their teaching skills and knowledge in a classroom setting. It was also believed that the practicum gave student teachers the actual or real experience of the teaching and learning environment as opposed to the artificial and theoretical aspects of the teacher education program. Students were provided with hands-on experience needed to develop an understanding of students 'needs within the classroom and other related matters. What they learnt on what it means to be a good teacher is practiced to find out if it works or not. This concurs with Villegas-Reimers's (2003) study, that the academic component of the teacher education program should be coupled with practicum, which provides student teachers with supervised experiences and help them to understand the full scope of the teacher's role. Student teachers get to understand the socio-cultural, political and economic factors underpinning education and learn in context from firsthand experience. It also corroborates with Darling-Hammond(2006) and Tshuma's (2009) studies that established that actual teaching practice experiences are powerful in making student teachers gain knowledge and experience in the field. Cochran and Lytle(1999) also assert that teachers learn to teach by teaching. That could be the reason why in the United

States of America, there are Professional Development schools (Villegas-Reimers,2003) that train teachers in the schools just like medicine that trains medical doctors in hospitals. The practicum component is believed to be adequately preparing student teachers for the actual classroom environment. But questions may arise on what characterizes adequate preparation and how we come to know that the adequate preparation is attributed to the practicum and not theory since practicum is the application of theory as argued by Gwele(2004) and Cochran and Lytle(1999) in their concepts of 'knowledge-for-practice 'and 'knowledge-of-practice'. One can conclude that knowledge-of-practice informs knowledge-for-practice; hence these types of knowledge complement each other. How much theory and how much practice constitutes adequate teacher preparation remains debatable, that is why the period of teacher training and the length of the practicum component differs with individual countries. For instance, Villegas-Reimers (2013) observes that Japan offers a 4-week practicum whilst Belgium, France and Germany offer a full year. Theory and practice remains a dilemma in teacher education.

The study also established that teaching practice is fairly well handled as there is a standard instrument that is used to carry out teaching practice supervision. Beliefs that the supervision teaching practice instrument minimizes subjectivity and bias, though it may not totally eradicate individual beliefs and opinions, help in objectively conducting teaching practice supervision. Individual student teachers are unlikely to be prejudiced as the same attributes are checked for all student teachers. However, Henry, Campbell, Thompson, Patriarca, Luterbach, Lys and Covington's (2013) study established that rating instruments, clinical practice observation ratings nor teacher candidates 'scores on examinations do not predict their later effectiveness in the classroom. This corroborates with the findings by the United States National Council for Accreditation of Teacher Education (2010) that noted that there is no clear evidence about teacher preparation programs to know with any certainty what contributes to teacher effectiveness or what makes clinical preparation effective. Despite the findings, scores have always been used in education to determine the performance of learners and students, of which without them it would be difficult to evaluate and find out if one is doing well or not.

The study found that student teachers 'performance in schools had improved due to the engagement of school mentors who are always with the student teachers. It was believed that mentors were readily available to help students with nitty grities of the teaching profession. This concurs with Tshuma's (2009) study that established that mentors are the pillars of the teaching practice component as they are with the students on a daily basis. It was also established that students did not only learn about the ethos of the teaching profession from mentors, but from any other member of staff at the school. This is well articulated by Grootenboer (2006:19) that,

*...pre-service teachers on practicum are observing and participating in the activities and rituals of teachers in the field...They become involved in the wider aspects of the teaching community through meetings and staffroom discussions, appropriating the required dress code, norms of behavior, beliefs, values and attitudes of those in the profession.*

The study, however, found that there was controversy as to whether non-specialists in the subject area could effectively supervise student teachers. There were beliefs that a good lesson does not need to be confirmed by a specialist whilst specialists argued that a non-specialist in the subject area could hardly give constructive advice. Similar sentiments were raised by Zengeya-Makuku, Sunzums, Zengeya and Bhukuvhani (2013:49) when they said,

*Nevertheless, the prevailing practice of cross-disciplinary supervision where in the majority of cases lecturers are assigned to students without considering their areas of specialization should be strongly discouraged while emphasis should be put on the possibility of supervision by appropriate subject specialists.*

There is need for lecturers as agency, to deliberate on the issue and come up with the best possible way of supervising different subjects in secondary teacher education colleges. Specialist supervision or not, when a lesson is taught and learners are proved to have learnt by being able to apply the knowledge that they learnt remains the same. What matters is, have learners learnt what the student teacher was teaching?

The study also established that there are beliefs that external examination of teaching practice is prone to subjectivity and bias as there seems to be no standard external assessment

instrument that is used by external assessors for final teaching practice examining. This concurs with Tshuma's (2009) study that established that final teaching practice external examiners use notebooks to jot down whatever they take note of and come up with the student teacher's final mark for teaching practice. However, Tshuma believes that the use of a standard external assessment instrument promotes uniformity and objectivity in the external assessment process and enables all the students' performances to be judged using agreed standard and uniform criteria. The use of a standard assessment gives credibility and transparency to the whole assessment exercise. A standard external assessment instrument also gives the external examiner a clean conscience that the mark awarded tallies with the comments given. Subjectivity and bias are minimized.

Teaching practice is a structure in the teacher education curriculum that is believed to be creating cultures that promote the 3-3-3 model, without it, the model would be constrained.

### **6.3.3 Opinions on how Science student teachers should be taught and the skills, attitudes and values they should acquire during their course of training**

The study established that people have several opinions on how student teachers should be taught. There are beliefs that the way they should be taught should equip them with knowledge, skills, attitudes and values they will also carry with them to learners in secondary schools. It came out that Science is a practical subject; therefore learner centred methodologies should be seen to be dominating Science laboratories. The discovery method, research and presentations, group discussions, demonstrations, experimentation, excursions, problem solving, projects, tutorials and peer teaching are among other recommended teaching methods that are believed to be appropriate in teaching Science student teachers. Such student centred methods are in line with exploratory competencies as espoused by Hill(2013) and Anderson's (2013) Competency Based Teacher Education(CBTE) model where students are expected to try out various methods of teaching that will make learners understand the concepts they are teaching. These methods also concur with JohnDewey's methods that should be used in his educational philosophy of progressivism (Taylor, 2014).These methods contrast with teacher

centred methods that assume that learners are empty vessels waiting to be filled (Freire,1973).However, Bekalo and Welford's (1999) study in Villegas-Reimers(2013) that focused specifically on the preparation of Science teachers in Africa reported that few, if any opportunities for practical work are offered in their pre-service preparation; as a result, Science is taught in lecture format with little, if any, emphasis on the practical applications of such knowledge. Although the findings might have been accurate at that time, the situation is now different in some of the African countries at present. Few countries that are extremely poor are the ones that could still be failing to carry out experiments in laboratories; otherwise, the situation has improved in most of the countries. With the UNICEF Science kits that have been donated to schools, Zimbabwe is one such African country that has improved in the offering of Sciences both in secondary schools and colleges.

When such methods of teaching are adopted in the teaching learning environment, student teachers are believed to acquire decision making, practical, problem solving, communication, listening, research, manipulative, computer and skills of handling apparatus among other relevant skills. Positive attitudes towards work, being adventurous, persistent and investigative develop. It is also believed that students would generally value hard work. The beliefs in the way student teachers should be taught promote cultures that enable the 3-3-3 model.

Discourses held about the teaching profession, beliefs about the vision, mission and core values of the MHTESTD,DTE and the studied college, what student teachers should learn, the skills, attitudes and values they should acquire and how they should be taught have been discussed as cultural factors enabling and / or constraining the 3-3-3model for Post 'O' Level Science.

#### **6.3.4 The discourse of conducting Action Research as laying the foundation for problem identification in research work**

The study established that people believe that content knowledge and pedagogical knowledge alone, without some form of reflective practice, cannot help student teachers identify teaching

and learning problems and try to come up with strategies to solve those problems; hence the need for conducting Action Research. It was also believed that Action Research provides student teachers an opportunity to be reflective classroom practitioners as they identify learning problems in their classrooms and come up with intervention strategies to minimize or solve the problems. This is consistent with Hobson, Harris, Buckner-Manley and Smith (2012) citing Ferrance's (2000) argument that Action Research, as a process in which participants examine their own educational practice systematically, allows practitioners to address those concerns that are closest to them, ones over which they can exhibit some influence and make change.

It was established that although Action Research was fairly handled by the majority of lecturers and student teachers (supervisor and supervisee), some supervisors felt that students were coming up with the same topics each and every year; as a result, they felt Action Research limits students. Supervisors felt students were not creative enough to come up with different problems from the familiar ones. This suggests that supervisors do not probe their supervisees when they bring usual topics so that from those usual topics the unusual are derived. Without much probing, students will continue to re-cycle the same topics.

It was also established that even the three or four cycles used in the intervention process were just the common ones. Creativity was believed to be lacking among most of the students as there are many problems associated with the teaching and learning of Science in secondary schools. It was also believed that widening the scope in research could solve the problem. Students should be exposed to all types of research then choose any form that they are comfortable with. This would minimize monotony and advantage those students who would want to advance with educational research.

Students felt that Action research was very relevant to them as classroom practitioners. They did not face any challenges with the research process; as such, they wondered why the lecturers wanted them to change to more challenging types of research. To them Action Research was the solution to classroom problems.

The practice of conducting Action Research in teacher preparation programs promotes reflective practice that enhances the 3-3-3 model.

#### **6.4 Agential Influences Promoting and / or Impeding the 3-3-3 Secondary Teacher Education Model For Post 'O' Level Science**

This section discusses data presented on agential influences that promote and / or impede the 3-3-3 model for Post 'O' Level Science. Decisions and choices made by the Principal, the Vice Principal, Department of Teacher Education officials, lecturers, Heads of schools, Heads of Science department in secondary schools, mentors and student teachers in trying to transform existing structures and cultures are discussed. The decision to enroll Post 'O' Level Science graduates, enrolment of qualifying and under qualifying students, using various methods of teaching, sourcing for the UNICEF Science kit, holding staff development programs for lecturers, conducting mentorship workshops for secondary school Heads and mentors, taking into consideration external examiners' recommendations about the library facility, failing to connect the generator to the Science laboratories, failing to increase staff establishment, failing to engage qualified laboratory assistants, allocating student teachers Integrated science classes and the decision by some of Heads of schools not to take student teachers for teaching practice are discussed as some among other cultures and structures that promote and / or hinder the 3-3-3 model.

##### **6.4.1 The decision by the Principal and the College Academic Board (CAB) to re-introduce the 3-3-3 model for Post 'O' Level Science**

The study established that whenever there is a crisis at the college, the Principal and the College Academic Board (CAB) engage in autonomous, communicative and meta-reflexivity (Kahn, 2009) to try and solve the problem. There was disadvantaged structural position of failing to get Post 'A' Level Science graduates. As concerned agents, they decided to recruit Post 'O' Level Science graduates in order to alleviate Science student teacher shortage at the college.

This is in line with DTE Handbook (2012) recommendations on the conditions of the associate ship status that colleges have the autonomy to make decisions about the programs they would like to offer, and then seek approval from the University whether or not to offer those programs. This autonomous status that the colleges of education have, advantages the colleges as they are faced with different problems. A problem faced by one college may not be a problem for another college, since local contexts vary. At times even if the problems might be similar, solutions applying to one college may not be the best solution for another. However, Chivore (1990) identifies the autonomous status of the colleges as one of the challenges that teacher education is faced with in Zimbabwe. He indicates that there is no teacher education curriculum plan that serves as a guideline on what teacher training colleges are expected to do. There could be advantages of having common curricula in teacher education, though not specified in Goodlad's (1990) study in Villegas-Reimers (2013) in the United States of America that teacher education curricula are set by external agencies. One advantage could be that of uniformity since the curriculum in schools is uniform. What is the justification of varying the curriculum in tertiary education since the student teachers will go back to the same schools?

Although there is no guideline for teacher education colleges, the vision and mission statements and the DTE Handbook (2012) provide a clear guide as to what is expected from each teacher education institution in Zimbabwe. How to achieve the goals may be different, but in the final analysis, the nation's teachers are produced. The autonomous status gives individual colleges the opportunity to solve problems that are peculiar to them hence addressing the demands of the communities they are serving and the society at large.

There was urgent need to act on the disadvantaged structural position that had created unfavourable cultures in order to transform the structure and cultures, thus the various agents agreed to re-introduce the 3 -year Post 'O' Level program for Science.

#### 6.4.1.1 The decision by students to enroll for the Science Post 'O' Level program

The study also found that when it was advertised that the college under study was considering people with Post 'O' Level Pure Sciences, Physical Science, Combined Science and Extended Science, a reasonable number heeded to the call, as seen in Table 5-7 as compared to the bottom numbers in Table 5.5. The 23 students that enrolled in 2007 when the model was re-introduced really rescued the bad situation that had befallen the college. Sciences nearly became extinct in the secondary teacher education college under study. Reasons given by students for taking up the Post 'O' Level Science program show that students had their own disadvantaged structural positions and cultures that they had to act upon, and in the process, transforming the college's disadvantaged structural position and cultures. This concurs with Archer (1995) and Archer (1996) that structures condition people to act in a particular way whilst cultures also determine what people do. This is also consistent with Pereira's (2012) study in Swaziland that established that because there was a new curriculum to be implemented, it meant that the cultures were to change to suit the new curriculum. Agents had to act in a particular way in order to transform the old structures and cultures. Similarly students, as agents acted by enrolling for the program and transformed the existing structures and cultures, thus enabling the 3-3-3 model for Post 'O' Level Science.

#### 6.4.1.2 **The** decision to recruit under qualified students

It emerged from the study that the first students who enrolled for the 3 year program had the required qualifications, but as time went on, students with the proper qualifications became fewer and fewer. This is most probably caused by the fact that most secondary schools have one or two classes that do Pure Sciences or Physical Science, the majority of learners do Integrated Science. A similar situation had re-surfaced where there were few students with the required Sciences. Because lessons had been learnt that if the required students are not available, make do with those that are there. The Head of Department could not sit down again with the Principal and seek permission to recruit students with Integrated Science; instead,

records indicate that all those students with A or B in Integrated Science were considered. These are the students Science lecturers were complaining about, that they had to teach them Pure Science content first, then go on to teach them how to teach that content to the learners. Heads of Science department in secondary schools and mentors also complained that they lacked content and could not carry out simple experiments.

To avoid the disadvantaged structural position that was experienced with the Post 'A' Level Science graduates, there was no option besides taking students with Integrated Science. These are the students that have kept the 3-3-3 Post 'O' Level Science program in progress. Although the majority of the lecturers in the Science department are complaining about the caliber of the students, there seems to be no other alternative solution to the Science student teacher shortage at the college, since this is not only peculiar to the college under study. This is confirmed by Ososki, White, Morago and Sickle's (2006) study that Science teacher shortage is a global issue affecting many nations.

The Principal and the Head of Science department, as agents, had to go by structural and cultural factors of the shortage of qualifying Science student teachers by recruiting under qualifying students, thereby enabling the 3-3-3 model for Post 'O' Level Science.

#### 6.4.1.3 The adoption of various teaching methods

The study established that lecturers work extra hard for the students to pass, considering the fact that the majority of them did Integrated Science and did not have Pure Science content. In order for the students to pass, lecturers use a variety of teaching methods. Demonstration and experiments, inquiry and discovery, individual presentations, lecturing and explaining, coursework assignments and online teaching methods are among other relevant methods. Most of these teaching methods are learner centred and participatory hands-on methods as advocated for by progressivists. Science as a practical subject requires such methods where students are actively involved in problem solving and discovering things on their own. Lecturers act as facilitators of the learning process. This concurs with Ali's (2012) study that subjects such

as Chemistry require instructional strategies such as practical work, group work or pair work, presentations, whole class discussion, application of knowledge, use of creative motivational techniques, questioning and applying problem solving or inquiry oriented instructional strategies. Ali (2012) corroborates with Sajjad (2011) and Atkinson (1999) that inquiry and discovery methods involve students in problem solving and critical thinking that allow them to construct knowledge, skills and values from direct experience. According to John Dewey, this is what is termed learning, since learning is nothing but experience. There are however, challenges with demonstration and experiments, inquiry and discovery methods as they require adequate apparatus and chemicals. It emerged from the study that lecturers group students to try and counter the chemical shortage. As experiments and demonstrations are done in groups instead of individuals, almost all the students have a chance to participate in the activities of the group.

It also emerged from the study that not only child centred methods are used but lecturing and explaining, teacher centered methods are used as well. The lecture method, though not recommended in practical subjects like Science, Al-Rawi (2013) finds it useful in stimulating open discussion, developing listening skills and attention. However John Dewey, in his progressivist philosophy of education argues that teachers must stop teaching and let learners learn. This method is used most probably because there is a shortage of chemicals and there are some topics that can easily be covered and understood without experimentation. There won't be any need to waste time carrying out experiments on easy topics, though the students would be expected to carry out the experiments with the learners in schools. Most probably these are the topics which the mentors complained that though they were simple, students failed to carry them out. At college they were assumed to be easy and a waste of time carrying out experiments on them. All the students understood them without even carrying out experiments. Lecturing and explaining was used.

Individual presentations and coursework assignments were considered crucial for the student teachers as they prepared the students for final examinations and the actual teaching in the

classroom. This is in line with Sajjad's (2011) observation that written assignments equip students with skills of organization of work, assimilation of facts and better preparation of examinations. Science coursework assignments were both practical and written and had deadlines for submission. This gave student teachers the opportunity to work extra hard as individuals and groups to complete the assignments at a specified given period. Practice makes perfect. As they wrote assignments, they practiced answering questions which they were likely to come across in the examinations. Practical assignments also afforded them the opportunity to deal with the apparatus and chemicals without the assistance from the lecturer. This concurs with Davis' (1993) views that individual presentations and written assignments emphasize on individual performance which takes place during examination time. Sajjad (2011) also saw individual presentations building confidence among students. It was established that individual presentations really prepared the student teachers for the classroom situation as they would be teaching learners as individuals and not as a group. Each and everyone's innovativeness and creativity would clearly come out and those that had challenges were assisted accordingly.

It emerged from the study that online teaching methods were minimally used by a few lecturers in the foundation courses. This concurs with Al-Rawi's (2013) observation that the current electronic medium does not permit the best on instruction. Besides, online teaching method is only limited to those students who have access to the computer and the internet and are highly computer literate, in order to be able to navigate the cyberspace. A few lecturers posted lectures to the e-classes. Students with laptops managed to access the lectures though they were a duplication of the oral lectures they had attended. It was also established that some lecturers encouraged students to work on their Action Research Projects online. This was an advantage to the students as they would work on the corrections and continue with the next section. Students with such lecturers have the opportunity of completing their projects faster as compared to those who work on hard copies.

Teaching methods chosen in teaching students were in line with learner centered methods that are encouraged for practical subjects. This is consistent with Tenuto's(2014) observation that

student centred teaching strategies help students feel more engaged and confident in their learning. Because most of the students did not do Pure Sciences, there was need to expose them to various methods that they will further use with the learners in schools. Participatory hands-on methodologies help students understand better as compared to teacher centred methods. Lecturers as agents, taught in a manner that defeats structural and cultural factors of shortage of apparatus and chemicals and unqualified students thereby promoting the 3-3-3 model.

#### 6.4.1.4 The decision to source for the UNICEF Science kit

The study found that because the students were not exposed to Pure Sciences that had a lot of practicals and experiments, the college had limited apparatus and chemicals. However, secondary schools had received Science kits from UNICEF. The Head of Department therefore, engaged in autonomous reflexivity and sourced for the UNICEF kit so that student teachers at college could be exposed to the kit while they were still at college rather than seeing it for the first time in schools. This concurs with Bhaskar's (1978) assertion that, "*Ask what not is different, but what is absent*". Through the assistance of the sister Ministry of Primary and Secondary, the donation was extended to the college. The kit exposed both students and lecturers to a variety of apparatus and chemicals that enhanced the teaching and learning of Science.

The Head of Department played her agency to counteract the institutional structures and cultures of the shortage of apparatus and chemicals at college, that hinder the teaching and learning of Science, and in the process enabling the 3-3-3 model.

#### **6.4.2 The decision to consider annual recommendations by external examiners about the library facility**

The study found that the library facility, which is considered the backbone in the core business of the college, was far below the expected standard. The library, with old few books, was too small for the numbers. The 10 computers that were found in the library were too few to be used by more than a thousand students at the college. The 30minutes given to each student for research is too little, as there is no meaningful information that can be gathered in such a time. External examiners' reports dating as far back as 2008 reported that the library facility had to be improved. The library was also lagging behind in terms of technology as it still used the outdated system in loaning out books.

It emerged from the study that few new books were in the library. The college had made efforts to act on the structural and cultural factors of the shortage of textbooks, which impeded the teaching and learning process, thus enhancing the 3-3-3model.

#### **6.4.3 The decision to hold staff development programs for lecturers and mentorship workshops for secondary school Heads and mentors**

The study established that for lecturers, Heads of secondary schools and mentors to keep abreast of what is happening in teacher education, staff development programs must be held with lecturers and mentorship workshops should be conducted with Heads of schools and mentors. It was established that lecturers identified teaching practice, ICT and research as some of the main areas they would want to develop. Teaching practice was identified because lecturers come across different situations every year since each year has its own crop of students. There was controversy on whether or not non-specialists in specific subject areas should supervise students on teaching practice and what lecturers should do when they supervise a student who is teaching wrong content to the learners, which of course could only be established by a specialist in the subject area. Such issues can be ironed out in a staff

development meeting where they are debated, and a way forward is mapped out. Secondary teacher education, like secondary school education, is subject specific; therefore, it would be quite in order to have subject specialists supervising student teachers on teaching practice, but because of some technicalities it becomes difficult. For instance, lecturers with primary school background where the teacher teaches all the subjects are found in secondary teacher education colleges and vice versa.

Information and Communication Technology has a wide variety of programs that lecturers can utilize in their teaching and learning, thus it was identified as another area where lecturers can be developed. As new programs are introduced, lecturers are kept well informed by members of the ICT department or by any other lecturer who has the knowledge of the program. This gives lecturers confidence as they conduct their lectures. Because lecturers supervise students' research projects and are regarded as academics, research was seen as important for them. The staff development committee spearheads all the activities by asking for volunteers to present on a variety of aspects in the research process.

Mentorship workshops for Heads of schools and mentors were considered as important as they had never been carried out before, though student teachers were mentored in schools. It was established that the workshops benefitted mentors more than the Heads who are mainly into administration and not in the classroom. This is consistent with Tshuma's (2009) study that established that mentor training equipped mentors with the requisite skills of supervision that enhances student teacher development. This corroborates with Hobson, Harris, Buckner-Manley and Smith (2012) citing Bigelow (2002) that mentoring helps pre-service teachers develop teaching behaviours and strategies through being guided by an experienced teacher who acts as a role model and advisor. The mentor orients the student teacher (mentee) to real classroom teaching and learning with consistent and on-going opportunities to observe, coach and co-plan with each other. Although Heads are not actively involved in mentoring student teachers, they were considered important participants and therefore should be aware of the college's expectations. It came out that mentors benefitted from the workshops as they were now fully informed on how to supervise and not assess student teachers. Like lecturers, they

should play a supervisory role where they are moulding student teachers to be the kind of teachers that are expected in secondary schools. As supervisors, they became aware that they should assist student teachers on how to scheme, plan, evaluate, introduce ,develop and conclude lessons. They should also see to it that they conduct themselves in a manner that does not bring the teaching profession into disrepute. Since their duties were not different from the lectures 'they felt they should not be providing a free service to the college that collects teaching practice levy from the students. A small fraction of it should be sent to them as a token of appreciation.

Lecturers, Heads of schools and mentors attended staff development and mentorship programs that equipped them with the knowledge and skills of how best to assist student teachers to be the type of teachers that schools, communities and the wider society expects. As agents, they got by structures and cultures that hamper teacher education programs and thereby promoting the 3-3-3 model for Post 'O' Level Science.

#### **6.4.4 Failure to increase staff establishment, engage qualified laboratory assistants and a computer technician**

The study found that for effective teaching and learning to occur, there is a need to have adequate staff, qualified laboratory assistants and a computer technician. It however emerged that almost all the departments at the college were understaffed. Chemistry was distinctively noted as there was only one lecturer teaching first and third year students at the college. Understaffing was seen as negatively impacting the performance of student teachers as most of them, though satisfactorily performing in Physics and Biology, were not performing well in Chemistry. Because of poor performance, it was established that most students had developed negative attitudes towards the subject. The development of negative attitudes towards Chemistry concur with Salome's (2013) study that the Chemistry curriculum content, teaching periods, methods of teaching Chemistry and lack of laboratory experiments might be some of the reasons that contribute to the negative attitudes towards Chemistry.

It also emerged from the study that the college and schools do not have qualified laboratory assistants. This also negatively impacts on the teaching of Science as some students frankly indicated that they left some topics untaught as they were afraid of setting up the apparatus and chemicals that they were not familiar with. If there were qualified laboratory assistants they were going to set up the apparatus for the students and assist them in carrying out the experiments. It also emerged from the study that it was better for the schools to engage students on internship rather than engaging unqualified laboratory assistants.

Because the college had no computer technician, it emerged that the college was lagging behind in ICT. Lecturers talked of computer programs such as granaries, computerization of the loaning out of books in the library, among other programs that can only be accessed if there is a technician. They felt there was a need to engage a qualified computer technician if the college was to match the 21<sup>st</sup> century expectations.

The Principal and members of the College Academic Board (CAB) as the deciding agents at the college, by failing to engage a computer technician and a qualified laboratory assistant acted in a manner that reinforced the disadvantaged structural position and cultures, thereby hindering the 3-3-3 model for Post 'O' Level Science. Similarly, in schools, Heads failed to engage laboratory assistants, thus reinforcing unfavorable structures and cultures of few learners doing Pure Sciences which constrained the model.

#### **6.4.5 Failure to connect the generator in the administration block to all teaching venues including Science laboratories**

It also emerged from the study that for lectures to continue to be conducted despite the continuous power cuts, the generator that was only connected to the administration block, the library and one of the blocks could also be connected to the rest of the teaching venues including the Science laboratories. Reliable sources indicated that the generator was big

enough to lift the whole college. Failure to connect it to all teaching venues defeated the whole purpose of it being sourced for back up. The preference of the administration offices to teaching venues including the Science laboratories showed that the core business of the college is not put into much consideration. Administration offices cannot be there without teaching and learning venues; hence, priorities in teaching and learning institutions should be properly set. The Principal and the College Academic Board(CAB),as decision makers failed to appropriately act on institutional structures, as a result, unfavorable cultures of electricity load shedding constrain the 3-3-3 model for Post 'O' Level Science.

#### **6.4.6 The decision to allocate student teachers Integrated Science classes and not to take student teachers**

The study also found that, for student teachers to practice teaching the three Pure Sciences, they must be deployed to schools with standard laboratories and be allocated classes that do the three Sciences. However, it emerged from the study that there are some Heads of schools that resolved not to take student teachers for one reason or another. It also came out that some Heads of Science department in secondary schools lack confidence with most of the student teachers in the 3- year Post 'O' Level Science program. They saw them fail to conduct simple experiments, and then decided to allocate them Integrated Science classes.

Heads of schools who do not take student teachers in their schools, and Heads of Science department in secondary schools as agents, act in a manner that reinforces the disadvantaged structural position and culture of lack of Pure Science teachers in secondary schools, and as a result constrain the 3-3-3 model for Post 'O' Level Science.

### **6.5 Summary**

This chapter discussed the findings of the study as presented in Chapter 5. Structural, cultural and agential influences were discussed. Attempts to show the interplay between the three

concepts were made. The disadvantaged structural positions of the acute shortage of Science teachers in secondary schools, the dwindling numbers of Post 'A' Level Science graduates, bureaucracy, the In-Out-In, institutional structures such as the family, the Department of Teacher Education at the University of Zimbabwe, the college under study and secondary schools, infrastructural and transport facilities, material and financial resources, utilities such as water, electricity and the internet were discussed as structures that facilitate and / or hinder the 3-3-3 model. Discourses held about the teaching profession, the vision, mission and core values of the MHTESTD, DTE and the studied college, beliefs about what Science teachers should learn, knowledge, skills, attitudes and values they should acquire and how they should be taught were discussed as cultural factors that promote and / or constrain the 3-3-3 model. Agential influences that were discussed as promoting and / or impeding the 3-3-3 model were the decision by the Principal and the College Academic Board to enroll Post 'O' Level Science graduates, the decision by students to enroll for the Post 'O' Level Science program, the recruitment of under qualifying students, the use of various teaching methods, sourcing of the UNICEF kit, the conduction of staff development and mentorship programs for lecturers and Heads of schools and mentors respectively, the decision to take heed of external examiners' recommendations regarding the library facility, failure to increase staff establishment, engage qualified laboratory assistants and connecting the generator in the administration block to all teaching venues including Science laboratories, the decision by some school heads not to take student teachers for teaching practice and Science Heads of department in secondary schools to allocate student teachers Integrated Science learners.

The next chapter is a summary of the study. It also draws conclusions and presents recommendations based on the findings of the study.

# CHAPTER SEVEN

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter draws together key ideas and lessons from the study. It is divided into three sections; summary of key ideas from each chapter, summary of main findings, conclusions and recommendations.

### 7.1 Summary of Key Ideas from Each Chapter

The first chapter covered the background of the study. Supra-national institutions, that is, the World Bank and UNESCO and international trends on teacher education were discussed. The chapter went on to provide the rationale of the study, the statement of the problem, research questions, the purpose, objectives and significance of the study. It also gave the boundary of the study, defined guiding key terms and how the various chapters in the study are organized.

Chapter two covered the first part of the literature review. The theoretical framework that underpins the study was discussed in depth, that is, Roy Bhaskar and Margaret Archer's critical and social realist theories respectively. Examples of studies that successfully used critical realism as a lens for studying phenomena and a critique of the theory were also given.

The second part of the literature review, chapter three, conceptualized teacher education by discussing philosophies that guide teacher education, the content of teacher education curriculum, teaching methods that are used in teacher education, the theory–practice dilemma in teacher education and challenges facing teacher education.

The fourth chapter of the study presented the methodology used to conduct the study. It discussed the interpretive paradigm, the qualitative approach and the case study design. The

population, sample and data collection instruments were also discussed. In all the data collection procedures, trustworthiness and ethical considerations were detailed.

The fifth chapter dealt with data presentation and analysis. The first part presented data on the biographical characteristics of the participants. The second part presented data on the rationale behind the re-introduction of the 3-3-3 model in secondary teacher education colleges. The third, fourth and fifth sections presented data on structural, cultural and agential factors enabling and / or constraining the 3-3-3 secondary teacher education model for Post 'O' level Science respectively.

The sixth chapter discussed the findings of the study. The discussion reflected on the structural, cultural and agential factors that enable and / or constrain pre-service teacher education programs in general, and the 3-3-3 model for Post 'O' Level Science in particular. Under structural factors, the disadvantaged structural positions that led to the re-introduction of the 3-3-3 model in Zimbabwe's secondary teacher education colleges, bureaucratic, institutional, infrastructural, material and financial resources and utilities such as water, electricity and the internet were discussed. Discourses held by people about the teaching profession, the vision, mission and core values of the Ministry of Higher and Tertiary Education Science and Technology Development(MHTESTD),the Department of Teacher Education at the University of Zimbabwe(DTE) and the studied college, beliefs about what Science student teachers should learn, knowledge, skills, attitudes and values they should acquire and how they should be taught were discussed as cultural factors. Decisions and choices made by DTE officials, the Principal, lecturers, Heads of secondary schools, Heads of Science department in secondary schools, mentors and student teachers that either reinforced or transformed existing structures and cultures were discussed. The decision to re-introduce the 3-3-3 model for Post 'O' Level Science, enrollment of qualifying and under qualifying students, the adoption of various teaching methods, sourcing of the UNICEF Science kit, conduction of staff development programs for lecturers and mentorship workshops for Heads of schools and mentors, consideration of external examiners 'recommendations on the library facility, failure to increase

staff establishment, engage qualified laboratory assistants and the computer technician and connect the generator to all teaching and learning venues, the decision to allocate student teachers Integrated Science classes and not to take student teachers for teaching practice were discussed as some among many agential influences hindering and / or promoting the 3-3-3 model for Post 'O' Level Science.

## **7.2 Summary of the Findings**

The study's main objective was to establish enabling and / or constraining factors in Zimbabwe's 3-3-3 secondary teacher education model for Post 'O' Level Science. Structural, cultural and agential factors were to be established. The study therefore found the following:

### **7.2.1.1 Structural factors facilitating and / or hindering the 3-3-3 model**

The study found that the acute shortage of Science teachers in secondary schools led to few pupils taking Sciences up to 'A' Level. This disadvantaged structural position negatively affected secondary teacher education colleges where there were also few Posts 'A' Level Science graduates taking up the teacher education course. The disadvantaged structural positions needed agency to communicatively reflect and take quick measures before Sciences became extinct in colleges. That is how the 3-3-3 model, which was phased out in secondary teacher education colleges in 1992 later re-surfaced, though specifically for Sciences. Bureaucratic structures adopted by most organizations facilitated and also hindered the model. The hierarchical structure promoted the partnership system of offering teacher education in Zimbabwe, where the Ministry of Higher and Tertiary Education Science and Technology Development, the University of Zimbabwe, colleges of education and schools, work together in the production of the nation's teachers. The hierarchical structure was however, also established as hindering the model in some instances as the red tape followed delayed or never considered some of the decisions by those at the bottom of the hierarchy. As such, innovation and creativity was seen to be stifled by the bureaucratic structure.

The In-Out-In structure, a common structure in teacher education programs globally, where students are exposed to theory and practice enabled the model. The first 3 terms of 3 months and the next 3 terms of 3 months out in schools on teaching practice and last 3 terms of 3 months back at college prepared student teachers for the teaching profession. Institutional structures such as the family, the MHTESTD, DTE, the studied college and secondary schools were established as facilitating the model. Some of the structures in the studied college and some of the secondary schools were also found to be hindering the model. Institutional structures such as understaffing, lack of laboratories and textbooks were some of the structures identified as negatively affecting the model. Infrastructural facilities, material and financial resources, transport facilities and utilities such as water, electricity and the internet were also established as either facilitating or hindering the model in one way or the other.

#### 7.2.1.2 Cultural factors enabling and / or constraining the 3-3-3model

The study established that there were many discourses held about the teaching profession. It was found that some people believed that it was a secure job that assured one of employment soon after completion. Others believed that it was an easy woman's job and accommodated desperate people. All these stereotypical beliefs enabled the 3-3-3 model as there were students taking up the program every year.

The teaching of Physics, Chemistry and Biology content knowledge, Theory of Education, Professional studies, National Strategic Studies, Health and Life Skills, Language and Communication and Information Communication and Technology pedagogical knowledge, were believed to be equipping student teachers with the knowledge, skills, attitudes and values expected in the teaching and learning environment and as such consequently enabling the 3-3-3model.

Learner centred methodologies such as demonstration and experimentation, inquiry and discovery, individual presentations, excursions, research, projects, group discussions, problem solving and online among other participatory methods were believed to provide student

teachers with hands-on experience expected of a Science teacher. However, teacher centred methods of lecturing were also believed to be used in instances where learner centred methods were not necessarily required or when the situations demanded.

These types of methodologies were believed to equip student teachers with decision making, problem solving, communication, listening, research and computer skills among other relevant skills. Positive attitudes towards work, curiosity, being adventurous, persistent and investigative attitudes are developed. Students are believed to value hard work if exposed to learner centred methods thus enabling the 3-3-3model.

#### 7.2.1.3 Agential influences promoting and / or impeding the 3-3-3model

The study found that decisions and choices made by DTE officials, the Principal, lecturers, Heads of schools, Heads of Science department in secondary schools, mentors and student teachers enabled and / or constrained the 3-3-3model.

Communicative and meta-reflexive decisions made by DTE officials, the Principal and lecturers to re-introduce the 3 year program for Post 'O'Level Science enables the 3-3-3 model. Autonomous and communicative decisions of student teachers enrolling for the program also enhance the program. The decision by lecturers to use various methods when teaching students; sourcing for the UNICEF Science kit and conducting staff development and mentorship workshops for lecturers and Heads of schools and mentors, facilitate effective teaching and learning, thereby promoting the 3-3-3 model.

However, failure to increase staff establishment, engage qualified laboratory assistants and a computer technician, connect the generator to all teaching venues including Science laboratories, allocate student teachers Pure Science classes and take student teachers for teaching practice, hinder the teaching and learning of Pure Sciences and consequently constrain the 3-3-3 model.

### 7.3 Conclusions

The study intended to bring to the fore issues behind pre-service teacher education programs that are claimed to be inadequate. It has been concluded that while most research studies are quick to point out that pre- service teacher education programs do not adequately prepare teachers due to shortage of financial, material and human resources, there are also cultural factors that come into play. The interplay between structural, cultural and agential influences (Archer, 1995 and Archer, 1996), as indicated in the findings of the study; clearly explain where the inadequacies lie. Inadequacies in pre-service teacher education programs therefore lie within structural, cultural and agential factors. This is so because structures provide certain conditions, which create certain cultures that determine people's actions. Conversely, cultures influence certain structures that condition people to act the way they do. When people are then confronted with structures and cultures that influence them to reinforce or transform those structures and cultures, pre-service teacher education programs are enabled and / or constrained.

Since the study also intended to be an eye opener for the Ministry of Higher and Tertiary Education Science and Technology Development and teacher education colleges regarding enablers and / or constrainers of the 3-3-3 secondary teacher education model for Post 'O' Level Science in order to intervene accordingly, the study concludes that agency plays a major role in transforming or reinforcing cultural and structural positions that it is confronted with.

The findings of the study intended to inform teacher education providers with adjustments if needed, in a bid to improve teacher preparation, therefore, the study concludes that adjustments be made in the 3-3-3 model for Post 'O' Level Science in order to improve Science teacher preparation.

Using Archer's theory of social realism, the study concludes that there is an array of structural, cultural and agential factors that enable and / or constrain the 3-3-3 model for Post 'O' Level Science. Structural factors are those factors that have to do with how the model is organized

and structured, institutions involved in the implementation of the model, the availability and adequacy of infrastructure, material and financial resources. Cultural factors involve discourses, beliefs, theories and opinions held by people that shape the model while agential factors deal with the way people react and act upon structural and cultural discourses and beliefs thus enabling and / or constraining the model.

## **7.4 Recommendations**

This study has delved into enabling and / or constraining factors in pre-service teacher education in Zimbabwe's secondary teacher education colleges. It therefore provides learning points for consideration by teacher education practitioners as well as academics doing research in the field. Recommendations are divided into two; those relating to constrainers of teacher education models and those relating to further research:

**7.4.1**For improving on constraining factors in pre-service teacher education, it is recommended that:

**7.4.1.1**The Department of Teacher Education at the University of Zimbabwe, in consultation with relevant stakeholders, develops norms and standards that govern secondary teacher education colleges that emphasize subject specialization.

**7.4.1.2**The Department of Teacher Education at the University of Zimbabwe, in consultation with lecturers, provides a standard assessment instrument for teaching practice external examining.

**7.4.1.3**The Department of Teacher Education at the University of Zimbabwe and secondary teacher education colleges consider engaging an international external examiner for teaching practice as is done in academic examining.

**7.4.1.4**The Principal, as the head of the institution, in consultation with relevant authorities, considers ensuring adequate staffing for effective teaching and learning to occur.

**7.4.1.5**The College, in consultation with secondary schools and the Department of Teacher Education at the University of Zimbabwe, come up with a Science teacher education program for students with Integrated Science.

**7.4.1.6**The Department of Teacher Education at the University of Zimbabwe and colleges, now that they have formalized the mentorship of student teachers in schools, consider allocating a certain percentage of teaching practice levy to the schools concerned.

**7.4.1.7**Mentors, as pillars of the 3-3-3 model should be provided with a token of appreciation in the form of incentives.

**7.4.1.8**The Department of Teacher Education at the University of Zimbabwe and secondary teacher education colleges devise efficient and effective teaching practice supervision and assessment strategies, where subject specialists supervise and assess students on teaching practice.

**7.4.1.9**The CAB, as the strong organ of college academic affairs, ensures that qualified personnel are appointed to teach the subjects they specialized in.

**7.4.1.10**The College's ICT department considers strategizing on how the student's computer laboratory can be utilized for teaching, research, typing and printing purposes.

**7.4.1.11**The Principal and his Advisory team, consider improving backup systems such as the connection of the huge generator in the administration block to all teaching and learning venues, since that is the core business of the college.

**7.4.1.12**The Principal and his Advisory team, consider extending the library and improving the standards in the library in this 21<sup>st</sup> century.

**7.4.1.13**The Department of Teacher Education at the University of Zimbabwe and lecturers, come up with modules for use by students while on teaching practice.

**7.4.1.14** The two models proposed by the study (4-2-3 and 6-2-1) be taken into consideration in reviewing Post ‘O’ Level pre-service teacher education curriculum models, since strengths and weaknesses in the 3-year Post ‘O’ Level Science program have been availed.

**7.5 Tables that Summarise the Findings on Enabling and / or Constraining Factors in Zimbabwe’s 3-3-3 Model for Post ‘O’ Level Science**

**Table 7-5.1: Participants’ views on enabling factors of the 3-3-3 model**

Archerian category	Emerging enablers
Structure	<ul style="list-style-type: none"> <li>• Bureaucratic</li> <li>• In-Out-In</li> <li>• Family</li> <li>• Institutional structures at DTE at UZ,</li> <li>• studied college,</li> <li>• secondary schools,</li> <li>• infrastructure,</li> <li>• material resources,</li> <li>• financial resources,</li> <li>• transport facilities,</li> <li>• water,</li> <li>• electricity,</li> <li>• internet</li> </ul>

Culture	<ul style="list-style-type: none"> <li>• Discourses held about the teaching profession, the vision, mission and core values and the college motto,</li> <li>• Beliefs held about the teaching of Physics, Chemistry, Biology, TOE, PS, NASS, HLS, ICT, TP, Com.Skills and Action Research.</li> <li>• Beliefs about using both learner-centred and teacher centred methods of demonstration and experimentation, inquiry and discovery, excursion, individual presentations, coursework assignments and online teaching methods.</li> <li>• Beliefs held about the development of decision making, problem solving, listening, manipulative, and communication, research and computer skills.</li> <li>• Beliefs about the development of positive attitudes towards work, curiosity, being adventurous, persistent and investigative and values of hard work.</li> </ul>
Agency	<ul style="list-style-type: none"> <li>• Decision to re-introduce 3 year program for Post 'O' Level graduates,</li> <li>• decision to enroll for the program,</li> <li>• recruitment of under-qualified students,</li> <li>• the adoption of various teaching methods,</li> <li>• the holding of staff development and mentorship workshops,</li> <li>• sourcing of the UNICEF Science kit and</li> <li>• Consideration of external examiners' recommendations.</li> </ul>

**Table7-5.2: Participants' views on constraining factors of the 3-3-3 model**

Archerian category	Emerging constraints
Structure	<ul style="list-style-type: none"> <li>• Bureaucratic structure,</li> <li>• institutional structures at the college under study,</li> <li>• lack of laboratories in secondary schools,</li> <li>• infrastructure, material and financial resources,</li> <li>• electricity and the internet</li> </ul>
Culture	<ul style="list-style-type: none"> <li>• Discourses held about the teaching profession,</li> <li>• beliefs about students with Integrated Science,</li> <li>• high student-lecturer ratio, and</li> <li>• beliefs held about Chemistry</li> </ul>

Agency	<ul style="list-style-type: none"> <li>• Failure to engage qualified laboratory assistants,</li> <li>• computer technician, increase staff establishment,</li> <li>• connect the generator to all teaching venues including Science laboratories,</li> <li>• Allocate students Pure Science classes and not to take students for teaching practice.</li> </ul>
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**Table 7-5.3: Recommendations on how the model can further be enhanced**

Archerian category	Recommendations
Structure	<ul style="list-style-type: none"> <li>• 4-2-1 or 6-2-1,</li> <li>• Institutional structures such as upgrading internet facility,</li> <li>• teaching practice and mentorship workshops once every year,</li> <li>• Science computer laboratory,</li> <li>• Purchase of more material resources such as textbooks and</li> <li>• production of modules</li> </ul>
Culture	<ul style="list-style-type: none"> <li>• Cultivating a culture of hard work,</li> <li>• research and</li> <li>• integration of ICT in teaching and learning</li> </ul>
Agency	<ul style="list-style-type: none"> <li>• Offering bridging course to students with Integrated Science,</li> <li>• engagement of qualified laboratory assistants or attachees and computer technician,</li> <li>• increasing staff establishment, extension of the library,</li> <li>• continue to add books and increase research time from 30mins to 1hour,</li> <li>• reviewing the timetable for ICT and the conduction of the lectures,</li> <li>• connecting the generator to all teaching venues including the laboratories,</li> <li>• strategizing on how to utilize the</li> </ul>

	students' computer laboratory for research, • the production of modules for use by students during TP
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**7.3.2**For further research, it is recommended that:

**7.3.2.1**Since this study focused on the 3-3-3 secondary teacher education model for Post 'O' Level Science, results are peculiar to the model,therefore, there is a need to find out what enables and / or constrains the 3-3-3 secondary teacher education model for Post 'O' Level Physical Education and Foundations of Sportand the 2-2-2 model offered by the college under study. These studies will give a complete picture on the extent to which secondary teacher education colleges address the demands of the communities they are serving and the society at large.

**7.3.2.2**Since research studies have been conducted on the impact of teaching practice or practicum in teacher education, there is a need to delve into the effects of educational foundation courses such as Theory of Education, Professional Studies, National Strategic Studies, Health and Life Skills and Language and Communication Skills on student teachers.

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## APPENDICES

### APPENDIX A: CONSENT FORM



University of Fort Hare  
*Together in Excellence*

#### Ethics Research Confidentiality and Informed Consent Form

Please note:

**This form is to be completed by the researcher(s) as well as by the interviewee before the commencement of the research. Copies of the signed form must be filed and kept on record**

**(To be adapted for individual circumstances/needs)**

The University of Fort Hare, School of Postgraduate Studies, Faculty of Education is conducting research regarding **enabling and /or constraining factors in the 3year Post 'O'Level Science program**. We are interested in finding out more about its strengths and weaknesses so that we may acknowledge the strengths and recommend on weaknesses. We are carrying out this research to help improve on teacher training and development.

Please understand that you are not being forced to take part in this study and the choice whether to participate or not is yours alone. However, we would really appreciate it if you do share your thoughts with us. If you choose not to take part in answering the asked questions, you will not be affected in any way. If you agree to participate, you may stop me at any time and tell me that you don't want to go on with the interview. If you do this, there will also be no penalties and you will NOT be prejudiced in ANY way. Confidentiality will be observed professionally.

I will not be recording your name anywhere during the interview and no one will be able to link you to the answers you give. Only the researcher will have access to the unlinked information. The information will remain confidential and there will be no "come-backs" from the answers you give.

The interview will last around **(15)** minutes. I will be asking you questions and ask that you are as open and honest as possible in answering these questions. Some questions may be of a personal and/or sensitive nature. I will be asking some questions that you may not have thought about before, and which also involve thinking about the past or the future. I know that you cannot be absolutely certain about the answers to these questions but I ask that you try to think about these questions. When it comes to answering questions there are no right and wrong answers.

If possible, our organization would like to come back to the institution once we have completed our study to inform you and the responsible authorities what the results are and discuss our findings and proposals around the research and what this means for teacher education programs.

### **INFORMED CONSENT**

I hereby agree to participate in research regarding enabling and / or constraining factors in Zimbabwe's 3-3-3 secondary teacher education model for Post 'O'Level Science. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop this interview at any point should I not want to continue and that this decision will not in any way affect me negatively.

I understand that this is a research project whose purpose is not necessarily to benefit me personally.

I have received the telephone number of a person to contact should I need to speak about any issues which may arise in this interview.

I understand that this consent form will not be linked to the interview, and that my answers will remain confidential.

I understand that if at all possible, feedback will be given to the responsible authorities on the results of the completed research.

.....  
**Signature of participant**

**Date:**.....

I hereby agree to the tape recording of my participation in the study

.....  
**Signature of participant**

**Date:**.....

## APPENDIX B: ETHICAL CLEARANCE CERTIFICATE



## University of Fort Hare

### ETHICAL CLEARANCE CERTIFICATE REC-270710-028-RA Level 01

Certificate Reference Number: NKO031SSHA01

Project title: **A critical realist explanation of enabling and constraining factors in Zimbabwe's 3-3-3 Teacher Education Curriculum Model.**

Nature of Project: PhD

Principal Researcher: Noziso Shava

Supervisor: Dr V Nkonki

Co-supervisor:

On behalf of the University of Fort Hare's Research Ethics Committee (UREC) I hereby give ethical approval in respect of the undertakings contained in the above-mentioned project and research instrument(s). Should any other instruments be used, these require separate authorization. The Researcher may therefore commence with the research as from the date of this certificate, using the reference number indicated above.

Please note that the UREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the document
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research

The Principal Researcher must report to the UREC in the prescribed format, where applicable, annually, and at the end of the project, in respect of ethical compliance.

**Special conditions:** Research that includes children as per the official regulations of the act must take the following into account:

Note: The UREC is aware of the provisions of s71 of the National Health Act 61 of 2003 and that matters pertaining to obtaining the Minister's consent are under discussion and remain unresolved. Nonetheless, as was decided at a meeting between the National Health Research Ethics Committee and stakeholders on 6 June 2013, university ethics committees may continue to grant ethical clearance for research involving children without the Minister's consent, provided that the prescripts of the previous rules have been met. This certificate is granted in terms of this agreement.

The UREC retains the right to

- Withdraw or amend this Ethical Clearance Certificate if
  - Any unethical principal or practices are revealed or suspected
  - Relevant information has been withheld or misrepresented
  - Regulatory changes of whatsoever nature so require
  - The conditions contained in the Certificate have not been adhered to
- Request access to any information or data at any time during the course or after completion of the project.
- In addition to the need to comply with the highest level of ethical conduct principle investigators must report back annually as an evaluation and monitoring mechanism on the progress being made by the research. Such a report must be sent to the Dean of Research's office

The Ethics Committee wished you well in your research.

Yours sincerely

  
**Professor Gideon de Wet**  
**Dean of Research**

12 November 2014

## APPENDIX C: INTERVIEW GUIDES

### C1: INTERVIEW GUIDE FOR THE DTE OFFICIAL

#### Section A

##### Biographic information for the DTE official

1. Date of the interview-----
2. Gender: Female [ ]            Male [ ]
3. Age range:                    30-39 years [ ]  
                  40-49 years [ ]  
                  50-59 years [ ]  
                  60-69 years [ ]  
                  70+ years    [ ]
4. Experience as DTE official-----years
5. What is your highest academic qualification?
6. What is your highest professional qualification?  
  
                  Bachelor of Science Degree (B Sc) [ ]  
                  Bachelor of Arts Degree (B A) [ ]  
                  B Sc + Graduate Certificate in Education (Grade Ce) [ ]  
                  B Sc + Post Graduate Certificate in Education (PGDE) [ ]  
                  B A + Grade Ce [ ]  
                  B A + PGDE [ ]  
                  Bachelor of Education Degree (B E D) [ ]  
                  Honors Degree [ ]  
                  Master's Degree [ ]  
                  Any other specify-----

#### Section B

##### **Structural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. What necessitated the re-introduction of the 3-3-3 secondary teacher education model for Post 'O' level Science in 2007? (Probe to understand the rationale behind the re-introduction)

2 What can you say about the 3-3-3 (in-out-in) structure of the model? (Probe to get the strengths and /or weaknesses of the structure)

3 How is teacher education structured/ organized in Zimbabwe? (Probe to get the hierarchical structure of MHTESTD > UZ > Colleges > schools)

4 Kindly give me the hierarchical structure prevailing in teacher education colleges (Probe to get Principal > Vice principal etc.)

5 How has the hierarchical structure enabled and/ or constrained the 3-3-3 Post 'O' Level Science model?

6 Which institutions are key players in teacher education? (Probe to get colleges, universities, schools, families etc.)

7 How has each institution (named above) enabled and /or constrained the 3-3-3 Post 'O' Level Science model?

8 How do infrastructural facilities facilitate and/ or hinder the implementation of teacher education programs?

9 Kindly comment on the adequacy or inadequacy of material resources as enabling and / or constraining teacher education programs

10. Can you comment on the availability or non-availability of financial resources as enabling and / or constraining teacher education programs?

11. How do transport facilities enable and / or constrain teacher education programs?

12. Can you kindly comment on any other issues that you consider structural that either enable and / or constrain the 3-3-3 model and feel may be of vital contribution to the study.

### **Section C**

#### **Cultural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science.**

1 May you please tell me why you chose the teaching profession? (Probe to get attitudes and beliefs about the teaching profession)

2 What do you think secondary school Science teachers should learn and know? (Probe to get the beliefs about the content of Science teacher education, e.g. Physics, Chemistry, Biology, P S, TOE, NASS etc.)

3 How do you justify what you think Science teachers should learn and know? (Probe to get the beliefs for teaching Physics, Chemistry, Biology, TOE, PS etc.)

4 To what extent do you think the 3-3-3 model is in line with this?

5. What skills, knowledge, attitudes and values do you think Science secondary school teachers should acquire during their course of training? (Probe to understand the beliefs held about each one of them)

6. In your opinion, how have colleges instilled these among student teachers?

7. How do you think secondary school Science teachers should be taught? (Probe to get teaching methods in science teacher preparation)

8 To what extent do you think each one of these teaching methods (indicated above) has been adopted in the training of Science secondary school teachers?

9 How do you think teaching practice has enabled and/ or constrained the 3-3-3 model?

10 How do you think mentoring has enabled and / or constrained the 3-3-3 model?

11 In your opinion, how well does the 3-3-3 model prepare Science teachers for lower and middle secondary school levels?

12. Kindly comment on any other issues that you consider cultural (discourses, beliefs, opinions, ideas and theories held by people that condition their actions) in teacher education, and you feel may be of vital contribution to the study.

## **Section D**

### **Agential influences enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. Considering the hierarchical structure adopted in teacher education, what role do the following play in facilitating teacher preparation programs?

(i) MHTESTD

(ii) University of Zimbabwe

(iii) College

(iv) Schools

2 Considering the bureaucratic structure adopted by teacher education colleges, what role is played by;

(i)The principal

(ii)The vice principal

(iii) H. O. Ds

(iv) H. O. Ss in the implementation of teacher education programs?

3What can you say about staff establishment in colleges?

3.1How has staff establishment enabled and / or constrained the 3-3-3 model?

4 What is the role of school mentors in teacher education?

4.1How have school mentors facilitated and / or hindered the 3-3-3 model?

5 Are there any other stakeholders that you are aware of, that actively participate in the training and development of Science secondary school teachers? (Probe to get stakeholders)

5.1How has each of these stakeholders enabled the 3-3-3 model?

6 Kindly comment on any other agential factors that you feel may be of vital contribution to the study.

Thank you for your time



- 3 How is teacher education structured/ organized in Zimbabwe? (Probe to get the hierarchical structure of MHTESTD> UZ> Colleges>schools)
- 4 Kindly give me the hierarchical structure prevailing in teacher education colleges: (Probe to get Principal> Vice principal etc.)
- 5 How has the hierarchical structure enabled and/ or constrained the 3-3-3 model?
- 6 Which institutions are key players in teacher education? (Probe to get information on colleges, universities, schools, familiesetc.)
  
- 7 How has each institution (named above) enabled and /or constrained the 3-3-3 Post 'O' Level Science model?
  
- 8 How do infrastructural facilities facilitate and/ or hinder the implementation of teacher education programs? (Probe to get more information on the library, laboratories, lecture rooms etc.)
  
- 9 How has college infrastructural facilities enabled and/or constrained the 3-3-3 model?
  
- 10 How has infrastructural facilities in secondary schools enabled and/or constrained the 3-3-3 model for Post 'O' level Science? (Probe to get more information on the laboratories, library, classrooms etc.)
  
- 11 Kindly comment on the adequacy or inadequacy of material resources as enabling and / or constraining teacher education programs
  
- 12 How has the adequacy or inadequacy of material resources enabled and / or constrained the 3-3-3 model?
  
13. Can you comment on the availability or non-availability of financial resources as enabling and / or constraining teacher education programs?
  
- 14 How has the availability or non-availability of financial resources enabled and / or constrained the 3-3-3 model?
  
15. How do transport facilities enable and / or constrain teacher education programs?
  
- 16 How has transport facilities enabled and /or constrained the 3-3-3 model?
  
17. Can you kindly comment on any other issues that you consider structural that either enable and / or constrain the 3-3-3 model and feel may be of vital contribution to the study.

## **Section C**

### **Cultural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science.**

1 May you please tell me why you chose the teaching profession? (Probe to get attitudes and beliefs about the teaching profession)

2 What do you think secondary school Science teachers should learn and know? (Probe to get the beliefs about the content in Science teacher education, e.g. Physics, Chemistry, Biology, P S, TOE, NASS etc.)

3 How do you justify what you think Science teachers should learn and know? (Probe to get information on the beliefs for teaching Physics, Chemistry, Biology, TOE, PS etc.)

4 To what extent do you think the 3-3-3 model is in line with this?

5. What skills, knowledge, attitudes and values do you think secondary school teachers should acquire during their course of training? (Probe to understand the beliefs about each one of them)

6. How do you think these have been inculcated among student teachers in the 3-3-3 Science program?

7. How do you think secondary school Science teachers should be taught? (Probe to get opinions on teaching methods to be used in Science teacher preparation)

8. In your opinion, to what extent has each one of the teaching methods (indicated above) been adopted in teaching student teachers in the Post 'O' Level Science program?

9 How does teaching practice (T P) facilitate teacher preparation?

9.1 How has teaching practice enabled and/ or constrained the 3-3-3 model?

10 How does mentoring promote teacher preparation?

10.1 How has mentoring enabled and / or constrained the 3-3-3 model?

11. In your opinion, how well does the 3-3-3 model prepare Science teachers for lower and middle secondary school levels?

15. Kindly comment on any other issues that you consider cultural ( discourses, beliefs, practices, theories, ideas and opinions held by people that condition their actions) in teacher education, and you feel may be of vital contribution to the study.

## **Section D**

### **Agential influences enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. Considering the hierarchical structure adopted in teacher education, what role do the following play in facilitating teacher preparation programs?

(i) MHTESTD

(ii) University of Zimbabwe

(iii) College

(iv) Schools

2 How has each one of them enabled and / or constrained the 3-3-3 model? (Take note discuss one by one)

3 Considering the bureaucratic structure adopted by the college, what role is played by;

(i)The principal

(ii) The vice principal

(iii) H. O. Ds

(iv) H. O. Ss in the implementation of teacher education programs?

4What can you say about staff establishment at the college?

4.1How has staff establishment enabled and / or constrained the 3-3-3 model?

5How has secondary schools enabled and / or constrained the 3-3-3 model?

6 What is the role of school mentors in teacher education?

6.1How has school mentors facilitated and / or hindered the 3-3-3 model?

7Are there any other stakeholders that you are aware of, that actively participate in secondary teacher education programs? (Probe to get stakeholders)

7.1How has each of these stakeholders enabled and / or constrained the 3-3-3 model?

8Kindly comment on any other agential factors that you feel may be of vital contribution to the study.

Thank you for your time

### **C3: INTERVIEW GUIDE FOR THE HEADS OF DEPARTMENT (H.O.Ds) AND HEADS OF SUBJECT (H.O.Ss)**

#### **Section A**

##### **Biographic information for the H.O.D and H.O.S**

1. Date of the interview-----
2. Gender: Female [  ]                      Male [  ]
3. Age range:                                      30-39 years [  ]  
    40-49 years [  ]  
    50-59 years [  ]  
    60-69 years [  ]  
    70+ years    [  ]
- 4 Teaching experience-----years
5. Lecturing experience in the subject-----years
6. Experience as H.O.D/ H.O.S-----years
7. What is your highest academic qualification?
8. What is your highest professional qualification?  
  
    Bachelor of Science Degree (B Sc) [  ]  
    Bachelor of Arts Degree (B A) [  ]  
    B Sc + Graduate Certificate in Education (Grade Ce) [  ]  
  
    B Sc + Post Graduate Certificate in Education (PGDE) [  ]  
    B A + Grade Ce [  ]  
    B A + PGDE [  ]  
    Bachelor of Education Degree (B E D) [  ]  
    Honors Degree [  ]  
    Master's Degree [  ]  
    Any other specify-----

#### **Section B**

**Structural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. What necessitated the re-introduction of the 3-3-3 secondary teacher education model for Post 'O' level science in 2007? (Probe to understand the rationale behind the re-introduction)
- 2 What can you say about the 3-3-3 (in-out-in) structure of the model? (Probe to get the strengths and weaknesses of the structure)
- 4How is teacher education structured /organized in Zimbabwe? (Probe to get the hierarchical structure of MHTESTD> UZ> College.>schools)
- 5Kindly give me the hierarchical structure prevailing in teacher education colleges: (Probe to get Principal> Vice principal etc)
- 6How has the hierarchical structure enabled and/ or constrained the 3-3-3 model?
- 7Which institutions are key players in teacher education? (Probe to get colleges, universities, schools, families etc)
- 8How has each institution (named above) enabled and /or constrained the 3-3-3 Post 'O' Level Science model?
- 9 How do infrastructural facilities facilitate and/ or hinder the implementation of teacher education programs? (Probe to get the information about the library, laboratories, lecture rooms etc)
- 10How has college infrastructural facilities enabled and/or constrained the 3-3-3 model?
- 11How has infrastructural facilities in secondary schools enabled and/or constrained the 3-3-3 model for Post 'O' level Science? (Probe to get information on the laboratories, library, classrooms etc)
- 12Kindly comment on the adequacy or inadequacy of material resources as enabling and or constraining teacher education programs
- 13How has the adequacy or inadequacy of material resources enabled and / or constrained the 3-3-3 model?
14. Can you comment on the availability or non-availability of financial resources as enabling and / or constraining teacher education programs?
- 15 How has the availability or non-availability of financial resources enabled and / or constrained the 3-3-3 model?
16. How do transport facilities enable and / or constrain teacher education programs?
- 17 How has transport facilities enabled and /or constrained the 3-3-3 model?

18. Can you kindly comment on any other issues that you consider structural that either enable and / or constrain the 3-3-3 model and feel may be of vital contribution to the study.

### **Section C**

#### **Cultural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post ‘O’ Level Science.**

1 May you please tell me why you chose the teaching profession? (Probe to get attitudes and beliefs about the teaching profession)

2 What do you think secondary school Science teachers should learn and know? (Probe to get the beliefs about the content of Science teacher education, eg Physics, Chemistry, Biology, P S, TOE, NASS etc)

3 How do you justify what you think Science teachers should learn and know?(Probe each H.O.S to get the beliefs held for teaching and learning his/her subject)

4 To what extent do you think the 3-3-3 model is in line with this?

5 What skills, knowledge, attitudes and values do you think secondary school teachers should acquire during their course of training? (Probe each H.O.D& H.O.S to understand each one of them)

6 How do you think these have been inculcated among student teachers in the 3-3-3 Science program?

7 How do you think secondary school Science teachers should be taught? (Probe each H.O.D & H.O.S to get teaching methods for his/her subject)

8 How has each one of the teaching methods (indicated above) enabled and / or constrained the 3-3-3 model?

9. How does teaching practice (T P) facilitate teacher preparation?

9.1 How has teaching practice enabled and/ or constrained the 3-3-3 model?

10 How does mentoring promote teacher preparation?

10.1 How has mentoring enabled and / or constrained the 3-3-3 model?

11 In your opinion, how well does the 3-3-3 model prepare science teachers for lower and middle secondary school levels?

12 Kindly comment on any other issues that you consider cultural (discourses, beliefs, practices, theories, ideas, opinions held by people that condition their actions) in teacher education, and you feel may be of vital contribution to the study.

### **Section D**

#### **Agential influences enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. Considering the hierarchical structure adopted in teacher education, what role do the following play in facilitating teacher preparation programs?

(i) MHTESTD

(ii) University of Zimbabwe

(iii) College

(iv) Schools

2 How has each one of them enabled and / or constrained the 3-3-3 model? (Take note discuss one by one)

3 Considering the bureaucratic structure adopted by the college, what role is played by;

(i) The principal

(ii) The vice principal

(iii) H. O. Ds

(iv) H. O. Ss in the implementation of teacher education programs?

4 How has each one of these enabled and or constrained the 3-3-3 model?

5 What can you say about staff establishment in your subject area?

5.1 How has staff establishment in your subject area enabled and / or constrained the 3-3-3 model?

6 What is the role of school mentors in teacher education?

6.1 How has school mentors facilitated and / or hindered the 3-3-3 model?

7 Are there any other stakeholders that you are aware of, that actively participate in secondary teacher education programs? (Probe to get the stakeholders)

7.1 How has each of these stakeholders enabled and/ or constrained the 3-3-3 model?

8 Kindly comment on any other agential factors that you feel may be of vital contribution to the study.

Thank you for your time

#### **C4: INTERVIEW GUIDE FOR STUDENT TEACHERS(FOCUS GROUP)**

##### **Section A**

##### **Biographic information for student teachers**

1. Date of the interview-----

2. Gender: Number of females [ ]      Number of males [ ]

3. Age range:

    20-29 years [ ]

    30-39 years [ ]

    40-49 years [ ]

    50-59 years [ ]

4 Work experience before joining the teaching profession -----years

5. What are your highest academic qualifications?

##### **Section B**

##### **Structural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. What do you think necessitated the re-introduction of the 3-3-3 secondary teacher education model for Post 'O' level Science in 2007? (Probe to understand the rationale behind the re-introduction)

2 What can you say about the 3-3-3 (in-out-in) structure of the model? (Probe to get the strengths and weaknesses of the structure)

- 3 How is teacher education structured/ organized in Zimbabwe? (Probe to get the hierarchical structure of MHTESTD> UZ> Colleges>schools)
- 4 Kindly give me the hierarchical structure prevailing in teacher education colleges: (Probe to get Principal> Vice principal etc)
- 5 How has the hierarchical structure enabled and/ or constrained the 3-3-3 model?
- 6 Which institutions are key players in teacher education? (Probe to get colleges, universities, schools, families etc)
- 7 How has each institution (named above) enabled and / or constrained the 3-3-3 Science model?
- 8 How do infrastructural facilities facilitate and/ or hinder the implementation of teacher education programs? (Probe to get the information about the library, laboratories, lecture rooms etc)
- 9 How has college infrastructural facilities enabled and/or constrained the 3-3-3 model?
- 10 How has infrastructural facilities in secondary schools enabled and/or constrained the 3-3-3 model for post 'O' level Science? (Probe to get information on the laboratories, library, classrooms etc)
- 11 Kindly comment on the adequacy or inadequacy of material resources as enabling and / or constraining teacher education programs
- 12 How has the adequacy or inadequacy of material resources enabled and or constrained the 3-3-3 model?
13. Can you comment on the availability or non-availability of financial resources as enabling and / or constraining teacher education programs?
- 14 How has the availability or non-availability of financial resources enabled and / or constrained the 3-3-3 model?
15. How do transport facilities enable and /or constrain teacher education programs?
- 16 How has transport facilities enabled and / or constrained the 3-3-3 model?
17. Can you kindly comment on any other issues that you consider structural that either enable and / or constrain the 3-3-3 model and feel may be of vital contribution to the study.

## **Section C**

### **Cultural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science.**

1 May you please tell me why you chose the teaching profession? (Probe to get attitudes and beliefs about the teaching profession)

2 What do you think secondary school Science teachers should learn and know? (Probe to get the beliefs about the content of Science teacher education, eg Physics, Chemistry, Biology, P S, TOE, NASS etc)

4 How do you justify what you think Science teachers should learn and know? (Probe each H.O.S to get the beliefs for teaching and learning his/her subject)

5 To what extent do you think the 3-3-3 model in line with this?

6. What skills, knowledge, attitudes and values do you think secondary school teachers should acquire during their course of training? (Probe each H.O.D & H.O.S to understand each one of them)

7 To what extent do you think these have been inculcated among student teachers in the 3-3-3 Science program?

8 How do you think secondary school science teachers should be taught? (Probe each H.O.D & H.O.S to get teaching methods for his/her subject)

9. How has each one of the teaching methods (indicated above) enabled and / or constrained the 3-3-3 model?

10 How does teaching practice (T P) facilitate teacher preparation?

10.1 How has teaching practice enabled and/ or constrained the 3-3-3 model?

11 How does mentoring promote teacher preparation?

11.1 How has mentoring enabled and /or constrained the 3-3-3 model?

12. In your opinion, how well does the 3-3-3 model prepare Science teachers for lower and middle secondary school levels?

13. Kindly comment on any other issues that you consider cultural (discourses, beliefs, practices, theories, ideas, opinions held by people that condition their actions) in teacher education, and you feel may be of vital contribution to the study.

## **Section D**

### **Agential influences enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. Considering the hierarchical structure adopted in teacher education, what role do you think the following play in facilitating teacher preparation programs?

(i) MHTESTD

(ii) University of Zimbabwe

(iii) College

(iv) Schools

2 How has each one of them enabled and / or constrained the 3-3-3 model? (Take note discuss one by one)

3 Considering the bureaucratic structure adopted by the college, what role you think is played by;

(i) The principal

(ii) The vice principal

(iii) H. O. Ds

(iv) H. O. Ss in the implementation of teacher education programs?

4 How has each one of these enabled and/ or constrained the 3-3-3 model?

5 What can you say about staff establishment at the college?

5.1 How has staff establishment at the college enabled and / or constrained the 3-3-3 model?

6 What do you think the role of school mentors is, in teacher education?

6.1 How have school mentors facilitated and / or hindered the 3-3-3 model?

7 Are there any other stakeholders that you are aware of, that actively participate in secondary teacher education programs? (Probe to get stakeholders)

7.1 How has each of these stakeholders enabled and/ or constrained the 3-3-3 model?

8 Kindly comment on any other agential factors that you feel may be of vital contribution to the study.

Thank you for your time

**C5: INTERVIEW GUIDE FOR HEADS OF SCIENCE DEPARTMENT (S.H.O.Ds) IN  
SECONDARY SCHOOLS**

**Section A**

**Biographic information for Secondary School Science H.O.Ds**

1. Date of the interview-----

2. Gender: Female [ ]            Male [ ]

3. Age range:            20-29 years [ ]

                                 30-39 years [ ]

                                 40-49 years [ ]

                                 50-59 years [ ]

                                 60-69 years [ ]

                                 70+ years [ ]

4 Teaching experience-----years

5. Experience as Science H.O.D.-----years

6 What is your highest academic qualification?

7. What is your highest professional qualification?

                 Bachelor of Science Degree (B Sc) [ ]

                 Bachelor of Arts Degree (B A) [ ]

                 B Sc + Graduate Certificate in Education (Grade Ce) [ ]

                 B Sc + Post Graduate Certificate in Education (PGDE) [ ]

                 B A + Grade Ce [ ]

                 B A + PGDE [ ]

                 Bachelor of Education Degree (B E D) [ ]

                 Honors Degree [ ]

                 Master's Degree [ ]

                 Any other specify-----

## **Section B**

### **Structural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. What do you think necessitated the re-introduction of the 3-3-3 secondary teacher education model for Post 'O' level science in 2007? (Probe to understand the rationale behind the re-introduction)

2 What can you say about the 3-3-3 (in-out-in) structure of the model? (Probe to get the strengths and weaknesses of the structure)

3How is teacher education structured/ organized in Zimbabwe? (Probe to get the hierarchical structure of MHTESTD> UZ> College.>schools.)

4Kindly give me the hierarchical structure prevailing in secondary schools: (Probe to get Head>Deputy Head etc)

5How has the hierarchical structure enabled and/ or constrained the 3-3-3 model?

6Which institutions are key players in teacher education? (Probe to get colleges, universities, schools, families etc)

7How has each institution (named above) enabled and / or constrained the 3-3-3 Science model?

8 How do infrastructural facilities facilitate and/ or hinder the implementation of teacher education programs? (Probe to get the information about the library, laboratories, etc)

9How has infrastructural facilities in secondary schools enabled and/or constrained the 3-3-3 model for post 'O' level Science?

10Kindly comment on the adequacy or inadequacy of material resources as enabling and / or constraining teacher education programs

11How has the adequacy or inadequacy of material resources enabled and / or constrained the 3-3-3 model?

12. Can you comment on the availability or non-availability of financial resources as enabling and / or constraining teacher education programs?

13 How has the availability or non-availability of financial resources enabled and /or constrained the 3-3-3 model?

14. How do transport facilities enable and / or constrain teacher education programs?

15 How has transport facilities enabled and /or constrained the 3-3-3 model?

16. Can you kindly comment on any other issues that you consider structural that either enable and/ or constrain the 3-3-3 model and feel may be of vital contribution to the study.

### **Section C**

#### **Cultural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science.**

1 May you please tell me why you chose the teaching profession? (Probe to get attitudes and beliefs about the teaching profession)

2What do you think secondary school science teachers should learn and know? (Probe to get the beliefs about the content in Science teacher education, e.g. Physics,Chemistry,Biology,P S, TOE, NASS etc.)

3How do you justify what you think Science teachers should learn and know?(Probe each H.O.S to get the beliefs for teaching and learning his/her subject)

4To what extent is the 3-3-3 model in line with this?

5. What skills, knowledge, attitudes and values do you think secondary school teachers should acquire during their course of training? (Probe S.H.O.Ds to understand each one of them)

6. How has these been inculcated among student teachers in the 3-3-3 Science program?

7 How do you think secondary school Science teachers should be taught? (Probe each S.H.O.Ds to get Science teaching methods)

8 How has each one of the teaching methods (indicated above) enabled and / or constrained the 3-3-3 model?

9. How does teaching practice (T P) facilitate teacher preparation?

9.1 How has teaching practice enabled and/ or constrained the 3-3-3 model?

10. How does mentoring promote teacher preparation?

10.1 How has mentoring enabled and / or constrained the 3-3-3 model?

11. In your opinion, how well does the 3-3-3 model prepare Science teachers for lower and middle secondary school levels?

12 .Kindly comment on any other issues that you consider cultural(discourses,beliefs,practices,theories,ideas,opinions held by people that condition their actions) in teacher education, and you feel may be of vital contribution to the study.

### **Section D**

#### **Agential influences enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. Considering the hierarchical structure adopted in teacher education, what role do you think the following play in facilitating teacher preparation programs?

(i) MHTESTD

(ii)University of Zimbabwe

(iii)College

(iv)Schools

2 How has each one of them enabled and / or constrained the 3-3-3 model? (Take note discuss one by one)

3Considering the bureaucratic structure adopted by schools, what role is played by;

(i)The Head

(ii) The Deputy Head

(iii) H. O. Ds in the implementation of teacher education programs ?

4How has each one of these enabled and / or constrained the 3-3-3 model?

5 What can you say about staff establishment in your department?

5.1How has staff establishment enabled and / or constrained the 3-3-3 model?

6 What role do school mentors play in teacher preparation?

6.1How have school mentors facilitated and / or hindered the 3-3-3 model?

7Are there any other stakeholders that you are aware of, that actively participate in secondary teacher education programs? (Probe to get stakeholders)

7.1How has each of these stakeholders enabled and/ or constrained the 3-3-3 model?

8Kindly comment on any other agential factors that you feel may be of vital contribution to the study.

Thank you for your time

## **C6: INTERVIEW GUIDE FOR MENTORS IN SECONDARY SCHOOLS**

### **Section A**

#### **Biographic information for Secondary School mentors**

1. Date of the interview-----
2. Gender: Female [  ]            Male [  ]
3. Age range:            20-29 years [  ]  
                                  30-39 years [  ]  
                                  40-49 years [  ]  
                                  50-59 years [  ]  
                                  60-69 years [  ]  
                                  70+ years    [  ]
- 4 Teaching experience-----years
5. Experience as a mentor.-----years
- 6 What is your highest academic qualification?
7. What is your highest professional qualification?  
  
    Bachelor of Science Degree (B Sc) [  ]  
    Bachelor of Arts Degree (B A) [  ]  
    B Sc + Graduate Certificate in Education (Grade Ce) [  ]  
    B Sc + Post Graduate Certificate in Education (PGDE) [  ]  
    B A + Grade Ce [  ]  
    B A + PGDE [  ]  
    Bachelor of Education Degree (B E D) [  ]  
    Honors Degree [  ]  
    Master's Degree [  ]  
    Any other specify-----

### **Section B**

## **Structural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. What do you think necessitated the re-introduction of the 3-3-3 secondary teacher education model for Post 'O' level science in 2007? (Probe to understand the rationale behind the re-introduction)
- 2 What can you say about the 3-3-3 (in-out-in) structure of the model? (Probe to get the strengths and weaknesses of the structure)
- 3How is teacher education structured/ organized in Zimbabwe? (Probe to get information on the hierarchical structure of MHTESTD> UZ> College.>schools.)
- 4Kindly give me the hierarchical structure prevailing in secondary schools: (Probe to get Head>Deputy Head etc.)
- 5How has the hierarchical structure enabled and/ or constrained the 3-3-3 model?
- 6Which institutions are key players in teacher education? (Probe to get colleges, universities, schools, familiesetc.)
- 7How has each institution (named above) enabled and /or constrained the 3-3-3 Science model?
- 8 How do infrastructural facilities facilitate and/ or hinder the implementation of teacher education programs? (Probe to get the information about the library, laboratories, etc)
- 9How has infrastructural facilities in secondary schools enabled and/or constrained the 3-3-3 model for Post 'O' level Science? (Probe to get information on the laboratories, library, classrooms etc.)
- 10Kindly comment on the adequacy or inadequacy of material resources as enabling and / or constraining teacher education programs
- 11How has the adequacy or inadequacy of material resources enabled and / or constrained the 3-3-3 model?
12. Can you comment on the availability or non-availability of financial resources as enabling and / or constraining teacher education programs?
- 13 How has the availability or non-availability of financial resources enabled and /or constrained the 3-3-3 model?
14. How do transport facilities enable and /or constrain teacher education programs?
- 15 How has transport facilities enabled and /or constrained the 3-3-3 model?

16. Can you kindly comment on any other issues that you consider structural that either enable and/ or constrain the 3-3-3 model and feel may be of vital contribution to the study.

### **Section C**

#### **Cultural factors enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science.**

1 May you please tell me why you chose the teaching profession? (Probe to get attitudes and beliefs about the teaching profession)

2 How has your choice facilitated and /or impeded the 3-3-3 model?

3 What do you think secondary school Science teachers should learn and know? (Probe to get the beliefs about the content of Science teacher education, e.g. Physics, Chemistry, Biology, P S, TOE, NASS etc.)

4 How do you justify what you think Science teachers should learn and know? (Probe each mentor to get the beliefs for teaching and learning his/her subject)

5 To what extent is the 3-3-3 model in line with this?

6 What skills, knowledge, attitudes and values do you think secondary school teachers should acquire during their course of training? (Probe each mentor to understand each one of them)

7 How has these been inculcated among student teachers in the 3-3-3 Science program?

8 How do you think secondary school Science teachers should be taught? (Probe each mentor to get teaching methods for his/her subject)

9 How has each one of the teaching methods (indicated above) enabled and / or constrained the 3-3-3 model?

10 How does teaching practice (T P) facilitate teacher preparation?

10.1 How has teaching practice enabled and / or constrained the 3-3-3 model?

11 How does mentoring promote teacher preparation?

11.1 How has mentoring enabled and / or constrained the 3-3-3 model?

12. In your opinion, how well does the 3-3-3 model prepare Science teachers for lower and middle secondary school levels?

13. Kindly comment on any other issues that you consider cultural (discourses, beliefs, practices, theories, ideas, opinions held by people that condition their actions) in teacher education, and you feel may be of vital contribution to the study.

## **Section D**

### **Agential influences enabling and /or constraining the 3-3-3 secondary teacher education model for Post 'O' Level Science**

1. Considering the hierarchical structure adopted in teacher education, what role do you think the following play in facilitating teacher preparation programs?

(i) MHTESTD

(ii) University of Zimbabwe

(iii) College

(iv) Schools

2 How has each one of them enabled and / or constrained the 3-3-3 model? (Take note discuss one by one)

3 Considering the bureaucratic structure adopted by schools, what role is played by;

(i) The Head

(ii) The Deputy Head

(iii) H. O. Ds in the implementation of teacher education programs?

4 How has each one of these enabled and / or constrained the 3-3-3 model?

5 What can you say about staff establishment in your department?

5.1 How has staff establishment enabled and / or constrained the 3-3-3 model?

6 What is the role of school mentors in teacher education?

6.1 How have you, as school mentors facilitated and / or hindered the 3-3-3 model?

7 Are there any other stakeholders that you are aware of, that actively participate in secondary teacher education programs? (Probe to get stakeholders)

7.1 How has each of these stakeholders enabled and/ or constrained the 3-3-3 model?

8 Kindly comment on any other agential factors that you feel may be of vital contribution to the study.

Thank you for your time

## APPENDIX D: LETTERS OF PERMISSION TO CONDUCT RESEARCH

*All official communications should be addressed to:*  
"The Secretary for Higher & Tertiary Education  
Telephones: 795891-5, 796441 9, 730155-9  
Fax Numbers: 792109, 728730, 703957  
E-mail: [thesecretary@mhelas.zw](mailto:thesecretary@mhelas.zw)  
Telegraphic address: "EDUCATION"



Reference:

MINISTRY OF HIGHER AND TERTIARY  
EDUCATION, SCIENCE AND  
TECHNOLOGY DEVELOPMENT  
P. BAG CY 7732  
CAUSEWAY

02 December 2014

Ms. N. Shava  
Hillside Teachers' College  
P Bag 2  
Hillside  
Bulawayo

Dear Ms. N. Shava

---

### REQUEST FOR PERMISSION TO CARRY OUT AN EDUCATIONAL RESEARCH ON "A CRITICAL REALIST EXPLANATION OF ENABLING AND/OR CONSTRAINING FACTORS IN ZIMBABWE'S 3-3-3 SECONDARY TEACHER EDUCATION MODEL FOR POST 'O' LEVEL SCIENCE"

---

Reference is made to your letter, in which you request for permission to carry out an educational research on "*A Critical Realist Explanation of Enabling and/or Constraining Factors in Zimbabwe's 3-3-3 Secondary Teacher Education Model for Post 'O' Level Science*".

Accordingly, be advised that the Head of Ministry has granted permission for you to carry out the research in Secondary Teacher Education Colleges.

It is hoped that once completed your research will benefit the Ministry. Accordingly, it would be appreciated if you could supply the Office of the Permanent Secretary with a final copy of your study, as the findings would be relevant to the Ministry's strategic planning process.

A handwritten signature in blue ink, appearing to read "Chirapa".

M. J. Chirapa  
**FOR: PERMANENT SECRETARY**

all communications should be addressed to:  
The Provincial Education Director  
Telephone: 09 69621/69942  
Telegraph: "SCHOLASTIC"  
Telex: 50531 MPSEIN ZW  
Fax: 09-77027



Ref:

Ministry of Primary and Secondary Education  
Bulawayo Metropolitan Province  
P O Box 555  
Bulawayo  
Zimbabwe

22-10-14.....

Miss/Mr/Mrs N. Shava  
Hillside Teachers' College  
.....  
.....

RE: PERMISSION TO CARRY OUT RESEARCH ON A CRITICAL ASSESSMENT  
EXPLANATION OF ENTRY AND/OR CONSTRAINING FACTORS IN  
ZIMBABWE'S 3-3-3 SECONDARY TEACHER EDUCATION MODEL FOR POST-LEVEL  
SCIENCE

With reference to your application to carry out a research on the above mentioned topic in the Education Institutions under the jurisdiction of the Bulawayo Province permission is hereby granted. However, you should liaise with the Head of the Institution/School for clearance before carrying out your research.

It will also be appreciated if you could supply the Bulawayo Province with a final copy of your research which may contain information useful to the development of education in the province.

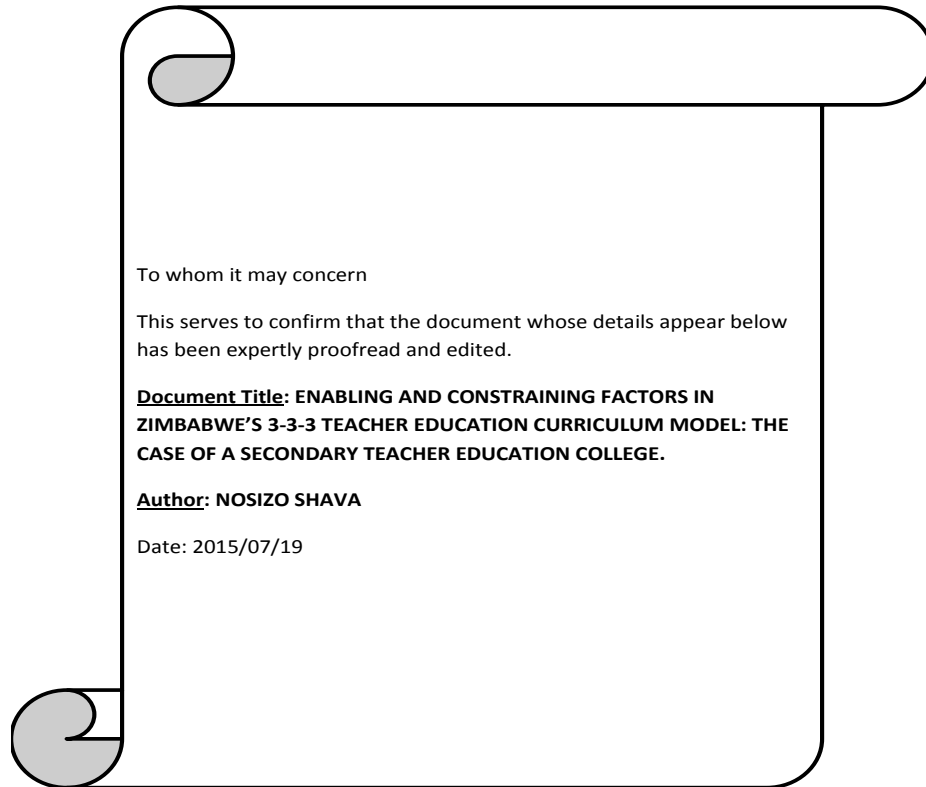
N. Shava  
.....  
For: **PROVINCIAL EDUCATION DIRECTOR**  
**BULAWAYO METROPOLITAN PROVINCE**



## APPENDIX E: PROOFREADING AND EDITING CERTIFICATE

PO Box 77214  
Empangeni  
3880

Mobile: 074 9211 480  
Email: zanibaz@yahoo.com



X 

Dr Berrington Ntombela  
Proofreader/Editor  
Signed by: Author

Banking details: Bank ABSA, Account No. 623828182, Branch Code 632005, Account Name: BXS Ntombela