

**MANAGERS' EXPERIENCES IN THE IMPLEMENTATION OF  
MATHEMATICAL LITERACY AT TECHNICAL AND  
VOCATIONAL EDUCATION AND TRAINING COLLEGES IN  
THE WESTERN CAPE**

by

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I declare that **MANAGERS' EXPERIENCES IN THE IMPLEMENTATION OF MATHEMATICAL LITERACY AT TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING COLLEGES IN THE WESTERN CAPE** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

A handwritten signature in black ink, appearing to read "M Hassan", written over a horizontal line.

SIGNATURE  
(MR S M HASSAN)

A handwritten date "9 June 2016" written in black ink, positioned above a horizontal line.

DATE

## **Dedication**

This study is dedicated to the memory of my late parents, Ghulaam Husein Hassan and Rabia Hassan.

I also dedicate this work to my loving wife Rukeyah Hassan, my two sons Saeed and Akeel Hassan and my six sisters.

## **Acknowledgements**

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## **Abstract**

Mathematics has always been a problem at schools, colleges and universities and to address this problem the South African government has introduced a new subject called Mathematical Literacy into schools and colleges. Since this subject places the emphasis on real-life contexts, there has been a special focus on its management at schools and colleges so that its implementation is done in an efficient way. This study therefore focuses on the experiences and interactions of managers of this new subject and how their leadership can improve performance in it.

In addition to the literature review, an empirical investigation based on a qualitative approach and involving semi-structured interviews with managers of three public TVET colleges in the Western Cape was conducted to collect data. The other method used was the analysis of documents relevant to the study.

The research found that managers of Mathematical Literacy have varying experiences in both their roles and the implementation of the subject. They also face varied challenges in relation to lecturers and students although there are also similarities regarding these at the different colleges in the study. The strategies of instructional leadership in intervention methods to improve performance in the subject which are encouraged by managers also differ, and some have better results than others. Various methods to empower lecturers are recommended. Recommendations are also made on what was found in this study, as are recommendations for further study.

### **Key terms:**

Mathematical literacy; Manager's experiences in mathematical literacy; TVET colleges; National curriculum vocational; Manager's roles; Mathematics; Curriculum experiences; Instructional leadership; Implementation; Curriculum implementation; Curriculum management; Encounters in mathematical literacy; Participation.

## Abbreviations

ACE – Advanced Certificate in Education

C2005 – Curriculum 2005

CAPS – Curriculum and Assessment Policy Statement

CH – Campus Head

CM – Coordinating Manager

DHET – Department of Higher Education and Training

DoE – Department of Education

ES – Education Specialist

FET – Further Education and Training

FH – Fundamental Head

HOD – Head of Department

ML – Mathematical Literacy

NATED – National Education

NCS – National Curriculum Statement

NCV – National Curriculum Vocational

NQF – National Qualifications Framework

OBE – Outcomes-Based Education

TIMSS – Trends in International Mathematics and Science Study

TVET – Technical and Vocational Education and Training

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# **CHAPTER 1**

## **INTRODUCTION AND BACKGROUND OF STUDY**

### **1.1 INTRODUCTION**

In this chapter a brief overview of the state of education in South Africa after 1994 and transformation of education is given. A discussion follows about the introduction of Outcomes-Based Education (OBE) and some of the reasons for its failure. A background to the study then explains why the researcher deemed its subject to be important. The emphasis then shifts to the subject Mathematical Literacy (ML) within the National Curriculum Vocational (NCV) framework at Technical and Vocational Education and Training (TVET) colleges and the main focus of this study on how ML is experienced by managers of these colleges. The research questions are stated together with the aims and purpose of the study. The chapter closes with definitions of words and concepts important in this study, together with an overview of the next chapter.

### **1.2 OVERVIEW OF THE STUDY**

This chapter provides an overview of the study as it occurred. First a brief summary of the purpose of this study is given as well as the context in which the study took place and why it is of significance to the reader. The problem is stated with the research questions and the delimitations of the study that define its scope. A brief summary on the literature, theoretical framework, aims and objectives of the study as well as a summary of the research questions is given. This chapter lastly summarizes the chapter layout of the whole study.

### **1.3 BACKGROUND OF THE STUDY**

Prior to 1994 the history of education in South Africa was for a long time embroiled in apartheid. Education in the apartheid era was a privilege enjoyed by a few and used to

divide the nation. It was a system that favoured whites and put blacks at a great disadvantage (Owusu-Mensa 2013: 1). Superior resources, better schools and better facilities were provided to whites. Non-whites, i.e. coloureds and Indians and to a much larger degree blacks, received inferior education. For example, black learners could not pursue careers in areas such as accounting, engineering and actuarial science as it was the government's objective to keep blacks at a disadvantage. Furthermore, many blacks could also not afford to go to school and the government of that day was not much concerned about this as their objective was to restrict blacks to menial employment and hence to keep them poorly educated (Owusu-Mensa 2013: 1). This situation of inferiority resulted in a segregated and discriminatory education system unacceptable to the majority of South Africans. This inequality caused nationwide strikes and uprisings.

The Soweto uprising in 1976 was perhaps a watershed moment for the government, putting the focus fairly and squarely on education. As with most uprisings this caused destruction to schools and the already poverty-stricken facilities, with the result that education suffered even more and some schools simply stopped functioning (Du Plooy 2010:1). From then on young people started to realize the importance of education and refused to be enslaved by an inferior or "gutter" education. As a result, young people and especially blacks demanded to be educated on the same level as the rest of the population so that they could secure jobs and a better life for themselves.

After the 1994 democratic elections, South Africa underwent many changes and the biggest change had of necessity to take place in the area of education. In order to redress the inequalities and imbalances of the past, the government unveiled Curriculum 2005 (C2005), which was based on the OBE system.

The reasons for introducing a new system of education can be seen from two broad angles. Firstly, every nation needs to keep abreast of local and international trends and developments in technology, the world of work and the economy, and secondly, an education system and a curriculum based on segregation, hatred and discrimination cannot be tolerated, especially in South Africa (Phorabatho 2009: 1). The aim of C2005



was to phase in a curriculum promoting life-long learning and based on outcomes rather than content only (Phorabatho 2009: 1). This meant a total paradigm shift in the way educators had to think and deliver their lessons in terms of teaching and learning.

Three major reasons why C2005 failed can be summarized as follows:

- The system was highly complicated, used vague and complex terminology and fell short of its expectations.
- Teacher training was inadequate and officials who offered the training were also not properly trained.
- Time-frames that were initially laid down were unrealistic (Phorabatho 2009: 2).

For the above reasons, as well as many others such as paradigm shifts in thinking and teaching and learning, C2005 had to be reviewed in the year 2000. Through a gradual process C2005 was first replaced by the National Curriculum Statement (NCS), after which the Curriculum and Assessment Policy Statement (CAPS) was introduced. This was rolled out in all phases in January 2012. While CAPS seems to look new, OBE is still the philosophy which underpins it (Chigongo 2013: 2; Botha 2011: 26).

The researcher's interest is in how Mathematical Literacy is experienced by managers of TVET colleges. This originated from his experience as a Campus Head (CH) and as a Head of Department (HOD) at a higher education institution where he lectured in Mathematics and Information Technology. During this time higher education institutions also went through many changes, both institutionally and in their programmes. The researcher became interested to know how other managers and heads were experiencing the implementation of new programmes and subjects in different educational structures. Having moved on to the TVET college sector, and lecturing in the new subject ML, the researcher became even more interested in this question.

Since the introduction of Mathematical Literacy in South Africa, research in the subject has been done mainly at schools, and only very limited and fragmented research was

found regarding TVET colleges. Furthermore, the research that was done at schools and TVET colleges was focused on educators' and learners' experiences of ML. The literature on managers' experiences and interactions with ML as well as Mathematics was limited. In the studies found, the influence of the instructional leadership of managers on improving academic results in the subject, irrespective of whether the manager is an Education Specialist (ES) or Fundamental Head (FH), has been overlooked.

There is a great need in not only South Africa but the world to improve results in Mathematics and mathematics-related subjects at schools, colleges and higher education institutions. Many people also struggle to apply the mathematics they have learnt to their personal lives and to the real world of work. Teachers and lecturers are inundated with calls to improve results in Mathematics and ML, but very little attention is given to the managers of the latter subject.

One wonders whether managers of a particular subject such as ML have an influence on the way the subject is delivered, improvement of the subject and hence improvement in students' performance in the subject. The researcher in this study sought to find out how the involvement of managers and their experience in instructional leadership in the management and implementation of ML influences students' performance in the subject.

#### **1.4 THE BIRTH OF PUBLIC TVET COLLEGES**

Between 2001 and 2003, through the then TVET Act (Act 98 of 1998), all technical colleges were reclassified as TVET colleges (Maharaswa 2013: 5). Various technical colleges also merged to become the public TVET colleges that they are now. There are currently 50 public TVET colleges in South Africa (*TVET College Times*, June 2014: 32) with roughly 300 campuses nationwide. Of these 50 Colleges, six are in the Western Cape.

TVET colleges diversified their programmes to offer technology-related programmes such as engineering, electrical work, motor mechanics, welding and boat-building, to name a few. They also expanded their programmes to include among others hospitality, hair design, business studies and office administration.

TVET colleges reintroduced the National Education (NATED) Report 191 programmes, consisting of the N1 to N6 programmes. TVET colleges also offered support to students by providing job placements, counselling and various forms of career support (Mohloloane 2004: 52), as well as catering for and not marginalizing students with any form of disability. These points will be developed through explanations of (i) the governance and management of TVET colleges, (ii) the NCV curriculum at TVET colleges and (iii) the reasons why ML was introduced in South Africa.

#### **1.4.1 Governance and management of TVET colleges**

The TVET Act 16 of 2006, which was subsequently amended as the TVET Colleges Amendment Act (Act 3 of 2012), governs public TVET colleges in South Africa. This Act provides a coordinated further education and training system which promotes co-operative governance (Mohloloane 2004: 51). The TVET Amendment Act referred to above deals mainly with the transfer of TVET colleges from a provincial competence to a national function through the Department of Higher Education and Training (DHET), which was established in 2009 (Maharasa 2013: 5). Briefly, the governance of TVET colleges according to the TVET Act 16 of 2006 is vested in a college council, an academic board and a students' representative council.

According to the same Act a public TVET college may further establish other structures as determined by the college statute. One such structure is the organizational structure, which according to Mohloloane (2004: 54) is the most important for any organization and even more so for an educational institution such as an TVET college. The organizational structure must be consistent with the strategy of the college and so designed to steer the college in the right direction. An organizational structure is defined

by Rue, Ibrahim and Byars (2013: 198) as the framework that defines the boundaries of the formal organization and within which the organization operates. It also defines the formal responsibilities, duties and tasks of everyone in the organization.

The way the organizational structure is set up can play a huge role in determining whether a manager at a certain level of an organization can effectively and efficiently pursue his or her objectives. This is also true of an TVET college in order, for example, for an Education Specialist in ML to make an impact where it matters most, namely the students' performance in the subject. The organizational structures of colleges vary slightly from college to college.

#### **1.4.2 The NCV curriculum at TVET colleges**

The NCV programme was officially introduced into TVET colleges in 2007 according to Gerber (2011) and it was also offered as an alternative to the schools' National Curriculum Statement (NCS) programme, which for some students was too academic.

One advantage of following the NCV programme is the fact that it leads to a qualification via which a student can enter into a career over and above obtaining a qualification which is on the same NQF level 4 as the NCS grade 12 qualification. Another advantage of the NCV programme at TVET colleges is that it offers training in vocational subjects, which is very appropriate for students who are practically oriented and not academically or theoretically inclined, thus giving these students another opportunity to equip themselves for the future.

The NCV programme consists of seven subjects, four of which are vocational subjects and three fundamental subjects. According to Mohlokoane (2004: 56) all TVET qualifications at TVET colleges will consist of three basic components: fundamental, core and elective. The fundamental subjects provide the foundational knowledge for learning at that level, the core subjects provide the specific knowledge needed for that particular field or qualification, and the elective subjects give the learner the opportunity

to study additional options or pursue a personal interest. In this scheme ML is a fundamental subject, along with English and Life Orientation.

### **1.4.3 Reasons why Mathematical Literacy was introduced in South Africa**

The introduction of ML as a subject at schools in the NCS programme as well as in the NCV programme at TVET colleges stemmed from the following:

- the belief that all learners can learn mathematics (Owusu-Mensa 2013: 2) and must be given the opportunity to do so;
- the fact that all learners must have some form of mathematics to apply in real life and in the working world;
- the poor results in mathematics in South Africa, according to the Trends in International Mathematics and Science Study (TIMSS) report (TIMSS report 2011: 4; DoE 2003: 9), as well as a recent World Economic Forum report stating that South Africa is placed last out of 148 countries in mathematics and science (News 24, June 2014); and
- the fact, as mentioned by Hechter (2011: 22), that many learners and adults find it difficult to apply the mathematics they learn at school in a flexible and useful way in real-life situations.

The government decided to address the above by introducing ML at schools in 2006 and at TVET colleges in 2007. South Africa was the first and only country in the world to have ML as a subject at schools and TVET colleges (Christiansen 2007 in Botha 2011: 1). ML is compulsory for learners not taking pure Mathematics (Owusu-Mensa 2013: 3). This gives students who perform very poorly in mathematics an opportunity, before they stop learning mathematics altogether, to do at least some mathematics which they can apply in life, instead of simply remaining innumerate.

## **1.5 A BRIEF LITERATURE REVIEW**

Literature in this study has been reviewed to include the various meanings of ML and concerns around it, the difference between ML and Mathematics, the management of

ML and finally the instructional leadership models as well as the ten roles an education manager of ML should play. In this chapter the definitions and the management of ML are discussed in detail, while concerns around Mathematical Literacy and the theoretical foundation on which the study is based will be discussed in Chapter 2.

### **1.5.1 Definitions of Mathematical Literacy**

According to the Department of Education (DoE), ML is defined as follows:

Mathematical Literacy provides learners with an awareness and understanding of the role that mathematics plays in the modern world. Mathematical Literacy is a subject driven by life-related applications of mathematics. It enables learners to develop the ability and confidence to think numerically and spatially in order to interpret and critically analyse everyday situations and solve problems (DoE 2003: 9).

More recently, the CAPS document defined ML thus:

The competencies developed through Mathematical Literacy allow individuals to make sense of, participate in and contribute to the twenty-first century world — a world characterized by numbers, numerically based arguments and data represented and misrepresented in a number of different ways. Such competencies include the ability to reason, make decisions, solve problems, manage resources, interpret information, schedule events and use and apply technology (DoE 2011: 8).

The core of ML is the fact that it involves real-life contexts and in order to make sense of these real-life situations and to find solutions to these problems, mathematical content is needed. The subject ML should enable the learner to become a self-managing person, a contributing worker and a participating citizen in a developing democracy (DoE 2011: 8).

The teaching of ML brings another angle to the subject, in that the main aspect that teachers had to and must understand is the shift from content to context teaching as ML

is driven mainly by context while the content is used as a process to explain the mathematics. Botha (2011: 7) further asserts that ML can be seen as contextualized mathematics in that it is seen as a human activity which is connected to reality and from which society can benefit. The gap between abstract concepts and mathematics needs therefore to be bridged so that the objective of Mathematical Literacy can be achieved. Teachers of ML must ensure that this happens and managers and implementers of ML must provide educators with the necessary support.

### **1.5.2 The management of Mathematical Literacy**

The researcher's view is that it is not only lecturers in the subject who must have full knowledge of all the documents, policies, processes and procedures related to ML, but also the immediate managers of the subject such as Fundamental Heads and Education Specialists, and to a lesser degree Campus Heads at campuses where the subject is offered. They are the managers and the implementers of the subject and their interaction with the subject is of paramount importance. Hence, they must be able to lead the implementation process and empower lecturers in terms of resources, support them and motivate them to improve the understanding of the subject and its overall results.

Another reason the researcher has placed the emphasis and focus on managers' interaction with the subject is that a lot of attention, and sometimes too much, is focused on lecturers in terms of improving mathematics results but no focus is placed on managers of the subject. The researcher is obviously not downplaying the importance of lecturers as they are the very first contact for the student of ML, but instructional leadership starts with the managers. According to Nel (2012: 144), "merely feeding teachers with content knowledge and/or best practices does not necessarily lead to the development of these teachers", an important point to note.

The researcher has also not come across much research done on managers' experiences and interaction with ML. The researcher believes that the success or failure

of any organization, including educational institutions, is fully dependent on the management.

## **1.6 STATEMENT OF THE RESEARCH PROBLEM**

According to McMillan and Schumacher (2006: 52) a problem statement orients the reader to the significance of the study and the research questions or hypothesis to follow. Research done on the subject of ML has been mostly about the subject itself, and secondly about the experiences and perceptions of learners and educators regarding the subject. To the researcher's surprise, very little research has been done which focused on the experiences and perceptions of managers (e.g. Education Specialists and programme managers) at TVET colleges regarding ML.

This study sought to find out how managers involved in the implementation of ML experienced it from their angle and position. It therefore sought to find out what problems, successes and solutions they had experienced.

## **1.7 THE AIM OF THE STUDY**

The main aim and purpose of this study was to determine how managers interact and experience the ML curriculum at TVET colleges in the Western Cape

## **1.8 THE OBJECTIVES OF THE STUDY**

In order to achieve the above aim the following objectives were formulated:

This study seeks to:

- determine how managers of ML at TVET colleges perceive the ML curriculum;
- determine how managers of ML at TVET colleges experience the implementation of ML from their angle and position; and



- find out the complexities of implementing the ML curriculum and supporting TVET college lecturers, and the methods that instructional leaders use to carry out these tasks.

## **1.9 THE RESEARCH QUESTIONS**

The main research question in this study was:

How do TVET college managers responsible for the ML curriculum interact with and experience the subject at TVET colleges in the Western Cape?

The following sub-questions were asked:

- How do managers of ML at TVET colleges perceive the ML curriculum?
- How do managers of ML at TVET colleges experience the implementation of ML from their angle and position?
- What complexities do instructional leaders find, and what methods do they use, in implementing the ML curriculum and supporting TVET college lecturers?

## **1.10 RESEARCH DESIGN AND METHOD**

The qualitative approach was used for this research, since a deeper understanding was needed of how managers experienced and interacted with the ML curriculum. According to Mouton (2005: 194), “one of the major distinguishing characteristics of qualitative research is the fact that the researcher attempts to understand people in terms of their own definitions of their world”.

### **1.10.1 Population and sampling**

The population of this study consisted of the managers and lecturers of six TVET colleges in the Western Cape Province. Each college has approximately five campuses. The sample of the study was three TVET colleges in the Western Cape chosen for their convenient distance from the researcher’s college.

### **1.10.2 Participants**

The participants of the sample consisted of Campus Heads, Education Specialists, Fundamental Heads, lecturers and a member of a mathematical organization with which the colleges were affiliated for support and which gave professional development to lecturers. The sample included three Education Specialists, one from each college; three Fundamental Heads, one from each college; one Campus Head from the college where the researcher is a lecturer and Education Specialist; the Coordinating Manager (CM) from a mathematical institution which supports the college in professional development programmes; and two lecturers for the purpose of triangulation.

### **1.10.3 Data collection**

Data were collected using semi-structured interviews with all the participants as indicated above. The researcher also analysed the minutes of meetings held by Education Specialists or programme managers at colleges on a weekly, monthly and annual basis with ML lecturers.

### **1.10.4 Data analysis**

All the interviews were recorded digitally, transcribed and analysed for patterns and themes which emerged, using categories aligned to the underlying theories of this research. Documents that were analysed were also placed in the same categories. The full analysis of the results is presented in Chapter 4.

## **1.11 RELIABILITY AND VALIDITY**

Reliability and validity are two main aspects of trustworthiness.

Validity, according to McMillan and Schumacher (2006: 324), refers to the degree of congruence between the explanations of the phenomena and the realities of the world, while reliability refers to the degree to which data collection will yield consistent findings,

or to which similar observations would be made or conclusions reached by other researchers (Saunders et al. 2003: 101).

One of the ways the researcher ensured validity in this study was to have a purposive sample of managers who were knowledgeable about the subject ML and currently managers of it at their respective colleges. The researcher also made sure that since he had to probe managers for answers in the semi-structured interview process, he was very careful not to allow his own biases to interfere with the data-collection process. Triangulation using document analysis was another way to ensure validity.

Reliability in this study was ensured by member-checking, which gave the participant the opportunity to verify the transcript of the interview and either accept or reject it.

## **1.12 DELIMITATIONS**

Delimitations are those characteristics that limit the scope and define the boundaries of a study. Delimiting factors include the choice of objectives, the research questions, variables of interest, the theoretical perspectives adopted (as opposed to what could have been adopted), and the population chosen for investigation (Simon 2011: 2). In this study schools and private TVET colleges were not part of the study; furthermore, managers who had been only recently employed as managers of the ML curriculum and had no experience in the public TVET college sector were also not part of the study.

The researcher also chose not to conduct any focus group interviews because of the time factor although it would have been valuable. It was also decided not to conduct structured interviews, in order to minimize the researcher's influence on the participants.

## **1.13 DEFINITIONS OF KEY CONCEPTS**

### **1.13.1 NCV**

NCV (National Curriculum Vocational) is a government-approved qualification offered at TVET colleges in South Africa since 2009. It provides an alternative to the school qualification and includes vocational subjects in its programmes.

### **1.13.2 Mathematical literacy**

Mathematical literacy in this study refers to “an individual’s capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgements and to use and engage with mathematics in ways that meet the needs of that individual’s life as a constructive, concerned and reflective citizen” (Modongo 2007: 22; Owusu-Mensa 2013: 5).

### **1.13.3 TVET college**

A TVET college is an educational institution where the TVET qualification is offered, mainly to young people between the ages of 15 and 19. These colleges also offer many support services as well as a diversified mix of qualifications to allow the young to take full advantage of their future possibilities.

### **1.13.4 Manager**

A manager is a person who through his or her knowledge and experience applies the process of coordinating the activities of others to achieve results that cannot be achieved by one person alone (Donnelly, Gibson & Ivancevich 1992: 5). In this research, “manager” refers to any of the following: Education Specialists, Fundamental Heads and Coordinating Managers at TVET colleges for the subject of ML.

### **1.13.5 Experience**

Experience can be an event or occurrence which leaves an impression on someone. In this research the impressions concerned are those left on the managers of the ML curriculum.

### **1.13.6 Implementation**

Implementation refers to the action of putting into operation a plan or system (Cambridge Advanced Learner’s Dictionary 2003: 628). In this research,

“implementation” denotes the putting in place of a plan of action by managers to deliver the ML curriculum successfully.

## **1.14 ASSUMPTIONS**

Assumptions, according to Simon (2011: 1), are things that are somewhat out of one’s control, but if they are not present the study will become irrelevant. This study assumed that the participants would respond to the interview questions honestly, truthfully and to the best of their knowledge. The study further assumed that all the managers interviewed in this study were well-educated, knowledgeable and experienced.

The study further assumed that all the managers and educators were well versed in all the government documents pertaining to Mathematical Literacy in the NCV programme at TVET colleges. They have also studied and implemented these documents while lecturing or serving as Education Specialists at TVET colleges themselves.

## **1.15 CHAPTER LAYOUT**

### **Chapter 1: Introduction and background to the study**

In this chapter an overview of the research conducted is given. It consists of the statement of the problem, the research question and the purpose of the research. It also gives an introduction to the background to education after 1994, introduces TVET colleges and indicates where Mathematical Literacy fits in.

### **Chapter 2: Literature review**

Chapter 2 gives a detailed review of Mathematical Literacy in South Africa especially at TVET colleges, the management thereof at TVET colleges and the theoretical foundations on which this study is based.

### **Chapter 3: Research design and methodology**

Chapter 3 describes the research design and methodology chosen for this study. It discusses how data were collected, what sampling techniques were employed and how

data were analysed. It also refers to research ethics and ensuring the validity and trustworthiness of results.

#### **Chapter 4: Findings of the research**

Chapter 4 focuses on the findings of the research collected from interviews by participants. This was done by identifying patterns, trends and themes.

#### **Chapter 5: Data analysis and recommendations**

Chapter 5 focuses on analysing the data obtained by identifying patterns, trends and themes. Recommendations are made for future research.

### **1.16 CONCLUSION**

In this chapter the researcher looked at the background of education in South Africa after 1994 and the changes that were made. Focus was placed on ML within the NCV curriculum at TVET colleges and its management. The basic questions were posed and the research methodology was discussed. In the next chapter the theoretical framework and the literature sourced are discussed.

# CHAPTER 2

## LITERATURE REVIEW

### 2.1 INTRODUCTION

McMillan and Schumacher (2006: 75, 474) describe a literature review as an illumination and analysis of related literature pertaining to a study which provides insights related to the study. In support of the above, Saunders, Lewis and Thornhill (2003: 44) assert that a literature review helps one to establish what has been published before on one's chosen area of research and helps to clarify one's research question for further refinement. Mouton (2005: 179) further alludes to this and describes literature review as studies that provide an overview of scholarship in a certain discipline through an analysis of trends and debates.

The purpose of conducting a literature review is firstly to improve one's understanding of the topic in order to build on previous knowledge, thereby placing its findings in a historical perspective (McMillan & Schumacher 2006: 76), and secondly to update both the reader and the researcher on the knowledge pertaining to the study before embarking on the study. Singh (2006: 36) also highlights the fact that it is essential for every investigator to be up to date about the literature on his or her topic.

Finally, Mouton (2005: 87) notes that a literature review ensures that one does not replicate a previous study. A literature review can also be used to review different types of research methods, especially in terms of instrumentation and sampling, to enable one to improve on one's own research and make it more sophisticated (McMillan & Schumacher 2006: 76; Mouton 2005: 87).

Literature in this chapter has been explored under the following topics: the different meanings of mathematical literacy and concerns around it, the difference between Mathematical Literacy and Mathematics, the management of ML, and finally the

instructional leadership models as well as the ten roles an education manager of ML should play.

## 2.2 DEFINITION OF MATHEMATICAL LITERACY

The Programme for International Student Assessment (PISA) defines mathematical literacy as:

“An individual’s capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgements and to use and engage with mathematics in ways that meet the needs of that individual’s life as a constructive, concerned and reflective citizen” (Modongo 2007: 22; Owusu-Mensa 2013: 5).

It is important to mention that South Africa was the first country where Mathematical Literacy was introduced as a subject at schools and at TVET colleges (Botha 2011: 3). It is also the only country that offers it as a *compulsory alternative* to Mathematics in grades 10 to 12 in the NCS curriculum at schools and on levels 2 to 4 in the NCV curriculum at TVET colleges (Botha 2011: 11; Graven & Venkat 2007: 67). Prior to the introduction of ML as a *subject*, mathematical literacy was simply seen or referred to as a mathematical *competency* whereby individuals could demonstrate the application of mathematics (Christiansen 2006: 6). The definitions of mathematical literacy in this study will be explored by considering other definitions of mathematical literacy and how it is interpreted in the following sections.

Reviewing the literature, it was difficult to find a general definition for mathematical literacy. There are as many conceptions and definitions of mathematical literacy from mathematicians themselves as there are different meanings internationally. There exists thus a range of conceptions and meanings as well as different interpretations and therefore also controversies (Madongo 2007: 21). Amongst mathematicians there is no agreement on how mathematical literacy is understood and interpreted. Other than in South Africa, it is seen as a *skill* embedded in the subject mathematics. It is therefore referred to in the literature as “quantitative literacy”, “numeracy”, “mathematical



proficiency” and “mathematacy” (Madongo 2007: 22; Skovsmose in Gerber 2011: 28). It also has different meanings and connotations in different countries. In England and Australia, for instance, it is referred to as numeracy, while in America it is referred to as quantitative literacy (Botha 2011: 21). From the above it can clearly be seen that there are no clear-cut answers to the questions of what mathematical literacy is and what it should be (Mbekwa 2006: 29), although there is some agreement that it has to do with real-life applications of mathematics. In order for this study to move forward the researcher wants to emphasize the contextual nature of the subject which forms the basis of Mathematical Literacy as focused on in government documents.

As will be seen later, mathematical literacy can be seen as a merging of contextual and mathematical orientations (Hechter 2011: 26), and the link between mathematical content and everyday context is at the heart of ML in curriculum documents in South Africa (DoE 2003). For educators as well as managers to have a better understanding of the implementation of the subject in TVET colleges, it is important for them to know that these differences exist.

## **2.3 CONCERNS AROUND MATHEMATICAL LITERACY**

Since 2006, when Mathematical Literacy was introduced in South Africa, initial concerns around the subject have been well documented. Some concerns highlighted by Bowie and Frith (2006) were:

- the ML curriculum looking too much like Mathematics;
- the increased use of computer technology in the ML curriculum and the lack of educators’ knowledge and skill in using computer technology;
- a lack of understanding of the contexts in which problems in Mathematical Literacy occur for students as well as lecturers, and how to integrate ML with other subjects; and
- a lack of clarity on what content and contexts learners should be familiar with.

Another concern was that in many circles there is a view that the subject ML is a watered-down version of Mathematics and therefore inferior to Mathematics (Botha 2011: 33). This view, which is a total myth, may be at the heart of the problems encountered in the teaching and learning of the subject. Gerber (2011: 7) asserts that ML is a subject in its own right that enjoys the same status as any other subject in the NCS and NCV curricula. Although the mathematics needed is easier to manage when problems are being solved, the emphasis is placed on the context in which the problem occurs, which needs to be addressed by both the students and the educator.

A further concern is the incorrect belief that ML can be taught by non-Mathematics people (Botha 2011: 33-34). One of the reasons for this notion could be the false belief that ML is inferior to Mathematics. Another is our dire shortage of Mathematics teachers (Verster 2009). This has forced many schools to employ the services of non-Mathematics teachers. In a study by Mbekwa (2006: 25) it was shown that many educators in the initial implementation of ML were experts in other subjects and not Mathematics. This state of affairs caused more harm than good to the subject. There were also teachers from other fields who were trained through the Advanced Certificate in Education (ACE) programmes run by universities to address this shortage.

When the NCV curriculum was introduced at TVET colleges the situation was not much different. Many lecturers at TVET colleges may recall that the NCV curriculum was difficult to implement (Gerber 2011: 10), being a new curriculum; and so was ML. Lecturers who had no prior knowledge of ML were asked to lecture on it, which resulted in disastrous performances in the subject.

Perhaps the biggest concern has to do with the way ML is taught in classrooms at schools and at colleges. Many ML educators still teach the subject the same way they teach Mathematics. The reason for this could be that many were never trained to teach this new subject, which has a totally *different* emphasis. Furthermore, TVET colleges with their range of programmes have required lecturers in ML to know how to integrate

and cross-reference the subject with contexts related to the programmes the students are studying to make it more meaningful and applicable to their fields of study.

A final concern, which the researcher has also experienced as an ML lecturer, has been parents' resistance to the subject (Verster 2009). Parents have been concerned that the subject would act as a barrier to some careers entered via tertiary education. Most universities have not had uniform policies for enrolling students with ML in various degree courses.

## **2.4 SPECTRUM OF AGENDAS IN RESPECT OF CONTENT AND CONTEXT**

In connection with concerns about the way ML is taught, Venkat and Graven (2007: 2) and Hechter (2011: 31) have developed a four-part pedagogic spectrum of agendas for teaching the subject. These are mentioned in Table 2.1 below. According to these authors the spectrum of agendas explains the dilemma and highlights the relationship between context and content in the teaching of ML.

The issue of the relationship between content and context is also at the heart of DoE documents. Christiansen (2006: 6) argues that the initial objective and expectations of engaging with complex applications which ML started off with are not being achieved as facilitators do not know how to attain the vision of Mathematical Literacy in terms of the understanding and awareness which Mathematical Literacy is meant to be based on. This therefore implies that managers of Mathematical Literacy need to put in a much stronger effort in ensuring that this vision is attained by putting into effect programmes for developing educators and lecturers at their respective colleges.

Graven and Venkat (2007: 70-71) encourage the idea that contexts should be engaged with in a way that drives mathematical learning. This also means there must be engaging in contexts rather than applying mathematics (DoE 2003). The educator must thus create situations and contexts in which the underlying mathematics is revealed

while using mathematics to understand the situation or context (DoE 2006). In order for this to happen, student-centred activities such as games and interesting activities must be used to highlight the contexts.

Hechter (2011: 23) refers to the issue of context in terms of two frames which can be used to describe Mathematical Literacy in terms of its teaching. One frame refers to Mathematical Literacy as the mathematics embedded in the context, while the other frame refers to the knowledge that a Mathematical Literacy graduate needs to function as a meaningful citizen. When teachers work in the contextual frame the emphasis is on context and the mathematics is in the background, while when a teacher puts emphasis on the mathematics, the context is used as a vehicle to do the mathematics. Empirical evidence has also shown that teachers do not remain in a certain frame but switch from one to the other in one lesson (Hechter 2011: 23). A brief summary is given in Table 2.1.

**Table 2.1: Different frames for the teaching of Mathematical Literacy**

<b>Context-driven (by learner needs) Content in service of context</b>	<b>Content- and context-driven Content and context in dialectical relationship</b>	<b>Mainly content- driven Context in service of content</b>	<b>Content-driven  No clear need for context</b>
Driving agenda:  To explore contexts that learners need in their lives (current every day, future work & every day, and for critical citizenship) and to use maths to achieve this.	Driving agenda:  To explore a context so as to deepen math understanding and to learn maths (new/GET) and to deepen understanding of that context.	Driving agenda:  To learn maths and then to apply it to various contexts.	Driving agenda:  To give learners a 2 <sup>nd</sup> chance to learn the basics of maths in GET band (grades 0-9).

The objective of ML teaching is to be in the first column (reading from left to right) or at least in the second one, and this should be the “core business” as mentioned by Graven and Venkat (2007: 76) of the subject. The DoE document (2006: 4) advises ML to “use situations or contexts to reveal the underlying mathematics *while simultaneously* using the mathematics to make sense of the situations or contexts”. However, investigations by Graven and Venkat (2007) have revealed that generally many ML educators are still in the last two columns, or switching from the left to the right, sometimes in the same lesson. This could be because the teachers still interpret the ML curriculum as involving basic mathematics (Graven & Venkat 2007: 2). This switching from one agenda to the next, in the researcher’s opinion and experience, causes confusion in students and aggravates their anxiety, since the reason they chose ML in the first place was their fear of pure Mathematics.

## **2.5. THE DIFFERENCE BETWEEN MATHEMATICAL LITERACY FOR NCV TVET AND FOR NCS TVET**

There are differences between ML in the TVET phase at schools and in TVET colleges, according to the Curriculum Documents for Mathematical Literacy (Gerber 2011: 41). ML is one of the fundamental subjects at TVET colleges in the NCV programme. There are three fundamental subjects and four vocational subjects offered at TVET colleges (Gerber 2011: 7). The NCV programmes at TVET colleges include Hospitality, Business Studies, Office Administration and Information Technology, to name a few, while ML is one of the fundamental subjects, along with English and Life Orientation.

In the NCV curriculum the learning outcomes are replaced by Topics, which in turn are divided into subject outcomes with learning outcomes to be achieved. Generally speaking there are also differences between ML and Mathematics on the TVET band. According to Madongo (2007: 44) there should be a clear understanding what ML is in relation to Mathematics and how there are differences as well as similarities between the two subjects. The difference between the NCS and NCV ML on the one hand and the difference between Mathematics and ML on the other are summarized in Table 2.2.

**Table 2.2: The differences between Mathematics and Mathematical Literacy in the NCS and NCV curricula**

<b>Mathematics (NCS)</b>	<b>Mathematical Literacy (NCS)</b>
Learning outcome 1: Numbers and number relationships	Learning outcome 1: Numbers and operations applied in context
Learning outcome 2: Functions and algebra	Learning outcome 2: Functional relationships
Learning outcome 3: Shape, space and measurement	Learning outcome 3: Shape, space and measurement
Learning outcome 4: Data handling and probability	Learning outcome 4: Data handling
<b>Mathematics (NCV)</b>	<b>Mathematical Literacy (NCV)</b>
Topic 1: Numbers	Topic 1: Numbers
Topic 2: Functions and algebra	Topic 2: Patterns and relationships
Topic 3: Space, shape and measurement	Topic 3: Finance
Topic 4: Data handling	Topic 4: Space, shape and orientation
Topic 5: Financial mathematics	Topic 5: Information communicated through numbers, graphs and tables

Extracted from DHET documents

In a study highlighting the differences between Mathematics and ML in the TVET NCS curriculum, Mhakure and Mokoena (2011: 316-320) drew results from teachers and HODs to ascertain their opinions on the differences between Mathematics and ML. The study revealed the following:

**Table 2.3: Differences between Mathematics and Mathematical Literacy from managers' perspectives**

Content and context	Teachers mentioned the following: Mathematical Literacy knowledge acquired can be used and applied in other subjects, allowing and encouraging cross-curricular learning and teaching (Mhakure & Mokoena 2011: 318). In the Mathematics curriculum the context is driven by content embedded in mathematical operations such as calculus, algorithms and algebraic manipulations.
Assessments and assessment standards	In Mathematical Literacy the assessment standards focus on the application of the learning outcomes to everyday life contexts and therefore on problem-solving as an instructional strategy, while the Mathematics curriculum focuses on mastery of mathematical skills and therefore looks toward careers requiring Mathematics as a major. This was said by the managers of the two subjects (Mhakure & Mokoena 2011: 319).
The learning process	In Mathematical Literacy, the learning process is multifaceted. This implies that a variety of instructional approaches must be used to cater for different learners' needs, while the learning process in Mathematics is more focused on knowledge. According to Hechter (2011: 24), "pure mathematics grows in complexity when the mathematical structures and concepts build on each other, therefore it grows more abstract and complex".
Processes and enablers	In relation to doing Mathematics, Hechter (2011: 25) mentions processes and enablers. According to Pugalee, processes include representing, manipulating, reasoning and problem-solving and Mathematical Literacy is "a complex interaction of these processes".

Extracted from Mhakure and Mokoena (2011)

The question is: Is it important to know the difference between Mathematics and ML and, if so, do managers of the latter subject need to take cognizance of this fact? The researcher is firmly of the opinion that lecturers need to know the difference so that the objective of ML's being a context-driven subject will always be uppermost in their minds,

and that managers must take cognizance of it so that the vision of ML as per policy documents is reached and the curriculum is steered in that way. This highlights the fact that these teachers could not make the distinction between the two subjects. Furthermore, managers also need to know these differences as they need to know where to place the emphasis. Because of their difference it needs to be managed differently and their interaction needs to be different.

### **2.5.1 The teaching and learning of Mathematical Literacy at TVET colleges in the NCV programme**

It has been shown that student-centred teaching and learning is a more dynamic approach than teacher-centred teaching and learning and obtains better results in all subjects. Even in minority groups where student-centred approaches are used it has been shown to improve results in performance. Studies by Ganyaupfu (2013: 29) which compared three approaches, the teacher-interactive approach, the student-centred approach and the teacher-centred approach, have found the teacher-centred approach to be the least effective. According to Gerber (2011: 30) the learner-centred approach, or student-centred learning as it is now called, is an essential component of the NCV programme at TVET colleges.

It is also true that the nature of subjects at TVET colleges lends itself very well to an active approach to teaching and learning because of the practical and vocational nature of subjects at these colleges. In order for success to be achieved, educators must be fully prepared to create suitable activities that will spark learners' interest (Gerber 2011: 31) in the fields they are studying and create student-centred classrooms by introducing group activities concomitant with their field. This means that lecturers will have to do thorough research and be innovative and adapt their teaching style for lessons to be topical and specific to the programme being taught. To the researcher this implies that the manager of ML must encourage and guide his or her lecturers towards success in implementing the student-centred approach in classrooms at colleges.



The following, adapted from Huba and Freed (2000), summarizes some key points and differences between teacher-centred learning and student-centred learning.

**Table 2.4: Teacher-centred versus student-centred learning**

<b>Teacher-centred learning</b>	<b>Student-centred learning</b>
Knowledge is transmitted from teacher to students.	Students construct knowledge through gathering and synthesizing information and integrating it with the general skills of inquiry, communication, critical thinking, problem-solving and so on.
Students passively receive information.	Students are actively involved.
Emphasis is on acquisition of knowledge outside the context in which it will be used.	Emphasis is on using and communicating knowledge effectively to address enduring and emerging issues and problems in real-life contexts.

Adapted from Huba and Freed (2000)

Regarding how students learn, pedagogy and course delivery, the following table can be presented as adapted from Allen (2004):

**Table 2.5: Teacher-centred versus student-centred learning**

<b>Teacher-centred learning</b>	<b>Student-centred learning</b>
Listening Reading Independent learning in competition for grades	Students constructing knowledge by integrating new learning into what they already know Learning viewed as a cognitive and social act
Based on delivery of information	Based on engagement of students or learners
Lecture-driven Assignments and exams for	Active learning Assignments for formative purposes

summative purposes	Collaborative learning Community-service learning Cooperative learning Online, asynchronous, self-directed learning Problem-based learning
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Adapted from Allen (2004)

One can easily observe that student-centred learning is an appropriate approach for the success of ML and many of the key elements of it are also included in the policy documents. In view of this it is important to have educators who are knowledgeable in the use of student-centred techniques and activities for use in class. The researcher strongly believes that managers must work with lecturers as well as students to ensure that the student-centred approach is implemented, first by providing lecturers with adequate training for student-centred learning, and secondly by following up via classroom observations to ensure that it is done. The researcher is of the view that this should be part of the manager’s educational leadership package. If gaps are observed corrective action should be put in place.

### **2.5.2 Professional development of educators as far as Mathematical Literacy is concerned**

Professional development is defined by Steyn and Niekerk (2007: 224) as “the participation of educators or educational leaders in development opportunities that enable them to be better equipped as educators and educational leaders”.

Ongoing professional development is an essential activity that can ensure that educators in an education system are well equipped and fully qualified to teach a subject. This also ensures that educators stay abreast of developments in their chosen fields. It is highlighted by Gerber (2011: 16) that for any implementation to be truly successful, teachers have to be involved with all the stages of the implementation,

which includes continuing to grow while the implementation process is being refined. The NCV as a new curriculum was designed in such a way that educators must be experts in their fields (Gerber 2011: 9). Yet TVET college lecturers were neglected when it came to professional development. This trend is only now changing thanks to the fact that TVET colleges are initiating their own professional development using the services of different institutions assisting them. The DoE and the DHET are only now coming forward with professional development programmes for these sectors.

The implementation of the NCV programmes at TVET colleges caused tremendous stress for both lecturers and educational managers from the very beginning. The reason for this was that educators and managers were faced with new subjects, new concepts, and new methods of delivery in terms of OBE and the switch from lecture-driven to student-centred learning and teaching, with no real guidance from the authorities. One of these subjects that were totally new in structure, and were introduced with a *specific objective* in mind, was obviously ML.

As mentioned before, with the introduction of ML at schools and at TVET colleges and given the unique and special skill required to teach the subject, it was found that very few educators were qualified to teach it. In a study done by Mhakure and Mokoena (2011: 317) it was revealed that out of 350 teachers studied, only 37 percent were qualified or specialists in the subject Mathematics. This poor state of educators' qualifications was also highlighted by a study done by Mbekwa (2006: 25-26) in which 20 in-service training teachers on an ACE course in ML reported on various questions. As far as their qualifications were concerned, 8 of the 20, i.e. 40 percent, said that their highest qualification in Mathematics was matric. The rest had qualifications unrelated to Mathematics. The problem was compounded by the fact that those teachers who had a Mathematics qualification found it difficult to move from content teaching to context teaching, which is a fundamental skill required in the teaching of ML. This state of affairs compelled the government to up-skill and re-skill many of these educators.

One of the first programmes designed to re-skill educators was a combined effort by the University of the Western Cape, the University of Cape Town, Stellenbosch University and the Cape Peninsula University of Technology offering the Advanced Certificate of Education in ML (Mbekwa 2006: 1).

Another attempt at re-skilling educators was the ACE course in ML referred to by Hechter (2011) under the auspices of Fort Hare University. This study revealed that teachers who attended an ACE course in ML interpreted the ML curriculum in different ways. The same study also found that educators, even though they were re-skilled, did not fully grasp the concept of context teaching in ML (Hechter 2011: iii) as they used a range of different methods which included either real-life contexts or mathematics.

The researcher himself, a lecturer in ML at an TVET college and now an Education Specialist in Mathematics (NATED) and ML (NCV), has been on two professional ML-teaching development programmes at two different institutions. One of these was a SETA-funded programme on how to make ML more practical and closer to real-life situations. The other was a six-month distance course with an intensive week-long residential component.

Hence, the researcher wants to make the point that if the government wants to reach the objective intended for ML as a subject applicable to real life, TVET colleges through the assistance of government must provide ongoing professional development to lecturers as well as managers to make the subject lively.

## **2.6 THE ROLE OF MANAGEMENT IN THE IMPLEMENTATION OF THE MATHEMATICAL LITERACY CURRICULUM**

Generally speaking, the success of any organization depends upon its management's ability to utilize the resources of the organization for achieving its pre-determined goals. The role that management plays at schools and colleges in curriculum implementation and in instructional leadership cannot be emphasized enough if quality education is to be achieved. This is true for a programme as a whole as well as for a single subject. In

order to achieve excellent results at educational institutions it is important that both management teams at schools and college councils at TVET colleges work as harmonious units.

Any curriculum at any educational institution starts from the top with the managers who must implement, resource and coordinate it. Any shortcoming in this process in terms of support and guidance can be detrimental to the programme as well as to a single subject as far as academic performance is concerned. To emphasize this point Du Plooy (2010) revealed in his case study that the success of a school and for that matter any educational institution depends on the effective instructional leadership and the effective management of the instructional leadership of *all* the members of the management team.

ML as a new subject is one requiring special skill to teach and the decision to introduce it at schools was taken at the highest government levels and with a specific objective in mind. It was therefore important for its introduction to be managed professionally, by the DoE and then, crucially, at school and TVET college level. Gerber (2011: 37) complains that the DoE rushed the implementation process of ML. No adequate training took place and this resulted in much confusion as far as teaching, planning and assessment were concerned.

The first role that managers have to play in the successful implementation of subjects at TVET colleges, including ML, is that of instructional leadership. This, according to Van Deventer and Kruger (2003) and Hallinger (2012), consists of three dimensions which are elaborated on in the theoretical foundations below. Secondly, managers of subjects at TVET colleges also manage the curriculum in terms of implementing it according to government policies and ensuring that all procedures and processes of assessment are adhered to. Thirdly, the manager of a subject has to manage the students at whom the subject is aimed, and lastly the manager provides the resources for its implementation in the form of qualified staff and training. In implementing the new subject of ML,

managers also had to ensure that the objective of making it applicable to everyday real-life situations was attained.

It was the wish of the researcher to investigate through this study what the experiences of the managers of ML were when implementing and performing each of these role functions.

## **2.7 THEORETICAL FOUNDATIONS**

### **2.7.1 Background**

According to Hallinger (2012: 15), leadership and management at schools and TVET colleges make a difference in school improvement and results. Simply put, “school leaders matter for school success” (Hornig & Loeb 2010: 66). School leaders inform school success. The way an educational institution is managed and leadership given determines the success or failure of that institution. It must be added here that when referring to leadership and management we are talking not only of the principal, as is often the case, but also of the Fundamental Heads, Education Specialists and Campus Heads of colleges who are responsible for the subject ML.

This study was underpinned by Hallinger’s (2012) leadership dimension of the promotion of a positive and successful climate in an institution. The leadership functions of this dimension are: (i) protecting instructional time; (ii) promoting professional development; (iii) maintaining high visibility; (iv) providing incentives for teachers; and (v) providing incentives for learners.

Van Deventer and Kruger (2003: 253) remind us that the climate of an educational institution has a direct influence on the members of the college and therefore their productivity and job satisfaction. This results in a positive climate for students to study and learn in, where there is a reduction in absenteeism, both in students and lecturers, the will to learn and teach, and a willingness on the part of lecturers to take risks since there is an atmosphere of confidence.

The entire college management team overseeing the ML curriculum, namely the Fundamental Head, Education Specialist and Campus Head, should work together collectively to create a positive climate where teaching and learning can take place. Some ways in which this can be done are:

- protecting teaching and learning time and not unnecessarily disrupting it through bad planning or the continuous absenteeism of lecturers;
- seeing to the professional development needs of lecturers as revealed through assessment;
- applying the rule of “management by walking around”; and
- motivating lecturers and students by providing incentives to lecturers as well as students, such as recognizing lecturers’ and students’ achievements (Kruger 2003: 210).

Education Specialists at colleges in charge of ML lecturers can do a lot to influence the morale of lecturers. Educators who feel empowered have higher morale (Van Deventer & Kruger 2003: 16) and hence relate to students in a more positive way, which can be valuable for a subject such as ML.

### **2.7.2 Instructional leadership**

Instructional leadership is defined by Van Deventer & Kruger (2003: 246) as “instructional leadership that is no longer a separate function distinct from a principal’s managerial duties, rather, the easiest, most direct way for a school principal to exercise instructional leadership is through the managerial tasks he or she engages in every day”.

Instructional leadership is mostly defined with the principal as the sole person mentioned, but the researcher’s view is that the concept of instructional leadership can be applied to a group of people working in harmony towards one goal, namely school or

TVET college improvement. If this can be achieved by one person it can surely be achieved by a group of people who have common objectives in mind. Van Deventer & Kruger (2003: 247) support this view in affirming that subject or learning area heads are all instructional leaders who should all work together in taking the lead in curriculum matters and improving them. The Reading First Notebook (2005: 1) takes this further by stating that the key players in instructional leadership are central office personnel, principals and assistant principals. At TVET colleges, Fundamental Heads, Education Specialists, Campus Heads and Programme Heads should fulfil the same function. The researcher believes that Education Specialists must play the role of instructional leaders.

This same principle of instructional leadership is not limited only to educational institutions. This idea can and must also be transferred to programmes, curricula and individual subjects such as ML.

It has been shown time and again that educational institutions with excellent results almost always have at their helm a very strong leader with a strong team with whom he or she works, while educational institutions where results are dismal have very poor leaders and a poor team. It is therefore important that Fundamental Heads share their Instructional leadership with the Education Specialists at TVET colleges in respect of ML because they are in charge of the subject. Shared instructional leadership is coming to the fore more strongly now than ever before and all educational institutions should take cognizance of this move towards shared instructional leadership.

### **2.7.3 Models of instructional leadership**

The other two dimensions proposed by Hallinger (2012: 6) and Van Deventer & Kruger (2003: 246) and forming part of the instructional leadership model are *defining the college's mission and managing the instructional programme*.

#### **2.7.3.1 Defining the college's mission**



The college's mission, according to Hallinger (2012), is based on two leadership functions, namely *framing the college's goals* and *communicating the college's goals*.

As far as ML is concerned, the researcher firmly believes and advocates that every department of ML should also have a mission statement which is aligned with the mission of the college. The formulation and perpetual maintenance of this mission must be the duty of the Fundamental Head and Education Specialist for ML together with Campus Heads. It is also of the utmost importance that the mission statement be formulated in collaboration with all staff, including the lecturers in ML. It is also important that managers promote this mission on all occasions such as at assemblies and meetings. Hallinger (2012: 9) underscores the fact that the mission needs to be visible and accepted throughout the institution. Examples of mission statements which can be formulated for an ML department at a TVET college are:

- improvement of Mathematical Literacy at the college; and
- establishing a culture and spirit of cooperation between managers, lecturers and students of ML.

The next step in the process should be the setting of goals for the subject of ML. These goals should mainly be set by the Education Specialist in collaboration with ML lecturers and should be clear, measurable, time-based and focused on academic progress (Hallinger 2012: 8).

Examples of goals that can be set are:

- attending specific courses for lecturers to improve their teaching skills using e-learning in Mathematical Literacy; and
- directing targeted remedial classes for ML to improve marks for the level 4 students of the current year.

These goals also need to be communicated to other departments, programme heads and lecturers and there should be buy-in on these goals, widely known and supported by those concerned.

### **2.7.3.2 Managing the instructional programme**

The second dimension, which refers to *managing the instructional programme*, deals with the coordination and control of instruction and curriculum. This dimension is possibly the most important leadership function for the managers of ML. It consists of the following leadership functions: *supervising and evaluating instruction, coordinating the curriculum, and monitoring students' progress*. Du Plooy (2010: 46), however, adds another function: that of *analysing data and promoting an instructional climate*.

Central to any educational institution is its primary task of offering and managing instruction to its students. It is the task of a college to ensure that quality instruction is provided by organizing the different subjects and activities in such a way that the curriculum objectives are reached and educative teaching and learning are achieved. According to Van Deventer and Kruger (2003: 249) instructional organization means the creation of opportunities for teaching and learning at a college. The curriculum documents for ML, namely the subject guidelines and assessment guidelines for the NCV programme as well as the year plans and the assessment plans, must be used as a guide and carefully studied and implemented to ensure that this takes place without fail.

It is also very important to note that to achieve excellent results in any subject it is vital that the college be properly organized. There are schools as well as colleges that perform exceptionally well despite elements which count against them, such as a lack of resources. A well-managed instructional programme goes hand in hand with a sound organizational culture. Where there is a well-managed instructional programme with strong instructional leadership there is also a sound organizational culture (Du Plooy 2010: 40). According to Du Plooy (2010: 40), educators perform well in a strong organizational culture with good and effective leaders. This same approach must be

used for Mathematical Literacy, where there needs to be a strong Education Specialist and a good culture present in the ML department.

The coordination of the ML curriculum at colleges is an important task for everyone who is involved in it, namely the Campus Heads at campus level, the Fundamental Head, the Education Specialist for ML and the lecturer. Coordination of the ML curriculum briefly entails:

- that more group work, research and student-centred teaching and learning are done and that lecturers are trained and equipped to do them; and
- that instruction time is utilized optimally as per the timetable.

Since group work, student-centred teaching and learning and research are all new aspects of the general approach to teaching and learning according to policy documents and also of ML, instructional leaders need to ensure that they are accomplished and done. Where there is a need, managers are expected to provide the necessary training to lecturers.

The optimal use of time is another issue that should be high on the agenda of Education Specialists, Fundamental Heads and Campus Managers. The delivery of the ML curriculum should not be unnecessarily delayed or interrupted. Education Specialists supported by their Fundamental Heads are expected to liaise with Campus Heads about timetabling so that enough time is allocated to the subject ML.

A further duty for Education Specialists is to equip their lecturers with e-learning methods for the ML classroom. Many lecturers are not trained in the use of e-learning in their classrooms. If this method can be learned, lecturers can make their classes very interesting for their ML students as there are innumerable resources such as galleries, pre-loaded lesson plans and software with various mathematical contents which can be used very effectively and productively in ML classrooms.

Supervising teaching and learning is also a crucial aspect of instructional leadership and an important task for the Education Specialist. According to Van Deventer and Kruger (2003: 250-253), it includes tasks such as lecturer appraisal, staff development, lecturer motivation and curriculum support.

Lecturer appraisal should be developmental rather than punitive. Steyn and Van Niekerk (2007: 250) mention that staff appraisal should refrain from being judgemental and focus on how it can develop staff in order for them to improve in the educative teaching of ML. Instruments which the Education Specialists can utilize are classroom observations, lecturers' portfolios and peer appraisal. Findings from these appraisals must be used by Education Specialists to feed into staff development programmes in ways that can improve classroom delivery.

The monitoring of student progress is another important leadership function for the Education Specialist. It is important for basically two reasons: (i) to assess how well learners have measured up against standards at college and national levels, and (ii) to provide managers of a college with valuable information on where to improve and give support to learners as well as lecturers. This can be a valuable tool to evaluate the effectiveness of an instructional programme. The internal continuous assessment (ICASS) and subject and assessment guidelines for ML as well as the year plans and assessment plans are useful in helping managers and lecturers to ascertain what needs to be learnt and how it is to be learnt. As Du Plooy (2010: 52) says, "Curriculum indicates *what* the learners will learn, assessment shows *how* learners have learned".

There are many instruments that can be used to assess students and therefore the instructional programme for ML: for example, class tests, assignments, projects, observations and activities on e-learning. This study has adopted the theory of instructional leadership as postulated by Hallinger (2012).

#### **2.7.4 The ten specific roles of Education Specialists**

Over and above the discussion above, the researcher also puts forward the ten roles of Education Specialists highlighted by Harrison and Killion (2007), which the researcher believes augment the different dimensions underscored by Hallinger (2012). The researcher has adapted these in particular for ML. They are as follows:

- *Resource provider* – Since lecturers do not always have the time at their disposal, a community of practice similar to the one advocated by Verster (2009) can be employed among the ML lecturers at a particular college. These might include websites, instructional materials, readings, and other resources for use with and by students. The Education Specialist might also share with lecturers such professional resources as articles, books, lessons or unit plans, and assessment tools.
- *Instructional specialist* – As an instructional specialist the Education Specialist helps colleagues implement effective teaching strategies. This might include circulating ideas for instruction for specific areas in ML which helped him or her or other lecturers, or planning lessons in partnership with fellow lecturers and sharing these on a bigger platform such as monthly or annual meetings. This might also include technological instructional strategies.
- *Curriculum specialist* – The Education Specialist for ML must also know his or her curriculum content well, which means knowing all the curriculum documents. He or she must know how it links together internally and also how it links together with other programmes and subjects to make it a more meaningful experience for the student. He or she must also assist lecturers in how to use the curriculum to plan for instruction and assessments so that the curriculum is implemented consistently throughout the college.
- *Classroom supporter* – As a classroom supporter the Education Specialist for ML, over and above doing classroom observation, must also help to give lecturers new ideas by demonstrating a lesson or through co-lecturing parts of

the section of work. The Education Specialist must also encourage other lecturers with innovative ideas and particular strengths in certain parts of the work to co-teach. According to Blasé and Blasé (in Harrison & Killion 2007) working with peers enhances lecturers' self-sufficiency and belief in their ability to solve their own problems.

- *Learning facilitator* – Facilitating professional development opportunities among lecturers is another role for the Education Specialist, Fundamental Head and Campus Head. When lecturers learn with and from one another, they can focus on what most directly improves student learning. When lecturers immediately apply and share what they have learnt on professional development courses it improves both themselves and student learning. Professional development programmes must be carefully planned for the year and it would be wise for the Education Specialist to be on a professional development committee.
- *Mentorship* – In an Education Specialist the role of the mentor must not be underestimated. Especially when new lecturers come on board who do not know the ML curriculum well, the Education Specialist should play a vital and pivotal role in advising lecturers about instruction, policies, procedures and the curriculum. The sooner and more effectively this is done the more confident the new lecturer will become and this will show in the ML results.
- *College leader* – The Education Specialist finds him- or herself on the management side of the organization structure of the college. He or she therefore has an influence on firstly the mission of the college and secondly the vision and mission of the ML department. The Education Specialist should also represent the college on mathematical organizations and focus groups and serve on all or most of the committees of the college so that a voice from ML can also be heard.

- *Data coach* – The Education Specialist should also know how to read, interpret and analyse data that are generated by students' results by means of assessments and otherwise. The analysis of these results should drive classroom instruction for ML and become topics of engagement on how to improve instruction and hence results. The Education Specialist should take an active role in this and lead these types of discussions.
- *Catalysts for change* – Education Specialists should also be catalysts for change, visionaries and change agents and “go against the grain” if they have to for the sake of their lecturers and students and for ML. They must also have an evolutionary mind set and look for better ways of doing things.
- *Learner* – An Education Specialist must remain a life-long learner, and go through continuous improvement him- or herself. He or she must not only improve themselves in Mathematical Literacy, but also attend management courses in order to enhance their skills and abilities to improve not only the lecturers but also the students.

The researcher has found by experience in his position as an Education Specialist that many of the above roles are not carried out by Education Specialists as managers and hence that many of the issues that could be addressed to make ML more meaningful and improve results are non-existent at Colleges. Managers of the subject should be encouraged to use these roles above as well as the dimensions mentioned by Hallinger (2012) to enhance their management of and interaction with the subject of ML at TVET colleges.

## **2.8 CONCLUSION**

This chapter has focused on a literature review which highlighted various aspects of ML, its definition in this country according to government documents, how it is defined elsewhere in the world, its concerns and the management of it employing a model of

instructional leadership. The researcher also focused briefly on the ten roles of an Education Specialist.

This literature review shows that there is no common understanding of what mathematical literacy is as the crucial concept of context is not well understood. There are also many concerns around the subject and no clear directions for instructional leadership on it as far as its dimensions are concerned.

The next chapter focuses on the research methodology that was used to answer the questions outlined in Chapter 1.



# CHAPTER 3

## RESEARCH DESIGN AND METHODOLOGY

### 3.1 INTRODUCTION

The literature review in Chapter 2 provided an outline of ML and the status of managers' interactions with it at public TVET colleges, together with the theoretical foundation on which the study was based. This chapter concentrates on how the qualitative investigation was designed and conducted at certain TVET colleges. It also discusses the research's design and approach, the method of data collection used, the instruments employed and how the data were analysed.

The chapter reintroduces the research questions and presents data-collection methods and instruments as well as the participants in the study with regard to the management of Mathematical Literacy in their respective colleges. It explains why the qualitative approach was used, and the research design is outlined in terms of the choice of the sample, methods of interview and how data were transcribed and analysed. Lastly, ethical considerations and the validity, reliability and trustworthiness of the data are discussed.

### 3.2 RESEARCH AIMS AND QUESTIONS

The aim and purpose of this study was to investigate and understand the experiences of TVET college managers in the implementation of the Mathematical Literacy curriculum.

The main research question in this study was:

How do managers responsible for the ML curriculum interact with the subject at TVET colleges in the Western Cape?

The following sub-questions were asked:

- How do managers of ML at TVET colleges perceive the ML curriculum?
- How do managers of ML at TVET colleges experience the implementation of ML from their angle and position?
- What complexities do instructional leaders find, and what methods do they use, in implementing the ML curriculum and supporting TVET college lecturers?

The researcher's objective was to find solutions and answers to these sub-questions by interviewing managers of three public TVET colleges in the Western Cape. The data were gathered by conducting semi-structured interviews as well as analysing documents relevant to these colleges.

### **3.3 RESEARCH APPROACH**

Mouton (2005: 55) describes a research design as a plan or blueprint of how one intends conducting the research. He further states that the research design focuses on the logic of the research (Mouton 2005: 56).

A researcher may decide on a quantitative, a qualitative, or a mixed approach to the research. A quantitative approach is one where the researcher wants to objectively measure and test a hypothesis to predict and regulate people's behaviour. In this approach data are obtained systematically and in a standardized manner and the unit of analysis is the variable (De Vos et al. 2011: 66). In the qualitative approach, on the other hand, the researcher intends to understand the meaning which people attach to their everyday lives (Research Methodology, UNISA Study Guide for MEDEM2 R, 2002: 13). According to Mouton (2005: 194) "one of the major distinguishing characteristics of qualitative research is the fact that the researcher attempts to understand people in terms of their own definition of their world".

Keeping the above in mind, the qualitative approach was best suited for the current research for the following reasons:

- The informants used in the research were all knowledgeable and information-rich about ML as all of them had been with these colleges since the introduction of ML as a new subject.
- They were also able to provide information and insight into the management of ML at TVET colleges as they were experienced in the processes of curriculum management and instructional leadership.
- Face-to-face interviews provided a powerful way of looking for patterns and trends to answer the questions of the research, probing beyond the surface.

The focus of this study was to investigate the lived experiences of Fundamental Heads, Education Specialists and Campus Heads in the implementation of the ML curriculum in their respective TVET college environments.

### **3.4 RESEARCH DESIGN**

De Vos et al. (2011: 307) mention that some authors refer to design as all those decisions a researcher makes in planning the study, while others refer to design as a phase in the research process. The type of design a researcher chooses depends on the purpose of the research and the nature of the research question (De Vos et al. 2011: 312).

This research followed the phenomenological design. This approach was chosen with a view to understanding the phenomenon which is being studied and to provide a description of the experiences as experienced by the participants (De Vos et al. 2011: 316). This was intended to explain the experiences of Fundamental Heads, Education Specialists and Campus Heads in the implementation of the ML curriculum in their respective TVET college environments.

#### **3.4.1 Population**

According to McMillan and Schumacher (2006: 119) a population is a group of elements or cases, whether individuals, objects or events, that conform to specific criteria and to which we tend to generalize the results of the research.

There are six public TVET colleges in the Western Cape Province, each college having approximately five campuses. Three of these colleges are in the False Bay, Cape Town and Northern Suburbs areas, and the other three are in the West Coast, South Coast and Boland areas. The population of this study therefore consisted of managers at all levels in the six TVET colleges of the Western Cape.

### **3.4.2 Sampling techniques**

A sample, according to De Vos et al. (2011: 223), consists of elements or a subset of the population considered for actual inclusion in the study. The same authors go on to say that a sample always implies the simultaneous existence of a population of which the sample is a smaller section.

In deciding on the sampling strategy, the four key factors of sampling as stated by Cohen, Manion and Morrison (2007: 100) are:

- the sample size;
- representativeness and boundaries of the sample;
- access to the sample; and
- the sampling strategy to be used.

Purposive sampling was used in this study since the researcher intended to include information-rich participants who possessed certain specific characteristics and who best satisfied the needs and objectives of the research (Gerber 2011: 69). McMillan and Schumacher (2006: 319) further assert that purposive samples are chosen because these participants are likely to be knowledgeable and informative about the phenomena under study.

The sample in this study consists of the managers from three public TVET colleges in the Western Cape. One of the three colleges is where the researcher is a lecturer in Mathematics and ML and an Education Specialist for ML (NCV) and Mathematics for the NATED programme. The other two colleges are near the researcher's college. One reason for selecting these other two was their easy access and short travelling distance

from the researcher's college. Another reason was the fact that the researcher was in regular contact with these colleges via workshops attended and focus group meetings working on projects involving these participants. Furthermore, the participants in the research were purposively selected since they satisfied the criteria that the researcher was searching for and met the researcher's requirements.

#### **3.4.2.1 Sample size**

In general, in qualitative research, the sample size should not be so large that it is difficult to extract thick, rich data (Onwuegbuzie & Leech 2007: 242). At the same time, as noted by Onwuegbuzie and Leech (2007: 242), the sample size cannot be so small that it becomes too difficult to achieve saturation. Gerber (2011: 70) recommends two to ten participants as sufficient for qualitative research.

Some insights offered by McMillan and Schumacher (2006: 322) for determining sample size are aspects such as the purpose of the study, the focus of the study, the availability of informants, and the stage when insights into the phenomenon have reached saturation point.

Although it was initially intended to include a sample of 13 participants, this was later reduced to ten. The sample comprised: three Education Specialists and three Fundamental Heads, one from each college; one Campus Head from the college where the researcher is a lecturer and Education Specialist; the Coordinating Manager from a mathematical institution which supports the college in professional development programmes; and two lecturers from the researcher's college.

#### **3.4.2.2 Sample**

The sample for this study was a purposive one of managers at all levels in three public TVET colleges in the Western Cape, out of a population of managers in the six public TVET colleges in the Western Cape, due to the three colleges' convenient distance from the researcher's college.

### **3.4.2.3 Participants**

The participants of the sample consisted of one Campus Head, three Education Specialists, three Fundamental Heads, two lecturers and the Coordinating Manager of a mathematical organization with which the college is affiliated for support and which gives professional development to lecturers and advice to the managers of the ML programme.

The Campus Head chosen was someone who had been with the college since the introduction of ML and despite never having lectured in ML or Mathematics, was knowledgeable regarding the policy documents on ML and aware of the initial problems which were encountered with the implementation of this new subject. The Campus Head was also knowledgeable about the resource requirements of the subject.

The three Fundamental Heads who were included in the sample had all been involved with the subject since its inception and played an instrumental and valuable role in the establishment of a Focus Group in the Western Cape. Two of these Fundamental Heads were in charge of only NCV Mathematics and ML at their colleges, while the third was in charge of all the NCV fundamental subjects, including ML. The reporting structure is that the Fundamental Head is in charge of the Education Specialists at each college and gives them directions regarding the subject, while the Education Specialists report directly to the Fundamental Head.

Education Specialists are the first contact for lecturers in ML and the immediate managers of the lecturers, and have the duties of managing and implementing the ML curriculum, solving problems relating to the subject and supporting their lecturers at their college. The three Education Specialists selected for the sample were also information-rich and had had many years' experience lecturing in the subject before being promoted to Education Specialist.

The two lecturers who were selected for the sample had been with their colleges since ML was introduced and their inclusion was mostly for triangulation purposes.

Furthermore, all the colleges in the sample were involved with one Mathematical Literacy organization as part of their lecturers' professional development.

### **3.4.3 Data collection**

Data-collection methods are explained in relation to the researcher's role, the interview guide, interview questions, document analysis, interviews with selected participants and interview transcription methods.

#### **3.4.3.1 The researcher's role**

According to McMillan and Schumacher (2006: 344-345), the roles of participant, observer and interviewer are the typical research roles for most forms of qualitative research. McMillan and Schumacher (2006) further mention that in the case of interviews the interviewer begins to establish the research role in the first contact with the participant. This is done when requesting an appointment, when explaining the purpose of the interview and when ensuring issues such as confidentiality and ethical considerations.

The need for and purpose of collecting data is to provide a solid foundation for the research as well as to substantiate the various arguments in research findings (Singh 2006: 212). McMillan and Schumacher (2006: 322) advise that the qualitative phases of data collection and data analysis are interactive and overlap. The authors also mention that the data-collection process goes through the following five phases, which the researcher has tried to follow as far as possible:

- In the planning phase, where the problem statement and initial research questions were analysed, it was suggested to the researcher to use TVET colleges in the Western Cape as settings and permission was gained through the Western Cape Department of Education. Careful consideration was given to those participants who were well-informed on the questions of the research.
- In the initial data-collection phase, the researcher, through friends and acquaintances made during years of contact with these colleges, established

who best met the criteria for a purposive sample of Education Specialists, Fundamental Heads and Campus Heads.

- In the basic data-collection phase, the researcher started his interviews, in which he carefully listened to and interpreted informants' answers to his questions and increasingly probed his informants to get beyond the surface of their responses.
- As soon as the researcher realized that no new information seemed to be emerging from his interviews and had gathered enough information to analyse, he terminated the data collection.
- As soon as active data collection was completed the researcher transcribed the data and used the transcribed data to continue with data analysis by identifying trends and patterns within the transcribed information.

The data-collection instruments used in this research were mainly interviews combined with document analysis.

#### **3.4.3.2 Interview questions**

According to McMillan and Schumacher (2006) the purpose, the problem statement and the participants in the research will determine the types of questions that will be asked. Interview questions may be focused on experience, behaviour, opinions and values, feelings, knowledge, sensory perceptions and/or the individual's background (McMillan & Schumacher 2006: 352).

Since interviewing is the predominant mode of data and information collection in qualitative research (De Vos et al. 2011: 342), it was decided to make use of mainly interviews to collect data for this research. In this research data were collected using mostly semi-structured interviews with all the participants as indicated above. Semi-structured interview questions were used mainly as a guide and the focus was more on getting to the heart of questions to probe beyond the surface for the main question above. Open-ended questions were posed. This gave the researcher a better opportunity to probe the participant for more detail by follow-up questions when necessary and allowed participants a better chance to fully express their views,



experiences and feelings. All these interviews were digitally recorded except the ones with lecturers, which were done via email.

#### **3.4.3.3 Interview sessions**

All the participants in the research who were interviewed face to face, i.e. the Fundamental Heads, Education Specialists and Campus Head, were first contacted via an email and a letter which sought their permission to interview them for this study. Their agreement was confirmed by signing a letter of confirmation. Subsequent to their acceptance a follow-up call was made to secure a date, time and venue for the interview.

#### **3.4.3.4 Interview guide**

An interview guide is simply a schedule of interview questions. According to McMillan and Schumacher (2006: 351), in the interview guide topics are selected in advance, but the researcher decides on the sequence and wording of the questions during the interview.

Extreme care was taken by the researcher in designing the key areas of the interview questions so that all aspects the researcher was interested in were thoroughly covered. Different interview guides were used for the different managers, although there were some elements common to all the interviews.

Three of the interviews were conducted at the college of the researcher: those of the Campus Head, Programme Head for Fundamentals and an Education Specialist for Mathematical Literacy. The other interviews were conducted at the other two colleges mentioned above, following the same procedure as above. Because of one Education Specialist's busy schedule the researcher conducted the interview at the participant's house during the 2014 September-October college vacation. The other interviews were conducted in the managers' offices at their respective colleges. All the oral interviews were digitally recorded on the researcher's laptop.

The interviews with the lecturers were done by means of email interviews, which according to Opdenakker (2006: 13-15) is one of the four interviewing techniques that can be used in qualitative research. Opdenakker (2006) identifies these four interview techniques as face-to-face, telephone, email and computer methods using MSN Messenger. Since it was difficult for the researcher to have face-to-face interviews with these lecturers, as they were always engaged in instructional lectures, the researcher opted for email interviews. Furthermore, the researcher also wanted to experience this type of interview. The advantages of this type of interview were that transcription was done automatically, that the interviewee had more time to reflect on the answer, and that the participant could answer the questions at his or her own convenience.

#### **3.4.3.5 Document analysis**

According to Saunders et al. (2003: 190-191), documentary secondary data include written documents such as notices, correspondence, minutes of meetings, reports to shareholders, diaries, transcripts of speeches and public records.

In this research, documents which were analysed and integrated with the interviews included:

- minutes of Mathematics meetings;
- weekly planning meetings; and
- programme managers' meetings.

Studying these documents helped to give a better understanding of how the managers solved problems and made decisions regarding their interaction with Mathematical Literacy and improving its performance.

#### **3.4.3.6 Transcription of interviews**

The researcher initially chose the Dragon NaturallySpeaking software to automatically transcribe the digitally recorded interviews. Since the software did not do what was expected of it, the researcher decided to transcribe all the interviews manually.

### **3.5 DATA ANALYSIS**

McMillan and Schumacher (2006: 364) refer to data analysis as an inductive process of organizing data into categories and identifying patterns among the categories. The research data collected, whether qualitative or quantitative, and whether gained via observations or via interviews, must eventually be analysed to give meaning to what was collected and how it answers the research question. Data analysis involves the “breaking down” of the data into manageable themes, patterns, trends and relationships (Mouton 2006: 108).

In analysing the transcripts the researcher first read them repeatedly so as to become familiar with the data and then listened to all the recorded interviews again and compared them with the transcripts to verify the accuracy of the data. The researcher also went through all the transcribed interviews in order to observe patterns and themes.

In studying the documents the researcher also looked at similar patterns and categories in them and focused on issues such as how decisions were made in the implementation of the curriculum, solving problems as far as instructional leadership was concerned, and intervention strategies for improving performance.

### **3.6 ETHICAL CONSIDERATION**

All research that is undertaken must meet the criteria of truth, honesty and impartiality. Ethical issues in research centre on informed consent, deception, confidentiality, anonymity, privacy and caring for the respondents participating in the study (McMillan & Schumacher 2006: 333).

Permission to do this research was obtained first from the Western Cape Education Department and the CEOs or Deputy CEOs of the three colleges concerned. Secondly, in order to abide by the ethical standards of research, the researcher ensured that informed consent was sought from each participant in the study. This was done by sending a letter requesting consent to each participant. This letter explained exactly what the purpose of the research was, what the research methods would be, and how

the results would be used. It was made clear that participation was voluntary and the participant could withdraw at any time if he or she so wished. Cognizance was taken of the fact that some participants might be made uncomfortable by some of the questions asked. This letter was sent to each manager referred to in the methodology above and to each of the three colleges forming part of this study. Each participant in the study indicated his or her informed consent by furnishing the researcher with a signed letter of acceptance. Issues around voluntary participation, withdrawal, confidentiality and privacy were fully explained to the participants before the interviews were conducted. Interviews took place after college hours to ensure minimum disruption of the colleges' academic and instructional programme. Permission to do this research was also sought from the University of South Africa, where the researcher is registered as a student. The ethics certificate obtained is attached as an appendix to this study.

Since a digital recorder was used to record interviews, which were then transcribed verbatim, informed consent for this process was also sought. Transcriptions were supplied to some participants, but not all, to verify that they were representative of the interviews and not a distortion thereof.

To ensure the confidentiality of the participants, everything possible was done to protect their identity and to protect the informants from the general reading public (McMillan & Schumacher, 2006: 334). This was achieved by keeping the names of colleges and participants hidden by using carefully chosen pseudonyms for colleges as well as participants. Any type of deception, such as withholding information or providing incorrect information, was refrained from as there was no need for it. Everything possible was done to protect the privacy of the managers in the study and to keep confidential any information about a college or campus that came to light through the research. The only instruments used were a digital recorder and a microphone, for which permission was obtained. No concealed media were used and if any other media equipment was required during this research it was not concealed.

All participants in the research were also informed about its results and colleges were free and welcome to use these results to improve their management style and improve results in Mathematical Literacy, where applicable.

### **3.7 VALIDITY AND TRUSTWORTHINESS**

Validity, according to McMillan and Schumacher (2006: 324), refers to the degree of congruence between the explanations of the phenomena and the realities of the world. Validity is simply a way of measuring whether the interpretations have mutual meanings between the participants and the researcher. On the issue of validity Cohen, Manion and Morrison (2007: 133) mention that validity is a demonstration that the instrument in fact measures what it is supposed to measure. On the trustworthiness of data, Shenton (2004: 63) and De Vos et al. (2011: 419-421) refer to the following four criteria which can be used:

- *Credibility*. This refers to whether the inquiry was conducted accurately to ensure accurate identification and description of a subject under study. One strategy that many researchers use is member-checking. The researcher employed member-checking by restating what was said during the interview as well as by asking the participants, when the interview had been transcribed, to verify the researcher's transcriptions.
- *Transferability*. De Vos et al. (2011: 420) and Shenton (2004: 69) refer to transferability as the extent to which the findings of one study can be applied to other situations. Another approach is to include strategies such as triangulation to corroborate, elaborate or illuminate the research in question (De Vos et al. 2011). The researcher in this research used triangulation by interviewing lecturers in Mathematical Literacy at the colleges in order to corroborate what managers of Mathematical Literacy said. Another strategy the researcher employed was document analysis.
- *Dependability*. According to De Vos et al. (2011: 420-421), dependability refers to the extent to which the research process is logical, well documented and audited. To ensure dependability in this research the researcher has presented a

well-documented outline of the study by reporting the processes of the research in detail. This enables any future researcher to conduct a similar piece of research (Shenton 2004:71).

- *Conformability*. This criterion, according to De Vos et al. (2011: 421), refers to how objective the research actually is. This objectivity can be ensured by *auditing* the process of data gathering and analysis. The strategy that the researcher has employed in this research is that of triangulation.

### **3.7.1 Triangulation**

Triangulation refers to the use of two or more independent sources of data or data-collection methods within one study in order to help ensure that the data are telling you what you think they are telling you (Saunders et al. 2003: 492). Triangulation therefore enhances credibility, validity and trustworthiness in a piece of research.

Triangulation in this study was achieved by interviewing lecturers and therefore ascertaining that managers do not contradict themselves. It was also achieved by comparing documents by analysing them as well as comparing answers from managers from the different colleges.

## **3.8 CONCLUSION**

In this chapter the research design and the motivation for a qualitative approach have been discussed. The data-collection methods as well as the research instruments such as the interview guide and document analysis have been described. A guarantee is also given that data collection was done in a valid and ethically sound way. Lastly, a brief description is also given of how data were analysed.

In the next chapter the researcher presents data analysis which emerged from the interviews conducted with the managers of Mathematical Literacy at TVET colleges, namely the Fundamental Heads, Education Specialists, Campus Heads, the Coordinating Manager, and lecturers.

# CHAPTER 4

## RESEARCH FINDINGS AND DATA ANALYSIS

### 4.1 INTRODUCTION

The aim of this research was to investigate and understand the experiences of TVET college managers in the implementation of the Mathematical Literacy curriculum at TVET colleges. The preceding chapter focused on the research design and methodology used to gather data for this study and explained how it was done.

This chapter focuses on the analysis and interpretation of the data collected by means of semi-structured interviews that were conducted with managers at different levels of the Mathematical Literacy curriculum, together with document analysis, at TVET colleges. This was done to address the following main research question:

How do managers responsible for the Mathematical Literacy (ML) curriculum interact with the subject at TVET colleges in the Western Cape?

The following sub-questions were posed:

- How do managers of ML at TVET colleges perceive the ML curriculum?
- How do managers of ML at TVET colleges experience the implementation of ML from their angle and position?
- What complexities do instructional leaders find, and what methods do they use, in implementing the ML curriculum and supporting TVET college lecturers?

The semi-structured interviews covered how the Campus Heads, Education Specialists and Fundamental Heads:

- perceived their role in managing the Mathematical Literacy curriculum;

- undertook the activities and functions for successfully managing the instructional programme of ML at TVET colleges;
- perceived their general knowledge of the NCV ML curriculum at TVET colleges;
- undertook measures to address curriculum problems in ML;
- experienced barriers and challenges in the implementation of the ML curriculum at an TVET campus;
- provided support and empowered lecturers in delivering the ML curriculum at an TVET campus; and
- experienced the implementation of the ML curriculum at TVET colleges.

## 4.2 BIOGRAPHICAL INFORMATION

The tables below indicate the biographical information of the participants in their respective positions in the colleges with respect to their experience in ML:

**Table 4.2.1: Managers of ML (Fundamental Heads/Programme Heads (FH))**

	<b>FH 1</b>	<b>FH 2</b>	<b>FH 3</b>
Number of years' experience in managing ML	8 years	8 years	8 years
Focus Group (FG) responsibility	Coordinating the attendance of ES at FG at her college.	FG coordinator for Mathematics and ML in the Western Cape.	FG coordinator for ML in the Western Cape.

**Table 4.2.2: Managers of ML (Education Specialists (ES))**

	<b>ES1</b>	<b>ES2</b>	<b>ES3</b>
Number of years' experience in managing ML	8 years	8 years	8 years



Focus Group (FG) responsibility	Member and Committee member in the FG	Member and Committee member in the FG	Member and Committee member in the FG
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**Table 4.2.3: Other (Campus Head (CH), Coordinating Manager (CM), Lecturers (L))**

	<b>CH</b>	<b>CM</b>	<b>L1 &amp; L2</b>
	Campus Head	Coordinating Manager of a mathematics Institution	Two college lecturers
Experience in Mathematical Literacy	8 years	8 years	7 years

Tables 4.2.1, 4.2.2 and 4.2.3 display the different managers' experience of involvement with Mathematical Literacy as well as the lecturers' experience in teaching the subject. All the Fundamental Heads and Education Specialists who participated in this study had experienced ML since its introduction at TVET colleges. This made them suitable participants for this study. Two of the Education Specialists rose up the ranks from being lecturers, to Focus Group members and finally coordinators of the subject in the Western Cape. One of the ESs is the author of a textbook which is widely used for ML at TVET colleges, *Mathematical Literacy – hands-on training*.

Although differentiation is made in the tables above between the eight managers as Fundamental Heads (FH), Education Specialists (ES), Campus Heads (CH) and Coordinating Manager of ML, they will henceforth all be referred to as managers of ML, since they are all managers of ML.

### **4.3 A BRIEF SUMMARY OF DATA COLLECTION**

Data collected from the interviews with the lecturers and the manager of the mathematical institution were mostly used for triangulation purposes unless the finding in the data brought something significant to the table which the researcher felt strongly should be included in the body of the data analysis. Document analysis was mainly used for triangulation purposes.

### **4.4 THE DATA ANALYSIS PROCESS**

All the digitally recorded interviews were transcribed verbatim and the massive amounts of data collected were typed out. It took the researcher roughly a week, spending at least one to two hours every evening, for one interview to be transcribed. The researcher started the transcription process as soon as all the semi-structured interviews were completed. Although the literature suggests that the analysis process and the data-collection process should not be separated (McMillan & Schumacher 2006: 366), the researcher started the analysis process as soon as all the transcriptions were done since he wanted to see the holistic picture.

The researcher first read and reread all the transcripts thoroughly one by one to get a sense of all the interviews as a whole. Next, the researcher made notes next to the margin of each transcript noting the main ideas as well as similarities which emanated from the transcripts. These main ideas were then compared with the interview schedule and research questions to derive broad categories. These main ideas were then summarized into codes and this together with the interview schedule and research questions served as a guide on how the main categories were developed.

### **4.5 DISCUSSIONS AND DATA INTERPRETATION**

To assist the researcher in identifying the categories and sub-categories he used a combination of the themes derived from the interview schedule, the research questions and his own personal experience as a newly-appointed Education Specialist for Mathematical Literacy in the TVET college sector. The following broad categories emerged:

- the role managers play in managing the implementation of the Mathematical Literacy curriculum at TVET colleges;
- experience gained by managers in implementing the ML curriculum;
- challenges facing managers in the implementation of ML;
- instructional leadership strategies managers apply to improve the ML curriculum and therefore its results; and
- support and development programmes to empower lecturers.

These categories are discussed in different sections in turn below.

#### **4.5.1. The role of management in managing the implementation of Mathematical Literacy at TVET colleges**

In this section data relating to the main research objective of how managers of Mathematical Literacy at TVET colleges overall interact and experience the Mathematical Literacy curriculum are presented.

The participants in the study were asked the following question:

”As an education specialist for ML, what do you perceive your major role to be as a manager of this new subject and curriculum?” The responses to this question were as follows:

ES1: *“My major role is to help the lecturers with academic support. I always say I want to lead by example, so if I can make things easier for the people in terms of making sure that assessment tasks are sent out on time, that the people do not have to be concerned about the structure and operations of the department, then they will have more time to focus on their content delivery and things like that... so I would say academic delivery.”*

ES3: *“To give guidance to lecturers, you know just to see that the subject is delivered in a way I think it is supposed to be intended. Ja, just the whole managing of the subject and the delivering of it.”*

FH2: *“I also feel that I am responsible, that if lecturers need anything that they know exactly I am the first port of call.”*

From the responses of ES1 and ES3, it can be concluded that these managers see their role as giving guidance and support and facilitating academic delivery so that the lecturers can focus on content delivery. Over and above this, ES3 emphasized his major role to be guiding the lecturers although he was also interested in monitoring how the subject was delivered. Fundamental Heads on the other hand saw their role as that of personal support in terms of being the first contact for lecturers' needs.

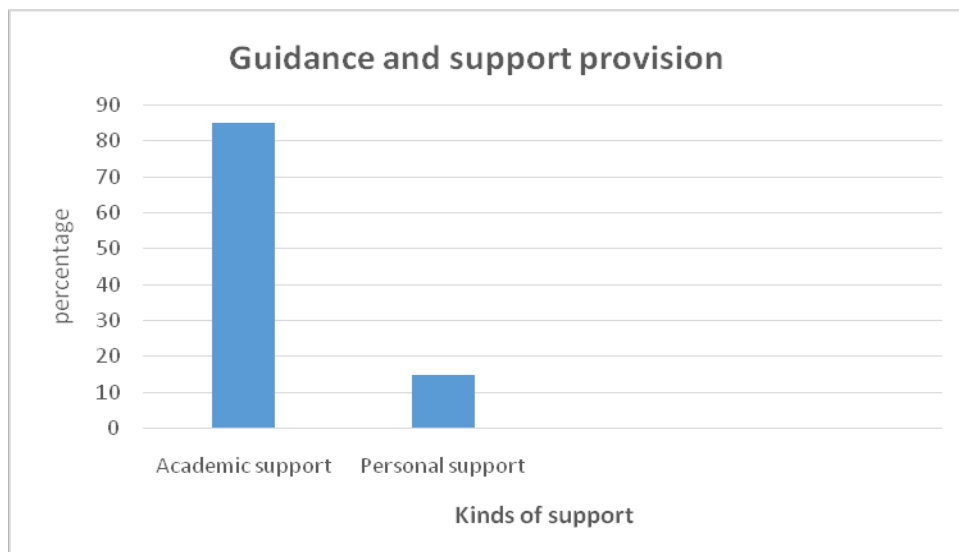
When managers were asked about what kinds of support they gave lecturers, the following responses were given:

FH2: *“I also feel that I am responsible, that if lecturers need anything that they know exactly I am the first port of call.”*

When she was probed further on this question about “anything”, she said:

*“In other words I will ask them at the end of every year what do you need for next year and I am open to their suggestions, does not matter what it is. If I stumble on a new book on the market wherever I am I will purchase it, I will give it to my lecturers, I will say to them do you think you can use it? I do search on the internet for them.”*

The managers who were interviewed therefore classified the kind of support as illustrated in Fig. 4.1:



**Figure 4.1: Guidance and support provision**

It therefore appears from the responses and the chart above that 85% of managers of ML see their support and guidance as academic, while 15% see their role as personal. This means that managers see academic assistance as important and this was also evident in the responses of lecturers when they were asked about it.

Lecturers were also asked the following question:

“What kind of guidance and support do you receive from your managers to effectively deliver the ML curriculum?” The lecturers responded as follows:

L1: *“They simplify the delivery of the curriculum.”*

Researcher: “In what way?”

Then L2 said: *“Subject meetings are held regularly to share information and to discuss subject matters.”*

To the same question of what their role is, others responded differently,

FH1: *“Firstly my role is to ensure that there is quality value in teaching taking place and that would also apply for Mathematical Literacy and also to... to ensure that there is a place for Mathematical Literacy... as I said, a lot of focus is placed on Mathematics and Mathematical Literacy, which then almost kind of demeans its importance... and I see my role as making sure that people can see there is a place for Mathematical Literacy and its purpose is different.”*

ES3: *“I definitely feel there is a place for ML and it is relevant, thus enhancing its quality.”*

The above responses supports the literature study in terms of one of the concerns around ML that it is perceived by many that ML is a watered down version of mathematics and not a subject in its own right and therefore inferior to mathematics (Botha 2011:33). The above managers are striving to correct this perception.

Researcher: “How do you ensure quality?”

ES1: *“By class visits formal and informal and then giving feedback, and I am trying to improve on that, to try and give feedback immediately after class visits, even if it is not formal, or maybe just a sentence or two verbally.”*

Researcher: “What do you mean by formal and informal class visits?”

ES1: *“One can give feedback, and informal also means that we do not officially record the lecturer’s performance, but use it merely to discuss issues with the lecturer.”*

To the same question as to how quality is ensured, the Campus Head responded differently:

CH: *“We say we are the most prestigious college, not just in the Western Cape but in the whole of SA, so where do we start? That is to live the mission in the classroom. We*

*must take our mission even to the subject ML, we must live our mission in our ML classrooms. We say we provide modern and the best resources so we need to give the student the best resources, the best facilities for ML, live the mission in the ML classroom by encouraging lecturers to bring out the competitiveness in the ML classrooms.”*

It therefore appears from the responses that for lecturers, especially, the ES plays a huge role in simplifying the curriculum and assisting in delivering the subject, while for the FH1 and for ES3 the value, status and purpose of ML are important. On the issue of how quality can be ensured, ES1 feels that it can be achieved through classroom visits and through feedback. It also appears that for the Campus Head what matters is not only feedback: over and above the mission statement, she is interested in the competitive performance of lecturers in the classroom.

It has therefore become evident that managers when perceiving their roles have also placed their emphasis on other areas beside guidance and support so as to ensure quality in teaching and learning and to enhance the value of ML to give it the place it deserves. Those who have placed the emphasis of their role on enhancing the value and place of ML were also trying to enhance the place of ML compared with Mathematics and acknowledging that the purpose of ML is different from that of pure Mathematics, which confirms the literature study about one of the concerns around ML, the perception of ML as a watered-down version of Mathematics and not a subject in its own right, and therefore inferior to Mathematics (Botha 2011: 33). Through these responses one can observe that these managers perceive their role to be to enhance the quality of ML by giving it the place and status it deserves and striving to correct this perception.

Thus the above indicates that it is very important always to engage with the vision and mission statement and it needs to be part of the subject as well as part of the classroom.

Furthermore, the literature review makes reference to visibility as one of the functions and dimensions of instructional leadership. These responses confirm that managers ensure quality in teaching and learning through being visible (“management by walking around”) and through connecting with the mission of the college.

The perception of the role that management plays at colleges in managing the implementation of the ML curriculum can be summarized as follows:

**Table 4.4: Role managers play in managing the implementation of ML**

Kind of support	Percentage of managers
Guidance and support	50
Quality and value assurance	25
Quality in the methods of teaching and learning	25

From the table it is clear that 50% of managers preferred their role to be giving guidance and support, while roughly 25% preferred their role to be focusing on quality and value assurance and 25% on quality in teaching and learning.

Since it appears that only 25% of managers felt strongly about the value and place of ML, more should be done to enhance the status of the subject. It is therefore important that senior managers at their level discuss ways to raise the subject’s profile.

Managers’ perceptions of their role are clearly tied in with their perception of the kind of support they give. As far as the literature is concerned, the above concurs very well with the dimensions of Hallinger (2012) in terms of what is expected of a manager in managing, supervising and evaluating the instructional programme.

One can therefore conclude that managers feel strongly that their roles in implementing the ML curriculum are those of ensuring quality as well as giving guidance and support. The researcher further concludes that as far as guidance and support are concerned, managers are strong on providing academic support, as Figure 4.1 also indicates.



#### 4.5.2. Managers' experiences in the implementation of the ML curriculum

This section presents and discusses data that inform the research question on how managers perceive and experience the ML curriculum.

Researcher: "How would you describe your knowledge of the NCV Mathematical Literacy curriculum at TVET colleges in terms of its policies, subject guidelines and how it should be implemented?"

ES3: *"I think, as I said ... over the years I gained a lot of experience, you know, with the subject and I feel that I am quite au fait with the subject guidelines and assessment guidelines and policies concerning ML and the year plan where I also give input at the Focus Group for the Western Cape."*

FH2: *"I am very au fait with the curriculum, because from the start I have made it my business to read (study) through the guidelines very carefully."*

CH: *"You asked me how I would rate myself, I would say 2, but I would not be able to teach the subject say when a lecturer is absent, but I know the guidelines, the subject guidelines, the assessment guidelines and I would be able to refer the students to what learning outcome they should be busy with etc."*

When the Coordinating Manager of the mathematical institution which provides support to TVET colleges was asked about his knowledge and contribution on the ML curriculum, his response was as follows:

CM: *"I cannot really say I contribute to the curriculum, but I know what the students need to know and how we need to plan for the lecturers."*

From the above responses it appears that the Education Specialists and Fundamental Heads are quite knowledgeable about the ML curriculum and its different guidelines. This was to be expected as almost all of them had been involved with the subject since

its introduction into TVET colleges in the NCV programme and had had to acquaint themselves with the guidelines and policies for the correct implementation of the subject at their colleges. The Campus Head, however, indicated that her knowledge was limited as her interaction with the subject was minimal. It appears from the responses from the CM that the mathematical organization providing support to TVET colleges does not contribute or give input, but uses the TVET colleges' policies and guidelines on ML to guide them to structure their support and training of TVET lecturers.

In the responses above managers agree that they should be knowledgeable on and experts in the curriculum and curriculum policy documents pertaining to ML. Hence the responses confirm the literature that Education Specialists should be curriculum specialists and knowledgeable on the curriculum and curriculum documents.

Managers were further asked about the manner in which they implement the ML curriculum at TVET colleges. Their responses were as follows:

ES1: *"I think in Mathematical Literacy what we try and do is that when we set up the year plans we use the learning outcomes from the curriculum in our year plan, so even if the lecturers without knowing it they are still in contact with these documents and learning outcomes and the specific outcomes because we typed everything into the year plan... so I think without them knowing it they only.... what we do is we've had workshops at the end of the year we have departmental meetings and then specifically now with the new curriculum that was introduced, then we'll compare old and the new curriculum and tell the lecturers... this was in the old curriculum and this has been taken out for whatever reason and it has been replaced with something else. For instance I know that with the level 3 curriculum the space and shape outcomes were moved from numbers to space and shape and I .. I don't think people have time to really sit and read those documents, so you really have to hold their hands and guide them."*

FH2: *"I always consult with my ML people (lecturers) but they must have enough confidence in me to actually refer to my greater knowledge, for want of a better word, if*

*they get stuck on something, and this is exactly how we do it. They respect me for my knowledge, I allow them to manage the ML but we always concur and we always come together and decide on matters together on their interpretation.”*

CH: *“... is to see that the resources that have been given to make available to the lecturer to use in his facilitation in his classroom, to see how it's been utilized, if it's effective, and how can we better that.”*

On the manner in which the curriculum is implemented, it appears that the Education Specialists due to their immediate interaction with their ML lecturers provide guidance to the lecturers by interpreting and unpacking the curriculum documents to create workable documents leading to year plans which outline in detail what topics need to be covered daily, weekly and termly. This is achieved by lecturers' participating in ML workshops and ML departmental meetings at most colleges in this study. Any changes to the topics in the curriculum are also explained and discussed before implementation. The Fundamental Head on the other hand allows the lecturers to manage the curriculum, but prefers the consultative approach in matters of curriculum for clearer implementation. Campus Heads mainly see to the provision of resources such as textbooks, stationery and classroom necessities to lecturers for the effective delivery of the curriculum.

The finding above also supports the view in the literature as far as the value placed on shared leadership, the consultative approach and the team approach as part of Instructional leadership in the delivery of a subject such as ML.

Lecturers were also asked how managers assist them in understanding the ML curriculum. The question was:

Researcher: "How does the way management implement the NCV ML curriculum assist you to obtain better performance in ML?"

L1: *“The programme manager plays a leading role to assist the lecturers with anything they need to deliver the curriculum in the classroom. He helps lecturers to interpret the curriculum correctly as far as possible.”*

To the same question the other lecturer said:

L2: *“They assist me a lot at the beginning of each year to start teaching while all students have already obtained their Mathematical Literacy. This eliminates frustrations and delays in delivering the curriculum, hence it contributes in improving the results. The management assist me as well to have my personalized classroom and arrange it the way I want with the availability of necessary resources in attempting to improve the results.”*

Researcher: “How are you as a lecturer at a TVET college involved in providing input and involved in decision-making as far as the instructional leadership you receive from your Campus Heads, Education Specialist and Fundamental Heads in the implementation of the Mathematical Literacy curriculum is concerned? Give examples.”

L1: *“Opportunities are given to lecturers to provide input in matters that are discussed.”*

L2: *“On campus level we have quarterly meetings where we normally provide our input, such as how to conduct classes, when to start with extra lessons and other curriculum-related issues to assist us in teaching ML.”*

From the responses above it appears that the lecturers also confirm the fact that the Education Specialist assists them in interpreting the curriculum and providing guidance as well as providing the resources for the delivery in the classroom. Lecturers also mentioned that they provide input in matters relating to the ML curriculum and that it is a shared approach which refers to shared leadership. This once again confirms the consultative approach referred to above in the literature.

From the responses, it appears that almost 55% of the managers in the study indicated that they guided lecturers in understanding the curriculum by interpreting the subject and assessment guidelines for them and designing workable documents for them to use. Although this is a low percentage, the above passage refers to the fact that the managers still play a pivotal role in the implementation of the ML curriculum as they are instrumental in articulating and translating these guidelines into workable documents ready for the lecturers to use. This is done by taking the guidelines and designing a year plan into topics and outcomes broken into weeks and days from the start of the year to the end. This includes assessment dates and topics which will be covered.

From the responses of managers it also appears that 45% of managers feel that consultation, soliciting input from lecturers and shared leadership are important in the implementation of the ML curriculum. This implies that managers encourage the involvement of their lecturers and consult them on curriculum matters. These responses show how important it is for managers of a curriculum to consult and involve everyone, managers as well as lecturers, as decisions cannot be made and implemented by only one person. This is highlighted in the literature in that leadership should be applied to a group of people working towards one goal as a team which includes shared leadership and participative management.

In summary, the above confirms the literature study in terms of the ten roles of an education specialist, namely that of the ES being a curriculum specialist and instructional specialist. Furthermore, it also confirms the literature study as far as coordinating the curriculum is concerned, which further deals with the fact that the curriculum should be organized in such a way that the curriculum objectives are reached through the careful study and knowledge of the curriculum policy documents.

Generally, one can therefore conclude that managers of ML experience better performance from their lecturers if they are knowledgeable about the policy and

curriculum documents and can support them in implementing these policies through a shared and consultative approach allowing for contributions from their lecturers.

#### **4.5.3. Challenges facing managers in the implementation of ML**

This section presents data on the research question about the kinds of challenges managers face in the implementation of the subject at TVET colleges.

Managers were asked about the difficulties, problems and challenges they face as far as the implementation of the curriculum is concerned. Their responses were as follows:

*FH2: "I would say it's not the managing (as such), as when you say 'managing' everything is there, but I just find that lecturers don't always meet deadlines, which causes a domino effect. I have also found that the lecturers are overloaded, they are expected to teach six groups five periods each, which means they are teaching for thirty periods, it gives them very little time to do adequate preparation and innovation... that is I find sad because I think they have got a lot of potential and it actually stunts their growth in that way."*

*FH1: "Do away with a lot of admin or get admin people to do admin or employ more lecturers so that you get a happier staff. This way there will be more time for creativity amongst lecturers in their classes."*

*ES1: "Administrative job, unfortunately that tends to consume your day more than often and I think I would like to do more.... Ja, more, I would like to do more on the academic side but unfortunately, responsibilities like attending, doing campus visits or attending meetings tend to infringe on one's time."*

It appears from the above responses that both FH2 and FH1 refer to the administrative overload of lecturers and how it affects the delivery of ML in the classroom, while ES1 refers mostly to the administrative duties of managers.

Administrative overload affects both lecturers and managers, as the above responses show. However, since the researcher is interested in the challenges managers face, it affects managers in the sense that when lecturers do not meet deadlines because of too-heavy lecturing loads and administrative tasks, it delays the work and processes of managers in a negative way.

37% of managers were in agreement that ML lecturers whom they are responsible for are overworked in administrative duties and this is one of the reasons they do not meet deadlines set for them. This implies that giving lecturers more time to concentrate on content delivery will enhance student performance and result in a happier staff and therefore the creation of a positive climate as referred to in the literature. This can be seen in the same light as are disruptions in instruction, as the teaching and learning process is rendered ineffective when lecturers are overworked and teaching and learning are activities which need to be protected, as referred to in the literature. Managers then are challenged in addressing this situation. Furthermore, overworked lecturers cannot contribute to a positive atmosphere at college. This detrimentally affects the culture and thereby affects the performance of students in ML, which also corresponds with the literature which refers to creating a positive climate in Chapter 2 of this study.

Although the frequency of managers reporting on administrative overload is not high it shows that this is an area senior managers or directors of colleges need seriously to look at if they expect better performance in ML. This will result in a higher morale amongst ML lecturers, thus creating a positive climate at colleges in the long term.

To the same question above the following managers responded differently.

*FH2: "I also find the normal challenge is managing the students coming to class. It's a little better now with the 80% attendance policy and we are hoping that next year this will be much better, but really this year as well – students' attendance I find to be very, very poor. I also feel that students who do well tend to feel that they don't need to come*

*to ML class and they can just come and write, which unfortunately is not the case because they lose vital information somewhere along the line.”*

ES2: *“The last two years we concentrated on absenteeism because that is in most cases the highest concern of most lecturers... if you don’t have the students in class you can’t teach.”*

From the above responses it appears that both FH2 and ES2 highlight student absenteeism as a concern for both managers and lecturers. Managers of ML are answerable when the issue of student absenteeism is raised and senior managers demand answers and solutions to this problem as funding to colleges is tied in with students’ attendance. Lecturers also look for answers and support from their immediate managers of ML. Hence this is an important challenge for these managers.

50% of the managers interviewed mentioned student absenteeism as a grave concern and challenge for managers to deal with on behalf of the lecturers as this affects results and performance and reflects poorly on the managers since they feel accountable to find solutions. They are also responsible for implementing and maintaining the 80% attendance policy designed by the DHET as students are barred from writing the final examination in a subject for which this policy was not adhered to.

It appears from the responses of managers that student absenteeism and reluctance to come to class is a huge challenge lecturers are faced with and managers need to deal with and find solutions for in their strategic planning. This places a major challenge on the managers of the subject. This is also a problem for lecturers as lecturing time is compromised, which seems to be a problem at all three colleges in the sample. This challenge that is faced by colleges is related to the fact that according to the literature study any disruption in the educational programme can delay and be detrimental to the instructional programme and affect results negatively in the process.

The researcher also feels strongly that senior managers need to give this high priority on their agenda by including this in their strategic planning. Other avenues over and



above these policies should be explored for better results, since implementing the DHET's 80% policy at TVET colleges alone is clearly not working successfully.

Managers were also asked the following question:

Researcher: "It is clear that you have challenges in connection with students. What problems and challenges do you encounter with lecturers?"

ES3: *"Dealing with the lecturing staff. I think many of them come from a pure Mathematics background and they struggle to teach the subject because they try to teach the subject in a pure Mathematics way... so they have to see that this is mathematics in context, and once you understand the context you can extract the mathematics from that, and I think that is the main challenge for most lecturers. Also we have a lot of foreign nationals teaching the subject, and especially with ML your command of the English language has to be very good, because very often these lecturers misinterpret a question, misinterpret a scenario, and that is why I feel that there is such a strong link between language ability and the mathematical ability as far as ML is concerned, because obviously, you know, if you don't understand what you are reading how can you extract the mathematics? So often we see when we do memo discussions, it is quite interesting how these lecturers can misinterpret a question, so if they misinterpret they are teaching incorrectly as well, so you see that is a challenge."*

FH2: *"I also find it very difficult to get suitably qualified lecturers. Lecturers that are suitably qualified are very often foreigners and foreigners have the problem of language barriers -- it's not the lecturer's first language and they do not interpret questions the same way."*

ES1: *"Firstly I would say in the people that you appoint... so in the recruitment, in the advertisement of the job, because you have to appoint people who know that Mathematical Literacy and Mathematics are two completely different subjects. What we have found at the college is that we had lecturers that were in the Mathematics department and now had to move over to the Mathematical Literacy department.... so I*

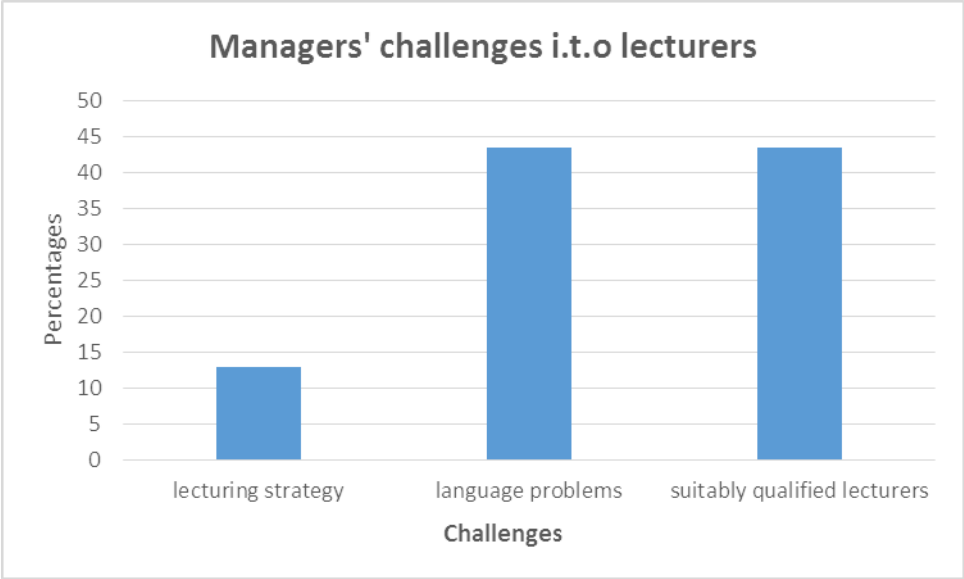
*think the appointment, and I think the support that managers can give the lecturers from that point onwards.”*

The above responses highlight a few issues. It appears from the responses that ES3 refers to two issues which are challenging, namely lecturing strategy as well the language problems encountered with foreign lecturers. FH2 also refers to the language problems encountered with foreign lecturers, but like ES1 also mentions the appointment of suitably qualified lecturers to teach the subject of ML. ES1 also makes mention of the fact that ML is a different subject and needs to be taught differently.

13% of managers made reference to the delivery of ML, while 43.5% of managers referred to language problems they are faced with which can become a problem.

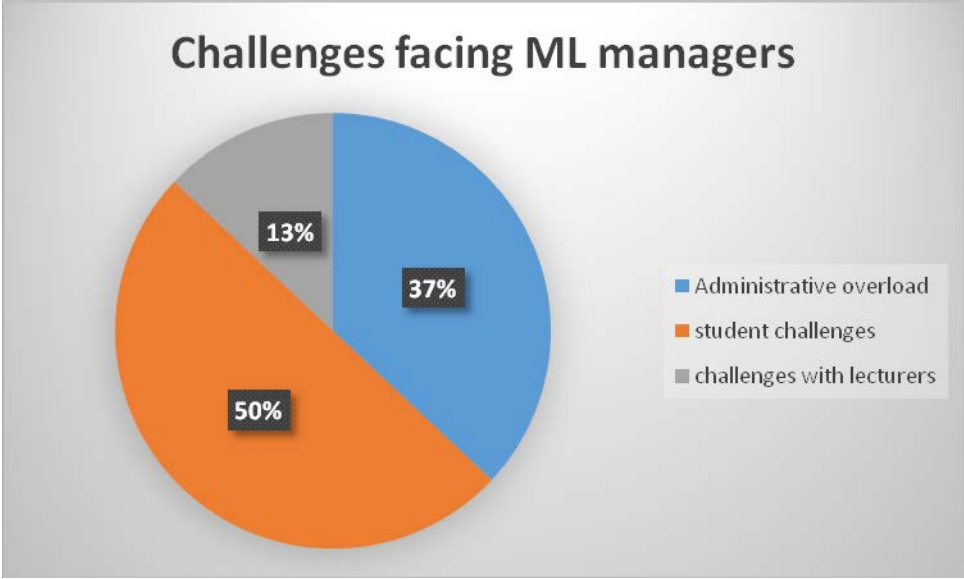
The literature review shows that ML is still delivered in a pure Mathematics mode and the interview responses highlight and confirms the literature review with regards to this which is still a problem at many TVET colleges. Given that ML is a new subject at TVET colleges and that the background of many lecturers is mainly pure Mathematics, it is always a challenge for managers of the subject to find suitably qualified lecturers to teach the subject. Many colleges have recruited lecturers from the Mathematics department to teach ML or employed non-Mathematics people to teach the subject, as the literature study (Mbeka 2006) also shows, and this has not helped the status of the subject at all or highlighted the difference between Mathematics and ML. From the data it appears that 43.5% of managers have indicated that finding suitably qualified lecturers is a challenge for them.

The challenges that managers faced with lecturers are shown in the following chart.



**Figure 4.2: Challenges faced with lecturers**

The findings regarding the challenges managers face are depicted in the pie chart below.



**Figure 4.3: Challenges facing ML managers**

The above responses around challenges with regard to lecturers emanate from the nature of the subject ML, which the literature also highlights (Bowie & Frith 2006;

Mhakure & Mokoena 2011). The literature highlights concerns that ML is taught in a pure Mathematics way; hence lecturers must understand from the start that ML and Mathematics are two different subjects. Moreover there is clearly difficulty in finding suitably qualified staff to lecture in ML at TVET colleges.

#### **4.5.4. Strategies of instructional leadership employed by managers of ML**

This section presents data on the research question on the complexities of implementing the ML curriculum and the methods of Instructional leadership that managers use to carry out this task. Managers responded in various ways to the question:

Researcher: "What instructional leadership strategies do you employ to ensure the effective delivery of ML at the classroom level at your college?"

Responses to this included the following:

ES1: *"Instructional leadership... OK, like I said with the class visits and report-back and feedback... by class visits, formal and informal, and then feedback, and I am trying to improve on that to try and give feedback immediately after class visits, even if it is not formal, or maybe just a sentence or two verbally."*

FH2: *"I do class visits to ensure that there is always quality in the classrooms and if I find that there is a lecturer that needs a little bit, he's given a topic but I just feel the topic is not interactive enough, I will do some research, let me look up on the internet, let me see if there is something else I can find on that topic, and then I will pass it on to him and then it is up to him to use it or not to use it, because it is very much... their classroom management is very much their style, I don't try to interfere, only, I try and encourage them."*

Different responses were also given by managers when they were further asked a question about how classroom observations assist them in instructional leadership:

FH2: *“Lately we have done class visits and I have actually asked them what they experience and what do they feel, and we plan on having a training session and we have already a date for January next year and I have asked senior academics and he has agreed to it and now we are going to sit down and plan exactly what we would like to see happening.”*

ES3: *“I try to do regular class visits and sort of see how they (lecturers) operate in class and sort of give them advice... you could have done it this way, try to do it this way etc... how the lecturers approach certain topics, maybe do this section before you do this section... try to guide them in that sense.”*

The minutes of ML departmental meetings also revealed that feedback from classrooms observed and the general observations made during classroom observations are a big point of discussion in these meetings. How ML delivery can be improved has also been considered in these meetings.

It appears from the above responses that both ES3 and FH2 depend on classroom visits to inform their instructional leadership strategies and it assists them in planning for future training needs and in giving feedback and advice. This also indicates the opportunity it affords to managers to give feedback to lecturers and to lecturers to improve their performance in class. Classroom observations also present a great opportunity for managers to reflect on their management and plan on improvements for the future in terms of corrective measures. Furthermore, it seems that classroom observations are also a point of discussion at ML subject meetings as the documents revealed.

50% of managers mentioned that giving feedback was a reason for conducting classroom observations, while 25% of managers revealed that they use classroom observation as a way to reflect on their own instructional leadership and to improve their own managerial skills and plan programmes depending on this reflection. Another 25%

of the managers said that they use classroom observations to plan for the future training needs of lecturers to address weaknesses observed.

It is important for managers to reflect on situations of teaching and learning through the monitoring of student progress, which gives managers valuable information on where to place emphasis for further support and professional development programmes. It is also good management conduct to be reflective. Senior management must also be informed about the findings of classroom observations so that their strategic planning can also look at ways to assist lecturers, Fundamental Heads and Education Specialists.

The above responses can best be summarized in a table as follows:

**Table 4.5: Managers' purpose in classroom observations**

<b>Reasons for observation</b>	<b>Percentage of managers</b>
Giving feedback	50
Reflecting on management	25
Improving future classroom performance	25

The above responses relate to the literature as far as the three dimensions of instructional leadership are concerned. The following items and concepts from the literature correspond with findings from this study:

- Managing the instructional programme in terms of supervising and evaluating instruction, quality instruction and supervising teaching and learning.
- Reflection after class visits giving rise to remedial classes and appropriate ongoing professional development if need be for lecturers.
- Classroom support and being visible around classrooms as one of the ten roles of an ES.

Lecturers were asked the following question on how they are helped by managers' classroom observations as an instructional leadership tool:

Researcher: "How does the classroom observation of managers assist you?"

L1: *"The programme manager does class visits and discusses problems that may exist (manager gives feedback) with the lecturer."*

L2: *"This (classroom visits) gives managers an idea and they see which trainings were relevant for us or which we still need."*

To the same question as above on what instructional leadership strategies managers use, there were various other responses.

ES1: *"We really want to assist lecturers in moving away from lecturer focus to student-focused teaching... so... I think that it can be very valuable, but we have to sort of nurture those ideas in lecturers... doing the student-centred approach by allowing students to ask questions..."*

CH: *"We need more extramural activities around Mathematical Literacy, get more real-life stories, bring in the cylinder, bring in the water, the measuring tape, let them measure, it needs to be in context, let lecturers show them how to measure... Lecturers must bring in more student-centred learning."*

The Coordinating Manager was asked the following:

Researcher: "Describe the kinds of support you render to TVET colleges in terms of improving results in ML."

CM: *"I think the course went well, and we stimulated the lecturers to involve learner-centred and activity-based instead of the old school of chalk and talk type of*

*presentation, and I think we did succeed in that, and some of that was for ML as well. A contingent that went over to the UK to find out more about learner-centred approach, and they were fully geared to implement it, and they did get the lecturers on their side.”*

Documents which were analysed, especially those of ML departmental meetings, also revealed that managers of ML at these meetings encouraged lecturers to incorporate student-centred learning and also to use real-life examples in their lessons.

From the above responses it appears that ES1, the Campus Head and the CM want to promote student-centred learning in ML classrooms. Encouragement of student-centred learning surfaced regarding the question of instructional leadership used by managers. This showed the willingness of managers to assist lecturers to move away from lecture-driven lessons as this is a need in ML according to the literature review of the spectrum of agendas referred to (Graven & Venkat 2007).

Furthermore, the above fact mentioned with regards to student-centred learning is also supported in the literature in chapter 2 as a successful strategy in ML lessons as there are many advantages as borne out the literature review in this study. Documents analysed also showed that it was an important point at meetings.

Interpreting the above responses one can conclude that because only 25% of managers have responded to student-centred learning in the classroom one can say that this area is still not used to its full potential as a tool for instructional leadership and is an area that managers of ML need to pursue with greater vigour by training lecturers in it through professional development programmes. The literature in this study has indicated that various methods of delivery and the use of contexts in activities are important for the subject of ML as student-centred learning is more powerful than the traditional approach, as the spectrum of agendas shows, and that the manager must guide this process for excellent results.

The following question was also put:



Researcher: “Do you use e-learning in classrooms and how do you use the integration of technology in the classroom?”

ES1: *“... and also programs such as CAMI, Learnscapes, we’ve got Blackboard and PLATO, so there are many opportunities for learners to access those types of resources if they feel like doing so after hours...”*

CH: *“We use PLATO, we use CAMI, and I can see that our e-learning is booked back to back... it’s working, but now we’ve linked CAMI with the clicker system of CAMI and that is what is working. I can see in the classroom by equipping the lecturers with MIMIO SMARTBOARD that was the best thing, because now it’s interactive and our students also enjoy it.”*

Documents which were analysed, especially the minutes of ML departmental meetings, also revealed that managers of ML at these meetings encouraged and motivated lecturers to incorporate e-learning in their classrooms and offered their services if assistance was needed.

From the above responses it appears that both ES1 and CH, as well as the documents analysed, refer to the importance of e-learning in classrooms and the integration of e-learning with lessons. One of the reasons managers advanced for the use of technology and e-learning in the classrooms, and for motivating senior managers to install it and lecturers to use it, is that it affords students the opportunity for independent study. Since many students are unable to attend a class due to work commitments or avoid it due to lack of understanding of certain concepts in ML, they can be encouraged to use e-learning as a form of self-study. Roughly 25% highlighted the use of e-learning and technology as a means of continuation of ML via off-campus independent study.

One of the concerns highlighted in the literature review in chapter 2, albeit a promising one, is that ML is a subject which demands the increased use of technology and e-

learning (DoE 2011) on a much bigger and broader scale in the classroom due to its nature as being student- centred and a subject where students need to become more actively involved. The above responses also highlight what was already indicated in the literature review: that one of the roles of an ES is to be a resource provider and to provide a community of practice by having an e-hub of instructional materials that ML lecturers can share within a college or even among colleges.

The above responses clearly indicate that e-learning must be used in the classroom to integrate it into the normal lesson plan, which is also one of the instructional leadership strategies that an ES can use. However, one does find in certain cases that the old “chalk and talk” is still prevalent as lecturers still feel anxious or reluctant to use e-learning facilities and there is thus a need for training in this area as well.

From the above responses and the statistics revealed from the above in connection with using e-learning and technology, it appears that according to the managers interviewed only a small percentage of lecturers are using technology. Since ML was envisaged as a subject which needs to incorporate technology, this study reveals that we are off target. Hence, managers of ML and senior managers as well need to do much more over and above just providing the physical resources. Although this study did not reveal how many lecturers at the colleges in the sample used technology, a quick survey can easily be done to obtain this information.

Managers were also asked the following question:

Researcher: “Instructional leadership which is participative and distributive, getting subordinates involved in decision-making and giving input, has been shown to be very effective. In what way do you involve your Education Specialist in decision-making as far as the ML curriculum is concerned?”

FH2: *“We always come together and decide on matters together... we do it collectively together, we never try and solve one question, just one person, we always listen to*

*everybody's input. To me getting subordinates involved in decision-making and giving input has been shown to be very effective in improving students' results, you know... sharing of best practices is extremely important ... what we have done this year, each one had to present.... prepare a lesson."*

*FH1: "My contact is, I rely very much on the feedback from the ES, so a lot of my consultation happens with my ES, I will ask them for feedback and what their ideas are, and obviously with the understanding that they are giving me what they are getting from the lecturers and what is happening in the classroom, but I also do have contact with lecturers."*

*ES3: "I have people working closely with me from different campuses. We gather in a small-group situation where we share ideas and they are my second-in-charge. At all the different campuses I have meetings every week with every person per campus and with all my lecturers."*

From the above responses it appears that both FH1 and FH2 believe strongly in obtaining feedback from lecturers and their subordinates and allowing them to make decisions. ES3 allows his lecturers to share their ideas and provide input as far as ML is concerned. Hence shared leadership and eliciting input from lecturers in connection with ML has proved a very valuable method of instructional leadership at some colleges. Almost 60% mentioned that shared decision-making and sharing of ideas is an instructional leadership strategy used by managers. Another response which emerged from the findings of the interviews revealed that quite a few managers applied shared decision-making and sharing of ideas and best practices as a method of instructional leadership to ML lecturers and hence to the subject.

Lecturers were asked the following question:

Researcher: "How are you as a lecturer at a TVET college involved in providing input and involved in decision-making as far as the instructional leadership you receive is concerned?"

L1: *“Subject matters are discussed during subject meetings. Opportunities are given to lecturers to provide input in matters that are discussed. Examples are: when a revision programme needs to be implemented, discussions about POAs (Portfolios of Assessments) and POEs (Portfolios of Evidence), examination and test timetables...”*

L2: *“On a weekly basis we hold morning briefing with Education Specialist on campus level. This makes it easy for us to provide input in the leadership, like which dates are suitable for tests, whether to look how far is it possible to finish a certain topic as it is stipulated on pace-setters”.*

The above responses also confirm the literature review on shared instructional leadership and participative decision-making as involving everyone and including not only the managers’ but also the lecturers’ input as important in decisions affecting ML. Decision-making is not the sole responsibility of one person alone. In this way people take ownership of their decisions. This also engenders a positive culture in a college and results in happier staff and students.

On the issue of instructional leadership managers were asked this further question:

Researcher: *“What do you think are ways of instructional leadership for improving the marks of students in the future?”*

ES1: *“Remedial classes I think are very good. I can speak from experience: where we selected students that really underperform, we have had smaller group sessions with them and they really appreciate it because then they know it is not nose to the grindstone and it is normally done very close to the exams, then we can really do it on a targeted approach to revision.”*

FH2: *“We decided that there need to be worksheets right at the start of the year and how can we best help the students because we are worried about the background that they come to us with... so we have worked out worksheets which they share and it’s not*

*just the seniors... what happens, the seniors will oversee it, in other words I will give it to each lecturer, in other words I will assign what topic it is they will oversee.”*

*FH3: “Where are the students struggling, and where are lecturers struggling, and then to put programmes and things in place that are incremental, taking students progressively from one place to the next and getting students engaged in extra lessons and extra tuition.”*

*CH: “We also encourage competitions to help the weak students, and my one colleague (lecturer) is flying with it and I am very proud of it, and we are now almost in our final of the ML I can see the results of that and I have never seen students so excited to go to ML extra classes, and what is also helping is the parent involvement in these extra classes, and for the level 3 and 4 the extra classes are taking place during the competitions and that is what is helping.”*

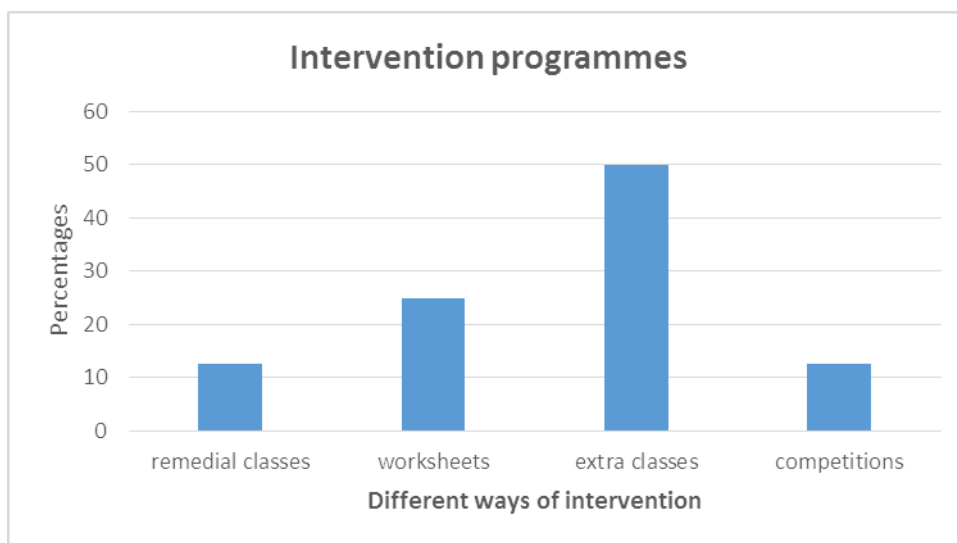
From the above responses it appears that for ES1 remedial classes as an intervention strategy work very well following a targeted approach in small groups, while worksheets work very well for FH2. FH3 is in favour of extra classes, and while CH also believes in extra classes, she encourages the idea of blending them with competitions.

13% of managers referred to remedial classes as an intervention strategy. The researcher feels that more should be done about it and it should be placed on the agenda of senior managers. 25% referred to the use of worksheets as an intervention strategy. Even though more managers did not mention this as a response it goes without saying that this is a very much preferred way of intervention at most colleges. 50% highlighted the use of extra classes as an important method of intervention.

Although only a small percentage, 13%, of managers reported that competitions were an intervention strategy they used at their college, it has proved a powerful method of improving results in ML, as the researcher himself can testify from his own college. Students enjoy competitions and through these many of the concepts of ML can be

driven home without the students' being aware of it. It also affords the lecturers an opportunity to focus on areas students struggle with. Hence it would be well worth it if senior managers of colleges took note of this.

The above results are displayed in the bar chart in Figure 4.4.



**Figure 4.4: Methods of intervention for ML by managers**

The Coordinating Manager of the mathematics institution providing support to TVET colleges was asked the following question regarding the intervention programmes:

Researcher: “So what kind of support did you give the college? In what form was it?”

CM: *“One of my employees went on a guided tour or a classroom walkabout of the college and a feedback was given to the managers, and from then onwards, and then to plan what type of service to render, and it was decided that each term to have a weekly session of one hour...”*

All the above responses pertaining to the various intervention programmes are valuable tools or strategies that managers are using at these TVET colleges to improve the results in ML at these colleges. Intervention programmes put in place by managers at their respective colleges are only possible when the ML curriculum is coordinated

properly, regular classroom visits are conducted, the instructional programme is supervised and evaluated, students' progress is monitored and their results are engaged with and discussed with the lecturers concerned. This also forms the foundation of Hallinger's (2012) dimensions as mentioned in section 2.7.3.2 in Chapter 2.

As far as intervention programmes are concerned, it is evident that all the managers interviewed by the researcher mentioned some form of intervention programme used to improve results and improve their own instructional leadership. The conclusion one can draw from this is that different measures are working at different colleges and managers of ML must maintain the programme which works best for them. These programmes to improve the results at TVET colleges can only work if managers (Fundamental Heads, Education Specialists and Campus Heads) are fully involved in designing and coordinating these programmes.

The documents analysed, especially minutes of meetings, also revealed that managers at these meetings discussed detailed plans for intervention right throughout the year and managers of ML were responsible for coming up with action plans in consultation with their lecturers.

#### **4.5.5 Providing support and opportunities for lecturer empowerment**

This section also relates to data emerging from the research question on the complexities of implementing the ML curriculum and deals mainly with the part on how managers support and empower lecturers of ML at TVET colleges.

Managers were asked the following question:

Researcher: "In which way do you empower college lecturers to effectively deliver the ML curriculum, in other words what professional development programmes do you organize for ML lecturers?"

FH2: *“I try and... there are lots of things I want to do, number one they are all involved in the Focus Group, I try and involve ... I try to give them a lot of uhm how must I put it uhm a lot of uhm... I won't say leeway... that is... I try and empower them, I try and empower them (through the Focus Group).”*

ES2: *“And staff development programmes, that is mostly done by the DHET, and they are all encouraged to attend the Focus Group as well.”*

From the above responses it appears that both FH2 and ES2 see the Focus Group sessions as valuable opportunities for lecturers to be empowered in the subject ML. The Focus Group is where the DHET invites all six TVET colleges in the Western Cape annually to attend various meetings and workshops to address issues about ML in connection with the content of ML, assessments and planning. It is compulsory for most managers of ML to attend, but lecturers are also invited and encouraged to accompany their managers on a rotational basis so that everyone has an opportunity to be exposed and empowered and give input at these Focus Groups.

40% of managers referred to the importance of using the Focus Groups to empower lecturers on training offered by the DHET, in connection with both the subject itself and issues around the planning of the subject. This implies that managers consider this training important.

The literature review makes reference to involving lecturers in all stages of the implementation of a subject in order for them to grow and keep abreast of developments regarding ML (Gerber 2011). The literature review therefore confirms what was found in this study.

The managers were further asked the following question:

Researcher: “What other opportunities are provided to lecturers to empower them in the subject of ML itself?”



FH1: *“We’ve had training related to ML by ETDP SETA, where both ES and lecturers attended, and we’ve also had the AIMS training that ES and lecturers had been part of, and ES also forms part of the decision-making in terms of the content around how the (training) programme is going to be structured.”*

ES3: *“Ja, with the education support, the e-learning department that we have, with the Mathematics/ML programmes that we have, they give the lecturers training to use the interactive boards and things like that.”*

CH: *“We also give training to lecturers on Mathematics/ML related in LearnScapes and how to use the SmartBoard using the MIMIO software as well as general training.”*

From the above responses it appears that FH1 is referring to ML-specific training provided to both lecturers and ESs, while both ES3 and CH are referring to training which enhances the delivery of the ML subjects through various means such as using Learnscapes (a video program that talks you through various pre-loaded lessons, which can be used as an addition to lecturers’ own lessons) as well as Smartboard programs.

On the same question above, other responses were also obtained:

FH2: *“We’ve also let them do a course where they discover what brain, what hemisphere of the brain they (the lecturers) actually move in, so I don’t want to expect the person that is creative to do the mundane thing and the person that loves structure to think out of the box... I also want to give them more.”*

FH3: *“At the moment they are all on what we call a junior management training programme.”*

CH: *“Lecturers had training in using the system where you can find out if students are visual, auditory or kinaesthetic learners in your class.”*

ES2: *“We try and work with the strength of the person... they also all of them -- not all of them, that’s not true, but if they are studying, like for example I’ve got one, he is doing his honours, he’ll get his degree, then the other one did some studying, I think he wrote his exams last year... so in other words they also know that continuous studying is not a problem. Also if there are any conferences I will let them know about it, they have got the option of going, I don’t force them to go, like the AMESA conference which was open to everybody.”*

It appears from the above responses that FH3 encourages personal development through official programmes, while FH2 and CH encourage personal development through college-driven programmes to enhance lecturers’ self-esteem. This shows that managers felt strongly about encouraging their lecturers’ personal development, which enhances their self-esteem, which in turn can indirectly improve results by creating a positive climate. ES2 encourages lecturers to pursue their own formal studies as well as providing opportunities for them to attend conferences.

30% of managers mentioned that they send their lecturers on ML-specific courses and although it is a small percentage that was reported on, the researcher is certain that most ML lecturers from the six TVET colleges in the Western Cape attended the ETDP ML course referred to in the response above as the researcher also attended it when he was a lecturer.

It is clear that lecturers need specific training in ML if one takes account of what managers above mentioned regarding lecturers not delivering ML via its context but still via a pure Mathematics path.

Lecturers were also asked the following question:

Researcher: “What development programmes do managers encourage you to attend in order to empower yourself to be a more effective lecturer?”

L1: *“Managers encourage us to go on developmental training mostly every year. Last year mostly we attended outside technological-related programmes to enhance our IT skills to support teaching of Mathematical Literacy and subsequently improve the results of students. We also attended in-house training on software mathematical applications such as Blackboard and Cami Maths. We also attended training on how to set up question papers and memos using Macros and Geogebra.”*

L2: *“The outside service provider, as well as an institution which specializes in mathematics training, also conducted training on platforms of classroom management and classroom facilitation. Managers also encourage us to attend trainings provided by the education department. Between 2013 and 2014 we attended one that was conducted by the education department, more on content development of Mathematical Literacy. Most of the trainings we are encouraged to attend have indeed (been) effective and have empowered us.”*

Documents which were analysed revealed that managers of ML at management meetings also reflected on the good and the bad of outside mathematics organizations and whether their activities achieved their desired outcomes of improving lecturers as well as students' performance in ML. This was another way in which managers and senior managers could reflect on the efficacy of their activities. Follow-up sessions with these institutions were also planned.

This training although not specific to the ML content is also essential since the subject demands interactivity and a student-centred focus to enhance classroom delivery. 25% of managers revealed that they provided training to enhance classroom delivery.

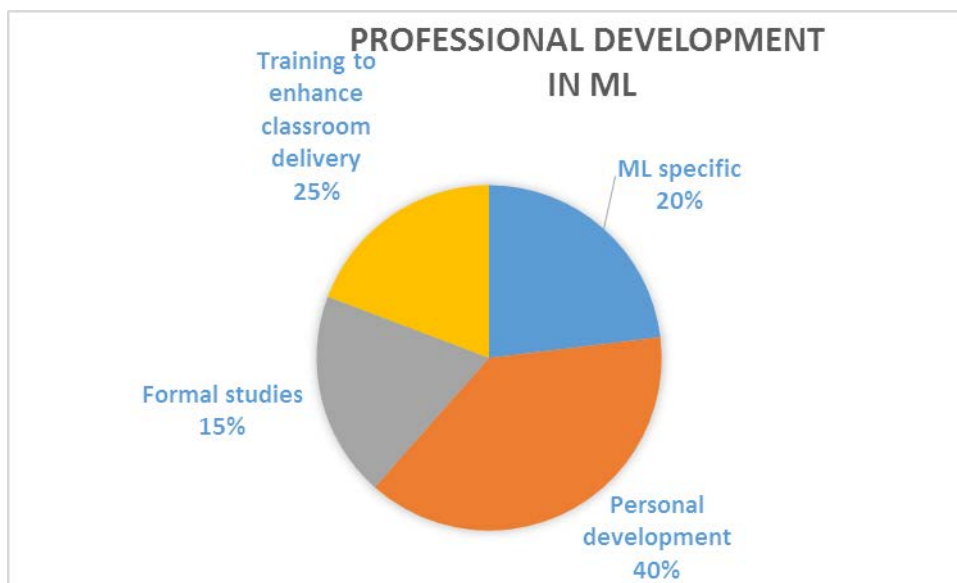
40% of managers stated in the responses that they arranged personal development training for their lecturers. This was a surprise as the researcher had expected the ML-specific training to be higher than it was. The reason for this could possibly be that managers are starting to realize the importance of developing lecturers holistically and

although various types of training are provided to all lecturers at the colleges irrespective of subject, it benefits ML lecturers strongly by raising their general confidence for the future.

The above shows that managers are also not standing in the way of lecturers who pursue formal studies in ML or other studies. Managers also encourage their lecturers to attend conferences in ML to get a broad exposure to the subject as well as for networking opportunities.

Although only 15% of managers reported on formal studies undertaken by lecturers to enhance themselves, the researcher knows of many lecturers pursuing formal studies. It seems that managers did not think it important to respond on it as it was not a college initiative, but was on a personal basis and the attendance at conferences was voluntary.

A summary by way of a pie chart is included below:



**Figure 4.5: Professional development**

On ML-specific training for lecturers of TVET colleges, the Coordinating Manager was asked the following question:

Researcher: “What professional development programmes are you involved in with TVET colleges to improve (i) lecturers’ activities, and (ii) managers’ abilities?”

CM: *“I think the main intervention is to help lecturers to improve the style of ML presentation. We did not work that much with the management, but I think that the times that we did work with the ES and Fundamental Head (managers) we did show them a few things.”*

Lecturers were also asked the following question:

Researcher: “The development programmes you are encouraged to go on: are they effective for you and do they improve students’ results in ML?”

L1: *“Management provides for lecturers to attend workshops on a regular basis. Lecturers are exposed to different or new teaching methods. ITC training is also provided. The lecturer comes to class from these workshops to implement new ideas. It keeps the students focused on the work. Consequently the results improve.”*

L2: *“Most of the trainings we are encouraged to attend have indeed been effective and have empowered us, especially the technological aspects of teaching Mathematical Literacy using various mathematical applications. However, sometimes the limited resources impact negatively on continuation and implementation of knowledge learned from this training.”*

It was interesting to note that no manager reported on the training they themselves provide internally to the lecturers at their respective colleges, e.g. demo lessons, small workshops on the moderation of question papers and setting of exam papers, and training of new beginner lecturers in ML. The researcher feels this also to be valuable training given to lecturers sometimes on a daily, at-need basis, but definitely on an annual basis. The format of this training might differ from college to college.

The above responses from managers, triangulated by lecturers, highlight much of what was also found in the literature review in Chapter 2 about the following:

- Creating a positive climate, one of the dimensions of Hallinger (2012) on which this study is based. Attending both ML-specific and personal development courses improves lecturers' self-esteem and confidence.
- E-learning, which is referred to in DoE documents, by attending non-ML-specific courses.
- Ongoing professional development for both managers and lecturers.
- An opportunity for the ES to practise his or her role as a learning facilitator by providing and facilitating these professional development programmes, thereby improving student learning and performance.
- The ES as well as the lecturer to be lifelong learners by attending management and other courses so that they manage themselves (and, in the case of an ES, their lecturers) more professionally.

From the above responses of managers one can conclude that ongoing professional development of lecturers is taking place at the colleges where interviews took place and managers see it as being important to empower their lecturers to improve themselves and to improve results in ML. However, managers also believed that empowering lecturers is not exclusive to ML, but empowering lecturers should also be focused on their improving themselves holistically.

## **4.6 TRIANGULATION**

Triangulation may be defined as the use of two or more methods of data collection in the study of some aspect of human behaviour (Manion et al. 2007: 141). Triangulation looks at human behaviour from different angles. Triangulation is a powerful way of demonstrating concurrent validity, particularly in qualitative research (Manion et al. 2007: 142).

In this study different research methods as well as different levels of participants were used to triangulate data to further validate what the managers of ML responded on. The different research methods that were used in this study were semi-structured interviews and document analysis. To enhance validity and studying human behaviour from different standpoints the researcher also interviewed lecturers via email and personally interviewed the Coordinating Manager of a mathematics organization which provides support to colleges in their ML curriculum. This support was not just for lecturers but also extended to managers.

In summary, the findings revealed from lecturers' email interviews triangulates and corresponds strongly with the responses from managers on the following issues: (i) support and guidance given by managers to lecturers, (ii) managers' curriculum implementation assistance in ML, (iii) accepting input from lecturers for shared leadership, shared decision-making and information-sharing, (iv) creating a positive climate around ML, (v) empowerment of lecturers through training, various workshops and instructional leadership, (vi) classroom observations and feedback given to lecturers, and (vii) assistance in intervention programmes. Further responses may be gleaned from the interview transcripts of the lecturers attached as appendices at the end of this research study.

## **4.7 CONCLUSION**

In this chapter the researcher presented discussions and analysis of results according to the following categories: (i) the role managers play in managing the implementation of the Mathematical Literacy curriculum at TVET colleges, (ii) experience gained by managers in implementing the ML curriculum, (iii) challenges facing managers in the implementation of ML, (iv) instructional leadership strategies that managers apply to improve the ML curriculum and therefore its results, and (v) support and development programmes to empower lecturers.

This chapter gave explanations of how managers' responses presented in graphs, and managers' responses quoted verbatim, served to explore their experience of and interaction with the ML curriculum at TVET colleges in the Western Cape. The next chapter concludes the study by discussing the findings, researcher's thoughts, recommendations and limitations of the study.



# CHAPTER 5

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1 INTRODUCTION

This chapter presents a summary of the research study. It presents the conclusions reached and recommendations made on the basis of the findings to improve the interactions of managers in the implementation of Mathematical Literacy at TVET colleges in the Western Cape. It also includes the researcher's recommendations as well as recommendations for further studies.

### 5.2 SUMMARY

The main research question and sub-questions are repeated here.

The main research question in this study was:

How do managers responsible for the Mathematical Literacy curriculum interact with the subject at TVET colleges in the Western Cape?

The following sub-questions were asked:

- How do managers of Mathematical Literacy at TVET colleges perceive the ML curriculum?
- How do managers of Mathematical Literacy at TVET colleges experience the implementation of ML from their angle and position?
- What complexities do instructional leaders find, and what methods do they use, in implementing the ML curriculum and supporting TVET college lecturers?

Chapter 1 of this study provided the foundation of the study. Section 1.1 presented the introduction to the study by introducing the reader to the state of education in South

Africa after 1994 and the subsequent transformation of education. A brief overview was presented in section 1.2 and an explanation of why the study was deemed necessary. The background of the study was presented in section 1.3 with reference to the history of education and the birth of TVET colleges. The research design and methods were outlined briefly in section 1.4. After the reader was given, in section 1.4.3, an outline of the NCV curriculum at TVET colleges and the reasons why ML was introduced at schools as well as TVET colleges in South Africa, a brief literature review was presented in section 1.5 with the definitions used in this study clarified in paragraph 1.5.1 and the management of ML in paragraph 1.5.2. Section 1.6 summed up the statement of the problem, with the research questions formulated in paragraph 1.6.3. Lastly, the outline of the dissertation in terms of chapter divisions was indicated in section 1.7.

Chapter 2 dealt with a review of the literature and the theoretical foundations that this study was based on. The chapter commenced with definitions of mathematical literacy in section 2.2 and some initial and current concerns about the subject in section 2.3. In section 2.4 a spectrum of agendas concerning ML was presented that dealt with the pedagogy of ML and the importance of teaching the subject in terms of context. Next, to put matters in perspective, the differences between Mathematics and Mathematical Literacy in the NCS at schools as well as the NCV curriculum at TVET colleges were presented in section 2.5 and the emphasis on student-centred teaching and learning was highlighted in 2.5.1. Section 2.6 dealt with the role of management in the implementation of the ML curriculum and section 2.7 handled the theoretical foundations of this study, namely the dimensions and models of instructional leadership as underscored by Hallinger (2012). Section 2.7.4 presented the ten roles of an education specialist as adapted from Harrison and Killion (2007).

In Chapter 3, after an introduction to the chapter in section 3.1, the aims and research questions were repeated in section 3.2 to remind the reader of the purpose of the research. The research approach and the reason why a qualitative approach was used were considered in section 3.3. The research design outlining a thorough description of

the population and the sample in terms of its size, techniques and participants was presented in paragraph 3.4.1. The data-collection methods as well as the research instruments such as the interview guide and document analysis were described in paragraph 3.4.3. The data-analysis procedure was explained in section 3.5 in terms of how the interviews were transcribed, and lastly, ethical considerations as well as the issue of validity and trustworthiness were presented in section 3.6.

In Chapter 4 the emerging themes were captured through the analysis and interpretation of data collected from the interviews with college managers, which included Education Specialists and Fundamental Heads of ML. The biographical information of the participants in the study was tabulated in section 4.2. A brief overview was given of how the data were collected and most importantly how the data were subsequently analysed in sections 4.3 and 4.4 respectively. The objective of data analysis was to give meaning to the findings by interpreting them against the background of the research questions and the literature study as discussed in Chapter 2. The research findings were then discussed in a clear and coherent manner in section 4.5. The interview schedule which was used to interview the participants in the study was used as a basis to derive the main categories, and sub-categories were obtained from themes observed from responses given.

Chapter 5 gives a summary of the chapters, which are identified in sequence in this section 5.2. In section 5.3 the summary of the important findings by way of conclusions and recommendations is presented using the literature review and the research questions as a basis. Section 5.4 deals with the limitations of the study and recommendations for further research are made in section 5.5. Lastly, the concluding remarks appear in section 5.6.

### **5.3 SUMMARY OF IMPORTANT FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

The findings will be categorized according to the research questions and linked to the literature of this study.

The first research question was to determine how managers of Mathematical Literacy at TVET colleges perceive and experience the Mathematical Literacy curriculum. It was found that some managers perceive their role as giving guidance and support to their lecturers, while other managers see their role as giving personal support. The managers who perceived their role to be guidance and support provided mostly academic support in simplifying the curriculum for lecturers. Other managers perceived their role as improving the value of ML and raising the status and profile of ML. Findings also revealed that managers' perceptions of their role are tied in with their perceptions of the support they give to lecturers.

In view of the above it can therefore be concluded that to raise the value of ML, emphasis should be placed on the vision and mission of ML and the need for senior managers to raise the subject's profile.

The second research question was to determine managers' experiences of how managers implement the ML curriculum. It was found that most of the managers who were directly involved with their lecturers at their specific TVET colleges were knowledgeable about the guidelines and policy documents on ML and they all deemed it to be important to be knowledgeable if guidance and support need to be given. This also confirms the literature that education specialists need to be curriculum specialists.

It was further found that in order to assist the lecturers in implementing the curriculum, managers need to unpack the curriculum for lecturers for easy use. Some managers also find consulting with lecturers a good strategy when implementing the ML curriculum as it involves everyone by giving input as well as securing everybody's buy-in.

One can therefore draw the conclusion that it is necessary for managers to involve all lecturers and to take the consultative approach in the implementation of the curriculum.

The third research question was to determine what kinds of challenges managers face in the implementation of ML. The findings revealed various challenges facing managers such as administrative overloading of both lecturers and managers, student absenteeism, challenges in connection with lecturers in terms of method of delivering the subject from a pure Mathematics angle, and language problems encountered with foreign lecturers. Managers also mentioned the difficulty of finding suitably qualified lecturers who know there is a difference between the teaching and learning of ML and that of Mathematics.

As student absenteeism is such a large problem for lecturers as well as managers of ML, it is clearly extremely important for senior and other managers to address this problem and propose an amended attendance policy for ML. Senior managers should also look at finding different ways of solving the challenge of the administrative workload referred to above.

The fourth research question deals with the complexities that managers find in implementing the ML curriculum and the methods of instructional leadership they use in carrying out this task. Findings from this research have shown that managers and especially Education Specialists use classroom visits to inform their instructional leadership strategies by giving feedback to lecturers but also to inform their own future planning in terms of training and using it to reflect on themselves.

The research has also revealed that managers use other forms of instructional leadership such as encouraging student-centred learning as opposed to teacher-centred learning so that ML can become more real and alive in the classroom. The use of e-learning to integrate ML lessons is also encouraged by managers. The literature review makes reference to e-learning and student-centred learning as cornerstones of the teaching and learning of ML. This research has also shown that managers also find shared leadership and the consultative approach to the implementation of the curriculum to be important as an instructional leadership strategy.

As far as methods of instructional leadership to improve performance in ML are concerned, managers have revealed the use of intervention strategies such as remedial classes, extra classes, worksheets and competitions which can be used as intervention strategies.

From the above one can conclude and recommend that managers should do much more to encourage lecturers to use e-learning and student-centred learning in their classrooms, and senior management should make appropriate resources available for TVET colleges to use by providing much more training for lecturers.

Furthermore, since many colleges use a variety of different intervention strategies to improve performance in ML it is important to recommend that the performance of students after undergoing these intervention programmes should be carefully monitored in order to ascertain which intervention strategy works best at a particular college and maintain the programme.

The fifth research question asked about the professional development programmes that managers of ML organize for lecturers in order to empower lecturers in ML. This research has revealed that managers encourage lecturers to attend ML-specific courses as well as training to enhance the delivery of the subject through e-learning programs and software that lecturers can use for teaching and learning. Lecturers are also encouraged to attend courses to develop themselves holistically, which improves their confidence and self-concept with regard to their subject. This study has also revealed that managers do not prevent lecturers from pursuing their own formal studies to improve themselves.

One can therefore conclude that various colleges use different and various professional development programmes to empower their lecturers and that some of these work better than others. It can therefore be recommended that these programmes should be monitored and those with the best results maintained, and that senior managers should

make more resources available to enhance the performance of the lecturers and therefore the students.

#### **5.4 LIMITATIONS OF THE STUDY**

Since the scope of this research was limited to Mathematical Literacy lecturers at public TVET colleges within the Western Cape, and only three such colleges were included in the sample, with their identities kept hidden, the findings of this research cannot be generalized. Furthermore, there are six public TVET colleges in the Western Cape and therefore what was found at the three colleges cannot be applied to any or all of those six colleges.

#### **5.5 RECOMMENDATIONS FOR FURTHER RESEARCH**

In order to reach the objective of this research, which is to ascertain how managers of ML interact with the subject at some TVET colleges in the Western Cape, new problems that emerged from this present study could be possible avenues and topics for further study. In view of the findings the researcher would like to recommend the following as subjects for further research:

- Steps which can be taken by managers of ML to overcome the language barriers in ML classrooms at TVET colleges.
- Learners' perceptions of the management of ML at TVET colleges.
- Management intervention in the implementation of student-centred activities to enhance performance in ML at TVET colleges.
- Management intervention in the implementation of e-learning activities to enhance performance in ML at TVET colleges.

#### **5.6 CONCLUSION**

In this chapter a brief summary was given of each chapter of this study. The researcher presented findings interpreted from the responses of the interviewees, general

conclusions, and recommendations for future TVET college practice as well as recommendations for further research.

This study has shown that managers have different experiences and interactions with Mathematical Literacy at the different colleges in the study, but there are also similarities. Managers are passionate about providing support to lecturers who put a strong emphasis on the academic part, while others are placing immense effort into raising the profile of the subject. Furthermore, how managers perceive their role in terms of the subject is strongly tied into the type of support they provide.

This study has also revealed that managers face many challenges at their colleges in implementing the subject and that these relate to students as well as lecturers. Many colleges via their managers are dealing with these challenges in their own way and as suits them best. In terms of instructional leadership strategies employed by managers it is evident that student-centred learning and e-learning, strategies for the subject which its guidelines advocate and encourage, are still found to be lacking. Many colleges, encouraged and coordinated by managers, are also using various intervention methods to improve performance in the subject. In many cases these intervention strategies are bearing fruit, but in other cases more needs to be done.

Lastly, managers and leaders have an immense power to introduce ideas and create platforms to improve the status of the subject and improve the overall performance of lecturers in and students of the subject. It would therefore be important as well as beneficial for senior managers of public TVET colleges to look at the results of this study in order to inform themselves for the future.



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# APPENDIX 1

## A. INTERVIEW QUESTIONS FOR CAMPUS HEADS/CEOs

1. As Campus Head of this TVET campus, what do you perceive your role to be in managing the Mathematical Literacy curriculum?
2. What activities and functions do you think a Campus Head should undertake for successfully managing the instructional programme of Mathematical Literacy at TVET colleges?
3. On a scale of one (very poor) to ten (extremely good) how would you rate your general knowledge of the NCV Mathematical Literacy curriculum at TVET colleges?
4. What measures do you undertake to address curriculum problems in Mathematical Literacy at this TVET campus?
5. As a Campus Head, what barriers do you experience in the implementation of the Mathematical Literacy curriculum at a TVET campus?
6. What do you think could be done to assist, support and equip (i) Campus Heads, (ii) Education Specialists, and (iii) Lecturers to effectively implement and deliver the Mathematical Literacy curriculum in order that the results in Mathematical Literacy improve at TVET colleges?
7. How do you ensure that the distributive instructional leadership of the college's mission, the effective management of the instructional programme, and creating a positive learning climate are translated into the Mathematical Literacy classroom?
8. How do you ensure that the college's mission is translated into the implementation of Mathematical Literacy?
9. How does your role as a Campus Manager help to improve results in Mathematical Literacy at your college?

## **B. INTERVIEW QUESTIONS FOR EDUCATION SPECIALISTS/ PROGRAMME MANAGERS**

1. As an Education Specialist, what do you perceive your major role to be within the college?
2. How would you describe your knowledge of the NCV Mathematical Literacy curriculum at TVET colleges in terms of its policies and subject guidelines and how it should be implemented?
3. What are some of the challenges you as an Education Specialist encounter in performing your duties in managing and implementing the Mathematical Literacy curriculum at your college?
4. What strategies of instructional leadership do you employ to ensure that Mathematical Literacy is delivered effectively at the classroom level across the campuses you are responsible for?
5. How do you deal with curriculum-related problems such as changes in the curriculum, poor performance of students and the contextual nature of the subject which teachers and learners encounter as far as Mathematical Literacy is concerned?
6. What have your experiences been in implementing the Mathematical Literacy curriculum at TVET colleges?
7. In what way do you empower college lecturers to effectively deliver the Mathematical Literacy curriculum?
8. How does your position as Education Specialist assist in improving the results of Mathematical Literacy at this college?



### **C. INTERVIEW QUESTIONS FOR FUNDAMENTAL HEADS**

1. How do you perceive your role as a Fundamental Head in managing and implementing the Mathematical Literacy curriculum at this TVET college?
2. What specific functions would you say Fundamental Heads should perform in the management and implementation of the Mathematical Literacy curriculum at TVET colleges in order to improve students' marks?
3. Instructional leadership which is participative and distributive (getting subordinates involved in decision-making and giving input) has been shown to be very effective in improving students' results. Do you involve your Education Specialists (and lecturers) in decision-making on the Mathematical Literacy curriculum, and if so how do you do this?
4. What difficulties do you encounter in managing the Mathematical Literacy curriculum at your TVET college?
5. How do you go about solving problems that you encounter with regard to Mathematical Literacy?
6. What support and development programmes do you give Education Specialists in managing and implementing the Mathematical Literacy curriculum at this TVET college?

## **D. INTERVIEW QUESTIONS FOR LECTURERS**

1. How does the way management implement the NCV Mathematical Literacy curriculum assist you in obtaining better results in Mathematical Literacy?
2. What kind of guidance and support do you receive from your managers to effectively deliver the Mathematical Literacy curriculum?
3. How are you as a lecturer at a TVET college involved in providing input and involved in decision-making as far as the instructional leadership is concerned that you receive from your Campus Heads, Education Specialists and Fundamental Heads in the implementation of the Mathematical Literacy curriculum? Give examples.
4. How do you ensure that the instructional leadership tasks of the college's mission and creating a positive learning climate are translated into the managing and implementation of Mathematical Literacy, and how does this help to improve students' results?
5. What development programmes do managers encourage you to go on to empower yourself to be a more effective lecturer? Is this effective for you and does it improve the results of students in Mathematical Literacy?

## **E. INTERVIEW QUESTIONS FOR MATHEMATICS ORGANIZATIONS**

1. Describe the kind of support you render to TVET colleges in terms of improving the results of the students in Mathematical Literacy.
2. Describe how you enhance the management abilities of the different managers of Mathematical Literacy such as the Fundamental Heads, Education Specialists and Campus Heads. What do you do to raise their profile?
3. What role do you play in directing the curriculum of Mathematical Literacy in terms of content that is studied at TVET colleges?
4. How do you monitor that the support that you provide TVET colleges is translated into the classroom of the Mathematical Literacy lecturer?
5. What professional development programmes are you involved in at these TVET colleges to improve (i) lecturers' abilities and (ii) managers' abilities?

## Appendix 2

### Interview Transcripts

*Banana 17/9/2014*

*Background*

*2009 6<sup>th</sup>-year academic manager*

R: Where were you in the scheme of things when the ML subject was introduced in 2006 at schools and in 2007 at TVET colleges and what was your first encounter with the ML curriculum and what were your impressions?

*AM: I can start off by saying that I was involved when it was introduced in PE. University of PE had a training course for teachers and I was involved in writing material and presenting and then I also know that AB took up the new system which everybody employed. I felt it was a good system but it has been misused in the new school system because some schools force students just to take ML just to up their matric results and then there is a drift away from Mathematics to ML, and now ML also does not provide access to further studies to any courses and that's a bit of a problem, but it is a good thing in that it gives the learners who did not take Maths in the past some ability, some skills to work out their own finances, to plan their mortgage bond and see if the subtractions or deductions are correct, that type of thing, it does not have to be mathematical in the abstract sense. It does cause a bit of problem with all the reading that's involved; that is the context, the learners are really struggling with that.*

R: In your experience at TVET colleges do you think it is managed correctly or could it be managed a bit differently from your perspective?

*AM: I can't really answer that question but I'll tell you a bit later what we did this year.*

R: Moving on, describe the kind of support you render to TVET colleges in terms of improving the results in ML.

*AM: We decided that it would be better to concentrate on the lecturers and we invited lecturers from colleges to do the mathematical thinking course in July 2013. I think the course went well and we stimulated the lecturers to involve learner-centred and activity-*

*based instead of the old school of chalk and talk type of presentation and I think we did succeed in that and some of that was for ML as well.*

R: Describe in which way you enhance the management abilities of the different managers of the ML such as FH, ES and CH? And what do you do to raise their profile?

*AM: That's also a very complicated and sensitive issue, because the managers should feel that they are doing a good job, but sometimes there has been miscommunication in that their dream for the college might not necessarily be the same as that of the teachers or lecturers at this stage at the college. There was a contingent that went over to the UK to find out more about learner-centred approach and they were fully geared to implement it and they did get the lecturers on their side but somehow there seems to have been a communication problem because the lecturers did not turn up for the meeting that we planned. We were obviously disappointed because we did put a lot of effort into it and only a few pitched, but we continued and we completed what we planned, and we got to have a final meeting soon to see how we can support them more in the future. If you want to expand on that you are welcome.*

R: So what kind of support did you give the college? In what form was it?

*AM: The first few sessions was to establish what type of service to be rendered, then one of my employees went on a guided tour or a classroom walkabout of the college and a feedback was given to the managers and from then onwards and then to plan what type of service to render and it was decided that each term to have a weekly session of one hour ....*

R: What role do you play in directing the curriculum of ML in terms of content that is studied at TVET colleges?

*AM: I can't really say that I contribute to the curriculum, but I know what is the student's curriculum to plan for lecturers. I know that but I did not contribute to the curriculum.*

R: So you're, your way, you look at the ML curriculum studying the documents see what is in there and see how you can gear your lessons and delivery along the policies within the ML curriculum.

*AM: So that the learners can understand it better.*

[Some items skipped of the interview...]

*The understanding is lacking... the understanding of the student.*

R: How do you monitor that the support you provide to TVET colleges give the lecturers is translated into the classroom level?

*AM: During our three-months mathematical thinking (MT) course there is a feedback session which we call assignments, which the lecturers (as students) do and hand in a lesson that they plan to make sure that they have incorporated the material that they have done on the course and then report on that, and from that we could see that they have used some of the information on the MT course, so that is a good way of testing that they did some change.*

R: And I am testimony to that as I was also one of the students.

*AM: I am very proud to have you and I am sure we did some good.*

R: So what about what one of your employees is doing now, one of the things to use where one can see how it is working and how it is translated into the classroom?

*AM: That came outside from the MT course which was specifically geared for intervention, we just finished the last class visits where the employee then look at the specific topic or specific issue that the lecturers pointed out and the employee went to see how it was presented and in what way it was presented and give feedback. She must now compile a report, then we will discuss that report with the managers (ES and FH) and afterwards we will also discuss this with the top management.*

*We are prepared to do more work next year on the basis of that.*

R: What PD programmes are you involved in with TVET colleges to improve (i) lecturers' abilities and (ii) managers' abilities?

*AM: I think the main intervention is to help lecturers to improve the style of ML presentation. We did not work that much with the management, but I think that the times that we did work with the ES and FH we did show them a few things.*

**Paul: INTERVIEW QUESTIONS FOR LECTURERS**

1. How does the way management implement the NCV Mathematical Literacy curriculum assist you in obtaining better results in Mathematical Literacy?

*The programme manager plays a leading role to assist the lecturers with anything they need to deliver the curriculum in the classroom. He helps lecturers to interpret the curriculum correctly as far as possible. Management provides opportunities for lecturers to attend workshops regularly.*

2. What kind of guidance and support do you receive from your managers to effectively deliver the Mathematical Literacy curriculum ?

*Subject meetings are being held regularly to share information and to discuss subject matters. The programme manager does class visits to support lecturers and to discuss problems that may exist.*

3. How are you as a lecturer at a TVET college involved in providing input and involved in decision-making as far as the instructional leadership is concerned that you receive from your Campus Heads, Education Specialist and Fundamental Heads in the implementation of the Mathematical Literacy curriculum? Give examples.

*Subject matters are discussed during subject meetings. Opportunities are given to lecturers to provide input in matters that are discussed.*

*Examples: When a revision programme needs to be implemented.*

*Discussions about POAs and POEs.*

*Examination and test timetables.*

4. How do you ensure that the instructional leadership tasks of the college's mission and creating a positive learning climate are translated into the managing and implementation of Mathematical Literacy, and how does this help to improve students' results?

*The lecturer should be well prepared every day. He needs to (show) respect to students and talk with authority. He should also ensure that students understand the work and keep them focused. Activities (class- and homework) play a very important role. Assessment tasks or activities should be done regularly according to an assessment schedule.*

5. What development programmes do managers encourage you to go on to empower yourself to be a more effective lecturer? Is this effective for you and does it improve the results of students in Mathematical Literacy?

*Management provides for lecturers to attend workshops on a regular basis. Lecturers are exposed to different or new teaching methods. ITC training is also provided. The lecturer comes to class from these workshops to implement new ideas. It keeps the students focused on the work. Consequently their results improve.*



## Mary's interview 2014

R: Thank you very much for doing this interview with me.

ES: *My aim to find out how managers of Mathematical Literacy interact with the subject.*

R: BASICS

ES:

R: The first question I want to ask you is how long have you been involved in the TVET college sector and when was your first encounter with the Mathematical Literacy subject and curriculum?

ES: *The first time I have been involved with the TVET college sector was since 1996 and the first time I came across Mathematical Literacy as a subject when I was asked to do a learnership because they do unit standards which is very much ML-based and that was in 2004, that was the first time I have been involved with Mathematical Literacy.*

R: What were your experiences like, what problems did you encounter and things like that?

ES: *I was actually very excited, because we were introduced to ML by AB and at that stage I felt I was excited about it because I thought it is something that everybody in SA should actually be taking. I just feel that the majority of our people in SA were being taken advantage of and plain simply because they do not know how to read tables, how to experience how people are taking advantage of them through adding on percentage, ah, when they buy something on hire purchase and I could actually see the value of it and I really felt very sad when they told us that the new NCV curriculum, that the students had to choose because they could not take both, because I just felt it was a subject that would really benefit each and every one of them.*

R: Uhm, uhm, OK. How would you describe your knowledge of the NCV Mathematical Literacy curriculum in terms of its policies and guidelines and to what extent does it inform your decisions and behaviour?

ES: *From the start I was involved with the curriculum of ML because my previous boss was a little bit scared of ML, he found it very strange and somebody had to take the lead, but yet I did*

*not teach it right from the start, but I guided them and I became very enthusiastic about it... and... I am very au fait with the curriculum, because from the start I have made it my business to read through the guidelines very carefully. I also, when the college goes up for training for the roll-out of the new curriculum, I go with my seniors for ML because as a programme manager I feel it is extremely important for me to guide. I always consult with my ML people but they must have enough confidence in me to actually refer to my greater knowledge, for want of a better word, if they get stuck on something and this is exactly how we do it. They respect me for my knowledge, I allow them to manage the ML but we always concur and we always come together and decide on matters together, on their interpretation. They have no hesitation on phoning me up and say, ES, this is what happened here, do you agree with or are they interpret it incorrectly or is there something in this question paper that is not quite right, and they usually accept my decision on that matter or my input on it... they value it.*

R: So in other words you do allow for input from others.

ES: *Oh yes, definitely, definitely.*

R: So it is not your decision only.

ES: *Not at all, not at all.*

R: Uhm, how do you perceive your role as a Fundamental Head in managing and implementing the ML curriculum at this TVET college?

ES: *I think that we are extremely fortunate because a lot of the things we do collectively together as all colleges in the Western Cape, but definitely one of the biggest roles that I feel is obviously working out the work scheme and assessment schedule but appointing qualified lecturers because although it is a subject called ML not everybody can teach ML. It is extremely important that the person has a good knowledge of the English language. That person also needs to have a definite lively personality to come across to the students, because if you make the subject dull and uninteresting then unfortunately you are going to lose your students. I also feel that I am responsible, that if lecturers need anything that they know exactly I am the first port of call... In other words I will ask them at the end of every year what do you need for next year and I am open to their suggestions, does not matter what it is. If I stumble on a new book on the market wherever I am I will purchase it, I will give it to my lecturers, I will say to them do*

*you think you can use it? I do search on the internet for them, I do class visits to ensure that there is always quality in the classrooms and if I find that there is a lecturer that needs a little bit, has given a topic but I just feel the topic is not interactive enough, I will do some research, let me look up on the internet, let me see if there is something else I can find on that topic, and then I will pass it on to him and then it is up to him to use it or not to use it, because it is very much... uhm, their classroom management is very much their style, I don't try to interfere, only, I try and encourage them.*

R: OK. Uhm, that was a very good answer... uhm, how do you, how do you actually interact with Education Specialists under you besides the lecturers, how do you interact with the Education Specialist?

ES: *You mean... our structure is as such I am post level 3 and I have two ML seniors under me, then am our post level 2 (they are our post level 2s) but I have also got two Maths lecturers under me, but because ML is a bigger component than the Maths even these Maths people do have ML lecturers they have to monitor, but they monitor them only in the form of marking and post-moderation for assessments because they... ah (laughs) strange enough, the Maths people don't really like to give ML, they prefer to teach pure Maths.*

R: Mmm, because what we said before, if they want to teach ML they must have a passion for the subject because it is a different type of subject.

ES: *Yes, so they will do the post-moderation for them but the seniors for ML will still do all the roll-out of anything new and the Maths seniors won't get involved as far as that is concerned.*

R: Mmm, OK.

ES: *How I interact with them, we try and meet on a monthly basis as a whole group together and we deal with anything that they come up... Lately we have done class visits and I have actually asked them what they experience and what do they feel and we plan on having a training session and we have already a date for January next year, and I have asked senior academics and he has agreed to it and now we are going to sit down and plan exactly what we would like to see happening... uhm... we also got together a as a whole group and we decided that there needs to be worksheets right at the start of the year and how can we best help the students because we are worried about the background that they come to us with... so we have*

*worked out worksheets which they share and it's not just the seniors... what happens, the seniors will oversee it, in other words I will give it to each lecturer, in other words I will assign what topic it is -- they will oversee it. They're allowed to swap topics if they are not comfortable with... and they will oversee the quality and I do the final quality control... so it is always a case of my seniors have the first input and then I verify it, for want of a better word.... and if I feel that there is something I can improve on I will not phone the lecturer, I will phone the senior and will ask him... please, what do you think about this, and we agree or we disagree, and I will take their word for it, because it is just my input, I just feel I must acknowledge them as specialists in the field.*

R: So basically then, uhm, we call the PL2 Education Specialists, you call them seniors.

ES: *Seniors.*

R: But they are PL2.

ES: *They are PL2.*

R: And they will have their lecturers under them and so on.

ES: *They will have their lecturers under them, definitely.*

R: It's nice to see you have got your finger on the pulse and you are very close to your lecturers as well and interact with them.

ES: *Yes, I am, I am, I actually do impromptu class visits as well... they find it nothing strange for me to come up to the campus (pause) on a regular basis and when I say regular at least (emphasis) once a month or twice a month... it's impromptu class visits... they know I am not there, I am just there to check to see are the students in class, how is the attendance and then just to pop in and ask him do you need any help, is there anything, are there any stationery requirements, can I do something for you, have you received this, have you got that... or I will just go and sit in the class for a few minutes and afterwards I will say, look that was very interesting, uhm, you know what about if you have brought a dice with, would not that have made the class a little bit livelier, but anything quality control, quality assurance... during our formal class visits for IQMS we notify them way in advance and that is a totally different process; when I go to see them on an informal basis they know I come as a friend and I come as guidance and they welcome me, they not, they don't resent me coming.*

R: So they are not averse to your visit.

ES: *Not at all, that is not the impression I get, because afterwards they will actually ask me as well and if they have a problem, when I say how to present it, for example, they might say to me, ES, I have got this very difficult class and never mind what I do, I just cannot get them to understand this, do you mind coming into the class and just see if you can get this across?*

R: Brilliant. Uhm, OK, maybe this question you have already answered this question in some way in the other questions but the question is, what specific functions would you say Fundamental Heads like yourself should perform in the management and implementation of the ML curriculum at TVET colleges in view of improving students' marks, and can you give an example maybe?

ES: *Right, first of all I think it is extremely important, as you say it is very important to keep the finger on the pulse, you are aware of your lecturers' shortcomings, because everybody got strengths and weaknesses and where there are weaknesses you can help and rectify, you try and do your best, I also ask them very much if they feel they need any training in something and they welcome to forward any suggestions and I finally give them the training they want. Definitely they have to send their spreadsheets to me on a regular basis, although the seniors do the moderation, the post-moderation, for the post level 1s they have to, at the end of every term they have to send me their spreadsheets so that at a glance see how they are performing. This is how I discovered for example that the June maths level 2 had done... very poor results, we had a pass rate of about 44%, which was totally unheard-of, so we called an emergency meeting... and I asked the lecturers, first of all the post level 1 lecturers, to try and look at the question paper to see in their opinion what they felt went wrong -- was it the question paper, was it too difficult, or what was it, and then we came together and we discussed it and everybody had their opinion and had their say and collectively we came to summarize how we can prevent something like this in the future happening, so we'll go and we'll point out what could the internal moderator have done to prevent something like this, because every paper needs to be internally moderated, would this have improved the students' results... what can we now do in order to not have the same results in September, because one of the things we have found is that it was actually a weak bunch of level 2s this year, so we immediately implemented extra classes, and*

*the extra classes was not just dictated upon, it was a case of I went to the core programme managers, I showed them the results and I got their buy-in. I said please, I do realize that you also want extra classes for your core people but I would like you to fit in... give me a time slot that will be appropriate and I would like you to encourage it, everybody who failed the ML June exam, that they take part in this extra classes ... and we got the buy-in and we also discussed with the students what will be the best time, is it a Saturday, is it a Friday afternoon, is it, do they prefer to do it twice a week for two hours? Then we come to an agreement, and then we implement it, but I very much (emphasis) control it. I request it from the academic manager, I... everything is worked out... I give the managers a budget, I actually monitor it every week, I will phone and say what was your attendance last week? Or they need to email me... all they need to do... it went well, we had so many students... or we had very few students due to the bus strike, that is what it was like the one day, or I will, I will also say, do you think it is still worthwhile continuing? Or we will come to an agreement... we near the end of the syllabus... we are now doing revision in class... they have enough time for revision inside classes, I think it is extremely important... and it is very important also to get students' feedback... I go into the classes and I will... let's say there is a lecturer who's had poor results... ah (a sighing laugh)... you need to find out what it is. I will go and sit in that lecturer's class, I will try and make a judgement, see what it is, I will also ask lecturer to step aside, I will chat to the students, I will give them a little slip where they can tell me whether they are satisfied or not with the lecturer, how do they perceive it, what do they think, what will help them to improve their ML marks, and it usually comes out that they are generally lazy (laughs)... they don't do their work (laughs)... very seldom that I had it where a lecturer cannot explain, very seldom... it's happened once or twice and then I will actually go in and sit in and monitor more closely or I ask... usually what I will do is I will tell the senior the feedback I've got, I will ask the senior to check and the senior would go and I would go, we go once or twice together and then we will monitor him. If it is a classroom management problem we try to give the lecturer support, ah, explaining to him why it is important and asking him which classroom he would like to sit in, like peer observation, it does not need to be a Maths person, it is just somebody he admires, and we ask the lecturer, do you mind if this lecturer sits in in one or two of your classes? And then I discuss with him what*

*have you peer-observed, what does he do differently that you do not do, do you think it will work for you?*

R: Thank you. Uhm... next question: instructional leadership which is participative and distributive, getting subordinates involved in decision-making and giving input, has been shown to be very effective in improving students' results. In what way do you involve your Education Specialist in decision-making as far as the ML curriculum is concerned?

*ES: Unfortunately, the curriculum has been laid out for us; there is very little input we can give into the curriculum as such. The only thing we can do is to get together and decide what topics must be offered first, how long we are going to spend on each topic, but because of the fact that in the Focus Group where everybody works together there is not much leeway, but I can get input at those Focus Groups. Before we even go to the Focus Groups I actually get my lecturers together and we chat and we discuss so that they can raise their concerns or whatever they feel and they in turn go to their post level 1s, they have meetings with their post level 1s and say look, we are going to a Focus Group meeting, is there anything, do you like the way we have done it this year? Is there anything you'd like to see differently... then also, uhm, where, ah, you know (sighs) sharing of best practices is extremely important... what we have done this year, each one had to present.... prepare a lesson. I chose a subject outcome, I divided them up into subject outcomes and each of them had to prepare a lesson and we record a lesson but they could choose any learning outcomes, we just took level 2, we divided up the lecturers (there are 16 of them in ML) and each of those subject outcomes and they could choose them, any subject outcome, and they had to now prepare a lesson. We captured it on data capture. They still have that lesson and we are going to have a day when we present all these lessons together and then we comment on it and whatever.*

R: Like criticize and comment.

*ES: Ja, comment on it, and if there is something nice, and the idea is to put that on our e-learning tube box. If the students want to download it, if they want to, the idea is to let them get a feel how to do it because next year we are going to do it on a bigger basis.*

R: OK, that's good. Uhm... what difficulties or challenges do you and did you encounter in managing the ML curriculum at your TVET college, and can you give us an example?

*ES: I would say it's not the managing, as when you say "managing" everything is there, but I just find that lecturers don't always meet deadlines, which causes a domino effect. I also found that the lecturers are overloaded: they are expected to teach six groups five periods each, which means they are teaching for 30 periods. It gives them very little time to do adequate preparation and innovation. That is I find sad because I think they have got a lot of potential and it actually stunts their growth in that way. I also find the normal challenge is managing the students coming to class. It's a little better now with the 80% attendance policy and we are hoping that next year this will be much better, but really this year as well – students' attendance I find is very poor, I also feel that students who do well tend to feel that they don't need to come to ML class and they can just come and write, which unfortunately is not the case because they lose vital information somewhere along the line. I also find it very difficult to get suitably qualified lecturers. Lecturers that are suitably qualified are very often foreigners and foreigners have the problem of language barriers: it's not the lecturer's first language and they do not interpret questions the same way. I find that heavy language-based question type of papers, question papers, is very challenging for the students, so those are the challenges, not, not actually managing of the curriculum or the curriculum itself but the logistics around it, how to get the best out of the curriculum.*

**R:** Uhm, related to this question, then how do you go about solving the problems that you encounter with regard to ML?

*ES: Uhm... if it is a curriculum issue, which does not happen very often, one of the things that I found was a fact, and I think we all agree that this year it is a bit different: we found that students did very poorly in paper 2 and we discovered why: because when they get tested basically it's paper 1 questions that are asked and not enough paper 2 questions, so I think by now adding this analysis grid, by ensuring there is enough challenging questions in every question paper, although your results are going to be slightly down, but you are preparing them better for what's coming in the end-of-year paper. Then I also encourage my lecturers to come together and if they have got anything that really bothers them, in other words they all feel for example that numbers are so important that they feel that unless the student has a good grasping of numbers this is a problem, so I encourage them to set up worksheets to share with*



*each other, to download things from the internet. We don't have open access to the internet, very few of us are allowed to go on YouTube, they are welcome to give me any sites and I will download it for them but we do it collectively together, we never try and solve one question just one person, we always listen to everybody's input. To me it is always amazing that if they are the internal moderator it's fine, but the minute somebody else moderates the paper internally there is a thousand and one things afterwards, you know, that this could have... there is a mistake here, this isn't correct, this isn't correct, and I encourage that, but they must do it through me, they cannot just go out and challenge everything, and sometimes they are correct, sometimes they are not correct, and then together we decide whether we should change it, whether it's going to advantage the student, disadvantage the student, does it really matter, it's a sort of a subjective interpretation or whatever and obviously very much memo discussions plays a big part here because a lot of the problems comes with lecturers marking absolutely according to the marking memo and not allowing for... to give credit to students with the knowledge that they actually are displaying... so to me that is extremely important that the lecturers are very much aware of the fact that they must mark in favour of the students... but of course where it is totally unacceptable that they have to be strict about that as well.*

R: Uhm... thank you for that. Uhm... what support and development programmes do you give Education Specialists in managing and implementing the ML curriculum at this TVET college?

ES: *Right. I try and... there are lots of things I want to do, number one they are all involved in the Focus Group. I try and involve... I try to give them a lot of, uhm, how must I put it, uhm, a lot of uhm... I won't say leeway, that is... I try and empower them, I try and empower them, but yet they know that I am there to encourage them, I always stand up for them if I see that something is not going right. I am very much aware of the fact that I will not reprimand a senior in front of his post level 1s... it's a case of I need to support him but yet he needs to know that if he was in the wrong that's how he can improve, so...*

R: So you give constructive encouragement.

ES: *Yes, I do give constructive encouragement... I do encourage them to tell me if they need something... I do feel that there are a couple of my... unfortunately I am very much a control*

*freak and I'll admit that myself... I give them deadlines but I give them deadlines in order for them to do better time management... if I find that they are not reaching the deadlines I will sit down with them and I will say to them, right, what is still outstanding, so let's now prioritize what is important. Then I sit down with them and then I say to them right... this and this is what you do, first this, then this, then this, and then the next thing, and I say to them, right, by when can you let me have this, and we come up with the date... they also know that... I am... fair; in other words if they've got personal problems, because that always can happen, all they need to do is let me know: ES, I know you told me this is the deadline, I don't think I am going to meet it because of X Y Z, then I will say, right, now when do you think you can let me have it -- if it is not so important that's fine, or no actually that's important, if you can only let me have this, that and this section, that is what I need... So it's very much like that... but I do want to give them time management -- I do, I do want to have time management. I also want to give them more. At the moment they are all on what we call a junior management training programme. We've also let them do a course where they discover what brain, what hemisphere of the brain they (the lecturers) actually move in, so I don't want to expect the person that is creative to do the mundane thing and the person who loves structure to try and do something to try and think out of the box so that we can actually...*

R: So in other words you work with the strength of the person and enhance --

ES: *We try and work with the strength of the person. They also, all of them -- not all of them, that's not true, but if they are studying, like for example I've got one, he is doing his Honours, he'll get his degree, then the other one did some studying, I think he wrote his exams last year, and then the one found that it was just too much: he could not cope with the demand of the work and the studying. It is a little bit outstanding (overwhelming). So in other words they also know that continuous studying is not a problem. Also if there are any conferences I will let them know about it. They have got the option of going: I don't force them to go, like the AMESA conference, which was open to everybody... unfortunately only one ML person went. He showed the initiative that he wanted to. If there are any like Pearson or any of the book companies, they do get involved, I do ask them, especially my post level 2s, I will try and involve them in as many*

*as the implementation... uhm... let's say the college want to implement something they are aware of what's going on.*

R: Uhm, uhm, and does it filter down to the post level 1s as well?

*ES: Ooh, ooh yes, we got a very good system; if they go on any course I ensure there is a day when they give feedback.*

R: OK. I like, I like the support that you give your, your... ah... the specialists and the superiors and the lecturers. I like the rapport that you have with them which is very good, it's very advantageous for any college if they implement it in that way.

*ES: We are very good about that because we always give feedback. As I said, we make time for feedback because we cannot send everybody and it's second best, I always feel that to attend something personal self is the best but if you cannot, that cannot happen, then the feedback must be cascaded down... and we are good at that, we are very good about that. Because from the Focus Group that we have at the end of the year you find that a lot of decisions get taken, a lot of new implementations gets done or whatever. Before we go on breakup we have a big planning meeting where everything will be passed out to them, then the beginning of next year another planning session where again information will be given. I also send to them in written format that they can always refer back to that when they need to because I do realize when you listen you don't take everything in, whatever, so it is always a backup for them so they can never say they were not informed.*

R: OK, thank you. Uhm, I am just going to throw in a few other questions if you don't mind... if you had total free rein what would you do to improve marks of students at your college and what would your recommendations be to the management of the college?

*ES: I love technology. I think that is the first thing I would do: I would ensure that lecturers have it. There is so much out there on the internet that they actually all have access to the internet in their classroom. I would encourage them to make the ML class become more alive. There is so much out there at a press of a button that they can engage with their students... I would like to see my lecturers and encourage them, which we haven't quite got there yet, that those working in different disciplines... if you are working in the ECD, all your formative assessments, to actually focus on things within the ECD department, if you are in business*

*studies focus on that, if you are in IT (because our IT people also do it) focus on that: in other words, make it far more personal to them that they can interact with it and see where they are going... I think that is the one thing that I would do... I would... Ja, whether it's going to improve the marks I don't know, but I do believe it's going to improve attendance and I believe it's going to enculture (inculcate) a love for the subject and with that already will be, will be better marks... I would also, if I had free rein, I would also have, I wouldn't say little competition, but little rewards for students who improve the most, who or whatever... I just find that lecturers somehow don't do that out of their own, whether it's just... I saw one of my lecturers in the June exams, it was not an ML lecturer, just quietly going around in the hall and putting a Chomp on each student's table. I thought, what a lovely touch... Wouldn't it have been nice for the college if they made some money available for lecturers to... boost the kids? I would actually have... when I say more toys I mean more educational toys... What is wrong, when you are teaching, uhm, when you are teaching, uhm, uhm, probability, to let them have dice, let them have playing cards?*

R: So that they can see reality.

ES: *So that they can see reality, even go into the Lotto even, whatever, even come with a barrel, have fifty in there, what are the chances? -- you know, let them participate actively in it. I think this would really improve the students' love for the subject and once they feel the love for the subject they will automatically love the subject.*

R: So what is, what's preventing you from implementing the competitions -- is it the budget, or... ?

ES: *It is the budget. There is absolutely nothing in the budget, they will slash anything like that, they really and honestly -- I am not Rockefeller, I don't have the money to do it myself, I just don't... uhm, I would also like to cut them a CD, a disc, so that when they enter -- because I've also realized that and that is one of those things I know -- we have our lazy students but we also got those genuine ones, who want to learn but have duties before they to come to college -- we've got students who've got to take their younger brothers and sisters to school and if they missed a class where they actually have the explanation this is the idea that I had: getting the lecturers do one lesson so later on there is that available on the e-learning tube box and they*

*know that today we've done ratios -- I have missed this but on the e-learning tube box and I can go and download the lecture live talking, but then it won't be live, it is recorded, but at least I can listen to the lecturer, I can see his explaining before I go and tackle the problems... and then of course in that way make them self-sufficient and also take responsibility for their own learning... but those are all dreams and goals.*

R: Thank you very much. I am just going to throw in one last question... uhm, then we'll wrap up. How managers operate and function in an educational organization can have a great impact on students' performance. To what extent do you ensure this takes place and how do you ensure this takes place through the Specialist that you've got?

*ES: First of all I do believe that that statement is true, I've seen it. A manager needs to be hands-on, a manager needs to control absolutely everything, they need to have a plan, they need to have deadlines, they need to have a bigger structure in place, they need to support their seniors or their Education Specialists and explain exactly what you expect of them, the deadlines you expect them to meet, and manage the whole time that they are on track, because otherwise everybody does their own thing and to me, yes, it's not a bad thing, but managing and controlling, and I am not saying "controlling", that is a wrong word, but by working together you actually get the strength of everyone, you actually get input from everyone, you get ideas from everybody, you get the best your college has to offer as long as you are prepared to share. I have also seen structures absolutely falling apart just because managers are not managing...*





## Research Ethics Clearance Certificate


This is to certify that the application for ethical clearance submitted by

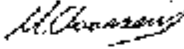
**S M Hassan [4557352]**

for a M Ed study entitled

**Manager's experiences in the implementation of mathematical literacy at FET  
Colleges in the Western Cape**

has met the ethical requirements as specified by the University of South Africa  
College of Education Research Ethics Committee. This certificate is valid for two  
years from the date of issue.

  
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Reference number: 2014 JULY /4557352/MC

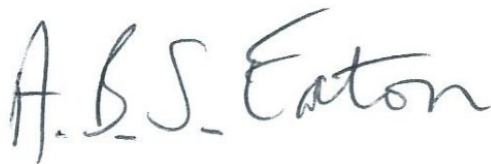
16 JULY 2014

25 Valley Road  
Kenilworth 7708  
Cape Town  
16 December 2015

**To Whom It May Concern**

This is to certify that I, Anthony Bartlett Shaw Eaton, M. Phil. (Oxon.), have edited the M. Ed. thesis by Shaik Mohammad Hassan on the subject *Managers' experiences in the implementation of Mathematical Literacy at FET colleges in the Western Cape*.

I received my accreditation as an editor of English-language texts from the South African Translators' Institute (SATI) in November 1999. I have been a member of the SATI for many years: my membership number is 1000539.

A handwritten signature in black ink that reads "A. B. S. Eaton". The signature is written in a cursive style with a clear, legible font.

(Mr) A. B. S. EATON

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