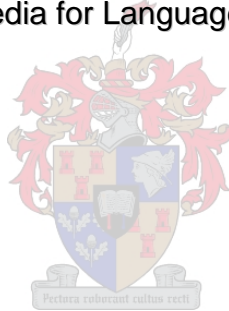# THE INTEGRATION OF MULTIMEDIA RESOURCES IN THE TEACHING OF TSWANA AT SECONDARY SCHOOLS IN THE MOTHEO DISTRICT

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Thesis presented in partial fulfillment of the requirements for the degree of Master of Philosophy in Hypermedia for Language Learning at the University of Stellenbosch

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Declaration

I, the undersigned, hereby declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in part submitted it at any University for a degree.

Signature:

Date: 31 October 2007

Summary

This empirical study focuses – through the use of a descriptive survey – on the viability of integrating multimedia programmes in teaching Tswana at ten secondary schools in the Motheo District of the Free State Department of Education. The study sought to explore, inter alia, the progress made by schools in providing Tswana teachers with access to computers, the extent to which Tswana teachers use multimedia programmes in their daily practice and to determine the quality of Tswana multimedia programmes that are offered in the market.

Opsomming

Hierdie empiriese studie fokus – deur die gebruik van 'n beskrywende ondersoek – op die lewensvatbaarheid om multimedia programme by die onderrig van Tswana by 10 sekondere skole in die departement opvoeding in die Motheo distrik van die Onderwysdepartement van die Vrystaat te integreer. Die studie het, onder meer, gepoog om vas te stel in watter mate daar al vordering gemaak is by skole om onderwysers van Tswana toegang tot rekenaars te verleen, hoeverre onderwysers van Tswana multimedia programme in hul daaglikse praktyk gebruik asook om die gehalte van multimedia programme wat vir Tswana beskikbaar is te evalueer.

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I would like to extend a word of appreciation and gratitude to the following individuals for their relentless support during the course of my studies:

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CHAPTER 1   Introduction

1.1   Focus Areas

In an attempt to highlight the importance of the use of computer-based multimedia resources in teaching Tswana as one of the eleven official languages in South Africa the following are discussed in this chapter; firstly, the integration of multimedia resources in the teaching of language, secondly, the benefits of using computer-based programmes in language teaching and thirdly, the need for quality CALL (Computer Assisted Language Learning) programmes. Annexures A and B provide a definition of basic terms and a descriptive list of related research.

1.2   The Integration of Multimedia Resources

The introduction of computer-based multimedia resources has undoubtedly created new teaching possibilities for both the subject teacher and the language teacher. Equally so, multimedia resources have the potential to enhance the quality of learning among learners of various cognitive levels. For example, a learner who struggles with spelling can use a relevant multimedia programme which provides opportunities for spelling practice. Possibilities presented by the use of multimedia resources in teaching include, but are not limited to, the use of various types of educational software, the unprecedented access to information via the Internet and the development of learning programmes by means of authoring tools such as Authorware and Toolbook.

Since 1994 the South African education system has experienced a series of changes. As it was anticipated, curriculum changes formed part of the general educational transformation that took place. The initial process of curriculum transformation focused mainly on the overt curriculum and its implications for teaching and learning in the classroom. In other words, teachers were grappling with the basics of a new curriculum and it might be fair to say that the use of technology in teaching was then not a priority for the national Department of Education. This could explain the reason

the White Paper on e-education was only published in 2004, seven years after the introduction of the National Curriculum Statement. The interim period, circa 2000-2002, also saw the revision of the original Curriculum 2005. The revision process revealed, among other things, that teachers were finding it difficult to implement the curriculum in the classroom due to difficult terminology, unwieldy administrative work and too many design-features in the new curriculum.

The newly introduced National Curriculum Statement in the Further Education and Training (FET) Band (Grades 10 – 12) outlines the envisaged role of the teacher as well as the learner. On the one hand, the teacher is expected, inter alia, to fulfill the role of a researcher, subject expert, material developer, assessor etc (NCS English Subject Statement, 2003, p.5). On the other hand, learners are expected to be able to "transfer skills from familiar to unfamiliar situations, demonstrate an ability to think logically and analytically as well as succeed in lifelong education and quality training" (ibid, p.5).

The above-mentioned roles for teachers and learners lend themselves to the use of technology in its various forms. For example, as a researcher, the teacher can use the Internet to search for information on various topics and the learner can, as an analytical thinker, analyse an article on a specific web-page and draw conclusions based on the analysis. Furthermore, the learning outcomes as spelled out in the policy statement for languages (The National Department of Education, 2003) are amenable to the integration of multimedia resources (see table 1.1 below).

Table 1.1: Learning Outcomes and Possible Programmes

Learning Outcomes	Possible Programmes
LO1: Listening and Speaking	Software on Pronunciation and Listening skills.
LO2: Reading and Viewing	Software on Reading and Viewing Skills
LO3: Writing and Presenting	Software on Spelling and Writing Skills
LO4: Language	Software on Grammar and Language Use

1.3   Benefits of Computer-Based Programmes

Ravichandram (2000, p.82) believes that computers make excellent teaching tools. He further asserts that computers can be useful in the teaching of any aspect of language such as "vocabulary, grammar, composition, pronunciation, and other linguistic and pragmatic-communicative skills. And the major benefits offered by the computer in enhancing language acquisition apparently outweigh its limitations".

Given the educational demands of the 21st century, the Tswana teacher, or any teacher, cannot afford to ignore the benefits provided by ICTs in teaching and learning. For example, the use of ICTs can reduce the time spent learning, improve learning effectiveness and efficiency, learners can access materials at their convenience and accessibility is facilitated for people with disabilities etc. (Alessi and Trollip, 2001, p.5).

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It is also worth noting that despite the numerous benefits of using multimedia resources in teaching and learning, the actual implementation of computer-based learning is not devoid of challenges. The challenges include a lack of resources (computers) at most of the previously disadvantaged schools in South Africa, low levels of computer literacy among teachers as well as lack of guidance on the integration of multimedia resources in teaching and learning.

1.4 The Need for Quality CALL Programmes

According to the ICT4LT Website (2007), the leading professional CALL associations, i.e. EUROCALL, CALICO and IALLT, "interpret CALL as meaning the use of computers in the learning and teaching of languages in the broadest sense, from the use of word-processors to the use of the Internet."

When looking at the implementation of CALL in the Free State, it is clear that it is still in its embryonic stage. Through a combination of factors, computers have generally not entered daily language teaching practices. These factors include, but are not limited to, the general lack of computerization of schools in the Free State and the low rate of computer literacy among teachers and learners.

English seems to be the language of preference when it comes to the development of CALL programmes in the Free State and South Africa in general. This is proven by the number of approved English CALL programmes that are listed in the resource catalogue[1] of the Free State Department of Education (henceforth FSDoE). Apart from English, it is very difficult to find CALL programmes that are written in other languages, especially African Languages. For example, the resource catalogue only provides two approved Tswana resources for consideration by Tswana teachers when they submit requisitions for Tswana material. A broader choice of CALL material in African Languages is needed for the integration of multimedia resources to become a reality. Apart from the availability of multimedia resources, it is also important for material developers to produce materials of good quality (see Chapter 4 for a further discussion on the quality of CALL materials).

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[1] The resource catalogue is herewith attached as Annexure E.

1.5   The Context of the Research

The Free State Department of Education has 325 secondary schools which are spread over five Districts. Most of the secondary schools that offer Tswana on home language level are found in the Motheo District. In total, the Motheo District has 17 secondary schools that offer Tswana as a subject and in general about 42 secondary schools in the Free State Department of Education offer Tswana on home language level. The towns that fall within the Motheo District include Bloemfontein, Thaba-Nchu, Dewetsdorp, Wepener, Tweespruit and Ladybrand.

The majority of 'Tswana' schools are clustered in Bloemfontein and Thaba-Nchu because of historical reasons. All schools that offer Tswana in the Free State are based in townships. Owing to the legacy of apartheid, township schools are generally under-resourced. It is therefore not unreasonable to presume a dire need for multimedia resources at most of the township schools.

According to the results of the 2001 census from Statistics SA, Tswana was spoken then by ± 169 425 people in the Free State. Thus the number of Tswana speakers in the Free State constituted only a meagre 6,8% of the entire population of the Free State province which stood at ± 2 633 504. It might be reasonable to assume that the current numbers will be different from the 2001 statistics because demographics change all the time (Statistics SA, 2001).

1.6   Problem Statement

The successful use of multimedia resources in teaching Tswana relies on, among other factors, the availability of such resources and their effective integration in classroom practice. The research problem is that *the general lack of effective Computer Assisted Language Learning (CALL) programmes at secondary schools in the Free State prevents Tswana teachers from using multimedia resources.* Thus the research problem can be couched as a question in the following manner: *How does the lack of effective CALL programmes at secondary schools in the Free State affect the integration of multimedia resources in the teaching of Tswana?*

1.7   Purpose of this Study

The purpose of this study is threefold:

Firstly, to explore the consequences for the lack or shortage of multimedia resources for teaching Tswana at secondary schools in the Motheo District. Secondly, to determine the quality of the few Tswana multimedia resources that are available in the market by conducting analytical review of such material. Thirdly, to give recommendations on the successful integration of multimedia resources in teaching Tswana.

1.8   Research Methodology and Chapter Outline

The research adopts the use of a ***descriptive survey*** as an overall research approach. The reason for the choice of a survey is that it "gathers data at a particular point in time with the intention of describing the nature of existing conditions, or identifying standards against which existing conditions can be compared" (Cohen, Manion and Morrison, 2000, p.169). In this case, the existing conditions of Tswana teachers in terms of CALL are explored based on a set of identified outcomes for the use of multimedia resources.

The data collection strategy involves the use of a questionnaire because according to Cohen, Manion and Morrison (2000), self-completion and postal questionnaires are one of the typical data gathering techniques for surveys. Additionally, well-structured questionnaires (whether quantitative or qualitative) enable the researcher to process and analyse data in a more systematic way.

The research also involves cluster sampling in terms of the grouping of Tswana teachers as subjects of the research. For example, by "cluster sampling, the researcher can select a specific number of schools and test all the students in those selected schools i.e. a geographically close cluster is sampled" (Cohen, Manion and Morrison, 2000, p.101). Out of the 10 secondary schools in the Motheo District, 3 Tswana teachers from each school were requested to complete the questionnaire.

Apart from a survey, the research approach also includes a text-based *evaluative analysis* of the quality of one of the two available Tswana multimedia resources.

In **Chapter 1** the problem and scope of the study is set out, various definitions of terminology provided and the aim of the research is laid down. The method of research to be employed and form of data collection is outlined and the rationale for the sample selection explained.

Chapter 2 focuses on the literature pertaining to the implementation of computer-based education locally and internationally. **Chapter 3** covers the specific theoretical aspects of Computer Assisted Language Learning as well as approaches and methods in language teaching. **Chapter 4** consists of an analysis of one of the available Tswana multimedia resources. **Chapter 5** outlines a survey on how the lack of multimedia resources affects the teaching of Tswana and puts forward recommendations for further research.

CHAPTER 2   Literature Review

2.1   Introduction

This chapter introduces a body of literature that is related to the integration of multimedia resources in teaching and learning. In order to develop a deeper understanding of the research, the reviewed literature is contextualized into four perspectives, namely, an International, African, South African and Provincial perspective. Chapter 2 also outlines the projects that have been undertaken by the FSDoE in implementing computer-assisted education at schools in the Free State. The last section of the chapter deals with Miller's Evolutionary Model on the successful integration of computer-assisted education at schools.

2.2   An International Perspective

As early as the 1990s there was a general conviction among several international educational scholars that multimedia has the potential to enhance learning and teaching, for example, Gayeski et al (1993, p.6) even emphasized that "we need to move faster in creating, disseminating and updating courseware" for the enrichment of teaching and learning.

Schwier and Misanchuk (1993, p.4) were of the opinion that interactive multimedia instruction integrates various sources and media in mediating an instructional problem which a learner might be experiencing at a particular point in time. Other writers such as Lippert (1993), Brown and Smith (1996) and Barker (ed.) (1989) also joined the chorus of believers in the possibilities provided by multimedia for the improvement of teaching and learning.

Even though the early days of instructional computing were filled with excitement and prophecies for the potential of great educational improvement through computer-based instruction, the actual improvement in learning is less dramatic despite great strides in technology and the availability of technological infrastructure (Alessi and Trollip, 2001, p.4).

Thus "the current state of instructional computing is still in flux, with users facing issues of software and hardware incompatibility, as well as a lack of excellent and effective educational software" (Alessi and Trollip, 2001, p.5).

Rapid developments in Information and Communication Technologies (ICT) in recent years have resulted in significant changes in the way the world operates and communicates. For example, the use of e-mail makes it possible for people in different parts of the world to communicate asynchronously in a relatively cost-effective manner. This in turn has had an impact on educational needs, both in terms of the content and the delivery of educational services, and there has been increasing pressure on decision-makers to acquire new technologies and to ensure their integration in national curriculums. At the same time, forms of ICT such as educational multimedia programmes and electronic devices are multiplying with an increasing array of ICT options for decision-makers to choose from when integrating ICT into education.

Faced with this situation, policy makers in many countries thought that to equip schools with PCs and train teachers in their use would prepare learners for the demands of the 21st century. "We know, however, that simply providing access to ICT is not going to radically change education systems for the better. An overall view of what education should be seeking to achieve is needed in order for ICT to be utilized to their full potential within education systems. Decision makers and policy makers need to formulate appropriate policies based on their specific situation and educational goals" (UNESCO, 2006, p.1).

As an example, the "ICT in Education" policies of countries in the Asia-Pacific region vary greatly. "While some have not yet formulated any specific visions or plans, others are at an advanced stage of ICT integration, that is, they are focusing on the meaningful integration of ICT (including radio, television and DVD) into teaching and learning processes" (ibid).

It is a UNESCO concern to ensure that ICT does not become a source of further inequality, with the digital divide accentuating already existing disparities. Access to

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computers, the Internet, and the capacity to make use of ICT are related to factors such as socioeconomic status, ethnic background, gender, age, educational background and geographical location. It is important that education policies acknowledge the gap and promote ICT in ways that will not widen the gap further.

Schofield (2003, p.2) explains that in the summer of 2002, "99 percent of public schools in the United States had some basic access to the Internet, contrasted with 35 percent in 1994 when the National Center for Education Statistics first started estimating Internet access in schools. U.S. public schools have made consistent progress in expanding Internet access in instructional rooms (i.e., classrooms, computer, and other labs, library/media centers) from 3 percent in 1994 to 77 percent in 2000 and 92 percent in 2002". In 2002, the ratio of students to instructional computers with Internet access in public schools was 4.8 to 1, an improvement from the 12.1 to 1 ratio in 1998, when it was first measured (ibid).

2.3 An African Perspective

Despite the fact that Africa is the continent where humankind is believed to have evolved millions of years ago, it remains one of the poorest continents in the world. Second only to Asia in size, much of Africa is home to people who live in poverty. Africa's woes have to a large extent been ascribed to its colonization, the enslavement of her people by western countries as well as the looting of natural resources by the colonizers. The World Bank supports this point by stating that on average, "45 to 50 percent of Sub-Saharan Africans live below the poverty line -- a much higher proportion than in any region of the world except South Asia. In 1993, an estimated 40 percent lived on less than a dollar (US) a day. At least 50 percent of these people are from five East African countries and Nigeria. Also, the depth of poverty -- that is, how far incomes fall below the poverty line -- is greater in Sub-Saharan African than anywhere else in the world" (WorldBank, 1996).

It is for this reason that most African countries are lagging behind when it comes to the use of ICT in the classroom. However, several outreach and government initiated programmes have resulted in the provision of computers to schools, teacher training

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in the use of multimedia resources as well as access to the Internet. One such programme is the Boipelego Programme in Botswana (Cossa, 2002).

According to Cossa (2002, p.28), "the Ministry of Education in Botswana is implementing an ambitious project to install 20 computers in each of the 205 Community Junior Secondary Schools under the Boipelego programme". An important part of this initiative is to provide training and support for Botswana teachers in the use of ICT and its integration into the existing national curriculum. The Ministry of Education in Botswana and the Internet Learning Trust (Interaid) are working on innovative projects to create training opportunities for teachers.

These projects will assist school children and teachers in capitalizing on opportunities ICT offers. "One of these projects is collaboration between the Mereway Middle School in Northampton and schools in Botswana. The Mereway Middle School has been one of the most innovative schools in the UK in the use of ICT in education and its potential for facilitating international link projects. The school has worked closely with the Internet Learning Trust on a number of projects" (Cossa, 2002, p.28).

This Botswana project is aimed at supporting the Ministry of Education initiatives that are directed to the use of Internet in schools. This project will provide training in the use of ICT for Botswana teachers. The initial training and support for teachers in 11 schools, identified by the Ministry of Education as suitable pilot models, will take place in schools that have already been equipped with 20 computers through the Boipelego programme (Cossa, 2002, p.28).

Key considerations will be to identify suitable hardware and software, including networking and modem access to the local Internet service provider, to devise effective teacher training methodologies, and to investigate ways that ICT can be integrated into the existing national curriculum in Botswana. As part of this project, a number of Botswana teachers from the pilot schools will have the opportunity to visit UK schools and learn about the use of ICT in education.

This will provide them with the opportunity to experience some of the best practices of ICT use in the classroom. It is hoped that UK teachers will then be able to visit Botswana pilot schools to promote cultural awareness and to provide in-school support for the Botswana schools (Cossa, 2002, p.28).

Another project that has seen its way into Africa is the World Links for Development Programme (WorLD) which was the brainchild of the World Bank Institute in 1997. WorLD which is managed by the World Bank, "functions to enhance knowledge and professional development through information and communication technology (ICT), by linking thousands of teachers and students in developing countries with their counterparts in the industrialized economies" (Poverty Net Library, 2003).

Learners from all over the world participate in collaborative projects, voice their opinions in online discussions, and gain access to information on the web. Professional development of teachers is ensured through technical and pedagogical training on a continuous basis. An attempt is thus made to integrate ICT in the course curriculum with the objective of increasing student knowledge and improving the education system in developing countries.

Through the medium of ICT, the programme "seeks to empower the students and teachers of the participating nations, by placing them on a common platform of global knowledge and information. Although the programme is designed to give equal gender access to participating schools, cases of discrimination against girl students are noted in a few countries. Some of the other challenges faced are inadequate hardware and software, slow Internet connectivity, high implementation costs and inability of students to pay high fees for accessing technology" (Poverty Net Library, 2003).

So far, the WorLD programme has been introduced to the following developing countries which include African countries: Brazil, Chile, Colombia, Costa Rica, El Salvador, Paraguay, Peru, Botswana, Burkina Faso, Gambia, Senegal, Ghana, Mauritania, Mozambique, South Africa, Uganda, Zimbabwe, Turkey, West Bank/Gaza, India, the Philippines. "Approximately 130 000 students and teachers in these

countries are collaborating over the Internet with partners in over 22 industrialized countries on projects in all disciplines" (Poverty Net Library, 2003).

2.4 A South African Perspective

The National Curriculum Statement (NCS) in the Further Education and Training band (Grades 10-12) provides a framework for the teaching and learning of Tswana as one of South Africa's eleven official languages.

The introduction of the NCS as the official national curriculum for schools is conceivably a logical step in transforming a previously imbalanced education system. It is logical in the sense that in the aftermath of the first democratic elections in 1994, South Africa needed to introduce a curriculum that would respond to the needs of all citizens of the country as opposed to the apartheid curriculum which discriminated on the basis of race. However, the real challenge remains the translation of policy into classroom practice.

In the context of this study, the responsibility of translating policy into practice falls on the shoulders of the Tswana teacher. The new curriculum requires teachers who are "mediators of learning, interpreters and designers of learning programmes and materials, leaders, administrators and managers, scholars, researchers and lifelong learners, community members, citizens and pastors, assessors and subject specialists" (NCS Overview, 2003, p.18).

The above-mentioned plethora of new roles for the Tswana teacher is further compounded by the incorporation of Information Communication Technologies (henceforth ICTs) into curriculum delivery. ICTs "represent the union of information technology and communication technology" (White Paper 7, 2004, p. 42). Thus ICTs combine hardware, software and other means of communication in the processing, management and exchange of data, information and knowledge. For example; computers, educational software, television, DVDs etc can be regarded as elements of ICTs. However, for the purpose of this study, ICTs imply the use of *computer-based technologies* in teaching and learning. According to the White Paper 7 on E-Education

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(2004), ICTs continue to make an impact on curriculum development and delivery and pose new challenges for education systems around the world.

Even so, the same White Paper 7 makes a bold suggestion that ICTs have the potential to "improve the quality of education and training" (2004, p.8) in the interest of social and economic growth. Thus given the socio-economic demands of the 21st century, the Tswana teacher cannot afford to ignore the supposed benefits provided by ICTs in teaching and learning. For example, the use of ICTs can reduce the time spent learning e.g. the use of videos demonstrating science experiments, improve learning effectiveness and efficiency as learners can access materials at their convenience and accessibility is facilitated for people with disabilities etc. (Alessi and Trollip, 2001, p.5).

Furthermore, as one of the previously disadvantaged languages in South Africa, Tswana requires a great deal of development (PANSALB Act, 1995) in terms of its use as an official language and as a language of learning and teaching in FET and Higher Education. The development of Tswana is incumbent, among other factors, on the quality of teaching and learning at school level especially in township schools because that is where most Tswana learners are found.

According to Malimabe (1990, p.4), "the written Tswana of high school pupils often has errors which are caused by interference from other languages. Many pupils in different townships are unable to maintain language purity as they live in a multilingual, multi-ethnic and multicultural society where a lingua franca [a language which is commonly used by people whose native languages are different] acceptable to all is essential".

The dilemma arises in the classroom where these learners are expected to communicate in 'pure' Tswana also referred to as 'Standard Tswana'. All Tswana policies as well as Tswana literature are written in 'Standard Tswana'. Furthermore, learner performance is also assessed on the basis of 'Standard Tswana' and this necessitates the use of a more formal and standardized form of the language.

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The use of ICTs in the teaching of a language forms the basis of Computer-Assisted Language Learning (CALL). CALL is used "as a general term to cover all roles of the computer in language learning" (Levy, 1997, p. 81). The envisaged research will therefore approach the use of multimedia resources from the perspective of CALL.

A preliminary online search of the SABINET database has revealed that no specific research has been done on the topic of the availability of multimedia resources for the teaching of Tswana at secondary schools. Even though a number of dissertations have been written on various aspects of the curriculum at secondary schools including computer-based instruction, the database carries no data on the studies that investigated the availability of multimedia resources for the teaching of Tswana or any other African Language.

Several valuable theses have been produced at various institutions of higher learning such as the University of Pretoria, the University of Stellenbosch and the University of Johannesburg etc, and quite a number of them focus on the implementation of e-education at schools. For example, Miller (1997), Laidlaw (1998), Mathew (2005) and De Villiers (2001) all did their studies on the implementation of e-education at either primary or secondary schools (see Annexure B).

2.5   A Free State Perspective

The Free State Department of Education (FSDoE) is a government department that is charged with the responsibility of overseeing all educational matters in the province that are related to schools and FET colleges. The overall learner enrolment within the FSDoE for 2007 stands at 684180 (FSDoE, 2007). All in all, the FSDoE has 1800 schools (NB: the number keeps on changing as a result of the inclusion of newly built schools and newly formed farm and independent schools) of which there are 325 secondary schools. More than 60% of the schools in the Free State are classified as farm schools.

Furthermore, the FSDoE is made up of 5 Districts as represented in the following table:

Table 2.1: Free State Districts

District	Area
Thabo Mofutsanyana	Eastern Free State
Fezile Dabi	Northern Free State
Lejweleputswa	Western Free State
Motheo	Central Free State
Xhariep	Southern Free State

The vision of the FSDoE is to "improve the quality of life of all Free State citizens by providing quality life-long education and training" (FSDoE, 2007, p.3). It aims to achieve this vision by "operating an efficient, effective outcomes-based education system that works towards the overall development of Free State citizens in a dedicated professional manner" (ibid).

Concerning the integration of ICT in education, the FSDoE (2007, p.41) has identified the "integration of all ICT and e-learning activities" as one of the challenges in its five year strategic plan. The strategic plan goes further to state the achievements of the FSDoE in relation to "opening the doors of education to all citizens of the province" (ibid, p.47) and some of the achievements include:

- Establishing 50 multimedia centres at 50 schools.

- Providing 254 schools with two computers each for administration purposes.

- Establishing a fully networked Education Management Information System (EMIS) for schools, district and Head Office.

The FSDoE has also established an E-Education Directorate whose functions are the following:

- Support the development of learners, educators and officials through e-learning.

- Increase the access to and use of learning and teaching resources through the Education Resource Centres (ERCs).

- Support the implementation of the curriculum through Educational Library, Information and Technological Services (ELITS).

- Increase the effectiveness of the department through ICT interventions.

So far, the FSDoE has been trying to provide secondary schools with computer laboratories for teaching subjects such as Information Technology (IT) and Computer Applications Technology (CAT). The general understanding within the FSDoE is that the availability of computer laboratories will facilitate the introduction of computer-assisted education in the teaching of other subjects.

The aim of the FSDoE is to have fully equipped computer laboratories at all schools by 2014. The envisaged learner/computer ratio is 1:5 which seems to be grossly ambitious at the moment especially given the fact that statistics have shown that there is an enormous increase of learner numbers. The Directorate responsible for curriculum support within the FSDoE, namely, FET Schools Directorate, recently completed a survey on the availability of computers at secondary schools.

Even though the survey was aimed at the introduction of IT and CAT, it does provide useful information regarding the possibilities for the broad integration of multimedia resources in teaching and learning.

The survey[2] reveals, among other things, that almost all schools have computers for either administration or tuition or both. Thus the picture is not as grim as it was a few years ago.

2.5.1   ICT Projects in the FSDoE

Over the past 6 years, the FSDoE has formed partnerships with various corporate companies as an attempt to expedite the introduction of ICT at schools. As it can be expected, some partnerships were more successful than others. The following is a description of some of the partnerships on which the FSDoE embarked:

2.5.2   Telkom Foundation

As a core objective, "the Telkom Foundation strives to develop a technology-rich society in South Africa, with particular focus on Information and Communication Technologies (ICT)" (Telkom Foundation, 2006).

ICT is therefore at the heart of almost all of the Foundation's activities: its involvement in schools, community centres and empowerment initiatives inevitably has an ICT component.

The Telkom Foundation's ICT focus encompasses the planning, provisioning, maintenance and enhancement of networked computer laboratories with internet connectivity. This focus area - called ICT Infrastructure Planning and Roll-out - "coordinates, together with Telkom's assistance, the implementation of technology in schools and Community Resource Centres. The implementation of an ICT solution means provisioning software, hardware, ICT Infrastructure, Internet, Rebate, pre-requisites, enhancements and publicity boards" (ibid).

The relationship between the Telkom Foundation and the FSDoE started in 2004 and the purpose of the partnership was to provide all the 30 Dinaledi[3] schools in the Free

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[2] A copy of the survey is herewith attached as Annexure C.

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State with 20 networked computers, a printer and Internet access. So far, the objectives of the partnership have been achieved.

2.5.3   Thintana i-learn Project

The Thintana i-Learn Project, is funded by Thintana, a consortium of Telkom's strategic equity partners - SBC International and Telkom Malaysia. "The consortium has provided R21, 2 million to set up computer centres in 200 disadvantaged secondary schools equally distributed in all the nine provinces and to train a minimum of 10 teachers per school" (SchoolNet SA, 2006).

Each of these schools received between 10 and 20 networked computers with Internet connectivity. This project was implemented over a two-year period. Schools were selected in line with the strategic developmental objectives of the Provincial Education Departments. SchoolNet SA has worked very closely with the National Department of Education and its Centre for Educational Technology and Distance Education (CETDE) and the sponsors over the past two years in developing this project.

2.5.4   Intel Teach to the Future

The Intel Teach to the Future project, which is funded by Intel, is one of the few that addresses the integration of ICT in learning and teaching. It is based on the premise that "the old model of training one facilitator per school has been replaced by a model in which SchoolNet SA will train a cadre of high quality senior trainers. These senior trainers will not only work in their own schools but also be used to provide training in other schools in their region. This is subject to schools requesting the training and paying the nominal amount that covers the cost of the senior trainer" (SchoolNet SA, 2006).

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[3] Dinaledi schools are secondary schools which the national Department of Education has earmarked in all provinces for a more focused and intensive teaching of Science and Mathematics as the so-called gateway subjects. These schools are given the necessary resources to enable them to produce more learners in Science and Mathematics. Dinaledi is a Sotho word which means stars.

Incidentally, Intel in collaboration with SchoolNet SA have recently launched another project called Intel Teach Essential which is mainly about project-based learning within the context of computer-assisted education. The Intel Teach Essentials project follows the same training model as the Teach to the Future project. There are presently no statistics on how many people have been trained through this project in the Free State.

2.5.5 The E-Lapa Project

The aim of the e-LAPA project, which was funded by the FSDoE, was to demonstrate best practice for the implementation of e-Education in the Free State province through the exhibition of the educator and learner web based learning and teaching activities at an international level in London in January 2005.

The e-LAPA Project was done in collaboration with a consortium of ICT companies based in the UK with the aim of creating platforms for interaction between the UK based officials and the officials in the FSDoE. Since the visit of FSDoE officials to London in 2005 very little has been done by the FSDoE to take the project forward.

2.6 Miller's Evolutionary Model

Pam Miller's case study on the integration of computers at Pinelands High School in the Western Cape in 1997 led her to the development of an examination model on the successful integration of computers in teaching and learning. The model is called the **Evolutionary Model** and it is a hybrid of three such models that came before it, namely, the Apple Classrooms of Tomorrow **(ACOT)** Model, the **CAMI** Mathematics Model and the Make It Happen! **(MIH)** Model (Miller, 1997).

ACOT

CAMI ⎱ **Evolutionary Model**

MIH
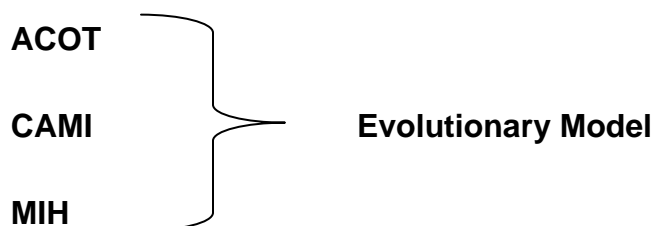
Figure 2.1

Essentially, Miller synthesized aspects of the three above-mentioned models "into one new Evolutionary Model to facilitate the examination of computer-assisted education at Pinelands High School" (Miller, p16). The following table briefly outlines the different phases of the Evolutionary Model which Miller says "do not have a particular time limit and individuals will be at different phases of their personal computer-assisted integration development" (ibid, p.18).

Table 2. 2: Summary of Miller's Evolutionary Model

Phase	Description
Phase 1: Introduction	In this phase the required hardware technology is introduced to the school in the form of computers, network systems and modems. Subsequently, the school checks the hardware for functionality. Plans are drawn up and training of prospective users begins. It is possible that the initial training may take longer than expected; the more enthusiastic teachers may begin to integrate computers in their teaching by doing simple work. At this stage, the support needed includes technical assistance, training and time to sell the idea to all members of staff.
Phase 2: Entry	In phase 2 teachers begin to use the equipment provided in phase 1. The use of the computer for simple tasks is continued by means of drill-and-practice instruction or text-based work. This is also a phase where teachers begin to lose their fear of computers as they constantly engage with it on a more basic level. Thus word processing is more likely to be the preferred teaching programme for most teachers at this stage. The teacher may also need technical assistance from time to time.
Phase 3: Intermediate	In this phase teachers and learners mainly use the computer as a tool and the word processor, database as well as a spreadsheet are the main packages used. The learner's computer work is completed more quickly than previously and the quality improves. The teacher becomes more of a facilitator and moves beyond drill-and-practice and text-based work to work of a more creative nature as he develops expertise in the computer. There is generally a desire for more forms of technology and the arrangement in classroom is adapted to maximize the use of space. The support needed in this phase has to do with the use of various instructional strategies training in the packages mentioned above.
Phase 4: Penultimate	A number of considerable improvements in the integration of computer-assisted education become evident in this phase. There is generally an exploration of a range of instructional strategies and collaboration occurs as teachers share new instructional patterns and methods. Learners also begin to cooperate as they carry out collaborative and creative project work. Thus group learning takes place. Many different computer programmes are used during this phase as learners engage in various learning activities. The support needed by teachers involves technical assistance, training in team teaching and new software and hardware packages.
Phase 5: Creation	The last phase represents an *ongoing* exploration of new teaching and learning methods and strategies and new technologies in general. The main feature of this last phase is that teachers work in collaborative teams timetables are adjusted to allow team teaching and collaborative work. In this phase teachers need time to attend relevant conferences and seminars to deepen their knowledge. They also need continual training in new and innovative technologies.

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Miller's evolutionary model supports a gradual introduction of computer-based education at schools. This approach can help to put teachers who are not comfortable with the use of computers at ease because it provides them with an opportunity to learn at their own pace as they simultaneously try a few new ideas in the classroom. The model also makes provision for both teachers and learners to work together in understanding the various uses of ICTs. Some models tend to focus more on either learners or teachers.

2.7   Conclusion

In reviewing the literature related to the integration of multimedia resources in teaching and learning, four perspectives were covered, namely, the International, African, South African and the Free State perspective. A study of international trends reveals that significant progress is yet to be made at the continental, national and provincial level.

It is the researcher's opinion that the use of computers in teaching and learning can only be achieved if money is made available for the purchase of the requisite equipment, for training in various software packages, for employment of required staff and for continuous technical assistance. This means that despite all the good intentions, the national Department of Education is still facing a challenge of putting a lot of money into the implementation of computer-based education.

CHAPTER 3   Theoretical Framework

3.1   Introduction

The purpose of this chapter is to place Computer-Assisted Language Learning (CALL) within a **broader** theoretical framework. Nothing ever exists in a vacuum and the same applies to CALL. The practice of CALL is informed by an undercurrent of supportive learning and teaching theories. Michael Levy is of the opinion that, given the comparative newness of CALL as a field of study, CALL practitioners "are likely to draw on theories from the more established disciplines that surround it" (1997, p.6). Levy further warns practitioners that "in attempting to make use of these theories, care has to be taken to ensure that the theories are applicable" (ibid).

Nonetheless, it can be argued that the applicability of theories to CALL depends largely on the researcher's intentions and his/her interpretation of the research purpose. Buys perceives each theory as a "building block in the theoretical framework" (2004, p.6). It is in the sense of 'building blocks' that chapter 3 will address itself to the theoretical underpinnings of CALL, approaches and methods in language teaching and learning theories. Figure 3.1 below, gives a schematic representation of how Chapter 3 is laid out.
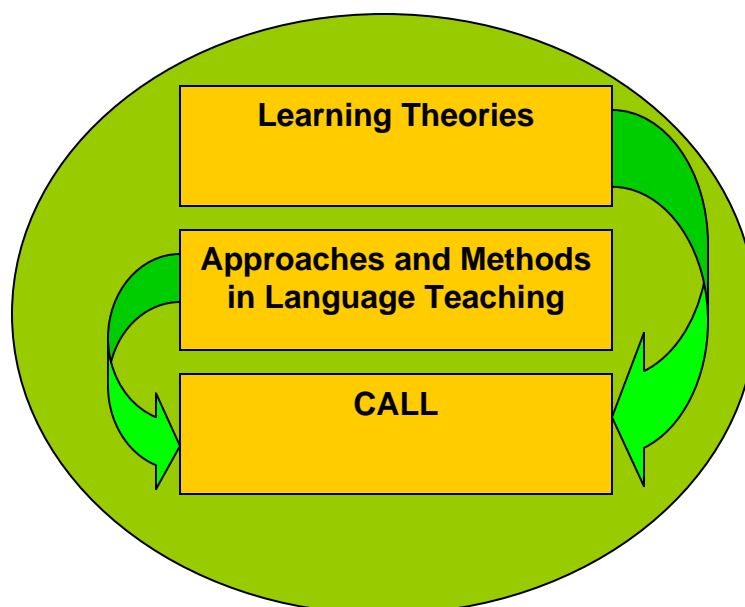

Learning Theories

Approaches and Methods in Language Teaching

CALL

Figure 3.1: Outline for Chapter 3

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3.2   Learning Theories

As a discipline, CALL cannot be completely disentangled from learning theories because learning theories concern themselves with the understanding of how learning takes place. It is therefore important for CALL practitioners to bear learning principles in mind when they either develop CALL software or apply CALL in the classroom. In the "middle of the 20th century, learning theory was dominated by the principles of **behavioral psychology** … in the 1970s, the behavioral paradigm began to be expanded by the ideas of **cognitive psychology** and … in the 1980s, a new learning paradigm, **constructivism**, began to influence education and instructional design" (Alessi and Trollip, 2001, p.16). It is worth noting that the literature also refers to behavioural psychology as behaviourism[4] and cognitive psychology as cognitivism.

3.2.1   Behaviourism

Behaviourism is a worldview that assumes a learner is essentially passive, responding to environmental stimuli. The learner starts off as a clean slate (i.e. *tabula rasa*) and behaviour is shaped through positive reinforcement or negative reinforcement. "Both positive reinforcement and negative reinforcement increase the probability that the antecedent behavior will happen again. In contrast, *punishment* (both positive and negative) decreases the likelihood that the antecedent behavior will happen again" (Learning Theories Knowledgebase, 2007).

Positive reinforcement indicates the application of a stimulus; negative reinforcement indicates the withholding of a stimulus. Learning is therefore defined as a positive change in the learner' behaviour. Much of early behaviourist work was done with animals (e.g. Pavlov's dogs) and the results were generalized to humans. Behaviourism precedes the cognitivist worldview.

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[4] The terms behaviourism and cognitivism will be used instead of behavioural psychology and cognitive psychology.

Behaviourism and Interactive Multimedia Design

According to Mark Warschauer (1996), behaviourist thinking led to the advent of a phase in the evolution of CALL which he calls behaviouristic CALL. Programmes of this phase entailed repetitive language drills and can be referred to as "drill and practice (or, more negatively, as "drill and kill").

The following table summarises the behaviourist outlook on learning:

Table 3. 1: Summary of the Behaviourist Outlook on Learning

View of the Learning Process:	Change in behaviour.
Locus of Learning:	Stimuli in external environment.
Purpose in education:	Produce behavioural change in desired direction.
Teacher's role:	Arranges environment to elicit desired response.
Typical Learning Activities:	Rote learning, memory-based assessment, repetition of tasks until the required response is given.
Exponents of Behaviourism:	Pavlov, Skinner etc

3.2.2   Cognitivism

According to Huitt & Hummel (2003), Jean Piaget was among the original exponents of the cognitive theory. As a biologist, Piaget was interested in how an organism adapts to its environment (which he described as intelligence). "Behaviour (adaptation to the environment) is controlled through mental organizations called *schemes* that the individual uses to represent the world and designate action. This adaptation is driven by a biological drive to obtain balance between schemes and the environment (*equilibration*)" (Huitt & Hummel, 2003).

Piaget hypothesized that infants are born with schemes operating at birth that he called "reflexes." In other animals, these reflexes control behaviour throughout life. However, in human beings as the infant uses these reflexes to adapt to the environment, these reflexes are quickly replaced with constructed schemes.

Piaget described two processes used by the individual in its attempt to adapt: assimilation and accommodation. Both of these processes are used throughout life as the person increasingly adapts to the environment in a more complex manner (Huitt & Hummel, 2003).

Assimilation is the process of using or transforming the environment so that it can be placed in preexisting cognitive structures. Accommodation is the process of changing cognitive structures in order to accept something from the environment. Both processes are used simultaneously and alternately throughout life (Huitt & Hummel, 2003).

As schemes become increasingly more complex (i.e., responsible for more complex behaviors) they are termed *structures*. As one's structures become more complex, they are organized in a hierarchical manner (i.e., from general to specific).

Cognitivism and Interactive Multimedia Design

According to Alessi and Trollip (2001), most instructional designers in the 1980s incorporated cognitivist principles in their work. "In computer-based instruction and interactive multimedia, screen design and presentation strategies increasingly reflected theories of attention and perception, and today designers are increasingly (though probably not sufficiently) incorporating motivation principles" (Alessi and Trollip, 2001, p.31).

Another important point in this case is that computer-based instruction was very programme-controlled in the 1960s and 1970s, however, "modern interactive multimedia programs provide a better mixture of learner and program control … instructional strategies and user control are increasingly based on individual needs and differences" (Alessi and Trollip, 2001, p.31). Alessi and Trollip go further to say that the cognitive approach has placed more emphasis on active learning and on learner activities than behaviourism.

3.2.3   Constructivism

In outlining the basic tenets of the constructivist learning theory, Alessi and Trollip (2001) define constructivism as a theory "that maintains that knowledge is not received from outside, but that we construct knowledge in our head" (Alessi & Trollip, 2001, p.31). Furthermore, there are different schools of constructivist thought. For example, according to social constructivism, learning is inherently social. Thus "what we learn is a function of social norms and interpretations, and knowledge is not simply constructed by the individual, but by social groups." (Alessi & Trollip, 2001, p.31).

Alessi and Trollip further state that the constructivist approach spread very rapidly in the early to mid-1990s. The spread of constructivism permeated "instructional design and multimedia fields" (Alessi & Trollip, 2001, p.32). An increasingly common point of view is that education has been much too objectivist, treating learners as empty vessels into which knowledge is poured.

Proponents of this constructivist approach maintain that designers should be creating educational environments that facilitate the construction of knowledge (Alessi & Trollip, 2001, p.32). In order to accomplish this goal, they suggest the following principles:

- Emphasize learning rather than teaching.

- Emphasize the actions and thinking of learners rather than of teachers.

- Emphasize active learning.

- Encourage learner construction of information and projects.

- Use cooperative or collaborative learning activities.

- Use purposeful or authentic learning activities.

- Emphasize learner choice and negotiation of goals, strategies and evaluation methods.

- Encourage personal autonomy on the part of learners.

- Support learner reflection.

- Support learner ownership of learning and activities.

- Encourage learners to accept and reflect on the complexity of the real world.

- Use authentic tasks and activities that are personally relevant to learners.

Huitt and Hummel (2003) cite the Russian, Lev Vygotsky, as the father of social constructivism. The major theme of Vygotsky's theoretical framework is that social interaction plays a fundamental role in the development of cognition. As quoted in Huitt and Hummel (2003), Vygotsky (1978) states: "Every function in

the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (inter-psychological) and then inside the child (intra-psychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals."

A second aspect of Vygotsky's theory is the idea that the potential for cognitive development depends upon the "zone of proximal development" (ZPD): a level of development attained when children engage in social behaviour. Full development of the ZPD depends upon full social interaction. The range of skill that can be developed with adult guidance (also referred to as scaffolding) or peer collaboration exceeds what can be attained alone.

Vygotsky's theory was an attempt to explain consciousness as the end product of socialization. For example, in the learning of language, our first utterances with peers or adults are for the purpose of communication but once mastered they become internalized and allow "inner speech" (Huitt & Hummel, 2003).

Constructivism and Interactive Multimedia Design

According to Alessi and Trollip (2001), advocates of the constructivist approach believe that tutorial and drill instruction, which they categorize as objectivist and instructivist, are not fit for developing lifelong learners. They also maintain that much of what is taught with traditional methods produces "inert knowledge which is not easily applied in new situations" (Alessi & Trollip, 2001, p.35).

Constructivists also argue that methodologies such as hypermedia, simulation, virtual reality and open-ended learning environments are of more benefit to learners, allowing them to explore information freely, apply their learning styles and use software as a resource rather than as a teacher. Thus activities such as writing compositions, building simulations and games and creating movies can be done using software tools (Alessi and Trollip, 2001, p.36).

3.3   Approaches and Methods in Language Teaching

In keeping with the evolution of learning theories and language learning theories, research on language teaching (over the years) has yielded an array of approaches and methods. It is important to look at the various approaches and methods for language teaching because they, to some extent, inform the conceptualization of multimedia design. For the purpose of this study, only a handful of language teaching approaches and methods will be discussed. The reason for choosing the approaches and methods mentioned below is that – in terms of their historical sequence – they represent a period of key theoretical transitions in language teaching.

Richards and Rodgers (2001, p.19) define an approach as "a set of correlative assumptions dealing with the nature of language teaching and learning. An approach is axiomatic … describes the nature of the subject matter to be taught." A method is defined as "an overall plan for the orderly presentation of language material, no part of which contradicts, and all of which is based upon the selected approach. An approach is axiomatic, a method is procedural" (Richards & Rodgers, 2001, p.19).

The following table summarises characteristics of the various language teaching approaches and methods as derived from Richards and Rodgers (2001):

Table 3. 2: Notes on Language Teaching Methods and Approaches

Name of Approach/Method	Characteristics
The Grammar-Translation Method (also known as the Prussian Method)	Reading and writing are the major focus and little attention is paid to speaking and listening.
	The sentence is the basic unit of teaching and language practice.
	Accuracy is emphasized.
	Grammar is taught deductively-that is, by presentation and study of grammar which are then practiced through translation exercises.
	The student's native language is the medium of instruction.
	Even though the grammar-translation method is still used in some parts of the world today, it has lost popularity and it lacks advocates. This method is widely used in foreign language learning.
	The grammar-translation method contains elements of a behaviourist outlook on learning in that it focuses on memorization and rote learning.
The Direct Method (also known as the Natural Method)	Classroom instruction is conducted exclusively in the target language.
	Only everyday vocabulary and sentences are taught.
	Oral communication skills are built up carefully and organized around question and answer exchanges.
	Grammar is taught inductively.
	New teaching points are introduced orally.
	Concrete vocabulary is taught through objects, pictures and demonstrations.
	Both speech and listening comprehension are taught.
	Correct grammar and pronunciation are emphasized.
	This approach also contains elements of behaviourism in the sense that it emphasizes **one correct answer** for assessment tasks.

The Audiolingual Method	It involves extensive oral instruction.
	The focus of instruction is on immediate and accurate speech.
	Attends to structure and form more than meaning.
	Demands the memorization of structure-based dialogues.
	Language learning is learning structures, sounds, or words.
	Drilling is a central technique.
	Grammatical explanation is avoided.
	The use of the student's native language is forbidden.
	Accuracy in terms of formal correctness is a primary goal.
	Behaviourism forms the basis for this method and this can be witnessed in the emphasis placed on memorization and structure.
Communicative Language Teaching (also known as the Functional Method)	Language is situated in social activity.
	Language is an effort of discourse production and comprehension i.e. communication.
	Attention is paid to both functional and structural aspects of language.
	However, the structural aspects have to be presented to learners in a situational and contextualized form.
	Content should be made real (authentic) through the use of media such as pictures, sketches, diagrams and other representations.
	The learner is a partner in learning rather than a passive recipient of information.
	This method contains elements of the cognitive and constructivist learning theories because of its emphasis on social activity and situational learning.
CALL	A more detailed discussion of this approach follows in paragraph **3.4** below.

3.4   Computer Assisted Language Learning (CALL)

CALL is used "as a general term to cover all roles of the computer in language learning" (Levy, 1997, p.81). In attempting to define CALL, Mark Warschauer (1996) has identified three distinct phases in its development, namely; *.behaviouristic CALL, communicative CALL and integrative CALL*. The following is a discussion of each phase:

3.4.1   Behaviouristic CALL

According to Mark Warschauer (1996), the first phase of CALL, conceived in the 1950s and implemented in the 1960s and '70s, was based on the then-dominant behaviourist theories of learning. Programmes of this phase entailed repetitive language drills and can be referred to as "drill and practice (or, more negatively, as "drill and kill")". Warschauer also refers to this phase as *Behaviouristic CALL.*

Warschauer goes further by citing a connection between drill and practice courseware and behaviourism. According to him, "drill and practice courseware is based on the model of *computer as tutor (*Taylor, 1980 *as cited in Warschauer, 1996*). In other words the computer serves as a vehicle for delivering instructional materials to the student. The rationale behind drill and practice was not totally inauthentic, which explains in part the fact that CALL drills are still used today" (Warschauer, 1996). The rationale that Warschauer refers to can be outlined as follows:

"Repeated exposure to the same material is beneficial or even essential to learning. A computer is ideal for carrying out repeated drills, since the machine does not get bored with presenting the same material and since it can provide immediate non-judgmental feedback (Warschauer, 1996)."

Thus a computer can present such material on an individualized basis, allowing learners to proceed at their own pace and freeing up class time for other activities. Based on these notions, a number of CALL tutoring systems were developed for the

mainframe computers which were used at that time. One of the most sophisticated of these was the PLATO system, which ran on its own special PLATO hardware, including central computers and terminals. The PLATO system included vocabulary drills, brief grammar explanations and drills, and translations tests at various intervals.

Warschauer further argues that in the late 1970s and early 1980s, "behavioristic CALL was undermined by two important factors. First, behavioristic approaches to language learning had been rejected at both the theoretical and the pedagogical level. Secondly, the introduction of the microcomputer allowed a whole new range of possibilities. The stage was set for a new phase of CALL" (Warschauer, 1996).

3.4.2 Communicative CALL

Warschauer (1996) traces the history and prominence of communicative CALL to the 70s and 80s. Proponents of communicative CALL felt that behaviouristic CALL did not allow enough authentic communication to be of much value. According to John Underwood (1984), as cited in Warschauer (1996), communicative CALL has the following characteristics:

- It focuses more on using forms rather than the forms themselves.

- It teaches grammar implicitly rather than explicitly.

- Allows and encourages learners to generate original utterances.

- Avoids telling learners they are wrong because exercises are based on personal interpretation and critical thinking.

- Communicative CALL is based on the model: computer as a stimulus and computer as a tool or workhorse.

3.4.3   Integrative CALL

Integrative CALL became prominent in the 90s. It was presaged by the advent of multimedia computers and the Internet. Multimedia technology is exemplified by the CD-ROM and allows a variety of media namely; text, sound, graphics, animation and media to be accessed on a single machine. Thus integrative CALL is premised on the integration of various forms of media as mentioned above. Warschauer (1996) further states that integrative CALL has the following characteristics:

- A more authentic learning environment which combines a range of language skills such as listening with speaking.

- Skills are easily integrated since a range of media combine reading, writing, speaking and listening.

3.5   The Benefits of CALL

One way to justify the need for CALL is to delineate its potential benefits for teaching and learning. Cullen Church (2002) conducted research on the advantages of CALL in the context of foreign language studies at Pôle National University in Djibouti. According to Church, the following are some of the advantages of CALL:

- Computer technology combines text, sound, still and motion pictures in hypermedia.

- Hypertext allows a user to read a passage and then click on a word or phrase in question. That link may then offer a definition, examples of usage, an image or even an audible pronunciation of the word.

- Learners don't have to wait for assistance from a teacher. They can study from any location where access is available and at any time.

Ravichandran (2000) also lists a few advantages of CALL in his study on the advantages and apprehensions relating to CALL. The following are listed as some of CALL's benefits:

- CALL programmes provide additional time and individualized practice to meet learning objectives.

- The computer can be used for adapting instruction to the unique learning styles of individual learners.

- By using the computer, learners are often able to use their Academic Learning Time (ALT) more fruitfully.

- The computer can give instantaneous feedback and help the learner ward off any misconceptions at the initial stages of learning.

- A computer can analyze the specific mistakes the learner has made and can lead the learner not only to self-correction, but also to understanding the principles behind the correct solution.

- CALL facilitates the synthesis of the pre-planned syllabus and learner syllabuses "through a decision making process undertaken by teacher and learners together" Ravichandran (2000).

3.6   Conclusion

In describing the development of CALL materials, Levy (1997) is of the opinion that "the way in which CALL is conceptualized can be largely determined by the hardware and software that is used, this initial design choice is the most important one, and it can have a sweeping influence on what is ultimately created" (p.2). However, it is important to realize that apart from hardware and software, there are other factors such as learning theories, language teaching approaches and learner needs which must be taken into consideration when teachers choose multimedia materials for their classrooms.

Levy also remarks that despite all the inroads that have been made in developing CALL materials, such as the ones that constitute Warschauer's integrative CALL,

CALL "remains a peripheral interest in the language teaching community as a whole, still largely the domain of the CALL enthusiast" (Levy, 1997, p.3).

However, it has to be pointed out that considering the publication date of Levy's book, it is possible that the language teaching community in general is currently showing more interest in CALL than it was the case in the 90s. It is also the researcher's opinion that all language teachers need to have a good grounding in learning theories as well as language teaching approaches and methods in order for them to develop an understanding of their classroom and the rationale behind the choices they make in terms of teaching.

If a language teacher knows and understands learning theories/language teaching approaches, he/she will be able to make informed decisions on the multimedia programmes he/she can buy in the market for the benefit of his/her learners. For example, the NCS places a great deal of emphasis on constructivism and communicative language teaching and the language teacher can always search for materials that reinforce these two.

CHAPTER 4   Analysis Of A Tswana Multimedia Resource

4.1   Introduction

This chapter is divided into two sections in which the first section gives an evaluative review of one Tswana multimedia educational programme. The second section outlines methods used in gathering data. The analysis and interpretation of research data will be given in chapter 5. In trying to justify the first section, it may not be enough to simply describe the use of Tswana multimedia programmes without looking at the educational quality of what the market has to offer.

4.2   An Evaluative Review of a Tswana Multimedia Resource

In appraising any software, the assessor is expected to use an assessment tool that best describes the features of the software being reviewed. In this case, the challenge is to find a 'suitable' CALL tool from a maze of tools that are on offer. For the purpose of this study, a CALL software evaluation form drawn from the website of ICT for Language Teaching (ICT4LT) will be used to appraise the one multimedia programme available.

The reason for this choice is that, in the researcher's opinion, the ICT4LT evaluation tool covers a wide range of criteria that need to be considered when software of this nature is reviewed. The evaluation tool is in fact a checklist that covers aspects of multimedia design such as screen design, user-friendliness and nature of the interaction.

Evaluating CALL software is not a straightforward task. It's quite different from evaluating a book. A good deal of the contents of a CALL programme may not be immediately visible and will only appear if the user follows a particular route. The following form is designed mainly for evaluating software packages that are intended to be used offline and are started from a hard disk on a stand-alone computer, from a network server, or from a CD-ROM or DVD-ROM.

Many of the criteria also apply to evaluating websites and web pages that contain interactive materials. The multimedia programme to be appraised is 'Polokelo ya Dithutiso' by Sherston-Sheshani. It is also worth noting that the multimedia programme mentioned above is listed in the catalogue of approved multimedia materials within the Free State Department of Education. The reason for choosing Polokelo ya Dithutiso is that it is the only programme that is written and made available in Tswana. The ICT4LT evaluation form has been adapted to suit the purpose of the intended review. For example, instead of 'ticking' yes or no for all questions, a more descriptive answer will be given for each question.

Table 4. 1: An Evaluative Review of a Tswana Multimedia Resource

Title of software package / program: Polokelo ya Dithutiso by Sherston-Sheshani
Aspects of the Curriculum
The programme covers most of the Learning Outcomes for languages as reflected in the National Curriculum Statement for Grades 8 and 9 i.e. Listening, Reading and Viewing, Writing and Presenting as well as Language. The only Learning Outcome that is not covered is Speaking. Exercises are done on the basis of relevant Assessment Standards.
Is the level of language that the program offers clearly indicated?
The teachers' note does give an indication that the programme is meant for additional language speakers of Tswana. However, it also states that Home Language speakers of Tswana can use the programme.
Is it easy to start the program?

Once installed, it is fairly easy to start the programme. The entry page gives the user a choice to follow the learner stream or teacher stream.

Is the user interface easy to understand? (For example, is the screen layout clear and easy to interpret?)

The programme uses a clear graphic user interface which is easy to understand. The user even has a choice to pick either a girl's voice or boy's voice for sound interaction.

Is it easy to navigate through the program?

It is easy to navigate through the programme. However, in multiple choice exercises the user is not able to proceed to other questions if a question is not answered correctly. The navigation is made easy by the hyperlinks on the left side even though there are no forward and back buttons within the exercises. The absence of forward and back buttons is definitely a shortcoming in the programme because the user has to go out of the exercise and start afresh.

Are icons that are used to assist navigation (e.g. back to the homepage, exit) clear and intelligible?

Icons used to assist navigation are clear and intelligible and they are also made clearer by the fact that each icon has a description next to it.

Is it always clear to the learner which point s/he has reached in the programme?

The programme gives the learner a list of exercises in different forms. For example there are multiple choice exercises, fill-in exercises, edit exercises etc. In this case, the learner will always know the topic with which he/she is dealing and the type of exercise he/she is working on.

Does the programme include scoring?

The programme does include scoring and a summary of a learner's performance in various exercises is given in the form of a report.

If a scoring system is used, does it make sense?

For multiple choice questions, the programme gives immediate feedback if an answer is either right or wrong. Furthermore, after each exercise, the user can see the questions that he/she got right and the ones that he/she got wrong.

If a scoring system is used, does it encourage the learner?

The scoring system does encourage the learner in the following ways: the feedback given has a positive tone, for example, the programme will tell the user that he/she is unlucky "o tlhokile lesego" instead of telling the user that he/she is wrong. In certain types of exercises, the learner is also given a hint of the correct answer.

Is the learner offered useful feedback if s/he gets something wrong?

The feedback given is very limited in scope in that it only states either

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the correctness or wrongness of an answer. In some cases, the multiple choice questions the learner is given hints of a correct answer when the programme flashes the correct answer in red.
If the learner gets something right purely by chance, can s/he seek an explanation in order to find out why the answer is right?
No, there are explanations given for answers.
Can the learner seek help, e.g. on grammar, vocabulary, pronunciation, cultural content?
No, the content is limited to the given exercises.
Does the program branch to remedial routines?
No, the only remedial choice the learner has is to repeat the exercises until he/she gets the answer/s right.
Can the learner easily quit something that is beyond his/her ability?
Yes, the learner can quit the exercise by clicking on the exercise menu.
Are the grammar and vocabulary used in the programme accurate?
The grammar and vocabulary used are to a large extent accurate, however, there are certain aspects of the programme that reveal English text. This means that such text was not translated to Tswana.

Does the programme offer cultural insights?
Yes, but such insights are only offered through exercises where cultural topics are dealt with.
If the programme includes pictures, are they (a) relevant, (b) an aid to understanding?
The programme does not include pictures.
If the programme includes sound recordings, are they of an adequate quality?
The only sound recordings are the voice prompts for exercises. These are of adequate quality.
If the programme includes sound recordings, are they (a) relevant, (b) an aid to understanding?
The voice prompts serve to guide the user through the programme rather than shed light on the content of the programme.
If the programme includes sound recordings, is there a good mix of male and female voices and regional variations?
Yes, the user can choose to be guided by either a male or female voice.
Can the learner record his/her own voice and play it back?

No, the programme does not provide opportunities for sound recordings.
Is the programme relevant to your national / regional / departmental programme of study?
Yes, the programme has relevance to the Learning Outcomes for languages as stipulated in the National Curriculum Statement.

In sum, Polokelo ya Dithutiso is a typical 'drill and practice' tool for learners who need to spend time practicing tricky aspects of language such as spelling and language rules. The programme does not seem to offer anything in the way of pictures, video clips and animations. This can be regarded as the biggest shortcoming of the programme. The programme is based on the behaviourist learning theories which, inter alia, presuppose the need for a single correct answer.

4.3 Research Method

A *descriptive* survey is an overall research approach of this study. The reason for the choice of a survey is that it "gathers data at a particular point in time with the intention of describing the nature of existing conditions, or identifying standards against which existing conditions can be compared (Cohen, Manion and Morrison, 2000, p.169). In this case the Tswana teacher's existing conditions in relation to CALL are explored.

4.3.1   Data Collection Method

The data collection strategy involved the use of a questionnaire[5] (see justification for the choice of this method in paragraph 1.8 of the first chapter).

In short, the questionnaire seeks to establish the kind of experience Tswana teachers have had in the use of multimedia resources. For this purpose, the questionnaire uses a number of closed questions. Closed questions are useful in eliciting specific answers from the respondents. The questionnaire also covers a number of topics as can be seen in table 4.2 below.

Table 4. 2: Topics covered in the Research Questionnaire

TOPIC	TYPE OF INFORMATION
Teaching Experience	Personal Details
Age	Personal Details
Qualifications in Tswana	Personal Details
Gender	Personal Details
Team Teaching	Integration
Group Work	Integration
Computer Ownership	Personal details, Support Infrastructure

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[5] Herewith attached as Annexure D. NB: the questions used in the questionnaire are informed by Miller's Evolutionary Model.

In-service Computer Training	Professional Development
Self-funded computer course	Professional Development
Purchased Subject Software	Support Infrastructure
Use of the Computer at School	Support Infrastructure
Teaching	Integration
Use of the Computer at home	Personal details, Integration
Decision-making	Support Infrastructure
Access to a computer application	Support Infrastructure

4.3.2   Research Procedure

In the context of this study, research procedure entails the process followed in administering the questionnaire to schools and retrieving it for the purpose of further analysis. The study involved cluster sampling in terms of the grouping of Tswana teachers as subjects of the research. For example, by "cluster sampling, the researcher can select a specific number of schools and test all the students in those selected schools i.e. a geographically close cluster is sampled" (Cohen, Manion and Morrison, 2000, p.101).

Out of the 10 secondary schools that offer Tswana in the Motheo District, 3 Tswana teachers from each school were requested to complete the questionnaire. The following is a list of schools to which the questionnaire was administered:

- Tsoseletso Secondary School

- Sehunelo Secondary School

- Kaelang Secondary School

- Albert Moroka Secondary School

- Moroka Secondary School

- Goronyane Secondary School

- Phetogane Secondary School

- Strydom Secondary School

- Ikaelelo Intermediate School

- RT Mokgopa Secondary School

In order to maintain gender representivity, the general expectation is that one out of every three teachers will be female. However, this may differ from school to school.

It must be emphasized that this study has, by no means, sought to make sweeping generalizations about the experiences of *all* Tswana teachers regarding the use of multimedia programmes.

The credibility of data gathered in any form of research hinges on a number of factors. Among these factors, the *validity* and *reliability* of a research method cannot be taken for granted.

According to Cohen, Manion and Morrison (2000), validity is defined as "a demonstration that a particular instrument in fact measures what it purports to measure" (p 105).

Reliability is defined as a demonstration that if research "were to be carried out on a similar group of respondents in a similar context (however defined), then similar results would be found" (Cohen, Manion and Morrison, 2000, p.117).

In order to ascertain the validity of the questions used in the questionnaire, the researcher gave it to teachers in two primary schools for a separate set of responses[6]. In this case, respondents were asked to also comment on the questions they cannot understand. This is a form of *triangulation,* more specifically methodological triangulation. Cohen, Manion and Morrison define triangulation as a "powerful way of demonstrating concurrent validity, particularly in qualitative research" (2000, p.112).

The rationale behind this approach is that preliminary responses can also reveal to the researcher whether there is consistency in the way questions are answered. Inconsistency could be caused, among other things, by the dubious nature of certain questions thus resulting in the disqualification of certain responses at the time of data analysis. Five of the six questionnaires administered at the two primary schools for the pilot were completed.

The sixth one was not completed because the teacher who was supposed to complete it reported sick and did not come to work. Generally, the respondents found the questions to be clear and understandable. This means that the researcher could now take the questionnaire to the ten target schools in the Motheo District.

In order to administer questionnaires at schools in the Free State, the Free State Department of Education expects researchers to submit a formal application for which they are given a permit letter[7].

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[6] Responses obtained from this exercise will not form part of the final analysis of data.
[7] Herewith attached as Annexure F.

The letter is then used by the researcher to access schools. Teachers were given two days to complete the questionnaire. This time frame was deemed reasonable by the researcher owing to other priorities that teachers have to attend to.

4.4   Conclusion

The review of Polokelo ya Dithutiso in this chapter gives a picture of the type of material Tswana teachers are likely to use if they begin to integrate multimedia resources in their teaching. Firstly, the catalogue of the Free State Department of Education reveals that there are very few multimedia programmes for Tswana. Secondly, the material reviewed in this chapter does not incorporate pictures, video and animations. Thus it is largely made up of text. Furthermore the research approach and data collection method outlined in this chapter are the ones leading to the findings in Chapter 5.

CHAPTER 5   Summary Of Results And Findings

5.1   Introduction

The purpose of this chapter is to give a summarized analysis of the data collected from the survey following the research approach and data collection method outlined in chapter 4. Based on the analysis, findings and recommendations for further research are given in an attempt to make a contribution to the body of research that is in line with the integration of multimedia resources in teaching Tswana or any other official language in South Africa.

5.2   Distribution and Retrieval of Questionnaires

As described in chapter 4, the research targeted 10 Secondary Schools in the Motheo District of the Free State Department of Education. The names of the schools are given in the same chapter. In distributing the questionnaire for the collection of data, 3 Tswana teachers per school were requested to complete it. Thus all in all, thirty completed questionnaires were expected on retrieval. Furthermore, despite the fact that it takes approximately 20 minutes to fill in the questionnaire, teachers were given 2 days to complete it in consideration of other competing priorities.

As explained in an introductory letter to the principals, the questionnaire would be collected on Thursday 04/10/2007, after they were delivered on Monday 01/10/2007. The letter further states that "it is not necessary to attach signatures or names on the questionnaire. In reporting results, only statistical summaries of the responses will be used. The names of schools will not be mentioned."

On 04/10/2007 only 24 questionnaires were retrieved instead of 30. The reason for the shortfall is that at one school two teachers were on sick leave.

At another school, only two teachers teach Tswana and at three other schools only two instead of three teachers completed the questionnaire (no reason was given in this regard). After collecting the questionnaires, the data was transferred to an Excel template prepared by Dr. M. Kidd of the Statistics Department at the University of Stellenbosch. Subsequently, the template was e-mailed to Dr. Kidd for data analysis.

5.3   Data Analysis and Synthesis

The data collected from the administered questionnaire can be summarized into eight sub-topics even though the questionnaire itself has 15 sub-topics. The ensuing data analysis will be discussed according to the following sub-topics:

- Experience as Tswana Teachers (including Age, Qualifications and Gender)

- Team Teaching (including Group Work)

- Computer Ownership

- Computer Training (including in-service training and self-funded courses)

- Availability of subject software

- Use of computer (at school, in teaching and at home)

- Computer related decision making

- Access to a computer application at school

5.3.1   Experience as Tswana Teachers

This section of the questionnaire sought to elicit data about the respondents' experience in teaching Tswana as a subject. Thus the respondent's overall teaching experience may vary from their actual experience as Tswana teachers. The experience of the respondents in teaching Tswana ranges from 1 to 30 years with 8 out of 24 respondents having no more than 5 years experience.

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In some cases the teachers might have been teaching for more than ten years but only started teaching Tswana when their schools experienced staff shortages in this subject.

As shown in figure 5.1 below, the subject experience of 14 respondents out of 24 ranges between 10 – 30 years.
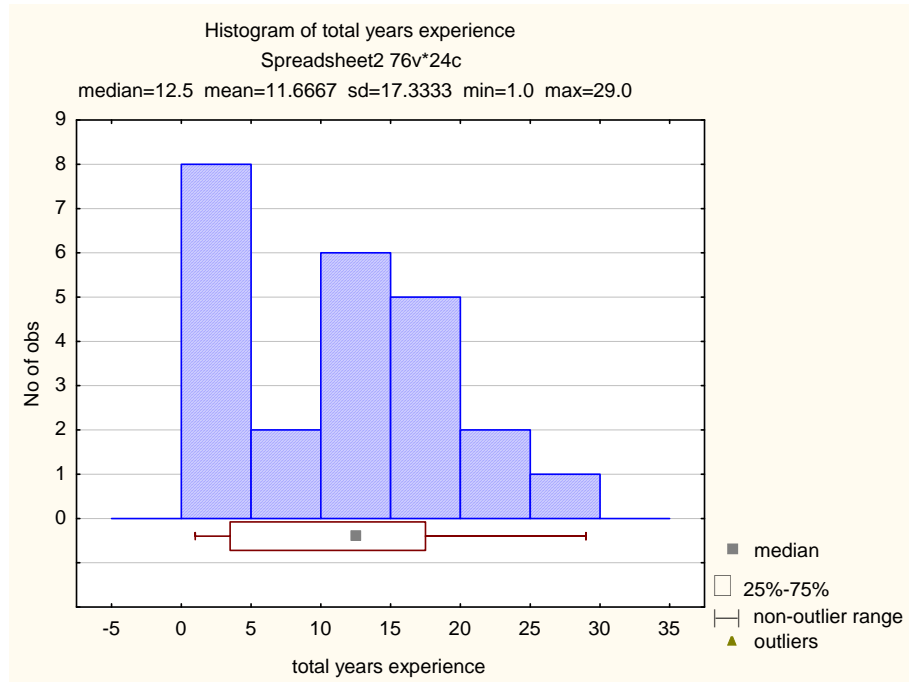
Figure 5.1: Experience of Respondents

In terms of age, exactly 12 out of 24 respondents are somewhere between 30 and 40 years old. Interestingly, none of the respondents is below 30 years old. Furthermore, about 21% of the respondents hold a second year qualification in Tswana and 63% of them hold a third year qualification. Only 8% have obtained an honours qualification in Tswana and none for Masters or Doctoral degrees. The gender of the respondents is split between 29% male and 71% female. This is interesting because one of the common assumptions is that there are more male than female teachers at secondary schools.

5.3.2   Team Teaching and Group Work

Team teaching is an approach that teachers are encouraged to use within the context of Outcomes-Based Education. It involves collaborative work between two or three teachers in teaching a specific aspect of a subject. For example, Tswana teachers can decide to address a particular aspect of a learning programme together while using different methods. Thus team teaching does not constitute the use of a single method of teaching. Responses show that even though 88% of the respondents are involved in some form of team teaching as part of their work (see figure 5.2), it is only 8% of them who use computers as part of their team teaching.
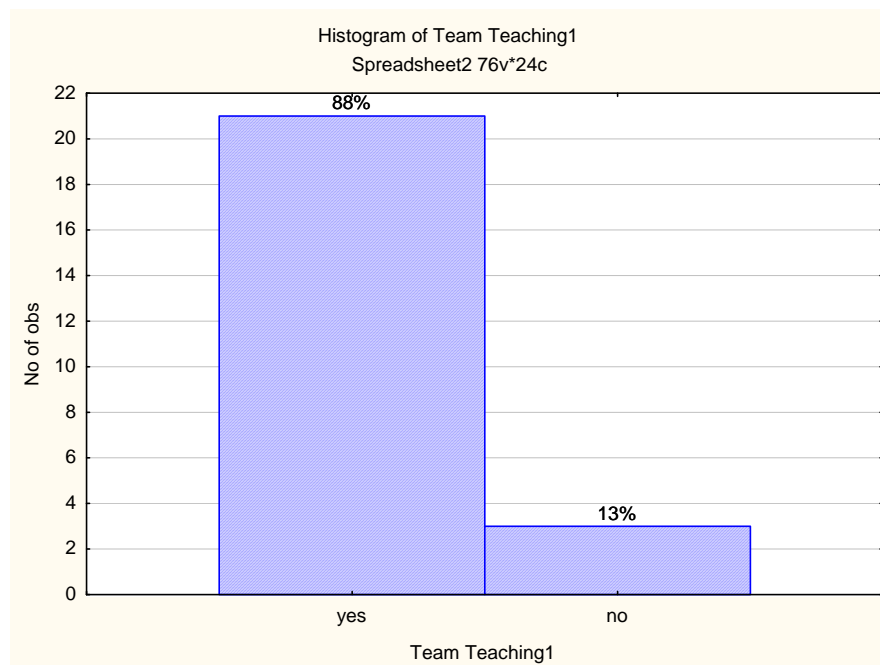
Figure 5.2: Use of Team Teaching

Group work is a mandatory method of teaching in Outcomes-Based Education. The use of group work is premised on the view that learning also happens within a social context. Similar to team teaching, most teachers (92%) use group work but very few (8%) of them have used the computer as part of this method (see figures 5.3 and 5.4 below).

Group Work 1: Do you use group work in your teaching?
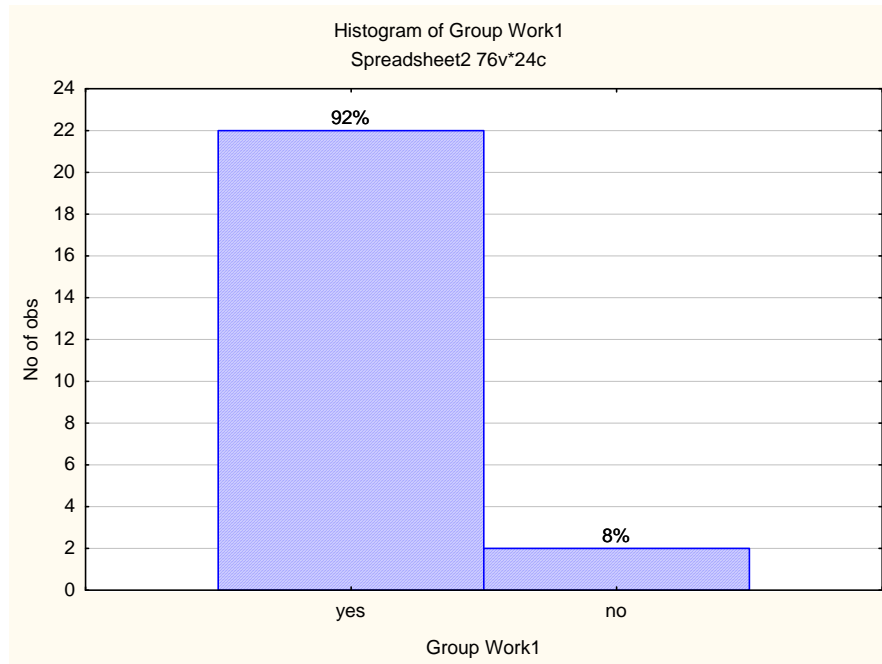
Figure 5.3: Number of teachers who use group work

Group Work 2: If yes, do you use the computer for group work in your teaching?
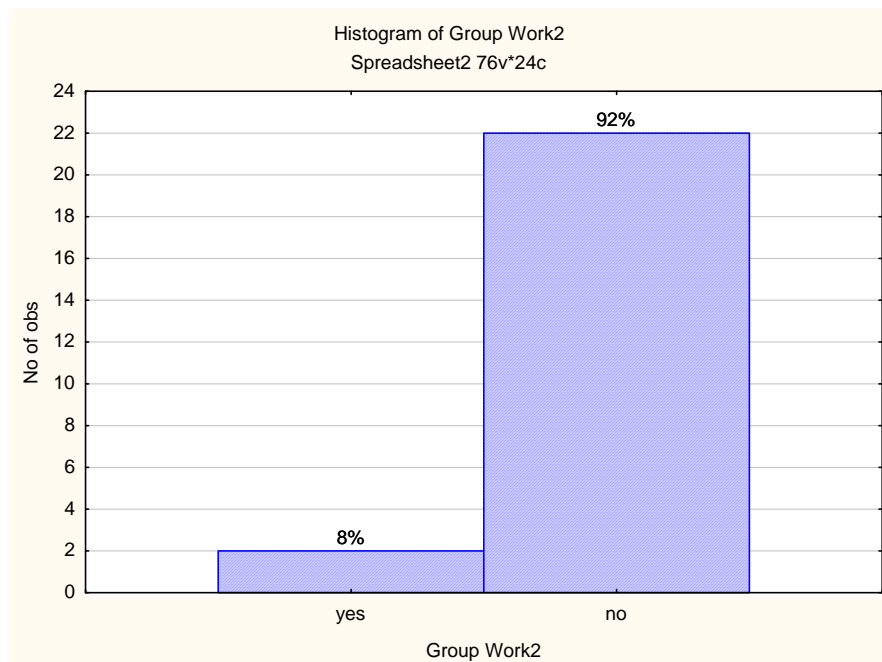
Figure 5.4: Number of teachers who use computers in Group Work

5.3.3   Computer Ownership

About 58% of respondents have computers at home and 42% do not. Of this 58%, only 33% have used the computer at home to plan for their work as can be seen in the figures 5.5 and 5.6 below. Ownership of a computer at home is important for lesson planning. A computer at home can be used for typing lesson plans, preparing presentations, typing tests, memos and notes. It is therefore an advantage to a teacher if he/she owns a computer at home.

Computer Ownership 1: Do you have a computer at home?
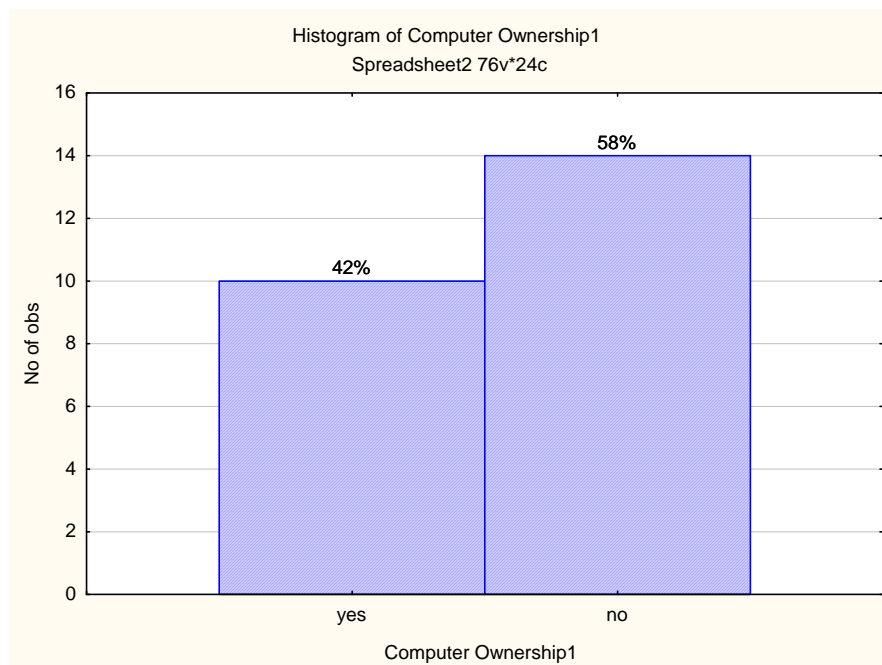
Figure 5.5: Number of teachers who own computers

Computer Ownership 4: Do you ever use your computer for your work?

Histogram of Computer Ownership4
Spreadsheet2 76v*24c
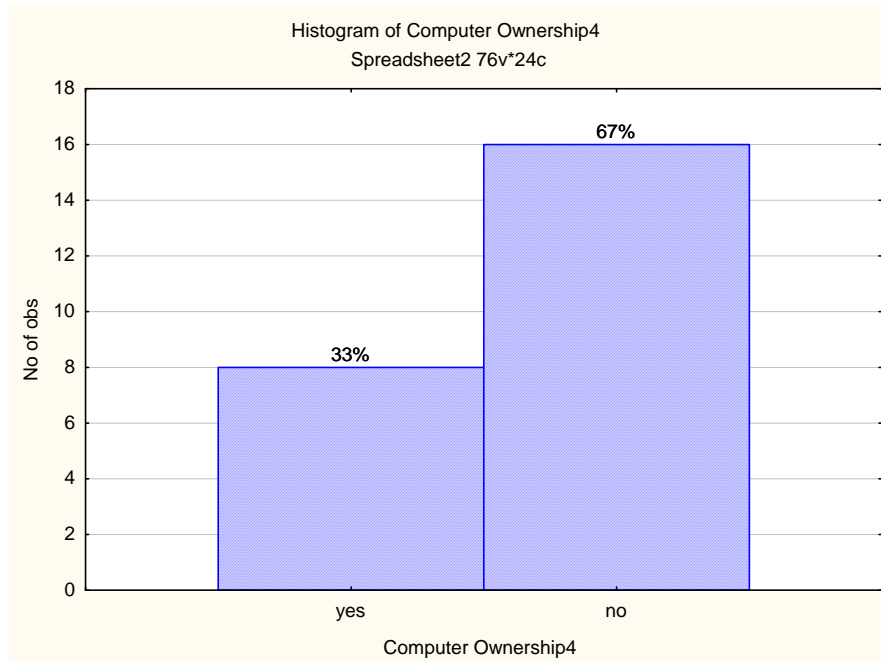
Figure 5.6: Work-related use of computers

5.3.4   Computer Training

According to Miller's evolutionary model, the introductory phase of the model entails, among other things, the training of prospective users of software. Thus training is regarded as a point of departure in the process of implementing computer-based education. In this section of the questionnaire, teachers were asked to respond to questions relating to their in-service computer training and self-funded computer course/s. In terms of in-service computer training, only 46% of respondents have ever received any form of training in word processing, 42% in the use of spreadsheets and 25% in the use of a presentation application. The rest of the other applications such as databases, e-mail and internet range between 8% and 13% (see figures 5.7, 5.8 and 5.9 below).

In-service Computer Training 1: Word Processing

Histogram of In-service Computer Training1
Spreadsheet2 76v*24c
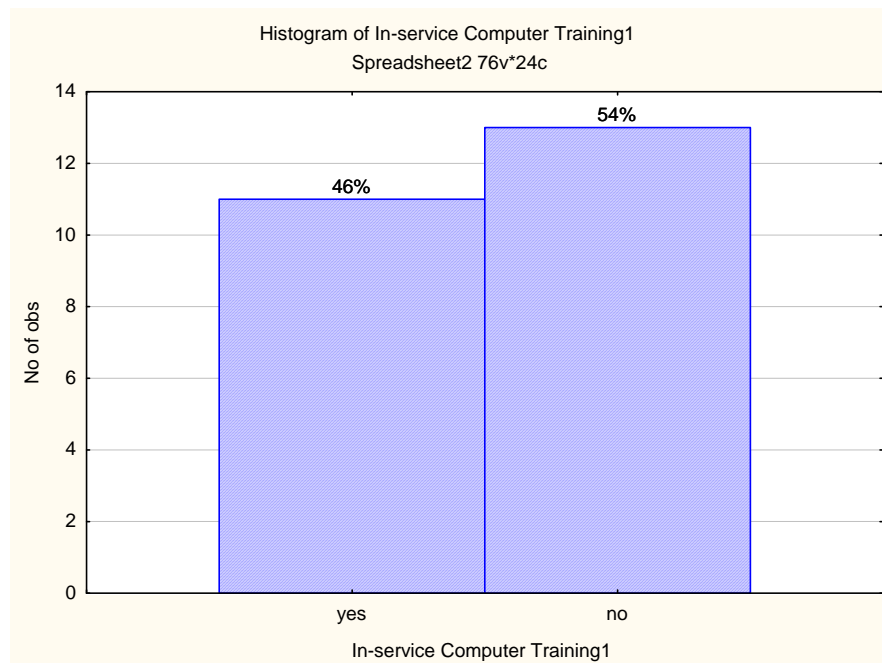
Figure 5.7: In-service Computer Training – Word Processing

In-service Computer Training 2: Spreadsheets

Histogram of In-service Computer Training2
Spreadsheet2 76v*24c
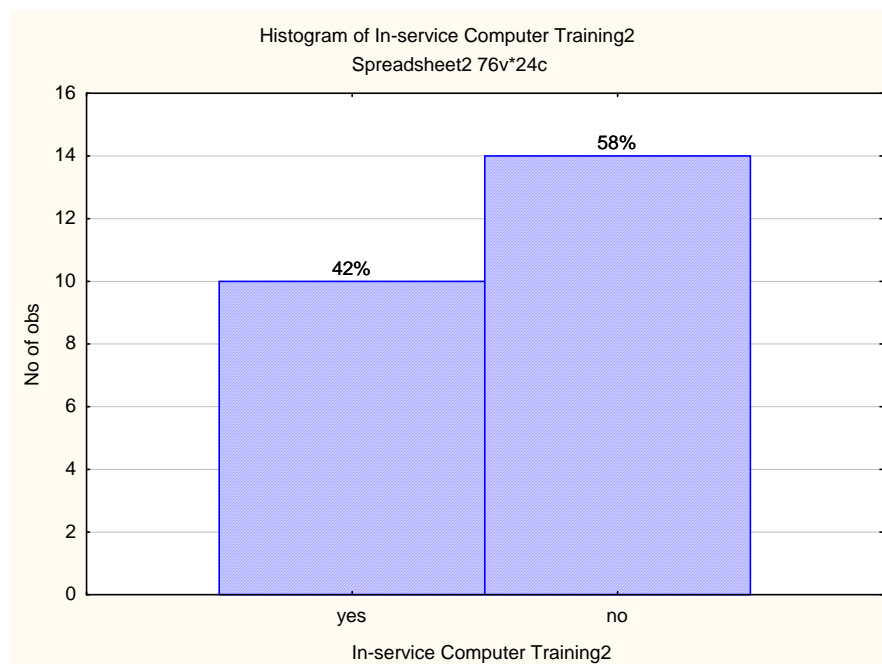
Figure 5.8: In-service Computer Training – Spreadsheets

In-service Computer Training 4: Presentation Application
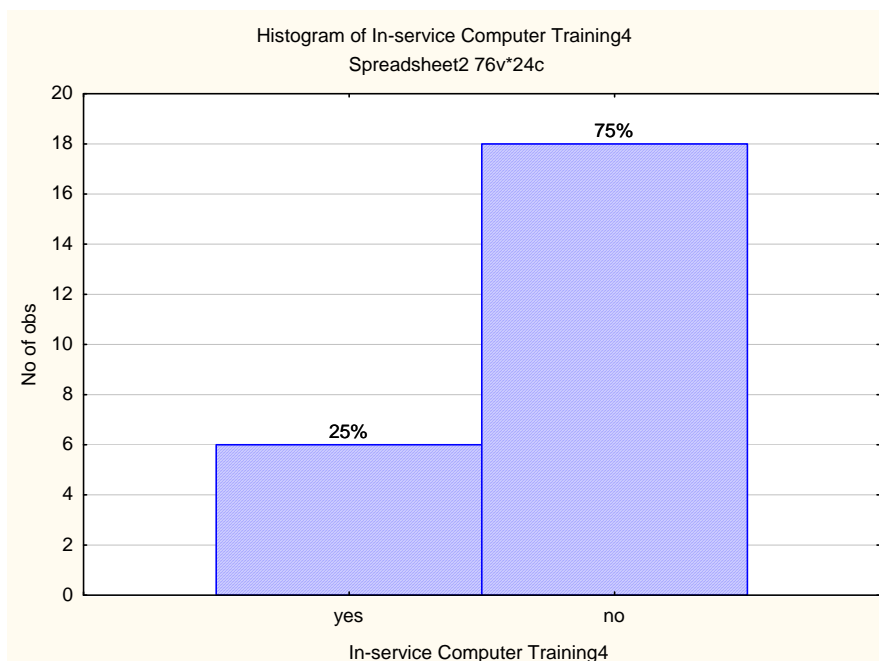
Figure 5.9: In-service Computer Training – Presentation Application

As to self-funded computer course/s, only 25% of the respondents have ever attended a computer training course funded by themselves and 21% of these respondents attended their courses at a teacher centre. In the Free State there are 5 Education Resource Centres (ERCs) which were established for teacher training. These ERCs organize various forms of training for teachers from time to time (see figures 5.10 and 5.11 below).

Self-funded Computer Course: Attended a Self-Funded Course

Histogram of Self-funded Computer Course
Spreadsheet2 76v*24c
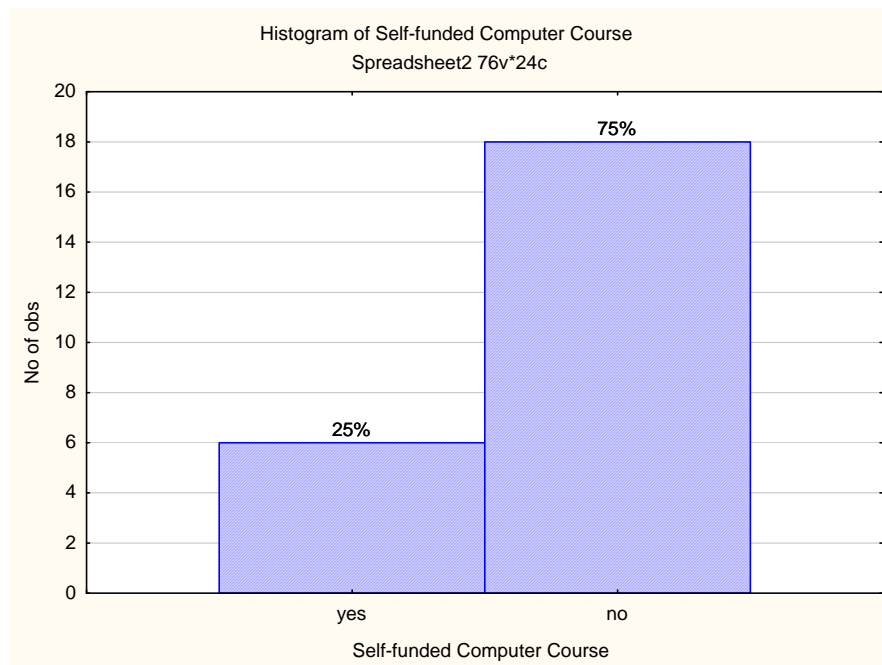
Figure 5.10: Teachers who funded their own training

Course: Teacher Centre

Histogram of Course(teacher centre)
Spreadsheet2 76v*24c
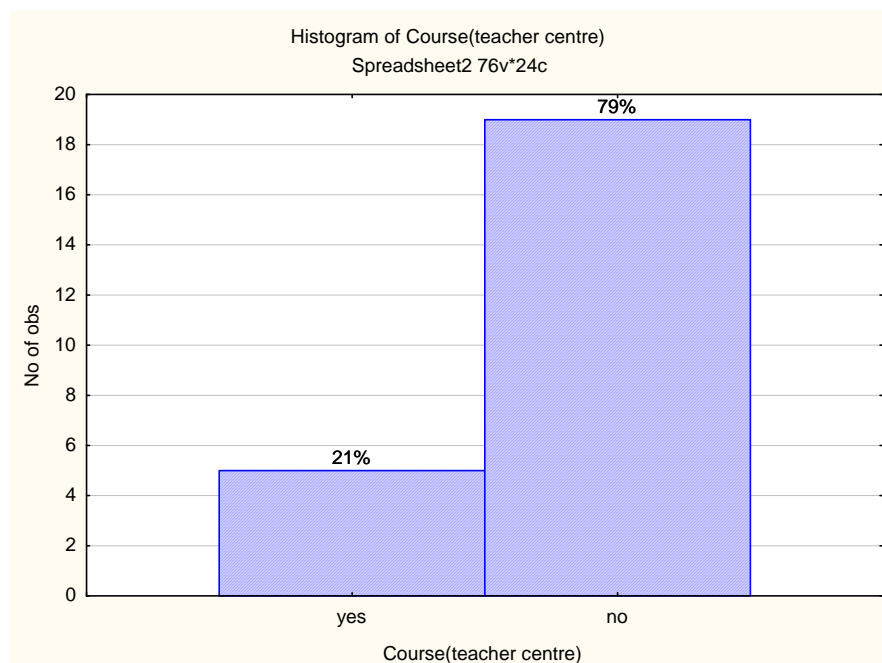
Figure 5.11: Teachers who attended training at teachers' centres

5.3.5   Availability of Subject Software

The availability of Tswana multimedia programmes is one of the main focus areas of this survey. It is therefore fitting to have a section in the questionnaire that deals specifically with this issue. In this segment of the questionnaire, respondents were asked to indicate whether their schools are in possession of Tswana multimedia programmes and the overwhelming response is that none of the schools has ever bought a Tswana multimedia programme even though there are two programmes in the departmental catalogue which they could have bought (see figure 5.12 below).

Bought subject software
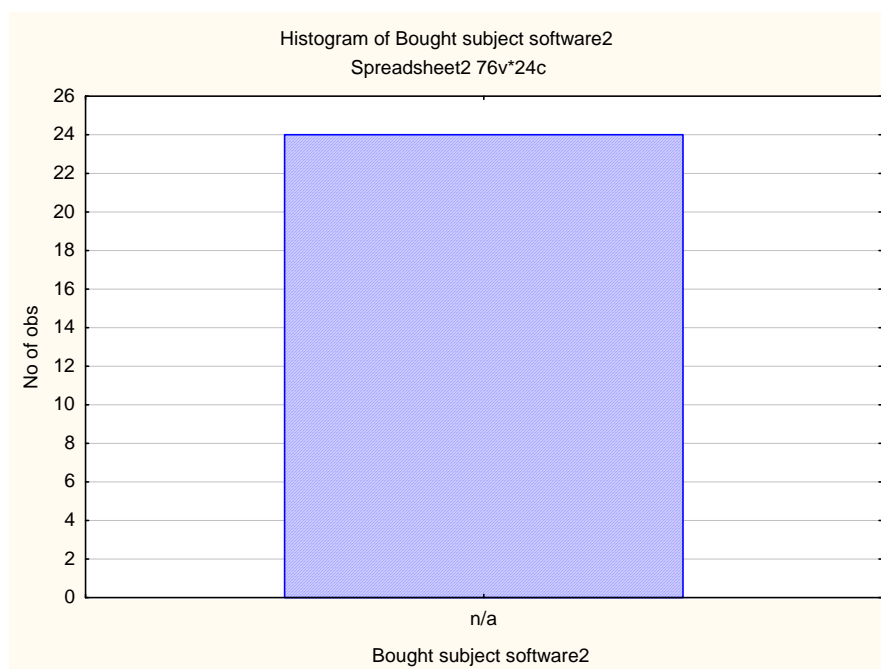
Figure 5.12: Teachers who bought own software

5.3.6 Use of computer

Even though schools covered in the survey have never purchased a Tswana multimedia programme per se, it is still possible for Tswana teachers – who have access to computers at their schools - to use the computer for planning, presentations, assessment etc. This section of the questionnaire deals with the use of computers at school, in teaching and at home. Responses indicate that only 13%

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of respondents use a word processor on a weekly basis and 75% of them never use a word processor. Only 4% of the respondents use a spreadsheet on a weekly basis and 83% of them have never used a spreadsheet and the same applies to the use of a presentation package (see figures 5.13 and 5.14 below).

Computer at school: Use of Word Processor
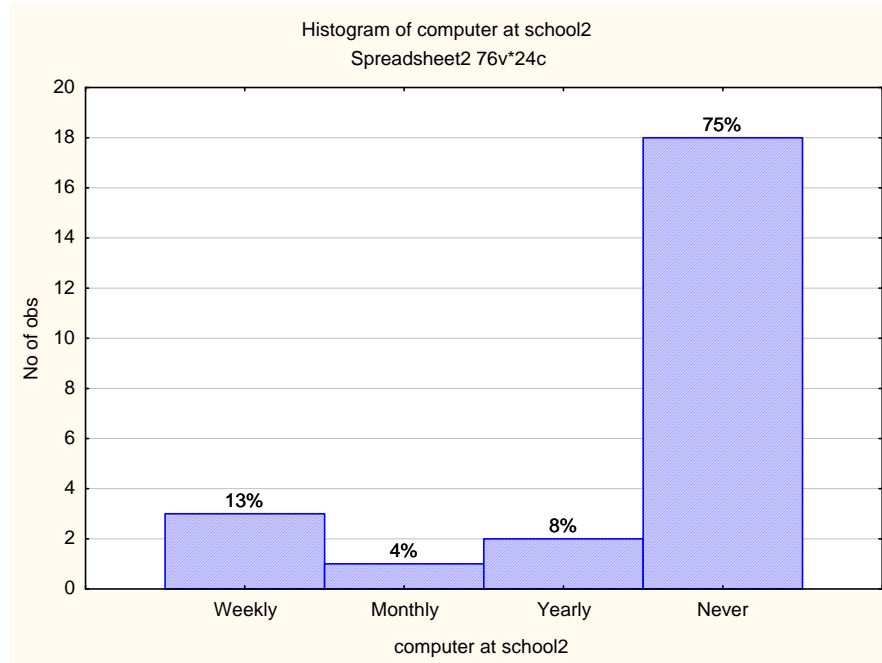
Figure 5.13: Use of word processor at school

Computer at school: Use of Spreadsheet

Histogram of computer at school4
Spreadsheet2 76v*24c
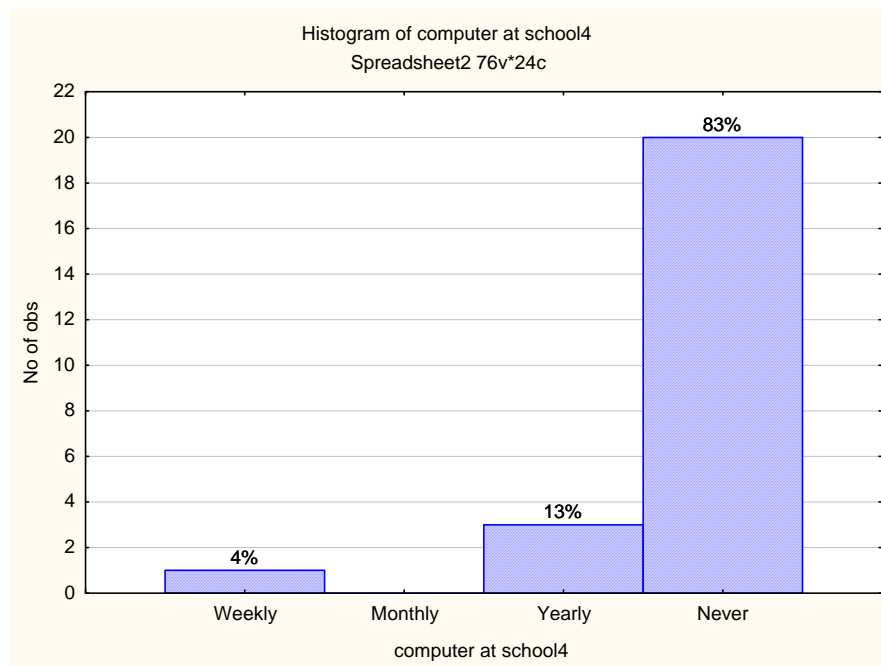
Figure 5.14: Use of spreadsheet at school

Regarding the use of various computer programmes in teaching, only 8% of the respondents use a word processor on a weekly basis and 79% of them have never used a word processor for teaching. Furthermore, only 4% of the respondents use a spreadsheet in their teaching on a weekly basis and 88% of them have never used a spreadsheet.

Only 8% of the respondents use a presentation package in their teaching as opposed to 83% who have never used it. As for the use of computers at home for lesson preparation or private matters, it is clear from the responses that very few of the respondents use various application software programmes on a regular basis i.e. daily. For example; in terms of a word processor, only 4% of the respondents use a computer daily and 13% weekly as opposed to 75% who never use a computer at home and more or less the same numbers apply to the use of other programmes (see figures 5.15, 5.16, 5.17 and 5.18 below).

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Teaching: Use of Word Processor
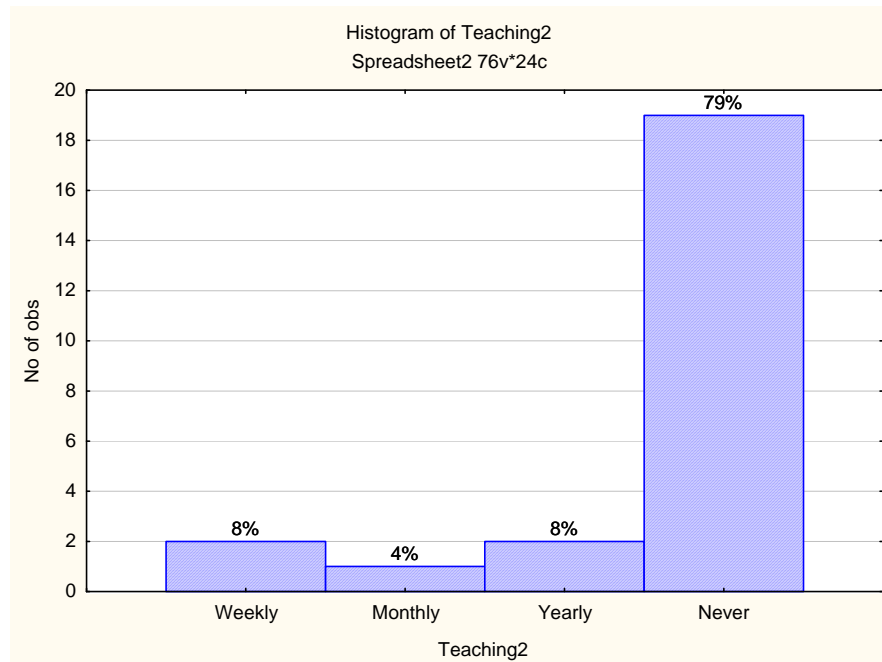
Figure 5.15: Use of word processor for teaching

Teaching: Use of Spreadsheet
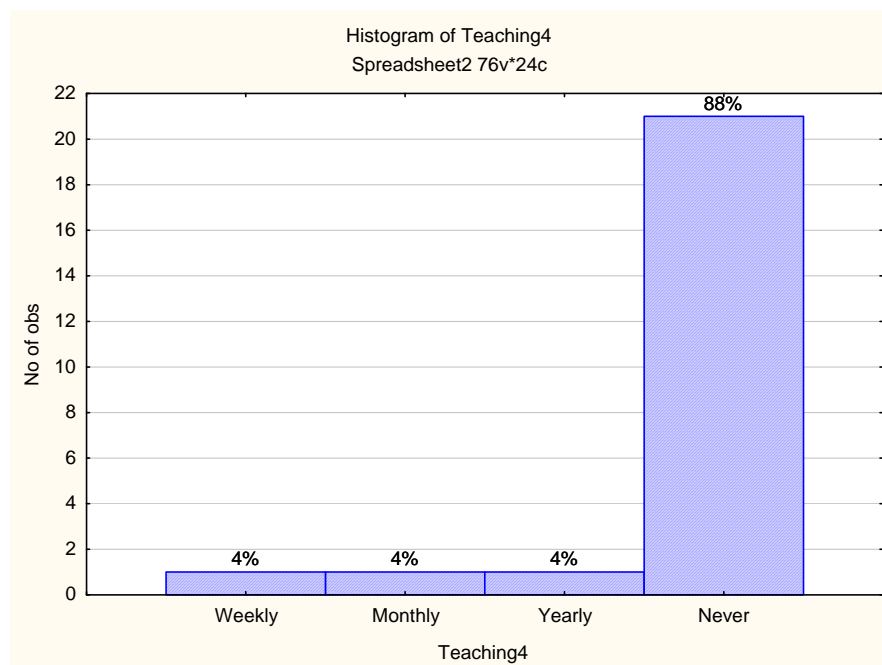
Figure 5.16: : Use of spreadsheet for teaching

Teaching: Use of Presentation Package
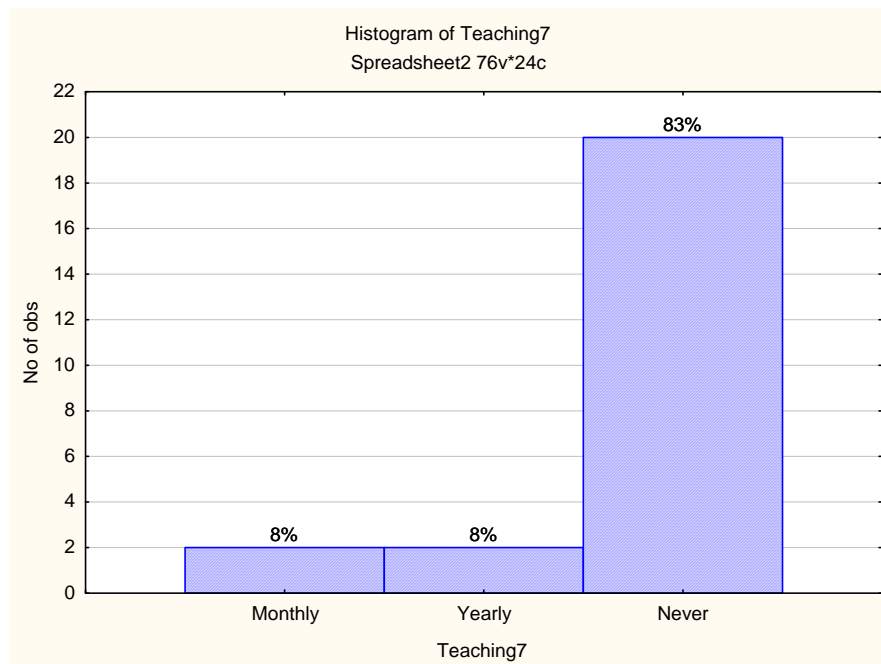
Figure 5.17: Use of presentation software for teaching

Computer at home: Use of Word Processor
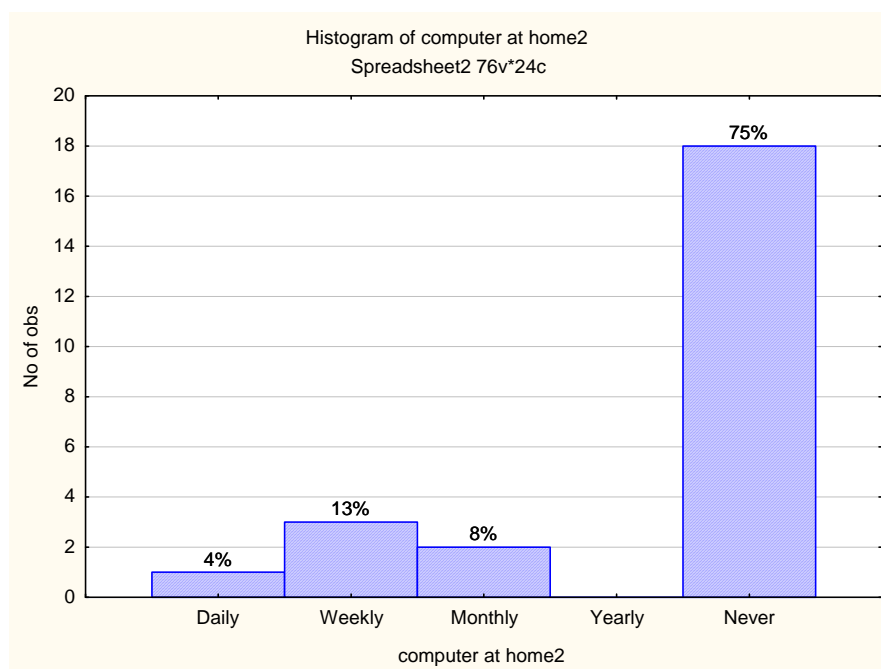
Figure 5.18: Use of word processor at home

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5.3.7 Computer related decision making

This section of the survey sought to find out whether respondents have ever been involved in a decision making process which entailed, inter alia, the purchase of computer hardware/software, physical design of a computer room, the allocation of hours in a computer room etc. The responses reveal that 100% of the respondents have never been involved in decision making processes relating to the use of computers at school as can be seen in figure 5.19 below.

Computer related decision making: Purchase of Computer Software
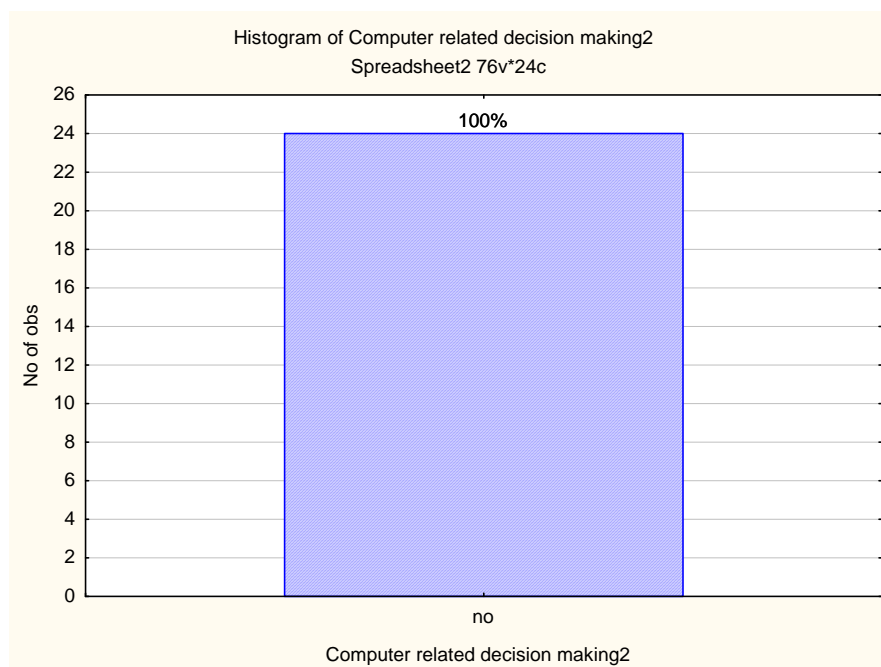
Figure 5.19: Teacher involvement in purchase of software

5.3.8 Access to a Computer Application at School

It is one thing to expect Tswana teachers or other teachers to integrate multimedia programmes in their teaching but if their schools do not have the basic infrastructure such as computers and the requisite application software, it will be almost impossible for them to integrate multimedia programmes.

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In this segment of the survey, respondents were asked whether they have access to the following computer applications at school when they need them:

- Word processing
- Spreadsheets
- Databases
- Presentation Application
- E-mail
- The Internet
- Graphics Application
- Tswana multimedia programme

Only 33% of the respondents have access to a word processor at their schools and 50% do not. Interestingly 17% of them have never considered using a word processor. From there the number of teachers who have access to other application programmes ranges between 8% and 25% (see figures 5.20, 5.21 and 5.22 below).

Access to a computer application: Word Processor
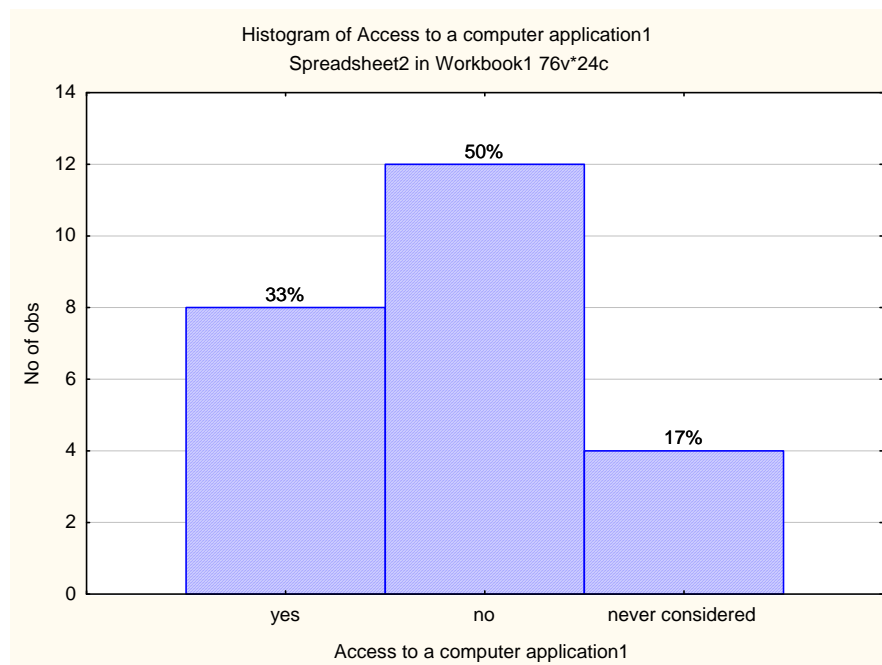
Figure 5.20: Access to a word processor at school

Access to a computer application: Spreadsheets
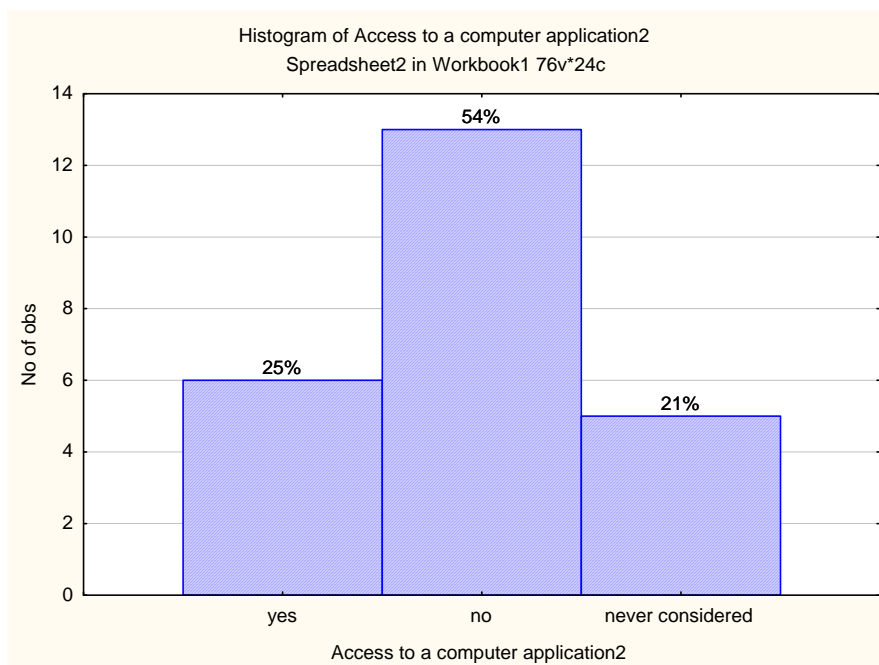
Figure 5.21: Access to a spreadsheet at school

Access to a computer application: The Internet
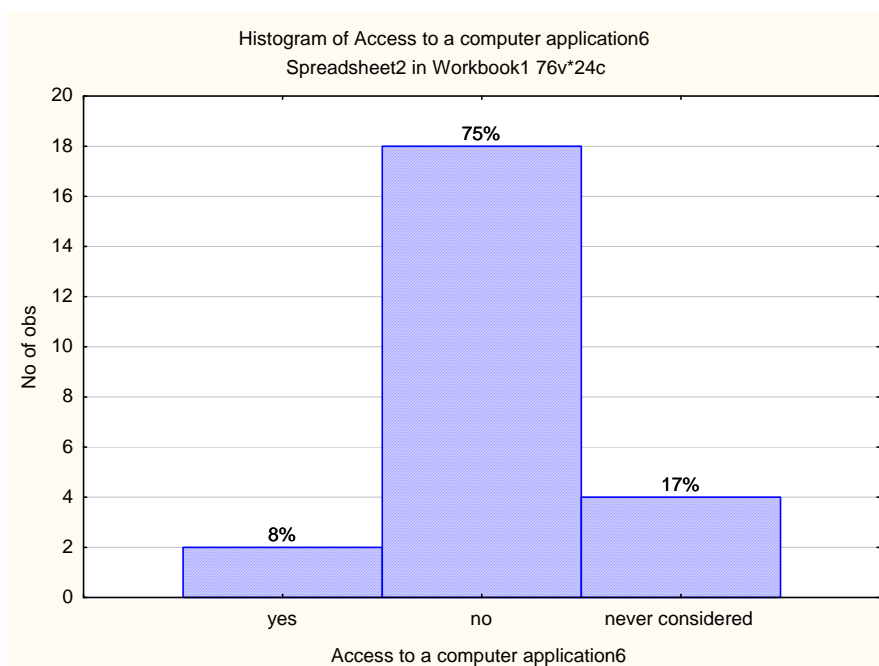
Figure 5.22: Internet access at school

5.4   Research Findings

Following the data obtained from 24 Tswana teachers at 10 secondary schools in the Motheo District of the Free State Department of Education, the following conclusions can be drawn:

- The current group of Tswana teachers at the 10 schools is older than 30 years. This raises a few concerns about the future and sustainability of Tswana as a subject because instead of employing new teachers, schools seem to be reshuffling existing staff to teach Tswana.

- Tswana teachers use team teaching and group work as part of their daily practice, however, the majority of them do not integrate multimedia programmes in their teaching.

- It is interesting to note that 58% of the respondents own computers at home and depending on the application programmes they have on their computers, teachers can use their personal computers to prepare for lessons and assessment activities.

- It is heartening to note that 46% of teachers have received in-service computer training in some of the application programmes. Furthermore, 25% of the respondents have even paid for computer training out of their own pockets. This demonstration of openness to computer training can be used as bedrock for further development.

- None of the respondents have ever been exposed to a Tswana multimedia programme despite the fact that two such programmes are listed on the departmental catalogue for multimedia resources.

- Concerning the use of the computer at school, home and in teaching, nothing much seems to be happening. The number of teachers who have ever used the computer as part of their daily practice ranges – on the whole – between 4% and 25%. The number also differs according to the use of various

application programmes. A word processor and a presentation programme seem to be more frequently used than any other application programme.

- None of the respondents have ever been involved in decisions regarding the purchase of computers at school neither have they been consulted about decisions regarding the general organization of a computer laboratory in cases where such laboratories exist.

- The number of teachers who have access to computers and various computer applications at their schools ranges from 8% to 33%. Again, a word processor seems to be popular among the rest. The fact that only a few teachers have access to a computer at their schools means that the chances of integrating multimedia programmes in their teaching are very small.

On the whole, the resource conditions at the schools that were surveyed do not lend themselves to a conducive environment for the integration of multimedia programmes in teaching Tswana as a subject. Apart from resources, basic computer training and training in e-education still require a great deal of improvement.

5.5 Recommendations for further research

- In order to make up for the limitations of the use of a questionnaire, it would be advisable to conduct additional research using various methods of triangulation.

- Teachers from primary schools should be included in such studies in the future.

- Similar research is needed for other African Languages because what obtains for Tswana may not necessarily apply to other languages.

- More schools need to be included in a survey of this nature in order to develop a bigger picture.

- A wider range of research projects needs to be developed, so as to research the applicability of ICT in more subjects.

5.6   Conclusion

One of the main findings of the research presented in this thesis is that the majority of Tswana teachers from the 10 schools have never used the computer to enhance their teaching. This is despite the fact that some of them have access to computers either at school or at home. It is therefore incorrect to assume that the availability of computers, especially at school, will automatically translate into the integration of multimedia resources in teaching. Thus apart from the availability of resources (computers and relevant application software in this case), the integration of multimedia resources in teaching relies on various other factors such as the following:

- Basic Computer Training (as a point of departure).

- School leadership in the area of computer-based education.

- Guidance and continuous support from the provincial department of education.

- Availability of Tswana multimedia resources.

- A positive attitude and the willingness by teachers to try something innovative in the interest of enhanced learning.

In summary, multimedia programmes are an effective way of teaching cross-curricular academic and cognitive skills in a constructivist manner. By following this approach, a teacher can facilitate the development of learners into self-reliant learners, able to work out their own solutions to the increasingly complex problems of the 21st century.

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Annexure A

Definition of Basic Terms

Term	Definition
Computer-Assisted Language Learning (CALL)	The use of the computer in the teaching of various aspects of language.
Information and Communication Technologies (ICT)	The combination of information with other related technologies, specifically communication technology.
Outcomes-Based Education (OBE)	An approach to learning and teaching which foregrounds the use of outcomes as part of planning. It aims at equipping learners with knowledge, skills, attitudes and values.
Evolutionary Model	The evolutionary model is about the integration of computer-assisted education in teaching and learning and it consists of five phases which represent different cognitive levels of operation. Each level of operation builds on the one preceding it.
Multimedia Resources	The use of computers to present text, graphics, video, animation, and sound in an integrated way. Multimedia applications were, until the mid-90s, uncommon due to the expensive hardware required.
Integration	The infusion of multimedia resources in teaching and learning activities.

Annexure B

Related research

Author	Research Details	Short Description
Bender, J.	Factors that determine successful computer implementation in schools. Mini-dissertation. M.Ed. (CAI). 1994. University of Pretoria.	The research explored the factors that determine successful implementation of computer-assisted education in schools.
Cossa, G.	Introduction of Information Communication Technologies (ICT) in secondary schools in Mozambique. Mini-dissertation. M.Ed. (CAE). 2002. University of Pretoria.	The research investigated the successful integration of ICT and Internet-based learning at secondary schools in Mozambique.
Kruger, G.M.	The integration of computers into the curriculum at Glenstantia Primary School: A case study. Unpublished M.Ed. Mini-thesis. 2003. University of Pretoria	The research focused on the integration of computer-assisted education at Glenstantia Primary School.
Mathew, S.K.	An investigation into the implementation of computer-assisted education in outcomes-based education: A case study at Sterling Primary School in	This study investigated the implementation of computer-assisted education in the outcomes-based education system at Sterling Primary

	East London. 2005. Unpublished M.Ed. (CIE) Thesis. University of Pretoria.	School in East London.
Miller, P.A.	The integration of computers at Pinelands High School: A case study. Mini-thesis. M.Ed. (CAE). 1997. University of Pretoria.	The research explored the successful integration of computer-assisted education at Pinelands High School.

Annexure C

FREE STATE DEPARTMENT OF EDUCATION

STATUS REPORT ON COMPUTERS IN SCHOOLS TEACHING COMPUTER APPLICATIONS TECHNOLOGY AS AN NCS GRADES 10 – 12 SUBJECT OFFERING FROM JANUARY 2006

Circular S7 of 2006 from the Department of Education refers to the essential requirements to offer the two computer related subjects, Computer Applications Technology and Information Technology, in the National Curriculum Statement at FET schools. Schools should not offer these subjects if they do not have the following resources:

1. **One computer per learner** per period/examination session (**only two examination sessions** per grade).
2. Hardware:
    - RAM: 256 Mb
    - Drives
      - HDD
      - CD ROM / RW
      - CD Writer (At least one per network)
    - CPU: 2.4 GHz
    - Peripherals
      - Keyboard
      - Mouse
      - Screen
      - At least **one high-speed printer per network**
      - At least **one scanner per network**
      - **One data projector per classroom**

3. Software (the latest versions):
    - Operating system, anti virus software and Internet security (for computers connected to Internet)
    - Application software (Microsoft Software is available to schools under the Microsoft Software agreement)
    - A typing tutor (Can be downloaded from the Internet for free)

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- Programing Language – Delphi (Information Technology)
4. **Internet and e-mail** should be available (at least for the teacher).
5. Adequate insurance and security measures for the protection and replacement of equipment.

Computer Applications Technology is a useful subject for learners who aim to attend university, as well as for those who prepare themselves for a job after grade 12. Currently a considerable number of schools are still without enough computers. In some instances, principals and educators need to turn down learners who want to take the subject and in other instances schools do not have enough computers to comply with the abovementioned resources which are needed, namely to have one computer for each learner in a class.
The subject was implemented in 2006 and the current situation in the schools under scrutiny is as follows:

School	Number of working computers	Number of Gr. 10 CAT learners (2006)	Total complement of computers required	Shortfall of computers	Shortfall of printers	Shortage of air conditioners	Need for data projector
			XHARIEP				
AJC Jooste	35	35	35	-	-	-	1
Hendrik Potgieter	24	22	24	-	-	1	1
Koffiefontein	13 (4 outdated)	21	21	12	-	1	1
Landboudal	50	18	50	-	-	-	1
Lere la Thuto	20	120	60	40	-	-	1
Olien	15 (outdated)	24	15	15 + server	1	1	1
Pellissier	20 (outdated)	96	50	30	-	-	1
Springfontein	20	40	20	-	-	-	1
Thabo Vuyo	40	71	40	-	-	-	1
Zatron	20	4	20	-	-	-	1
District Total	**277**	**451**	**335**	**77**	**1**	**3**	**10**

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School	Number of working computers	Number of Gr. 10 CAT learners (2006)	Total complement of computers required	Shortfall of computers	Shortfall of printers	Shortage of air conditioners	Need for data projector
			MOTHEO				
Acaldemy of Exc.	16	12	16	-	1	1	1
ACC	42 (outdated)	34	40	20		1	1
Atlehang	20	21	25	25	-	1	1
Bartimea	44	16	44	-	1	-	1
Bainsvlei	25	50	30	5	1	-	1
Bloemfontein High	52	89	55	3	-	2	2
Bfn South	35 (outdated)	12	35	35	1	1	1
Calculus	28	48	28	-	-	1	1
Castle bridge	30	34	35	5	1	-	1
Christiaan de Wet	20 (10 outdated)	40	25	15	-	1	1
Commtech	60 (outdated)	140	75	15	2	1	2
Dr Blok	30 (outdated)	87	45	15	-	-	1
Dr. Viljoen	44	64	44	-	1	1	1
Fichardtpark	80	150	80	-	-	-	-
Heatherdale	20	95	55	35	-	-	2
HTS	60	109	60	-	-	-	2
Jim Fouche	98 (45 outdated)	82	90	-	-	1	-
Ladybrand	35	31	35	-	-	-	-
Lekhulong	20	116	60	40	1	-	2

School	Number of working computers	Number of Gr. 10 CAT learners (2006)	Total complement of computers required	Shortfall of computers	Shortfall of printers	Shortage of air conditioners	Need for data projector
Leratong	40	320	160	120	4	4	4
Lereko Sec.	20 (outdated)	36	36	16	2	2	2
Louw Wepener	40 (20 outdated)	39	40	20	-	-	1
Martie du Plessis	36	20	36	-	-	-	1
Navalsig	60 (20 outdated)	88	60	20	-	2	2
Oranje Meisies	80	85	80	-	-	-	-
Petunia	24	-	24	-	1	1	1
Popano	40 (20 outdated)	68	40	20	1	-	1
President Steyn	20	16	20	-	-	-	1
Rosenhof	20	30	35	15	-	-	-
Sand du Plessis	70	63	70	-	-	-	-
Sehunelo	34 (9 outdated)	65	35	10	-	-	1
Sentraal	60	54	60	-	-	-	2
St Michaels	30	21	30	-	-	-	-
Tsotseletso	46 (20 outdated)	42	45	20	-	-	1
District Total	**1 419**	**2 297**	**1 708**	**474**	**18**	**21**	**39**

School	Number of working computers	Number of Gr. 10 CAT learners (2006)	Total complement of computers required	Shortfall of computers	Shortfall of printers	Shortage of air conditioners	Need for data projector
LEJWELEPUTSWA							
Boshof C/S	68	122	70	2	-	-	1
Bultfontein C/S	21 (outdated)	33	35	14	-	-	1
Concordia S/S	21	104	55	34	1	1	1
Edu College	28	36	40	12	-	-	1
Gimnasium	35	74	40	5	-	-	1
Goudveld	40	59	40	-	-	-	-
Hennenmean	30	20	30	-	-	-	1
Hentie Cilliers	35	42	35	-	-	1	1
Hoopstad	25	20	25	-	-	1	1
Kheleng	43	40	45	2	-	-	-
L A Wesi	20	30	35	15	-	-	-
Lebogang	20	60	35	15	1	-	1
Lekgarietse	17	70	40	23	1	-	1
Lenakeng	12	37	40	23	1	-	1
Lephola	22	144	80	56	1	1	2
Leseding	29	124	70	41	1	1	2
Letsete	7	90	50	43	1	1	2
Mamello	28	78	40	12	-	-	1
Meloding	17	65	40	23	-	-	-
Mophate	24	90	50	26	1	1	2
Phehello	20	77	40	20	1	1	1

School	Number of working computers	Number of Gr. 10 CAT learners (2006)	Total complement of computers required	Shortfall of computers	Shortfall of printers	Shortage of air conditioners	Need for data projector
Rearebetswe	Department busy installing new lab						
Reatlehile	40	64	40	-	-	-	1
Riebeeckstad	40	69	40	-	-	-	1
Sandveld	19	16	20	1	-	-	1
Senzile	75	36	75	-	-	-	1
Staatspresident Swart	35	15	35	-	-	-	1
Theunissen	16	14	20	4	-	-	1
Thotagauta	21	173	90	69	2	1	2
Tikwana	5	16	20	15	-	-	1
Unitas	109	74	115	6	-	-	-
Welkom High	55	110	60	5	1	1	1
Welkom Secondary	20	43	45	25	1	1	1
Wessel Maree	27	49	30	3	1	1	1
Winburg	30	23	30	-	-	1	1
District Total	**1 033**	**2 099**	**1 535**	**494**	**14**	**13**	**34**

THABO MOFUTSANYANA							
Bethlehem Comp School	16	15	20	4	-	-	1
E E Monese School	60	90	60	-	1	1	1
Ficksburg	80	33	80	-	-	-	-

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School	Number of working computers	Number of Gr. 10 CAT learners (2006)	Total complement of computers required	Shortfall of computers	Shortfall of printers	Shortage of air conditioners	Need for data projector
Harrismith	30	35	40	10	-	-	1
Kgolathuto	19	175	90	71	2	2	2
Lindley	11	20	25	14	-	-	1
Makgabane	19	102	60	41	2	2	2
Marallaneng	40	80	50	10	1	-	1
Mosioua Lekota	50	188	100	50	2	2	2
New Horizon	58	40	58	-	-	-	1
Nkarabeng	23	80	45	22	1	-	1
Nkhobiso	12	30	20	8	-	-	1
Ntsu Secondary	40	120	65	25	1	1	2
Paul Erasmus	25	17	25	-	1	-	1
Phukalla	35	68	35	-	-	-	1
Reitz	30	17	30	-	-	-	1
Retief	80	80	90	10	1	-	2
Sasamala	20	60	35	15	1	-	1
Seotlong Agric	28	88	45	17	1	-	1
Sibonakalise School	12	52	30	18	-	-	1
The Beacon	40	128	70	30	1	1	2
Voortrekker	71	52	71	-	-	-	1
Vrede	30	30	40	10	-	-	1
Warden	23	19	23	-	-	-	1
Witteberg	35	63	35	-	-	-	1

School	Number of working computers	Number of Gr. 10 CAT learners (2006)	Total complement of computers required	Shortfall of computers	Shortfall of printers	Shortage of air conditioners	Need for data projector
District Total	887	1 682	1 242	355	15	9	30
FEZILE DABI							
Afrikaans High Sasol	39	40	45	6	-	-	1
Afrikaanse High Krd	30	70	40	10	-	-	1
Boitlamo Secondary	40	65	40	-	-	-	1
Brentpark	15	40	25	10	-	-	1
Dr. R. Cingo	23	108	60	37	1	1	2
Edenville High	25	50	25	-	-	-	1
Fakkel School	30	30	35	6	-	-	1
Heilbron	37	20	37	-	-	-	1
HTS Sasol	22	32	35	13	1	1	1
Iketsetseng Comp	22	100	55	33	1	1	2
Kahobotjha Sakubusha	22	20	25	3	-	-	1
Kroonstad High	32	60	35	3	-	-	1
Nampo Secondary	65	51	65	-	-	-	1
Parys High	33	19	35	2	-	-	1
Pele-ya-Pele	30	60	30	-	1	1	-
Phehellang	18	53	30	12	-	-	1
Phiritona High	45	145	80	35	1	1	2

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School	Number of working computers	Number of Gr. 10 CAT learners (2006)	Total complement of computers required	Shortfall of computers	Shortfall of printers	Shortage of air conditioners	Need for data projector
Retshedisitswe	23	150	80	57	1	1	2
Salomon Senekal	30	18	30	-	-	-	1
Sarel Cilliers	20	40	25	5	-	-	1
Sasolburg High	33	40	40	7	-	-	1
Sediba Thuto	21	59	35	14	-	-	1
Steynsrus High	25	56	35	10	-	-	1
Tsebo Ulwazi	15	53	30	15	-	-	1
Tweeling High	15	32	35	20	-	-	1
Vaal Christian High	23	30	35	12	-	-	1
Vaal Park High	41	65	45	4	-	-	1
Villiers High	10	13	20	10	-	-	1
Weiveld Landbou	35	40	45	10	1	-	1
Wilgerivier	30	30	35	5	-	-	1
Yakhisizwe	25	83	45	20	-	-	1
District Total	**874**	**1 672**	**1 232**	**359**	**7**	**6**	**34**

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Annexure D

QUESTIONNAIRE

THE INTEGRATION OF MULTIMEDIA RESOURCES IN THE TEACHING OF TSWANA AT SECONDARY SCHOOLS IN THE MOTHEO DISTRICT

Please mark your choice with an X or fill in where required.

1. **Experience**
   How many years have you been teaching Tswana?
   a.   in total ……………..
   b.   at your current school ………………

2. **Age**
   How old are you? ………………….

3. **Qualifications**
   What is your highest qualification level in Tswana? (tick the appropriate box)

2nd Year
3rd Year
Honours
Masters
None of the above

4. **Gender**
   Are you male or female? (tick the appropriate box)

M	F

5. **Team Teaching**

1.	Are you involved in any team-teaching in your department(s)?	Yes	No
2.	If YES, are you involved in any team-teaching which involves the computer?	Yes	No

6 **Group Work**

1.	Do you use group work in your teaching?	Yes	No
2.	If YES, do you use the computer for group work in your teaching?	Yes	No
3.	Have you had training in teaching with cooperative groups?	Yes	No

7. **Computer Ownership**

1.	Do you have a computer at home?	Yes	No
If YES, …			
2.	Did you buy it before you joined your current school?	Yes	No
3.	Does your computer have access to the Internet?	Yes	No
4.	Do you ever use your computer for your work?	Yes	No

8 **In-service Computer Training**

Have you ever attended a training session on one or more of the following at your school? (tick where applicable)

1.	word processing	Yes	No
2.	spreadsheets	Yes	No
3.	databases	Yes	No
4.	presentation application	Yes	No
5.	e-mail	Yes	No
6.	The Internet	Yes	No
7.	graphics application	Yes	No
8.	subject specific application e.g. Polokelo ya Dithutiso – Literacy Bank	Yes	No

9. **Self-funded Computer Course**

1. Have you ever attended a computer training course funded by yourself?		Yes	No
If YES, was that course at a …			
2. teacher centre?		Yes	No
3. university		Yes	No
4. university of technology?		Yes	No
5. computer school?		Yes	No
6. other? …………….. (please specify)		Yes	No

10. **Bought subject software**

1. Has your subject department bought a software programme(s)?		Yes	No
2. If YES, what is (are) it (they) called? ……………………			
If YES, …			
3. did you help decide which programme to buy?		Yes	No
4. have you attended a training session on that programme?		Yes	No
5. have you used that subject package in a lesson with a class?		Yes	No

11. **Use of the computer at school**

How often do you use the applications below at school for lesson preparation? (tick where appropriate)

1.	games e.g. Spelling games	Daily	Weekly	Monthly	Yearly	Never
2.	word processor	Daily	Weekly	Monthly	Yearly	Never
3.	database	Daily	Weekly	Monthly	Yearly	Never
4.	spreadsheet	Daily	Weekly	Monthly	Yearly	Never
5.	graphics	Daily	Weekly	Monthly	Yearly	Never
6.	e-mail	Daily	Weekly	Monthly	Yearly	Never
7.	presentation package	Daily	Weekly	Monthly	Yearly	Never
8.	the internet	Daily	Weekly	Monthly	Yearly	Never
9.	subject-specific package	Daily	Weekly	Monthly	Yearly	Never

12. **Teaching**

How often do you use the applications below while teaching

1.	games e.g. Spelling games	Daily	Weekly	Monthly	Yearly	Never
2.	word processor	Daily	Weekly	Monthly	Yearly	Never
3.	database	Daily	Weekly	Monthly	Yearly	Never
4.	spreadsheet	Daily	Weekly	Monthly	Yearly	Never
5.	graphics	Daily	Weekly	Monthly	Yearly	Never
6.	e-mail	Daily	Weekly	Monthly	Yearly	Never
7.	presentation package	Daily	Weekly	Monthly	Yearly	Never
8.	the internet	Daily	Weekly	Monthly	Yearly	Never
9.	subject-specific package	Daily	Weekly	Monthly	Yearly	Never

13. **Use of the computer at home**

How often do you use the computer applications below at home for lesson preparation or private matters?

1.	games e.g. Spelling games	Daily	Weekly	Monthly	Yearly	Never
2.	word processor	Daily	Weekly	Monthly	Yearly	Never
3.	database	Daily	Weekly	Monthly	Yearly	Never
4.	spreadsheet	Daily	Weekly	Monthly	Yearly	Never
5.	graphics	Daily	Weekly	Monthly	Yearly	Never
6.	e-mail	Daily	Weekly	Monthly	Yearly	Never
7.	presentation package	Daily	Weekly	Monthly	Yearly	Never
8.	the internet	Daily	Weekly	Monthly	Yearly	Never
9.	subject-specific package	Daily	Weekly	Monthly	Yearly	Never

14. **Computer related decision making**

Have you had any input into the …

1.	decisions with regard to the purchase of computer hardware?	Yes	No
2.	decisions with regard to the purchase of computer software?	Yes	No
3.	physical design of the computer room?	Yes	No
4.	the allocation of hours in the computer room?	Yes	No
5.	long-term plans for the computer room?	Yes	No
6.	discipline code of the computer room?	Yes	No

15.   Access to a computer application

Do you have access to the following computer applications at school when you need it? (tick all appropriate boxes)

1.	word processing	Yes	No	Never considered using
2.	spreadsheets	Yes	No	Never considered using
3.	databases	Yes	No	Never considered using
4.	presentation application	Yes	No	Never considered using
5.	e-mail	Yes	No	Never considered using
6.	The Internet	Yes	No	Never considered using
7.	graphics application	Yes	No	Never considered using
8.	subject specific application e.g. Polokelo ya Dithutiso – Literacy Bank	Yes	No	Never considered using

Thank you for your assistance!